ALASKA LAND MOBILE RADIO

Alaska Land Mobile Radio Communications System

2022 Annual Business Case

February 1, 2023

UC Approved: January 18, 2023
EC Approved: February 1, 2023

Table of Contents

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. Accepted by the Executive Council on June 17.	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
Shafer, Sherry	2/13/2013	Annual review and update. Approved by the User Council - final.	6
Shafer, Sherry	2/19/2013	DOD correction to paragraph 3.7 verbiage	6
Shafer, Sherry	1/27/2014	Annual review/update. Approved by the User Council on December 16, 2013. Approved by the Executive Council on January 27, 2014, - final.	7
Shafer, Sherry	1/28/2015	Annual review/update. Approved by the User Council on January 12, 2015. Approved by the Executive Council on January 28, 2015, - final.	8
Shafer, Sherry	2/8/2016	Annual review/update. Approved by the User Council on January 6, 2016. Approved by the Executive Council on February 8, 2016 - final.	9
Shafer, Sherry	1/31/2017	Annual review. Approved by the User Council on January 10, 2017. Approved by the Executive Council on January 31, 2017 – final.	10
Shafer, Sherry	1/17/2018	Annual review. Approved by the User Council on January 17, 2018. Approved by the Executive Council on February 9, 2018 – final.	11
Shafer, Sherry	2/6/2019	Annual review. Approved by the User Council on January 16, 2019. Approved by the Executive Council on February 6, 2019 – final.	12
Shafer, Sherry	2/4/2020	Annual review. Approved by the User Council on January 16, 2020. Approved by the Executive Council on February 4, 2020 – final.	13
Shafer, Sherry	2/2/2021	Annual review. Approved by the User Council on January 21, 2021. Approved by the Executive Council on February 2, 2021 – final.	14
Shafer, Sherry	3/14/2022	Annual review. Approved by the User Council on January 17, 2022. Approved by the Executive Council on March 14, 2022	15
Shafer, Sherry	2/1/2023	Annual review. Approved by the User Council on January 18, 2023. Approved by the Executive Council on February 1, 2023.	16

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 Communication Services (APSCS): a State of Alaska (SOA) office in the Department of Public Safety (DPS) that operates and maintains the SOA Telecommunications System (SATS) supporting ALMR and provides public safety communication services and support to state agencies.

AST: Alaska State Troopers

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.

Department of Public Safety (DPS): a State of Alaska (SOA) department where the SOA Telecommunications System (SATS) and ALMR programs reside.

Executive Council: governing body 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 the 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: 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 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: governing body 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 public safety-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 their use at no cost.
- Promotes economy of scale/efficiency using 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 cases of multi-agency, multi-jurisdiction response situations.

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 interoperability[1] 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, coverage includes all major highways and more than 80 percent of the State's population. Additionally, the ALMR P25, trunked, digital, voice-over-internet protocol (VoIP) technology provides the capability to pass real-time data such as location, maps, profiles, telemetry data and photographs, which surpasses traditional conventional systems that only allow limited transmission of data traffic.

Because ALMR is a shared system utilized by the DOD, all users enjoy the benefits of stringent 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, and local agencies with a capability to talk day to day on the same radios they would use during catastrophic events that may involve 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 previous legacy systems. At the end of calendar year 2022, ALMR had supported 134 agencies utilizing 25,056 subscriber units. Additionally, ALMR supported 18,206,404 group and individual calls[3], 29,881,390 push to talks[4] and with a .0004 system-wide busy rate for the entire year.

Overall, ALMR has proven time after time through numerous, costly 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, ALMR coverage and security, with the advantage of shared cost saving 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 ALMR. 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 membership, benefit the citizens of the Alaska.

While ALMR is a very effective system that greatly enhances wide area interoperable communications; some perceived shortcomings can be attributed to insufficient user training, poor subscriber equipment maintenance by member agencies, lack of

[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.

coordination between stakeholders or a general lack of knowledge on how ALMR operates and the benefits it provides. There is even greater potential for ALMR as users become more familiar with the system and fully utilize the capabilities of their subscriber equipment. Strengths and weaknesses of ALMR, 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 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 reduce 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 economically sound, whose total benefit and capability could not be obtained separately by any major stakeholder group without considerable capital investment and ongoing annual sustainment costs. Contribution by any one of the stakeholders brings economic benefit to all others.

