STATE OF WYOMING

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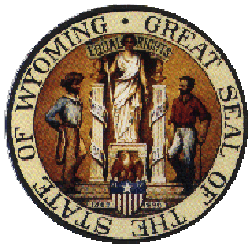

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STATE AND LOCAL GOVERNMENTS OF WYOMING

SECTION II: BACKGROUND

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2. BACKGROUND

This document serves as a private sector view of the State and Local Governments of Wyoming's (As Is) Wireless communications environment. It will address public sector trends within the industry as well as the business, functional, and technical requirements of the State and Local Governments.
The intent of this study is to deliver to the State and Local Governments solutions based on current concepts that address these trends and requirements. The State and Local Governments have requested such a viewpoint study, as well as a cost estimate for a recommended approach.
The author was chosen because of its vast experience in implementing and managing large regional and State and Local Governments wide area digital communications solutions. For years the author has been the prime provider of radio communications equipment throughout the State and Local Governments .

This study will augment and compliment past and current efforts of several entities in the State and Local Governments to develop their vision for a wireless, wide area communication network. Among them are the State Agency Law Enforcement Communication System (SALECS) commission, the Associated Public Safety Communication Officers (APCO), the Wyoming Department of Transportation (WYDOT), the Wyoming Administration and Information Planning and Coordination Office (A&I), and the State and Local Government's consultant, RSM McGladrey.

2.1 INDUSTRY TRENDS

A number of recent trends have affected wireless communication networks' effectiveness within State and Local Governments. Some of these trends are:

- Rapidly changing communications technology environment:
  - Communications technology is moving toward software-based versus hardware-based components and system solutions
  - Emergence of open standards versus proprietary networks
  - Advanced system integration techniques that combine computer Information Technology (IT) and two-way radio systems have led to the development of multiple and diverse technology choices
- Increasing focus on Core Competencies, (such as fighting crime, responding to critical fire and emergency situations, delivering emergency medical response, jail management, judicial personnel safety, providing quality of life for citizens and tourists, developing the best educational programs, developing youth, etc.):
  - Entities are looking for partners that are experienced with developing and deliverying solutions that address these trends, thereby positively impacting core competencies and meeting (or exceeding) entity goals and initiatives
  - Entities are seeking to maximize Return on Investment

- ➲ Faster response time and increased officer safety

❖ Efficient and Effective deployment of limited human resources

- ♦ Cost containment

Improved customer satisfaction and public service, lifecycle management of networks, how this process is measured (best practices), and accountability of government

- ♦ Entities are being faced with doing "more with less", capital funding is shrinking and competition amongst a multitude of prospects for this limited funding is becoming more and more intense

❖ Growing popularity of sharing State and Local Governments revenues with a private sector alliance approach

❖ Sharing resources and radio spectrum, designing to a standard and open-architecture are just a few of the requirements that now requirements necessary to receive Federal or State grant funding

❖ Increasing challenge of recruiting and retaining qualified technical resources within the public sector has become very challenging due to a tight labor market

- ♦ Updating the skill levels of existing human resources is difficult due to ongoing technology changes

❖ Pressing need for entities to share critical information and interoperate across jurisdictions

Most, if not all, of these trends have in some way affected the State and Local Governments of Wyoming. Today, the State and Local Governments expends all of its limited communications resources in its best efforts to keep the current VHF State and Local Governments wide radio network operational. This technology is aging and no

longer serves the State and Local Government's public safety needs adequately. New concepts need to be addressed by the State and Local Governments and the private sector that will fully address the trends and challenges presented here.

2.2 WYOMING'S BUSINESS REQUIREMENTS AND INITIATIVES

Communications solutions are only effective if they meet the business, technical, operational, and functional requirements of the State and Local Governments. Following is an understanding of those requirements that a new communications concept would help meet. These requirements are derived from extensive research and analytical conversations with State and Local Governments agency personnel.

2.2.1 Overall State and Local Governments Initiatives

- Efficient government
  - Focus on investments and services that will build on capacity and equity

For example: the State and Local Governments Department of Corrections is currently addressing ways to efficiently staff its facilities and maximize the placement, allocation, and management of inmates.

- Improve government services through technology
- Public Safety for all citizens and tourists
- E-Government
  - Maximize the State and Local Governments's capability of delivering the most cost effective services
  - Maximize efforts and reduce costs throughout all of State and Local Government
  - Government "integrity" through standardization
- Nurture the "New Economy"
  - Wireless technologies are now knowledge-based in skill sets demanding private-public alliances
  - Solutions need to address predictable costs of doing business, including workplace training, brick and mortar space, and capital funding sources

- Acquire access to capital funds and quality human resources/suppliers

The State and Local Governments have advocated several strategies and initiatives. The following is an understanding of these more specific requirements and their potential for communication solutions.

- Privatization—Public/Private partnerships helping to limit the growth of government, maximizing and reallocating of resources by allowing entities to focus on core competencies.

For Example: The State and Local Governments can leverage a pool of 23 counties, 97 towns and cities, 48 school districts, and hundreds of special districts to share costs (and benefits)

- Enhance and Build Core Industries
  - Tourism
  - Agribusiness
  - Energy and Minerals
- Expand and Recruit Technology in State and Local Governments (Communications and IT)
- Develop and Maintain a Quality Workforce
- Financial and long-term Solutions
  - Identify new revenue streams
  - Reallocation of resources, maximization of Return On Investments (ROI), broaden tax base
  - Long-term investments to overcome the deficits—realization of fixed expenditures for mission-critical projects, maximizing and reallocating current revenue streams
  - Limit government growth and improve customer service
  - Measuring of governmental accountability through updated processes and promoting knowledge-based businesses
  - Public/private cooperation

- Technology strategy of building out State and Local Governments wide voice, data, and video network with highly trained workforce and improved technology to deliver services to the public at low cost

2.2.2 Opportunity Areas

The State and Local Government's business initiatives are sound and compare to those in the industry. For the sake of this study, the initiatives will be categorized into five "buckets." These buckets are opportunity areas for the State and Local Governments. They are:

- **Revenue Generation Growth**
- **Cost Management or Containment**
- **Investment Management**
- **Resource Productivity Deployment**
- **Customer Satisfaction and Retention**

This assessment will address these desired business outcomes for the State and Local Governments and will provide suggested solutions that are available in the private sector today. There will be constant reference to these outcomes in this study.

A recent user survey conducted throughout the State and Local Governments, including some Federal agencies, concluded that over 55% of those interviewed said that the present communications system does not meet their needs. A total of 234 surveys were returned from the study.

The following data collection summarizes the functional communication requirements of the State and Local Governments.

