TECOLOTE RESEARCH, INC.

Alaska Land Mobile Radio System Economic Analysis

Executive Summary

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1 PROBLEM STATEMENT

This report summarizes an Economic Analysis (EA) of the Alaska Land Mobile Radio (ALMR) system.

The ALMR communications system is a joint cooperative effort between federal, state and local government agencies to build and operate a single land mobile radio infrastructure for day-to-day and emergency response communications. This system is given executive oversight by an appointed executive council of federal, state, and local government representatives. As of 1 July 2008 the ALMR system moved from a project status to an operational status. A direct result of this transition is the requirement that a basis and means for sharing on-going infrastructure operations and maintenance costs be established.

This EA examines the ALMR Cooperative Partnership (originally formed in 1997) and alternatives to validate its continued existence as the appropriate solution for the stakeholders and ALMR Cooperative Partnership as a whole. This analysis compares two alternatives: (1) continuing the ALMR partnership on a cost-sharing basis with (2) separating the assets and reverting to separate systems. The analysis includes cost and non-cost factors (factual tangible and intangible benefits, both positive and negative) of each alternative from each major stakeholder's perspective. It also includes an assessment of the solicitation and responses to the stakeholders' top 3-5 leadership concerns/issues associated with maintaining the existing joint ALMR system versus creation of separate systems for each stakeholder.

The ALMR *approach* to funding the system is that each stakeholder funds the preventative and repair maintenance of its owned equipment and shares the funding of common support. The *method* for allocating cost sharing seeks to equitably allocate common support costs based on an agreed cost driver while leaving the cost of stakeholder-owned equipment maintenance to the stakeholder (equipment purchased to satisfy a stakeholder's requirements whether operating in a partnership or separately). In August 2008, the ALMR Executive Council (EC) approved furtherance of a cost share concept that allocates a stakeholder's cost share based on number of subscribers. During the course of this analysis and in the process of reaching full stakeholder approval of the cost-sharing agreement, evidence arose through various stakeholder inputs to consider a different method based on usage (airtime and site usage collectively). Since the shared-cost allocation is a level of detail below the primary alternatives analysis and is not essential to the economic analysis, there are only a few instances in this analysis where the method of cost sharing is evaluated and reported. It should be kept in mind that there is not yet an accepted cost-sharing agreement.

2 BOTTOM LINE

ALMR provides significant value: it meets operational requirements and has a cost per unit that is reasonable compared to other systems and alternatives.

Our analysis indicates that the initial cost-sharing method is not sufficiently equitable and presents an unfair burden upon some stakeholders as indicated by some dissent expressed in stakeholder interviews and surveys. The cost-sharing method should consider the actual usage by members and apportion shared costs equitably in relation to needs and operational use. The contribution of all would still serve to deliver a system that is an economically sound solution for all parties; that is, the total benefit and capability could not be obtained separately by any one agency at the current capital and sustainment costs. Therefore, any contribution by one brings

economic benefit to all others. This conclusion is supported by stakeholder-substantiated opinions in face-to-face interviews and on in-depth, written surveys, and based on experience and analysis.

The bottom line is:

- ALMR is in compliance with national policy for Land Mobile Radio (LMR) Systems.
- Compliance provides a robust product (with notable benefits).
- Robust products cost more than "adequate" systems.[1]
- Stakeholders with statewide responsibilities recognize and appreciate the benefits.
- Even stakeholders with pockets of responsibility where a less robust system might be sufficient (e.g., in DOD and at local level) do perceive the value as highly desirable.
- All stakeholders perceive that funding is more of an issue than cost and cost is more of an issue than value (i.e., even though ALMR provides a needed service, funding by stakeholders is often an issue).
- 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. Economic analysis also demonstrates that the need to revisit the method of cost sharing is warranted, but the approach is still sound.
- Stakeholders derive great benefits from the ALMR Cooperative Partnership, such as technical expertise, narrowband compliance, and greater levels of interoperability than they could achieve autonomously without significant additional cost to their organizations.
- Funding the ALMR capability is always an issue, even when costs are fair and equitable; stakeholders have to weigh the necessity to meet all requirements with the reality of limited budgets that impact all functional areas.