When ALMR transitioned to operational status on July 1, 2008, the ALMR Cost Share Cooperative Agreement established an approach and method for sharing costs by the parties. The cost share approach stated the owner of the infrastructure equipment is responsible for the maintenance of that equipment in accordance with the requirements defined in the ALMR Service Level Agreement (SLA). The cost share method states the costs of the OMO and the System Management Office (SMO) 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).

In 2012, with the divesture and transfer 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). The SOA, DOD, Federal Non-DOD, and local agencies concurred with this approach and method.

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 guidelines for LMR systems, which provides a robust product with notable benefits.
  - Stakeholders, even those that could make do with a less robust system, recognize and appreciate the additional benefits and perceive value as members.

- The cost of separating is greater than the cost of maintaining ALMR.
  - Economic analysis performed while exploring the idea of separating the partnerships demonstrate 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 (of which there are two) maintenance, both the State of Alaska and DOD Alaska would each pay 50 percent of those costs, or in other words, each would pay 100 percent of their owned Master Site costs.

This Business Case update continues to validate sharing ALMR is still the best solution to meet 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, it 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/technology[5], the cost to separate ALMR[6] and the many additional risks/costs produced by such a separation.

[5] Alaska Land Mobile Radio Communications System Total Cost of Ownership Study, September 18, 2008.
[6] SDID for Alaska Land Mobile Radio, July 1, 2008 and Appendix A, Alaska Land Mobile Radio System Feasibility Analysis for DOD/SOA Separation.

The following disasters exemplify and demonstrate the value of sharing ALMR.

- The first week of December 2022, a blizzard buried Anchorage and the surrounding areas with over 28 inches of snow in two days. This led to schools and businesses being closed for multiple days with many roads being impassable. Emergency crews, DOT personnel, and emergency managers utilized the ALMR system to rescue stranded motorists and coordinate plowing crews.

- On December 2, 2020, a record six inches of rain fell in a 24-hour period contributing to an estimated half mile of the mountain crashing down into the harbor in Haines taking three homes along with it. Roadways throughout the town were also washed out. Both the Alaska State Troopers and the Haines Volunteer Fire Department utilized the ALMR system to evacuate residents and deploy searchers looking for people who may have been trapped in the debris.

- On 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 ALMR and the benefits it provides to member agencies. ALMR supported 143,599 push to talks (PTTs) and AWARN supported 53,940 PTTs, almost twice the normal daily amount.

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

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

- In 2016, the use of ALMR during the McHugh Creek fire in July provided critical interoperability 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.

- Other events demonstrate where a lack of ALMR coverage 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 lies outside of the ALMR coverage footprint and conventional frequencies had to be utilized. The trunked system includes both regional and statewide incident command zones, that allow multiple agencies from multiple jurisdictions/disciplines to communicate over assigned talkgroups, to coordinate their actions. Conventional radio operations do not have any such function. Limited communications can hamper coordination of evacuations in an emergency like this fast-spreading fire that puts both citizens and first responders in danger.

- Severe windstorms in September 2012, 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 previous conventional systems, they could have been out of contact from several hours to several days.

Events like these emphasize the incredible need for reliable communications to maintain interoperability between Federal, State, tribal, and local government public-safety entities and underscore the continued commitments needed to sustain funding for ALMR as well as the need to continue efforts 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, and
- Reduces property loss.

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

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. 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 of 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 of 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 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.[12] 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 interoperability[13] 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

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

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 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 ALMR communications infrastructure requires the same level of commitment, support, and funding from public leaders, as does the building and maintenance 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 annual budget planning.