2.2.2.1 State and Local Government's Functional Requirements

- Interoperability between agencies within the State and Local Governments and other users throughout the State
  - Essential for normal operations, disasters, emergency planning, and overall improved public safety (Only 9% or users said they thought they had State and Local Governments wide coverage)
  - Mutual aid improvements
- Improved coverage (Survey indicated 47% of the user base experienced "dead spots" as they tried to do their job, 20% said they had limited range)
- Emergency notification
- Hazardous environment operation
- Secure communications
- Reduction in contention for voice channel access
- Extended power source duty cycle
- Mobile and Portable unit identification upon push-talk
- Remote monitoring and interrogation of hardware
- Full complementary assortment of accessories
- Ease of channel identification
- Telephone interconnect
- Simplistic operation

The following data collection summarizes the technical requirements of the State and Local Governments.

2.2.2.2 State and Local Government's Technical Requirements

- Trunking technology
- Utilization of additional transmitter sites
- Software driven hardware

- Common platform
- Single button sub-audible emergency activation
- Intrinsically safe portable radio
- Encryption algorithms
- Short text messaging
- Lithium Ion battery technology
- Remote diagnostics
- Seamless roaming between sites/counties/cities/State and Local Government's (Interoperablility)

2.3 SUMMARY

This review of the current trends in the industry and the State and Local Government's business, functional, and technical requirements indicates a strong need to plan for a new Public Safety and Service communication solution. The aged technology, non-interoperative status, challenged maintenance support system, and limited capital resources offer a real challenge for both the public and private sector.

The State and Local Government's vision of wireless operations includes:

- State and Local Governments wide interoperability
- Network planning processes that minimizes technology obsolescence
- Migration to the current and latest technology
- Technology lifecycle management
- Operation and management focused on the goal of predictable yearly fixed costs

There are private sector resources and processes that can meet these challenges, satisfy the aforementioned requirements, and help enable the State and Local Governments to find a long-term solution that delivers reliability, cost prediction, and alliances.

The trends indicate that the State and Local Governments would benefit greatly from private sector help in developing the State and Local Governments of Wyoming's public safety radio network into a strong technology and public service showplace.

STATE AND LOCAL GOVERNMENTS OF WYOMING

SECTION III: SITUATION ANALYSIS

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3. SITUATION ANALYSIS

This section examines the State of Wyoming and all Local Government entities' current wireless communication systems situation. Past surveys point to several immediate concerns:

- Aging technology
- Lack of interoperability
- Deficient or no coverage
- Utilization of non-standardized technology prevents migration to computer/software controlled systems
- Lack of replacement parts and technical support
- Managed and maintained through best efforts and limited resources
- Inefficient use of current resources

For Example: there are numerous independent systems being operated and maintained by State/County/City and private service providers within the State. These "As Is" independent systems can not be merged into one shared system.

The risk that the State is taking in operating its aged system are very high. One of the State's main, mission critical initiatives is to provide for a more efficient government with improved public safety and services. The current system is not meeting the needs of the user base and of the State's citizens and tourists.

3.1 SYSTEM DESCRIPTION

The current systems consists of mainly small, hardware-based VHF systems scattered throughout the State. Each system is made up of different configurations of base stations, control stations, and dispatch centers. Hardware-based systems started evolving into software (computer controlled) systems in the late 1970's. These computer controlled systems are now evolving into Information Technology (IT) based wide area communications systems that lend themselves to advanced system management and service support processes. These systems provide features that are unique to the Public Safety user. Features such as Emergency Call, Priority Queuing, Caller ID and Emergency System Reconfiguration are a few examples . These features are not present in telephone, paging and public two-way radio systems.

Some of the agencies within the State that utilize individual systems include WYDOT, the State Penitentiary in Rawlins, the US Forest Service, and various local public safety departments and government agencies. These systems are virtually autonomous, provide coverage within jurisdictional boundaries, and provide for very little

or no interoperability between agencies whose boundaries are contiguous, or for users whose jobs require them to travel over large distances.

Dispatch links within the systems are a mix of analog and digital microwave, RF links, and phone lines. A major trend in Public Safety Systems is to link sites of the wide area system using customer owned and controlled digital microwave. This is an important consideration in evaluating wireless, Mission Critical Public Safety systems.

3.2 SYSTEM SUPPORT

The current WYDOT and SALECS VHF system, including the microwave subsystem, is being supported by WYDOT. WYDOT consists of five (5) Districts dispersed throughout the State of Wyoming with ten (10) communication maintenance shops (approximately two per District). Approximately eleven (11) customers are maintained in this system with two being Federal customers.

WYDOT is staffed with twenty-one technicians, an installation person, and a secretary. Currently, three managers manage the system, however their many varied duties prevent them from focusing on some of the tasks and activities of the position.

Overall, the agency delivers good support services. It has established the majority of normal support practices such as inventory, unit programming and asset control, preventative maintenance programs, technician dispatching , end user training, and component maintenance. These services appear to address the operation and maintenance of the aging technology.

WYDOT charges its users the costs of maintaining the system and does not make a profit. Costs to maintain are identified through time sheets from the technicians and other support people working on the respective agency's hardware. Outside of WYDOT, there are several standalone systems throughout the State that are being serviced independently.

In reviewing the current system management practices, it was found that there were process areas that could be improved upon. Available private sector processes could augment and/or improve the technical training, system performance measuring, disaster and technology planning, and site maintenance categories in best-in-class system management. These processes are critical to, and are actually part of the new technologies. The software based nature of the systems allows for these advanced management techniques to be employed. Increased system performance as evidenced by less down time, fewer busies, and enhanced coverage are a few of the over-riding benefits to the Public Safety User as a result of this computer based technology.

As communication systems move from hardware to software based design, the system documentation and maintenance process is critical. Site and network requirements are different, and State codes need to be strictly enforced, technical skill sets are new and continually need upgrading. The critical need for proactive technology planning is of utmost importance. It is our understanding that the State of Wyoming is very interested in pursuing best practices in these areas.

The total cost to own, operate, and maintain the current systems is not known at this time. Hard costs such as capital, operation and maintenance appear to be identified, however, "hidden and opportunity" costs are not. An example of hidden costs are cellular phones, pagers, and other wireless devices that are used to supplement communication by users and would be replaced by one field unit in a state of the art wide area communication system. These devices might be purchased under other budgets so the costs are hidden, but must be addressed. Opportunity costs are those that occur because of sub-optimal technology and or operational decisions. Examples of these costs are dual help desks that could be combined or a technology selection that did not optimally meet a business need. The technology selection may not address the processes and applications of a mobile workforce and cost the entity downtime, lack of capacity, or recovery costs. These costs also must be measured and included in cost accounting.