3 ANALYSIS APPROACH

The total cost of operating ALMR consists of (1) shared infrastructure cost (funded by the owner agency), (2) operations and system management services and circuit costs funded by an agreed cost-sharing method, and (3) other maintenance (i.e., excluded costs; e.g., radio repair). The EA compares costs of items (1) and (2) combined and item (2) alone. Item (3) is not within the scope of this analysis. (As a reference point, the initial cost-sharing method–that uses a per-subscriber cost apportionment to allocate the total cost of item (2) services–estimated the cost-sharing fee to be $18 per month in 2010.)

In making these comparisons, the EA evaluates (a) two alternatives for Alaska LMRs (ALMR Cooperative Partnership and Separate Systems) and (b) compares, exclusively for DOD, ALMR to two other LMR systems–Ft. Lewis, Washington, LMR and Hawaii's Pacific LMR (PLMR). There are two types of comparisons. The Alternatives Analysis provides a side-by-side comparison of two alternatives while the Benchmark Comparison provides a cost performance ratio comparison of similar systems for the same (single) type of alternative (a DOD partnership).

The Alternatives Analysis compares cost and non-cost factors (intangible benefits) of two alternatives: (1) continuing the ALMR Cooperative Partnership on a cost-sharing basis with (2)

[1] There is insufficient cost data to evaluate how much different.

separating the assets and reverting to separate systems. The analysis includes tangible and intangible aspects, both positive and negative, of each alternative from the stakeholder's perspective. It also includes an assessment of the solicitation and responses to the stakeholders' top 3-5 leadership concerns/issues associated with maintaining the existing joint ALMR system versus creation of separate systems for each stakeholder category (DOD, State, Local, and non-DOD Federal). These concerns/issues are supported by an in-depth survey.

An Independent Validation for Cost Reasonableness (IVCR), a companion analysis exclusively for DOD, is reported in a separate document[2] and focuses on the cost reasonableness of similar DOD installations. The IVCR benchmarks ALMR costs with other like shared systems that engage DOD Information Assurance standards to assess whether the annual ALMR shared user costs for operation and sustainment are fair and reasonable compared to other DOD benchmarked systems given the level of services provided.

The economic analyses were based on existing ALMR documentation, interviews with ALMR stakeholder, stakeholder survey inputs, and interviews with the management staffs of the other LMR systems.

4 QUANTITATIVE AND QUALITATIVE RESULTS

4.1 ALMR Cooperative Partnership v. Separate Systems Costs

Table 1 provides a high-level summary of the capital and operations and maintenance (O&M) costs in millions of dollars ($M) for the two ALMR alternatives and shows the cost advantage of Alternative 1, ALMR Cooperative Partnership.

Table 1. Cost Comparison of Alternatives

Life Cycle Cost Estimate FY2009-2025 ($M)	Total
Alternative 1, ALMR Cooperative Partnership	$117.0
Alternative 2, Separate Systems	$315.5
Alternative 1 Cost Avoidance	$198.5

This comparison shows the significant cost avoidance associated with the ALMR Cooperative Partnership.

4.2 Stakeholder Interviews and Survey

The Bottom Line conclusions above are based on analysis of face-to-face interviews with 16 key stakeholders about their participation in ALMR and their top concerns/issues with continuing the present ALMR Cooperative Partnership versus an alternative that would divide ALMR into separate entities. Table 2 lists ALMR stakeholders that were interviewed.[3] Each of the stakeholders also submitted an in-depth survey with their substantiated opinion of a variety of

[2] Alaska Land Mobile Radio Independent Validation for Cost Reasonableness, Final Report, Tecolote Research, Inc., 25 February 2009.

[3] All stakeholders provided a face-to-face interview, reviewed and validated the interview transcripts, and submitted a survey, except (1) the interview with ATF was not completed, (2) the interview with FNSB was documented but was not validated by the stakeholder and a survey was not submitted, (3) the ALCOM interview was provided by email from a template questionnaire, (4) the DOA interview was conducted by teleconference, and (5) the Elmendorf interview was documented but the interview transcript was not formally validated by the stakeholder.

topics related to system operation. Stakeholder Top 3-5 Concerns are discussed in detail in the ALMR Economic Analysis Final Report.