Independent studies conducted by both the Department of Defense and the State of Alaska, over the past several years, have examined ALMR 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.[16]

A successful strategy for improving interoperability must also be based on user needs.[17] Therefore, continually identifying and validating stakeholder operational requirements for ALMR, 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 economic 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 ALMR will be governed, managed, operated, and modified. ALMR is managed as a

[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

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),[18] 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.[19]

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

- 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 Alaska[20]
  - 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 EC[21]

- Operational support includes:
  - Operations Management Office (OMO) - 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 EC[22]
  - 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 assurance[23]

- 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

[18] ALMR Cooperative and Mutual Aid Agreement, Article 6, September 12, 2022
[19] ALMR Cooperative Agreement, Article 7, September 12, 2022
[20] Charter for the Alaska Land Mobile Radio Executive Council, October 15, 2020
[21] Alaska Land Mobile Radio Communications System User Council Charter, July 20, 2022
[22] Operations Management Office (OMO) Customer Support Plan (CSP), July 20, 2022
[23] System Management Office (SMO) Customer Support Plan, March 22, 2022
[24] Service Level Agreement, January 1, 2022

- System Updates – For feasibility purposes, ALMR must be upgraded every four years. For maximum efficiency and ease of system upgrade, it should be completed every two years. ALMR migrated to Motorola 2021.1 software platform between July and November 2022.

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
  - 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 2[25]
  - Inconsistent encryption capabilities across different agencies (manual re-keying required additional dedicated equipment)
  - No data capabilities; paging available[26]
  - Limited redundancy; constrained by a single radio channel[27]
  - Inconsistent security applications/standards[28]
  - Constricted wide area coverage; when within range of a single repeater[29]
  - Non-compliant with Federal mandates[30]

- ALMR
  - Single system supporting interoperability at all levels
  - Complies with Homeland Security SAFECOM Continuum guidelines for Interoperability.[31]
  - 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

[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] Alaska Land Mobile Radio Total Cost of Ownership Project, Market Strategy Group, LLC, February 2005
[30] *ibid*
[31] *See* http://www.safecomprogram.gov/NR/rdonlyres/65AA8ACF-5DE6-428B-BBD2-7EA4BF44FE3A/0/Continuum080106JR.pdf

- Provides for wide area coverage along major highways in the state[32] 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 and increases 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 keys[33] (OTAR on existing trunk infrastructure)
- Secure data with wide/personal/local area network capabilities[34]
- Available redundancy: multiple communications channels exist[35]
- Security certification for mission essential systems carrying sensitive information whose degradation or loss is unacceptable.
- Availability of multiple equipment vendors[36]
- Improved voice quality[37]
- Enhanced functionality including data and other capabilities[38]

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 across Alaska.

Additional capabilities include:

- Expanded Coverage - Coverage provided by ALMR is possible through the use of the State's existing microwave infrastructure. The potential exists for ALMR to expand further into less populated areas of Alaska by adding additional sites to the network backbone or through the use of private commercial circuits and innovative integration with existing conventional systems.
- Expanded Capabilities - ALMR allows for data transmission 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.

[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*

- Support for 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 has occurred, while 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 ALMR 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 network devices.
- Radio Security - 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 and should be updated at least every two years. This provides a solid security defense against the threats posed by malware, denial of service attacks, and intrusion attempts that are so prevalent today.

3.0 Economic Feasibility

3.1 Efficiency of Operations

A seamless communication infrastructure between, and within, agencies provide 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 funded through shared investments. 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

[39] 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.

2 transportable communications systems, providing coverage to Alaska's population centers, major roadways, and portions of the Marine Highway.

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

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 ALMR 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 from which to choose from:

- Agencies would fund, implement, operate, and maintain their own independent infrastructure.
- Federal, State, and local governments would cooperate to share a standards-based fixed infrastructure.
- Agencies could purchase a limited number of ALMR radios to use when required and continue to maintain their own independent 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 quantitative data on these organization's current LMR costs, and qualitative data regarding issues with the conventional network.[40]

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

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 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 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 approximately $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 ALMR.[42]

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.[43]

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.[44]

3.4 Economic Analysis

41 ALMR Total Cost of Ownership (TCO) Detailed Briefing Report, Market Strategy Group, March 2005
42 Alaska Land Mobile Radio (ALMR) Cost Share Update briefing to the Executive Council, August 21, 2008
43 Cost Share Working Group Closeout Briefing, given by Mr. Pat Shier, 4/19/2012.
44 November 29, 2012 Executive Council Meeting Minutes, dated January 27, 2013.