The age of the networks and their ineffectiveness has created a good deal of hidden and opportunity costs over the years. Benchmarked costs of ownership assessments nationwide, show that the costs of owning, operating, and maintaining a wireless network amount to **three to four times** the original purchase figure.

The cost, scope and time constraints of this deliverable have prohibited a detailed, total cost of ownership study from being performed. It is highly recommended that a total cost of ownership study be undertaken by the State of Wyoming and the Local Governments or by an appropriately experienced public entity on the State's behalf.

STATE AND LOCAL GOVERNMENTS OF WYOMING

SECTION IV: OPPORTUNITY AREAS

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4. OPPORTUNITY AREAS

The numerous radio systems employed by the agencies, departments, and local governments operating in the State of Wyoming utilize aging, hardware-based technology. Changes to these current systems are limited and time consuming. Due to this situation, interoperability between agencies, departments, and local governments within the same geographical area, is restricted or even impossible.

Furthermore the age of the State and Local Governments current systems presents the problem of frequency coordination. The VHF frequency band was not standardized by the FCC in the manner of the more contemporary 800 MHz band, making frequency separation and allocation less than optimal. Due to the limited availability of spectrum resources, agencies wishing to move to the frequency coordinated 800 MHz band must consider immediate steps to obtain frequency resources allocated in this band. Failure to obtain and operate at these frequencies may mean the inability to acquire them in the future.

For Example: the rural areas of the western slope of Colorado now face spectrum shortages due to re-allocation of unused 800 MHz spectrum

Private sector frequency planning resources are available to assist the State and Local Governments These constitute opportunity areas for the State and Local Governments to upgrade their communications network and secure their technological future. Modern software-driven wide area digital radio systems rely on coordinated and organized frequency bands. These frequency bands facilitate immediate benefits in the areas of interoperability and user safety and system management flexibility.

4.1 TECHNICAL AND OPERATING ENVIRONMENT GAPS

The current communications systems have many issues. Some of the technology is over twenty years old and is not supported by manufactured parts. WYDOT has done a good job in trying to keep their network operating. However, the system is not migrateable, and is a “closed” system, meaning that the system can not merge to the newest technology, it is a standalone semi-network that can only be temporarily patched up. It also has coverage issues, and is severely limited in its ability to link law enforcement entities together in emergency situations. The system does not readily accommodate additional users and thus several cities and townships run independent networks within their user base.
This situation does not add revenue streams for the State and Local Governments and the history of deficit budget status seems to constantly challenge and prevent any movement geared at changing the system. The root cause for these gaps is twofold:

One, the aged systems and its deficiencies are partially a result of the current system management processes.

The current practices served well twenty years ago, but newer technologies demand newer support processes, and these processes demand software based systems. Best-in-class processes and system management involves planning for technology changes, its timing, and impact.

The private sector has established practices that can prevent obsolescence by strategically planning for and employing strategies that successfully and continually upgrade to newer technology. A matrix and scope of these practices follows in this section.

Two, the State and Local Governments throughout the State of Wyoming should consider re-examining their procurement and revenue generation laws. The historical deficit budget environment is very challenging and requires that State and Local Governments prioritize and drive Mission Critical projects to receive funding.

Private/Public Alliances can bring revenue sharing and generate ideas that will aid State and Local Governments in attaining their communication visions, and should not be quickly dismissed.

The private sector can provide financial engineering practices that offer the State and Local Governments a consistent, regular monthly payment schedule to cover its wireless costs. This alliance assists the State and Local Governments in its biennial budget process as it now can plan for a stream of payments over time.

Following is the ranking of these opportunity areas and root cause.

Table A—Ranking and Prioritizing of AS IS Gaps Root Cause Identification

Gap Area	Cause
Existing system aged, beyond useful life ❖ Lack of coverage, interoperability ❖ Limited user base ❖ Non-standardized, non migrateable, standalone system	Accountability best-in-class system support and management accountability processes
Low priority for system transformation	Business case methodology
Deficit Budget	Legal State charters, small tax base, procurement practices
Dry revenue streams	Legal State charters
Antiquated service support and metric/measurement processes	Knowledge of private sector support packages
Recruitment/Retention of technical resources	Accountability best-in-class system support and management accountability processes

4.1.1 Support Services Environment Gaps

As mentioned in the previous section, there are various support practices that could be improved. Process improvement is limited by the existing hardware based “As Is” technology. The State and Local Governments concur and want to transform their communications networks and support processes to become State of the Art. As technology evolves, so does the process-driven support services. The support services are an integral piece of the technology efficiencies and effectiveness of a technology choice. Thus the classic definition of technology (knowledge, processes and equipment combined) is maximized in ”IP” systems of today.

Establishing best-in-class, managed services during the implementation phase of a new network will permit the State and Local Governments to realize a sound baseline of network operations and procedures.

The State and Local Government’s existing technology has dictated antiquated support practices that are of minimal value in today’s New Information Economy. The older service practices are manual in nature, unplanned and reactive to both repair response and system health measurements/metrics.

To increase the accountability of the public sector, as well as to maximize the return on investment for the technology selected, a complete co-share and alliance process should be formed between public and private entities.

A gap in the current managed services environment will occur when a new system is implemented. Relearned processes and practices will be essential to operate, manage, and maintain any new network. The following is a listing of service categories that would be required and their scope.

Table B—Service Categories and Scope

Category	Scope
Asset Management	Asset Management is concerned with the tracking, reporting, and management of the different elements of an entity's wireless investment by physical location, utilization, PM status, etc. Maintenance of software version database is also included here.
User Administration	The process of organizing, supporting, and educating users. Incorporates training and help desk. The feedback mechanism through which radio groups learn how to evolve and grow their systems.
Network Administration	The activities and systems surrounding the management of a private wireless network such as performance tracking, network monitoring, contract administration, vendor management, and FCC license management.
Site and Network Maintenance	Activities associated with private wireless infrastructure operations. Examples include: preventative maintenance, and equipment repair, board replacement and repair, regular site inspections, etc.
Planning	The set of activities that ensure wireless technology matches business objectives. Includes strategic planning, standards, and venture initiatives.
Subscriber Unit Maintenance	Maintenance programs specifically targeted at the subscriber unit. Examples include: unit repair and preventative maintenance of subscriber units.
Training	Annual training programs specifically targeted to meet the goals and objectives of the different support functions.