Table 2. Stakeholder Organizations Surveyed

Ref #	Category	Stakeholder
1	State	Alaska Dept of Transportation/Public Facilities (DOT/PF)
2	State	Alaska State Troopers (AST)
3	State	Alaska Dept of Public Safety (DPS)
4	Non-DOD	Transportation Security Administration (TSA)
5	State	Municipality of Anchorage (MOA)
6	DOD	USARAK
7	DOD	Eielson AFB, AK
8	Locality	Fairbanks Police Department (FPD)
9	Locality	Fairbanks Fire Department (FFD)
10	Locality	North Star Fire Service Area (NSFSA)
11	Locality	Fairbanks North Star Borough (FNSB)
12	Non-DOD	Drug Enforcement Agency (DEA)
13	DOD	Alaska Command (ALCOM)
14	State	Dept of Administration (DOA)
15	Non-DOD	Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF)
16	DOD	Elmendorf AFB, AK

4.3 Benefits and Detractors of Alternatives

Table 3 shows some highlights of the benefits (↑) and detractors (↓) with respect to each of the two alternatives as derived from published guidance and judgments of stakeholders from face-to-face interviews and a written survey. In the table the use of *ALMR* by stakeholders represents the ALMR Cooperative Partnership for an LMR system under the governance of regional/statewide council as opposed to separate system managed by a subset of stakeholders.

Table 3. Benefits and Detractors of Alternatives - Highlights

Alternative 1, ALMR Cooperative Partnership	Alternative 2, Separate LMR Systems
Governance	
↑ Provides framework for collaborative decision making representing common stakeholder objectives. ↑ Common governing structure provides venue for solving interoperability issues by improving policies, processes and procedures of any major project. ↑ Enhances communication, coordination and cooperation to reduce internal jurisdictional conflicts.	↑ Governance needed only to accommodate the requirements of an individual stakeholder. No requirement to coordinate or achieve consensus among different organizations. ↓ Creates an inherent absence of coordination between stakeholders of separate systems that has to be overcome through numerous formal written agreements.
Narrowband Mandates	
↑ Fully compliant; all frequencies are shared (public safety included, which must be shared). ↑ ALMR stakeholders stated compliance effectively increases safety and security response with appropriate levels of interoperability. ↑ Compliance is highly attributable to securing federal grants.	↑ Approximately half of ALMR stakeholders stated moving to separate systems would not affect compliance with Narrowband Mandates. ↓ Many legacy systems are wideband, non-compliant. ↓ Multitude of systems must use same limited number of frequencies. Separation of joint frequencies is a major challenge.

Alternative 1, ALMR Cooperative Partnership	Alternative 2, Separate LMR Systems
Interoperability	
↑ Fully interoperable. ↑ Police officers particularly appreciate added safety and security of always-available radios. ↑ For emergency situations, reduces risk of interoperability problems by using a validated system, proven through regular training and exercises.	↓ May not be fully interoperable with other agencies. ↓ Bridges may be required to make disparate systems interoperable.
Standard Operating Procedures	
↑ Maintains formal written guidelines and instructions for incidence response. Enables emergency responders to successfully coordinate incident response across disciplines and jurisdictions. ↑ Ability to provide clear and effective ground rules for development and deployment of any interoperable communications solution.	↓ SOPs may only exist within individual agencies and are not shared, resulting in uncoordinated procedures and/or incompatible data systems among agencies and could hinder effective response. ↓ Requires independent stakeholders to invest time and attention to develop Joint SOPs with outside agencies.
Technology	
↑ Successful communications technology is supported by strong governance and collaboration among stakeholders. ↑ Technology is scalable and addresses needs at all levels, existing infrastructure requirements, cost v. benefits, and sustainability. ↑ Security and authentication challenges are considered in all implementation decisions. ↑ Employs Two-Way Standards Based Sharing of data files. This increases access to information, improves user functionality, and permits real-time collaborative information between agencies. ↓ Concern over “chasing latest technology”.	↓ Data sharing between agencies could be limited to static snapshots of information in a given time period. ↓ Requires minimal planning and training to share data with other agency systems, but can hinder real time information exchanges. ↓ Relies on radio swapping or maintaining a cache of standby radios that can be time-consuming, management intensive, and likely to provide limited results due to channel availability. ↓ Interoperability requires Gateways, shared channels or proprietary shared systems all of which drive a cost, coordination and agreement with other agencies.
Training and Exercises	
↑ Plans and conducts recurring, comprehensive and realistic exercises that includes all stakeholders to test system effectiveness and address potential problems. ↑ Has an established Operations Management function that provides classroom and one-on-one training to new system users. Mitigates cost to stakeholder participants.	↑ Can limit scope of training and exercise responsibility only to subscribers on the separate LMR system. ↓ Agencies generally provide initial orientation to users regarding their respective equipment. Multi-agency or multi-jurisdictional operations are not a primary focus. ↓ Single agency activities do not promote interoperability across disciplines and jurisdictions.
Usage	
↑ Interoperability systems are used every day for managing routine as well as emergency incidents. ↑ Users are familiar with the operation of the system and routinely work in concert with one another.	↑ Provides acceptable daily use and employment during emergency response situations. ↓ Generally requires work arounds, gateways, radio swapping, cache radios, to be interoperable with other LMR systems and agencies.