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.[45]

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.[46]

Comments from stakeholder interviews indicated:

- Building separate capabilities provided by ALMR would cost more and work much less effectively. [47]
- There are tremendous benefits with ALMR technology and the interoperability it affords them. [48]
- The system is better now and cheaper than the legacy system. [49]
- Interoperability levels achieved by the ALMR consortium model are not achievable with independent systems[50].
- Independent systems could not be built or maintained with the same cost efficiencies generated by the consortium model[51].
- Splitting ALMR would eliminate or complicate interoperability between the Municipality of Anchorage (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.[52]

[45] Tecolote ALMR Stakeholder Interview Letter, distributed by Mr. Del Smith via email, 10/8/2008 3:37 PM
[46] ALMR Economic Analysis participant stakeholder email, sent Wed 10/8/2008 3:37 PM
[47] ALMR Stakeholder Interview, USARAK G6, Colonel Darin Talkington, October 15, 2008
[48] ALMR Stakeholder Interview, 354 Communications Squadron, Eielson AFB, Major Amy Osterhout, October 16, 2008
[49] 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)
[50] ALMR Stakeholder Interview, Alaska Department of Administration, Deputy Commissioner Rachael Petro with Commissioner Special Assistant Carol Beecher, November 13, 2008
[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, Traffic Department, Mr. Trygve Erickson, and Assistant City Manager, Ms. Heather Handyside, October 14, 2008

- Splitting ALMR will cause degradation to interoperability even for the MOA. It will be more of a challenge to provide training whereas now it is easier with everyone using the same type of equipment[53].

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.[54]

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.[55]

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 ALMR as presently configured and operated.

In late 2018, Motorola was asked to update the cost figures to separate ALMR.

3.6 ALMR Feasibility Study

[53] ALMR Stakeholder Interview, Traffic Department, Mr. Trygve Erickson, and Assistant City Manager, Ms. Heather Handyside, October 14, 2008
[54] Alaska Land Mobile Radio (ALMR) Economic Analysis (EA) Executive Summary, 5 March 2009, Tecolote Research, Inc., Pages 7-8.
[55] Alaska Land Mobile Radio System Feasibility Analysis for DOD/SOA Separation, June 3, 2008

In 2011, the SOA Legislature requested an independent study[56] 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.[57]

The study also noted that although ALMR 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.[58]

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.

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, the most important of which is interoperability is severe and significant. There is a cost for interoperability but not having 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 the 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.

[56] ALMR Feasibility Study, State of Alaska, October 2011, World Wide Technology, Inc.
[57] Ibid, page2
[58] Ibid, page 11

- 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.[59]

3.7 Benefits of the Shared System Approach

ALMR 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 compliant 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.

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.[60]

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:

[59] ALMR Feasibility Study, State of Alaska, October 2011, World Wide Technology, Inc., page 13-18
[60] ALMR Feasibility Study, State of Alaska, October 2011, World Wide Technology, Inc., page 2-3

- 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)
  - 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 the 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 capability[61]

[61] ALMR Self Assessment performed at http://www.safecomprogram.gov/SAFECOM/selfassessment, 12/2/2008

In June, 2019, the Project 25 (P25) Technology Interest Group (PTIG) published a list[62] showing there are currently 39 states utilizing P25 statewide communications systems. 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.

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 must 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

[62] https://project25.org/images/stories/ptig/P25_Trunking_Systems_List_Final_REV-11b_June_2019_190610.pdf

and was 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 exercises 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. Training is also needed for personnel within member agencies who are programming and maintaining subscriber units.

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 had never been aligned since they were originally sent to the field and the radio codeplugs (programming) had set preferred sites in another zone in which the radios 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 also on the wrong channel. This single incident demonstrates the compounding effects of errors that highlight (or reinforce) the need for on-going training to be conducted at regular intervals.

In 2022, ALMR conducted live training events and also produced multiple training videos. Materials are easily accessible on the ALMR web site.