STATE AND LOCAL GOVERNMENTS OF WYOMING

SECTION V: CONCEPTUAL DEVELOPMENT METHOD

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5. CONCEPTUAL DEVELOPMENT METHOD

5.1 INTEGRATED APPROACH—BUSINESS AND TECHNOLOGY

Following is a description of the approach used to solve State and Local Government communication deficiencies in Wyoming. Due to the limited time and the degree of scope for this study, it was important to rapidly collect completed work pertaining to the business issues and initiatives of the State and Local Governments. An extensive search of the State's applicable web sites was conducted. In addition, several statewide surveys and interview findings were compiled for reference. The approach was to collect, categorize, analyze, and synthesize the data. Completing this process was necessary to identify the State of Wyoming's, and the Local Governments within the State, key business requirements. A recommended solution and next steps are based on these requirements. If a solution is just a technical solution, experience has demonstrated that it will not be in the best interest of the State or Local Governments.

As in the business requirement process, past studies were researched and diagnostic conversations with key WYDOT personnel were held to determine the functional and technical requirements to be satisfied. The data was then processed as in the scenario above.

5.2 TECHNICAL ASPECTS OF CONCEPTUAL DEVELOPMENT

The same aspects of a detailed system design are addressed in developing a conceptual system, albeit on a much abbreviated level of detail, These aspects include:

1. Coverage Analysis
2. Site Survey
3. User Interviews

5.2.1 Coverage Analysis

During the interviews with the WYDOT personnel a scenario was developed that defined the conceptual system. This led to the coverage requirements.

The concept system is conceived to include and support all public safety (police, fire, sheriff, EMS) highway, and all non-public safety departments within the State of Wyoming. The de facto coverage requirement standard for public safety agencies across the US is 95% reliability. Therefore the concept is based on this 95% "standard." It was also agreed upon that the initial phases of this system concept

would be targeted at vehicular use (mobile) within agencies such as the Highway Patrol, Fish and Game, Highway Maintenance etc., who have border to border responsibilities. Coverage estimates are for mobile talk in (from mobile to the base unit).
The recommended approach is to achieve mobile coverage requirements first. After this has been satisfied, add additional sites relative to the user requirements in any given area. This methodology prevents over-design, and ultimately insures coverage is met at the lowest possible cost.
For the purpose of this study, coverage predictions focus on major highways and roads throughout the State. Laramie, Albany, and Carbon Counties are Phase I of Zone I for this report. WYDOT personnel believe this region is representative of the four coverage categories that make up the state.

1. Urban Areas such as Cheyenne in Laramie County
2. Rural Areas in all three counties
3. Forested park and recreational areas in Albany and Carbon counties.
4. Unique building penetration requirements like that of the State Penitentiary in Carbon County

Wide area radio communications would provide the interoperability necessary for public and officer safety during transportation of prisoners to and from the state penitentiary. Optimal placement of an additional transmitter site(s) would be deployed to enhance the "in-building" prison requirements.

5.2.2 Site Survey

In a detailed system design, transmitter sites would be identified and surveyed to determine their "readiness" in terms of electrical, environmental and space criteria. Electrical criteria include such things as grounding, primary and backup power, and tower assessment. Environmental criteria concentrate on such needs as HVAC (heating, ventilation, and air-conditioning). Spatial criteria concerns are for room within the shelter for equipment, as well as space on towers for antennas.
Typically older, hardware-based two-way radio systems are housed in shelters that require improvements to the environmental and electrical factors. Space is also a common problem, as the legacy system needs to remain in place while the new system equipment is being installed. Towers need to be evaluated and by and large need improvement or replacement.

In general these studies require a substantial amount of time and resources from both the private sector and user sector to acquire valid data which is critical to design, implementation, and on-going system management and maintenance. Since neither the time nor the resources were available for this conceptual development, a large amount of estimates (educated guesstimates) have been employed and factored in to account for these CRITICAL system design factors or aspects.

5.2.3 User Interviews

User interviews are done for several reasons. Data collected from these interviews is used in the system design process to develop a system loading and talk group information base. This base is used to determine, among other things, channel requirements, dispatching elements and wide area audio switching requirements. With this information the site connectivity and communication transport subsystem is also determined.

User interviews also provide clues to coverage problems, and help establish which features will benefit operations. This has a direct impact on system architecture and equipment selection.

This Conceptual System Development has considered these elements, but has by no stretch of the imagination gathered enough data to provide a system design. However, this concept can be used and will be helpful in establishing a direction and course of action for the State of Wyoming.

5.3 SUPPORT SERVICES ASPECTS OF CONCEPTUAL DEVELOPMENT

It is essential to understand the support operations. Again, several statewide surveys were compiled for reference and on-site interviews were conducted with key WYDOT personnel. Best-in-Class support practice templates were used to determine the current operational practices and the degree of value that WYDOT and the standalone service providers contribute to today's available support structure. A scope of work was also handed out to the WYDOT personnel for each support element listed in the templates. The first template reviewed contained over 160 elements of support services. The template was named, "Systems Management Responsibilities," and the main categories were:

- **Radio System Support Services**—Technical Dispatch and Support, Repair depot coordination,

  Preventative maintenance programs, software subscription and warranty coordination, remote Monitoring activities, etc.

- **Radio System Inventories—**Inventory records processes, programming templates,

  Spare equipment logistics, system configuration and as-built drawing procedures, system

  Design documentation, etc.

- **System Performance Reporting**—Third party service provider programs, device performance

  Reporting, root cause analysis of devices, system performance reports and analysis, airtime

  Usage reports, system busies analysis, etc.

- **Planning—**Disaster recovery planning, user needs analysis, evaluation of available technologies, business case analysis to evaluate new applications, short and long term

Technology plans, impact studies, etc.

- **User Support—**User needs procedures, response mechanism, support telephone lines, user group committees, etc.

- **Training—**Evaluate current training program, current training needs for both technical and training needs, new hire and refresher programs, training logistics, etc.

- **System Programming—**Establish programs for programming and reprogramming field units,

  Coordinate programming teams, updating templates, etc.

- **Site Maintenance—**Evaluate each infrastructure component location, compliance to R56 standards, quality audits, coordinate outside site providers, etc.

- **Spectrum Management—**FCC license management, data bases, manage and renewal process, frequency acquisition, spectrum services activities, etc.

- **Antenna Site Management—**Site inventory, property management, site development, property marketing, engineering, etc.

The second template, “Network Resourcing-Due Diligence”, addressed the procedures for managing all the vital tasks. These elements include, but are not limited to: response times, repeat repair, management and maintenance responsibilities for site components, special equipment needs, alarm information, and other daily tasks.

These two templates established a sound baseline for the “what is” of the State and Local Government operations. The understanding from the WYDOT interviews helped determine what they currently do and the processes they would like to follow. It is also important to understand what this management team feels is necessary for the operating and managing of the new technology network. The system management responsibility template indicated that WYDOT found all categories of high value.