Alternative 1, ALMR Cooperative Partnership	Alternative 2, Separate LMR Systems
Cost Sharing	
↑ Provides the most comprehensive interoperability capabilities for the least cost to stakeholders ↑ Capital investment in infrastructure and subscriber equipment already made. Maintaining ALMR precludes significant costs to build separate systems. ↑ None of the ALMR stakeholders considers it economically sound to cease their partnership to pursue separate LMR systems. ↓ Depending on cost-sharing method, some stakeholders may pay for collective requirements that exceed their individual needs.	↓ Would be generally more expensive or cost prohibitive to make extensive capital investment ↑ Owner will upgrade only when required and not share in cost of technology upgrades that exceed their needs. ↓ May require 10% to 20% additional sites for SOA because change from VHF to 700MHz equates to reduced coverage. ↓ Non-DOD Federal would revert to legacy systems and incur significant cost to overcome loss of coverage and interoperability.
Risk Factors (from Separation Study)	
↓ Provides higher fidelity on future costs but uncertainty exists on how costs will be shared.	↓ All fixed and subscriber RF equipment will have to be replaced/moved from sites currently owned by others. ↓ Benefits local government, but additional cost of new subscriber/dispatch equipment may preclude participation without state assistance. ↓ Reduced coverage for SOA on 700 MHz will require additional sites and makes obtaining sufficient 700 MHz and 380 MHz NTIA channels for wide area trunking difficult.

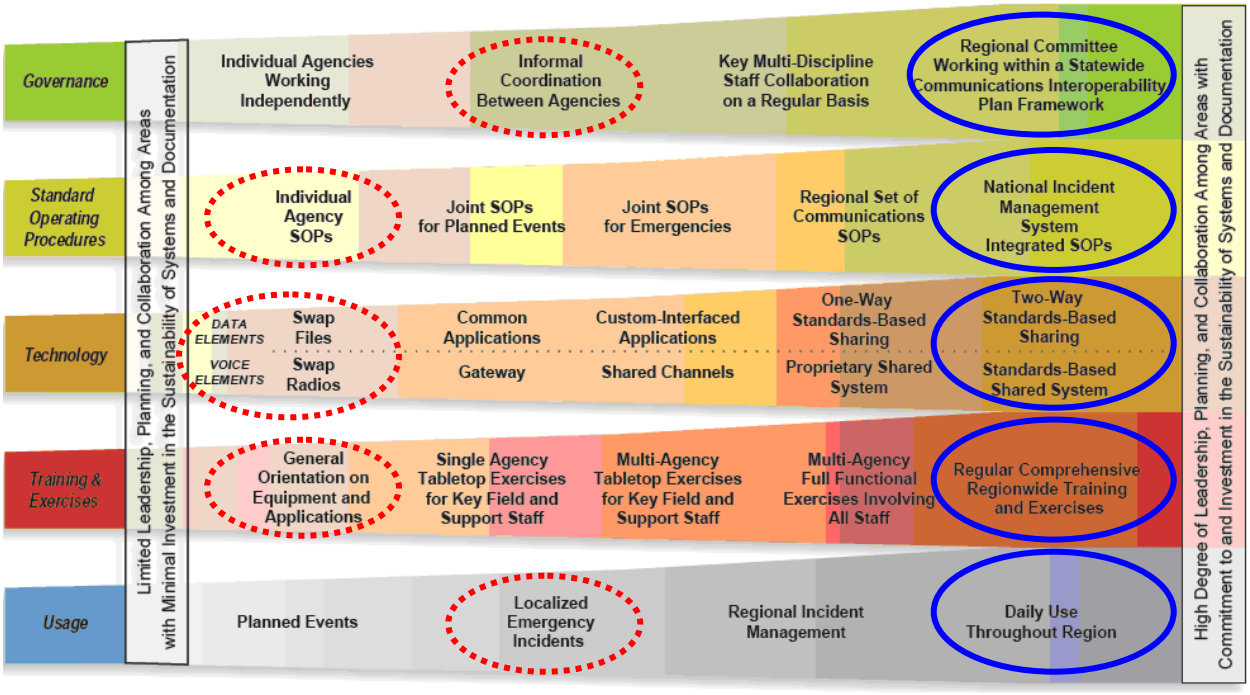
Based on the response of ALMR Stakeholders and the volume and impact of the benefits of Alternative 1, the ALMR Cooperative Partnership offers significantly more value in almost every area.