4.2 Economic/Political Risks

Separate studies were conducted in 2002[63] and 2004[64], 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 eensure 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.

[63] ALMR Communications Plan Overview, October 5, 2002
[64] ALMR Risk Assessment, 5 Star Team, December 2005

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 Public Safety (DPS) 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.

The State had previously 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. In 2022, ALMR and the Alaska Public Safety Communication Services (APSCS) office was transferred from under the Department of Military and Veterans Affairs to the Department of Public Safety.

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 was 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 ALMR is not properly maintained, which would have disastrous consequences for all involved.

In the meantime, the State continues to look at possibilities for revenue generation that would directly support public safety and therefore ALMR but has not yet taken proactive steps to implement any. There is no shortage of ideas for exploration, from a percentage of a statewide gasoline tax to a telephone surcharge; other states have implemented various methods to fund their statewide LMR systems.

4.3 Technology Risks

The expanded capabilities of technology like ALMR 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 ten manufacturers who have completed the Acceptance Test Procedure (ATP) and have subscriber units approved to operate on ALMR. With the conversion to Phase II, the ATP process must be repeated for new Time Division Multiple Access (TDMA) compliant models to be approved to operate on ALMR. There are currently five manufacturers who have TDMA capable radios approved to operate on ALMR.

Unfortunately, more sophisticated equipment in the field can lead to 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 lifecycle replacement. Motorola® supports backwards compatibility and pre-tested software patches for up to five system software platform releases. In 2022, ALMR underwent a system software/hardware update and currently operates on the Astro 2021.1 platform. Additionally, the State recently invested $24M to upgrade the 20-year-old Quantar site radios to GTR site radios finishing the project in September.

Risks on the immediate horizon, include the pending replacement of the State's XTS® and XTL® subscriber units, which reached end of life in 2018 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 as they are no longer supportable. The introduction of TDMA to the system highlighted the need for radio replacement as soon as possible to fully maximize new system capacity improvements.

Long-term evolution (LTE, or Voice-over LTE (VoLTE) has yet to be proven for public safety-first responders in Alaska. The trending conventional wisdom at national levels, regarding the use of LTE technology by first responders, now foresees it as an augmenting technology for LMR systems and not replacements for them.

The 134 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 by AT&T, replacing their LMR systems. Agencies recognize LMR systems provide key mission-critical voice communications, which currently are not available through FirstNet by AT&T 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 by AT&T 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. The standards work will determine the functionality and performance requirements for mission-critical VoLTE. The FirstNet Authority 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 by AT&T 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 the NPSBN (FirstNet by AT&T), even if only to augment 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 ALMR and year after year, it has failed to be adequately addressed. Underfunding of ALMR 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 equipment began to fail in 2017 causing site outages, sometimes on a weekly basis. The SOA ASPCS continued work throughout 2022 performing a microwave refresh project and had completed the remaining sites before the end of 2022. Software updates to the new microwave system will continue with an annual update for all sites.

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 ALMR. Should this occur, the costs of regaining the level of interoperability provided by ALMR, and the risks associated with such a collapse, remain very relevant.

Areas affected would 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 of 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 do not address the time it would take to plan, fund, and implement any type of new system, let alone whether an adequate 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-

[65] *See* http://www.ncjrs.gov/pdffiles1/nij/211512.pdf

term risks and to emphasize those areas affecting the system's operational health and outlook.

A viable long-term strategy for funding ALMR continues to be a challenge and major stumbling block to a secured future as the preferred system of the Alaska public safety community. It is imperative the State leadership and the State Legislature address the issue and implement a practical solution for a solid funding stream for public safety interoperable communications. If the ALMR partnership were to dissolve, the cost of building a separate, comparable system would be magnitudes greater than the cost of sustained operations and maintenance funding of the current ALMR system.

In March 2022, the governor signed Administrative Order 333 which established a 9-1-1 Advisory Group, and they will be the ones to have discussions on possible future funding ideas for ALMR. At this time, they have only appointed the chair and vice chair.

The 2022 update of the Business Case validates previous decisions that the shared approach 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 a funding solution to fully sustain and maintain ALMR into the future.