STATE AND LOCAL GOVERNMENTS OF WYOMING

SECTION VI: CONCEPTUAL ALTERNATIVES

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6. CONCEPTUAL ALTERNATIVES

In addressing the opportunity areas for the projected number of State and Local Governments participants, the following are three conceptual alternatives that the State should consider. The conceptual alternatives described below were selected with certain criteria that address the State and Local Government's valued business outcomes. A description for each alternative is included as well as a value proposition for each.

These conceptual alternatives included leasing/financing options which have not been priced. This pricing is available upon request.

6.1 CONCEPT SELECTION CRITERIA

Each concept is compared to the following criteria and definitions:

- **Cost—**The initial investment purchase and ongoing costs for the concept. The number of users also drives this category on the system, and elements of a total cost of ownership, be it capital, operational, hidden, or opportunity costs. This element needs to be viewed throughout the lifecycle of the technology chosen.
- **Coverage—**Communication need criteria. This category includes both the geographic as well as obstacles the geography may represent. It also considers the need to communicate in a variety of modes, (in building, on street, on site, across state, and within towns and counties). The ability to configure the system to meet mission critical tasks.
- **Capabilities—**Considers the need for priority, single, and group communications, analog or digital technologies, standard or custom features, interoperability, and migration alternatives.
- **Control—**The ability to control a system or network dedicated to public safety agencies. The wireless network technology choice needs to insure privacy, network reliability, central dispatch, and a stable technology platform. Also included here would be the ability to plan for next versions of technology and create and maintain support processes. (technology lifecycle management).
- **Capacity—**The ability for a concept system to handle peak loads of communication traffic. The agility of a system to handle different traffic patterns.
- **Value—**The cost versus benefit of the concept, overtime. Should consider the non-quantifiable and perception value of the solution.
- **Focus—**The question to be answered if the concept truly meets the entity's core competencies.
- **Safety—**Does the concept improve public safety and employee safety? Also risk is mitigated in direct correlation to the degree of safety that a solution delivers.

These criteria will be used to rank each concept and will be scored on how each concept meets the valued business outcomes of the State and Local Governments in Wyoming. Again, these outcomes were categorized at the beginning of this document, they are:

- **Revenue Generation Growth**
- **Cost Management or Containment**
- **Investment Management**
- **Resource Productivity Deployment**
- **Customer Satisfaction and Retention**

The conceptual alternatives consider all of the above, as well as address the opportunity areas discovered in the "as is" system and operational situation. The general opportunity areas include replacing an aged system that has limited capabilities, unable to accommodate additional users, no migration capability and plan. Selecting Alternative #2 or #3 is an opportunity to prioritize and prepare such a plan. We all hope that an alternative is selected and implemented before a catastrophic life and limb incident occurs that would dictate immediate replacement. There is a need to review state law(s) to accommodate new public/private sector alliances that could increase revenue streams and aid the State and Local Governments in procuring a phased solution over time. This business case for action would help the deficit budget history as well as predict future revenues and costs over a fixed period. Lastly, an update of support services and processes needs to be launched concurrently when a new wireless network is implemented.

6.2 CONCEPTUAL ALTERNATIVES DESCRIPTION

There are a total of three (3) concepts that the State should consider. The following is a description and analysis for each.

- Alternative #1—Do Nothing, "as is environment"
- Alternative #2—State to own, manage, and maintain the new communications network
- Alternative #3—Public/Private alliance to build, own, and operate the new communications network

6.2.1 Alternative # 1

6.2.1.1 Technology Description

There is no new technology description to narrate. The current system is "as is".

Conceptual Alternative #1 – Remain As Is

In this scenario, the State and Local Governments will remain status quo with their current radio systems. This is probably the least costly short-term, as no investment other than maintenance is required. This alternative also retains the existing system inadequacies. Interoperability and coverage issues remain intact. As time progresses, aged equipment will no longer be supported, and replacement parts will become non-existent. This holds true for the mobile and portable subscribers as well as the infrastructure at the radio sites.

6.2.1.2 Service Support Description

There is no modernistic service support description to narrate. The current support is "as is".

Alternative #1 should not be considered as an option. By doing nothing, the State saves the initial purchase of a new technology, but risks the potential of life and safety issues for the public and its employees. Over time, the costs to own, operate, and maintain the system would be the most expensive concept to practice. It has been estimated, based on the existing number of sites, transmitter equipment, current microwave investment, mobiles, portables and dispatch console positions in service, in the State by both State and Local Governments, that the maintenance dollars spent average $2.5 million annually. The existing system is limited and is of minimum value to its user base. It does not satisfy any business outcomes that the State and Local Governments have set out to achieve. **Investment management** becomes an unattainable goal. This alternative is a short-term volatile risk to the private and public residents in the State. The government focus back onto core competencies, revenue generation, increase in public and officer safety will not be met, customer satisfaction is not achieved. Deployment of limited resources, technology migration techniques and lifecycle management is not attainable.

6.2.1.3 Value Proposition

Under Alternative #1, the State and Local Governments can realize the existing system's limitations. The agencies can attempt to plan for corrective replacement strategies and or support improvement programs.

6.2.2 Alternative # 2

Alternative #2 provides a vehicle in which the State and Local Governments can replace the existing system. Through an operating or tax-exempt capital lease, the State and Local Governments could predict the costs to implement a new network over time. A phased approach facilitates planning out the technology implementation schedule with a private sector supplier.

Alliance with the equipment manufacture is imperative to overcome the management challenge of software version compatibility of all the component equipment.

These conceptual alternatives included leasing/financing options which have not been priced. This pricing is available upon request.

6.2.2.1 Technology Description for Alternatives #2 & #3

The computer controlled wide area system design was chosen for its versatility in filling the feature set demanded by the Public Safety Users whose lives and those they serve depend on Mission Critical Communication. Features that provide benefits that are designed to be life saving and offer the users ease of use, which is critical during life threatening situations.

The Statewide Concept is developed using state of the art system architecture that can link many sites together to provide field users the theoretical ability to roam throughout the State of Wyoming and use their field unit to communicate throughout the area. The system will allow the Mission Critical users the benefits of Public Safety derived features and the Public Service users the common trunked radio features that allow them to do their jobs in an efficient an effective manner.

The Conceptual System includes an initial one-hundred (100) sites. About fifty (50) existing DOT sites and fifty (50) more "conceptual sites." "Conceptual sites" are estimates of the number of sites that would be needed to fill in coverage that the existing DOT sites do not currently cover.