4.4 Comparison of Standards of Operations

In order to analyze non-cost factors to determine benefits and detractors of the two alternative constructs, many survey questions were related to the framework of the Department of Homeland Security's SAFECOM Interoperability Continuum. Homeland Security designed the Continuum "to assist emergency response agencies and policy makers to plan and implement interoperability solutions for data and voice communications. The Continuum identifies five critical success elements that must be addressed to achieve a sophisticated interoperability solution: governance, standard operating procedures (SOPs), technology, training and exercises, and usage of interoperable communications." Figure 1 shows the SAFECOM Interoperability Continuum.[4] Many of the Stakeholder Survey questions were related to each of the five elements. The solid blue ellipses indicate where stakeholders place ALMR on the interoperability continuum. The dashed red ellipses estimate placement of stakeholder legacy systems or a perceived separate system (i.e., EA Alternative 2).

[4] Interoperability Continuum Brochure, Department of Homeland Security, undated.

Figure 1. SAFECOM Interoperability Continuum for Stakeholder Separate Systems and ALMR



The highest level of interoperability on the SAFECOM Interoperability Continuum is on the right side of the chart. Multi-agency enterprises such as ALMR generally find it easier to achieve this level because these Continuum standards rely heavily on inter-agency cooperation and willingness to adhere to policies and protocols that affect the entire group. An independent LMR group exercises much more autonomy over its agency's actions, but it must work much harder to achieve interoperability with outside organizations. Figure 4 clearly illustrates that ALMR stakeholders are fully aware that reverting to separate LMR systems would be a regression compared to what they experience today.

4.5 Independent Validation for Cost Reasonableness

The IVCR validated the reasonableness of the cost of ALMR when compared to two other benchmark systems, PLMR and Ft. Lewis LMR. It concluded, "The robustness of the system, the services provided, and the cost performance ratios validate that ALMR costs are reasonable."

5 CONCLUSIONS AND RECOMMENDATIONS

ALMR provides significant value: it meets operational requirements and has a sustainment cost that is reasonable compared to other systems. In addition, it would be far more costly to create separate systems than to maintain the existing cooperative. The lifecycle costs to operate ALMR are approximately $117M compared to $315M to replicate separate systems. The predominant difference between these two alternatives is the capital investment cost. For ALMR, capital assets have already been acquired and the infrastructure is in place. The creation of separate systems would drive enormous upfront costs to construct. Even local

government and non-DOD agencies would incur significant expense to acquire new equipment making this a cost prohibitive venture.

Even with cost aside, the vast majority of ALMR stakeholders, without reservation, support the ALMR Cooperative Partnership. They feel the governance is working and providing a necessary function to effectively and efficiently use available narrowband frequencies and share a common infrastructure at a reasonable cost. Most are well aware that due to the issue of limited frequencies alone, there is no way to "go back" or separate the system. Only one stakeholder even expressed considering a separation, but also noted the need for further study to determine feasibility and cost.

The contribution of all would still serve to deliver a system that is an economically sound solution for all parties. The total benefit and capability could not be obtained separately by any major stakeholder group when considering the estimated capital and sustainment costs. Therefore, any contribution by one brings economic benefit to all others. This conclusion is supported by stakeholder-substantiated opinions in face-to-face interviews, from in-depth surveys, and based on experience and analysis.

The bottom line is:

- ALMR is in compliance with national policy for Land Mobile Radio (LMR) Systems.
- Compliance provides a robust product with notable benefits.
- Stakeholders with statewide responsibilities recognize and appreciate the benefits.
- Even stakeholders with pockets of responsibility where a less robust system might be sufficient (e.g., in DOD and at local level) do perceive the value as highly desirable.
- 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 from the ALMR Cooperative Partnership, such as technical expertise, narrowband compliance, and greater levels of interoperability they could not achieve autonomously without significant additional cost to their organizations.

Three conclusions can be drawn from this economic analysis.

- The ALMR Cooperative Partnership is a sound solution for federal, state and local government agencies, both operationally and financially.
- The cost of separating is greater than the cost of maintaining ALMR.
- Services and related costs are properly "sized" for Alaska.