This software driven wireless technology also provides an unsurpassed level of System Management and Service Support Process that insure maximum reliability and communication integrity. The communications system technology that the cost estimates are base on uses unsurpassed quality hardware equipment that is given intelligence and an unsurpassed feature set that equals a highly reliable, low risk and liability wireless wide area system.

Technology Description

- Conceptual Alternative #2 – State to own, manage, and maintain the new communications network

In this scenario, the State and Local Governments realize:

- Fixed annual infrastructure payments driven by the requirements and the timetable of the end users
- Individual agencies are financially responsible for mobiles, portables and console dispatch equipment
- Support services are customized to augment customer(s) resources
- Customized training programs are developed and implemented
- System capabilities are greatly enhanced to meet the functional requirements of the users
- Interoperability between agencies, departments, cities, counties, etc., are easily accommodated
- System redundancy is inherent in wide-area designs
- Customer(s) responsible for the equipment maintenance, system management, lifecycle management, spectrum management and technology obsolescence

6.2.2.2 Service Support Description

The State and Local Governments will receive System Maintenance Services that facilitate greater system uptime, while controlling costs. This customized program includes the following services: Network Management Services, Dispatch Services, Technical Support Services, Infrastructure Repair, Radio Repair, Software Subscription Services, and Customer Support Manager Services.

These customized services will allow the State and Local Governments to utilize their current technical operational staff to perform all on-site repairs to the infrastructure. Additionally, the State and Local Governments are fully responsible for field repairs to their system and numerous managing functions of its operation.

Network Management Service (NMS)

Network Management Service electronically monitors specific elements of the system for events and alarms using system specific monitoring tools. The Network Management center is staffed with trained technologists, who acknowledge the event, run available diagnostic routines, and initiates an appropriate response.

The necessary hardware and applications for these services will be provided. Connectivity is required to the Network Management Center where a staff of diagnostic technologists provide 7 x 24 monitoring. Connectivity is either by dial-up PSTN or high-speed (56K) link. Diagnostic connections access via an 800 number line.

Upon receipt of an alert, a system technologist will dial back and execute diagnostics remotely. Often, restoration can be achieved without further intervention. Monitoring is achieved through a variety of fault management tools that are installed on customer systems during the staging process. Whenever a system fault occurs, these tools will automatically phone the Network Management Center and report the alert. This connectivity allows our diagnostic technicians to quickly run remote diagnostics and determine the correct restoration actions.

Dispatch Service

A single point of contact is key to the efficient management of customer issues. Dispatch Operations is staffed with trained Customer Support Representatives that provide a central point of contact for all your service requests. A toll-free, 7-day per week, 24 hour per day (7 x 24)-coordination point for all service requests is standard. All requests are tracked and monitored from beginning to end with a Call Center Operations Case Number. Automatic, time driven, escalation to management of all open issues is an integral part of this process. Wyoming State and Local Government notification and escalation can also be accommodated. Dispatch Operations will receive all calls and dispatch or coordinate appropriate technical support. If on-site service is required, a technician may be dispatched to the site and track the call to closure.

Technical Support

Technical Operations staffs a help desk to provide system level technical support. Product specialists are trained to provide expert troubleshooting assistance and are fully trained on the Wyoming State and Local Government products and systems. The technical staff has access to test systems and can

simulate the configurations to aid in the diagnostic process. Technical Operations is supported by 24 hour monitoring of customer systems, which provides automatic notification of system faults. Technical Operations for severity 2, 3, 4 issues is supported during regular business hours of 8:00 am to 5:00 pm.

Radio Repair

We provide depot repair to the component level on two-way and data radios for conventional and trunked technology, including portables, mobiles, desktop equipment, repeaters and consollettes. Trained technicians diagnose the problem and take appropriate action to repair the radios.

Infrastructure Repair

We provide depot repair to the component level on infrastructure equipment. Trained technicians, who utilize specialized test equipment, perform the equipment repairs in our depot facility. All equipment is repaired to factory specifications and complete system testing is available in the laboratory. Coordination and handling of original equipment manufactured (OEM) repairs are also covered.

Software Subscription Agreement

Software Subscription Agreement (SSA) program consists of periodic Software Enhancement Releases and Core Releases for use with upgrade-capable equipment. We will issue the State and Local Governments periodic bulletins announcing Enhancement Releases and Core Releases. Installation of Enhancement Releases and Core Releases are not included with the SSA.

Customer Support Management

Customer Support Management provides system life cycle account management in conjunction with our field teams. The Customer Support Manager (CSM) is responsible to oversee the execution of a support agreement contract by serving in the role of customer advocate. They serve as a defined point of contact for issue resolution and escalation, monitoring of our contractual performance, providing review and analysis of process metrics and fostering a partnership for continuous improvement with customers. As such, the CSM continually analyzes the performance of the system, and the service provided, through the eyes of the State and Local Government.

A CSM can be located remotely, or may be dedicated to a region of customers and reside in that area. The concept is built upon a model of continuous improvement through the use of metric management and a close working relationship with the customer. The CSM is responsible for development of a documented Customer Support Plan that defines commitments and manages expectations for both the customer and Motorola.

6.2.2.3 Financial Engineering Description

Merging both the technical and service support concepts to the State and Local Government could be attractive. They can realize new technology and purchase best-in-class support services to augment its existing support personnel and operations.

The private sector has available leasing plans that enable clients to manage expenditures and budgets. Under this type of concept, the customers can have consistent, regular monthly payment options to cover the phased implementation schedules. The private sector would build, design, and implement the solution, but the customers would own, manage, and maintain it. Rolled into the lease package could be support services that are updated and in line with the emerging, marketplace technologies. The packages can be tailored to fit the phases and are normally in the five to ten year period.

These leasing/financing options have not been priced. This pricing is available upon request.

This alternative can achieve some of the business outcome goals of the State and Local Government. You will be able to better **manage your costs** due to predictable payments, and be better equipped to **manage your investment** through public/private finance and planning sessions. In addition, the updated support packages can help you manage and operate the system more efficiently. You would gain some effective **deployment of limited technical resources.** The new solution can improve coverage, capacity, and capabilities and can help improve **customer satisfaction and public safety.** This concept would help improve your control of the new network. It would be imperative that your existing support personnel follow the updated processes and "best practices" for system management. This option does not address **revenue generation** since there is no plan to align with the private/public sector to map out access charges and other user fees for statewide participation. There is no privatization concept here. A State and Local Government directed department would have to be formed to market the system. Alternative #2 initially costs more than Alternative #1; however, over time, the value of these new technology and support services will be proved and the costs to operate and manage will be lower. This option does not return the State and Local Government to core competencies and does not gain access to immediate technical expertise. The "best practices" of system management would be the responsibility of the State and Local Governments.

6.2.2.3.1Rough Order of Magnitude (ROM)

A ROM is an estimate that is built around educated assumptions. It is not a budgetary cost that the author is bound to deliver. It is a "range of value." This ROM is a value

that the State and Local Governments can use to weigh and consider alternatives. This definition of a ROM is applied to the conceptual system estimates below.

6.2.2.3.2Pricing Criteria

The payment schedule below includes costs for the system components, which include, but are not limited to:

- Base station trunked site and all auxiliary equipment
- Network communication transport system(s) to provide site connectivity
- Implementation costs
- Design costs

The price and payment schedule do not include:

- Mobile and portable subscriber units
- Dispatch console positions
- Site improvements, including tower improvement

This pricing is based on a specific system concept that may or may not totally meet the State and Local Government's requirements. Deviation from this concept, based on technical requirements such as site locations, frequencies, and user requirements will change the system concept and system pricing. This is not an offer for sale.

6.2.2.4 System Overview

A Wide Area Digital Trunk Communication network with two (2) zones and fifty (50) RF sites per zone is the basis for this ROM. A one-hundred (100) site digital microwave will be used to interconnect the system components.

6.2.2.4.1Private Sector System Responsibilities

Private Sector will be responsible for the performance of all equipment as provided. The State and Local Governments will assume responsibility for the performance of all other equipment necessary for completion of this project not provided by Private Sector.

- Provide a Project Manager and project implementation team that meet the requirements necessary to implement the State and Local Government system
- Schedule the system upgrades and cutover in agreement with the State and Local Governments so as to minimize the downtime of the system and the impact to the State and Local Governments
- Private Sector will be responsible for coordinating the activities of all Private Sector subcontractors
- Administer safety work procedures for construction and installation
- Install and optimize Private Sector provided equipment
- Execute Acceptance Test Plan
- Provide user training on new equipment
- Develop Fleet Map for the system

6.2.2.4.2The State and Local Government System Responsibilities

The State and Local Governments responsibilities include:

- Provide a designated project manager for system design and implementation
- Host all project meetings
- Provide all travel accommodations for State and Local Government visits to factory staging
- Costs of plan check fees, permit fees, and special use fees, or other fees of a similar nature are the responsibility of the State and Local Governments
- Cost of bonds
- Supply primary commercial power, wiring, and cable terminations

- Supply all FCC, FAA, Zoning, Site Access, and other permits (including but not limited to easements, impact studies, planning commission approval, variances) or any other agreements required to gain use of sites

- Posting the RF license for radio sites prior to testing

- Supply the site links (i.e., telephone circuits, leased T1, etc.) as required to accommodate the audio and data signals required for the Private Sector system. Private Sector will provide the appropriate link specification to the State and Local Governments

- Secure lease agreements or purchase of new site locations and obtain all necessary approvals and permits prior to the scheduled construction date

- Provide facilities (equipment shelter and tower structures) that meet Private Sector's R56 Installation Standards for equipment installation

- Provide adequate space for all equipment installations

- Provide site access as required for project implementation

- Provide programming and installation for all of the subscriber units

- Sign the System Acceptance certificate upon successful execution of the Acceptance Test Plan

6.2.2.4.3General Project Guidelines

- Soil will be normal as defined in electronics industries association standards for steel antenna towers and antennas supporting structures

- Criteria for tower loading is based on the new system implementation only

- Price does not include furnishing plot plans, legal descriptions or site surveys

- No professional engineering inspections are required

6.2.2.5 Project Pricing (Alternative 1 & 2)

Alternative 1

It should be understood that if "Do Nothing, as is" is selected, the State and all Local Governments will need to maintain equipment in use, (estimated to be ~ $2,500,000.00 annually). In addition to annual service cost, existing equipment will eventually require replacement. This cost is estimated to be ~ $ 55,777,362 Range +/- 20%.

Both maintenance and equipment replacement costs are based on the following:

- 92 – Analog repeaters, duplexers, antennas and coaxial line @ ~ $909,880
- 485 – Analog base stations, antennas and coaxial line @ ~ $4,248,600
- 5415 – Analog mobile radios @ ~ $13,537,500
- 8095 – Analog portable radios @ ~ 6,880,750
- 44 – Analog vehicular repeaters @ ~ $435,160
- 87 – Radio console positions @ ~ $2,610,000
- 40 – Sites of microwave radios, antennas and coaxial cable @ ~ $16,000,000
- Services associated with equipment replacement @ ~ 25% of equipment costs is $11,155,472

Alternative 2

Private Sector provided equipment and services. Range +/- 20%

Estimated Alternative # 2, based on the same criteria applied to Alternative #1:

Phase 1 = Albany, Laramie and Carbon Counties
Phase 2 = Natrona, Fremont, Sublette, Converse, Niobrara, Platte, and Goshen Counties
Phase 3 = Sweetwater, Uinta, Lincoln, and Teton Counties
Phase 4 = Park, Hot Springs, Washakie, Big Horn, Sheridan, Johnson, Campbell, Crook, and Weston Counties

Phase-1; (1 year build-out)

- 20– 5-Channel IR sites, 1- Zone Master, Digital microwave for each to each site, all support services, implementation services and installation services as outlined in verbiage, no system management services

PHASE-1 TOTALS: $24,572,000

Phase-2; (1 year build-out)

- 30– 5-Channel IR sites, 1- Zone Master, Digital microwave for each to each site, all support services, implementation services and installation services as outlined in verbiage, no system management services

PHASE-2 TOTALS: $28,139,000

Phase-3; (1 year build-out)

- 30– 5-Channel IR sites, Digital microwave for each to each site, all support services, implementation services and installation services as outlined in verbiage, no system management services

PHASE-3 TOTALS: $19,653,000

Phase-4; (1 year build-out)

- 20– 5-Channel IR sites, Digital microwave for each to each site, all support services, implementation services and installation services as outlined in verbiage, no system management services

PHASE-4 TOTALS: $15,258,000

Alternative two project total, based on a four year build-out : $87,622,000

Equipment requirements to be procured by agency / department / division / etc.

- Mobiles and portable price range; $2,500 – $3,500 each
- Radio console dispatch positions, price range; $10,000 – $50,000 per position

Caveats: This cost estimate does not include applicable tax or freight
This is an estimate only. Not an offer for sale.
These fees are subject to change. This pricing is not transferable.
Assumes industry standard tax exempt structure and non-appropriation clauses.
Various end of term options are available for discussion.

6.2.2.6 Value Proposition

This Alternative # 2 will permit the State and Local Governments to implement a phased statewide digital communication system that will insure a greater degree of public safety through agency interoperability and retention of total network control.

6.2.3 Alternative # 3

This option is an alliance option that can benefit the State of Wyoming and all the Local Governments within the state. The concept attempts to capture all the business outcomes as well as meet the functional and technical requirements of the State and Local Governments.

6.2.3.1 Technology Description

Conceptual Alternative # 3; Public / Private alliance to build, own, operate the new communications network.

The State and Local Governments realize:

- Return to core competencies by the State and Local Government personnel
- Potential fixed annual infrastructure payments driven by the requirements and the timetable of the end users
- Individual agencies are financially responsible for mobiles, portables and console dispatch equipment
- Support services are customized to augment customer(s) resources and those of the alliance partner
- Customized training programs are developed, implemented, ongoing and dynamic
- Infrastructure maintenance becomes the responsibility of the alliance formed
- System capabilities are greatly enhanced to meet the functional requirements of the users
- Interoperability between agencies, departments, cities, counties, etc., are easily accommodated
- System redundancy is inherent in wide-area designs
- Contractual agreements to mitigate risks and liability associated with technology obsolescence, system management, and lifecycle management and spectrum management is now a duty that the private sector is responsible for.

- Revenue generation, cost management and containment, investment management, resource productivity deployment, customer satisfaction and retention are the ultimate goals of this alternative. Experience shows that these goals can be accomplished if the State and Local Governments alliances are achieved.

6.2.3.2 Service Support Description

In recent years, the wireless marketplace has seen a significant migration to complex/wide area systems. These systems have increased in complexity, have a large investment, and greater risk. It has also brought a new form of competition to the private marketplace. These factors all contribute to greater visibility to system failures and increased political and public relation risk. As a result, a new set of standards in the support services for these systems have emerged.

Customers today find themselves faced with limited resources, both personnel and financial making it difficult to be totally self-maintained. They are looking for ways to operate their systems as efficiently as possible with the greatest Return on Investment (ROI). This means that their staff has to stay current with the latest state-of -the-art equipment and operating procedures. Because of the vast changes in technology, customers are having a hard time keeping up with the pace. They do not have the additional capital for training and equipment needed to keep their communication systems operating at peak performance. Also, competition for highly skilled technicians has become fierce. As a result, the high-tech technicians are offered more appealing jobs if they relocate. This increases the training cost creating a constant effort needed to educate.

Customers are also finding it difficult to manage their systems. Trying to stay up on the latest technology, keeping current on the latest software versions, while taking necessary actions towards greater system performance has become overwhelming for many customers. The result is poor performance.

The State and Local Governments will not only receive System Maintenance Services, but also be able to partner on the System Management Services, allowing for maximum system uptime, while reducing their costs. A recommendation includes the following services: Network Management Services, Dispatch Services, Technical Support Services, Infrastructure Repair, On-Site Infrastructure Response, Radio Repair, Software Subscription Services, System Survey and Analysis, Customer Support Manager Services, and a Field Network System Manager. These services are detailed below.

By providing System Maintenance Services that includes On-Site Response, and Network Management Services, the State and Local Governments can concentrate on maintaining the Microwave system, Subscriber installations, and first echelon subscriber repairs throughout the entire state.

6.2.3.3 Management Services

Network Manager

The Network Manager will work directly with the State's and or Local Government representatives as a point of contact for interaction with all internal agencies and third party subcontractors. The Network Manager is ultimately responsible for and may perform or coordinate the following:

- Coordinate service activities and ensure compliance of system service provided under contract
- Oversee preventive maintenance activities

- ❖ Manage emergency repair efforts and escalation procedures
- ❖ Ensure accurate record maintenance and service history statistics
- ❖ Review service information and quality reports generated by the system service database
- ❖ Make adjustments to improve efficiency of the service program
- ❖ Consult the State and Local Governments in the development and implementation of Standard Operating Procedures which covers the policies and procedures associated with the utilization of the digital trunked radio system
- ❖ Conduct monthly meetings with the State officials to review system and service support performance and address technology and/or operations issues that surface
- ❖ Direct the effort for required resources to evaluate, incorporate, and update all system training content and materials as required by new applications and as agencies/departments are added
- ❖ Guide the effort for required resources to evaluate, monitor and assist in license management to ensure the State and Local Governments have frequency resources available to meet current and long-term requirements
- ❖ Notify regional FTR's for complex system issues
- ❖ Uphold all quality standards procedures

Reporting

The Network Manager in concert will provide the following reports to the State and Local Governments with the State Technical operation:

Report Name	Description	Timing
Service History	Summary of work performed by unit	Monthly
Equipment Inventory	Location, model, serial number, quantity	Annual
Preventive Maintenance	Equipment checked with result summary	Quarterly
System Performance	System FNE equipment availability as reported by Manager device	Four week intervals

Additional specific reports may be developed by the Network Manager in conjunction with the information requirements of the State and Local Governments, based on an available information resource.

The following is an example of the information that will be gathered by the remote monitoring system. In addition to this information, the remote monitoring will provide real time alerting of system parameters that do not meet preset standards. This information will automatically notify the Network Management Center of a system alert and initiate a Customer Service Request (CSR).

The gathering and warehousing of all information allows us the ability to provide reports (6-ups) to all parties involved. These reports will assist in administering the network, viewing the current utilization, and making decisions based on the performance of the system. This data can also be used to operate the network, analyze the flow of data, and offer system solutions.

Two sets of 6-up charts are currently available. One is Device Reliability and Availability, and the other is System Utilization and Performance.

Device Reliability and Availability supplies the State with the following information on a monthly basis:

- System Interruptions (total & unplanned) - This graph show a systems performance and measures it by sigma. The amount of failures, total and unplanned are graphically presented over a given period of time, usually 1 year.

- Customer Service Requests Volume - Total number of Customer Service Requests (CSR's) opened for the given months. CSR's are broken into three categories, severity 1, severity 2, and severity 3.

- 4-Week Unplanned Downtime - Identifies area/component related to the cause of downtime. Areas are graphed using the following categories, Zone Controller, Repeater, MBX, Audio Switch, Wireline, DIU, Sites, SmartZone Manager, and CIU. Downtime is measured and graphed in seconds.

- Customer Service Requests (CSR) Service Level - Total number of Customer Service Requests (CSR's) opened for the given months. For each month CSR's are broken into four categories, compliant, non-compliant/severity 1, non-compliant/severity 2, and non-compliant/ severity 3.

- Downtime (root-cause) - Measures actual seconds of downtime and identifies the root-cause. Areas of root-cause are Time Stamped/Missed Data, Site AC Power, Planned Downtime, RFI, Communication Link, Equipment, Software, Systems Test, Generator Test, or Other.

- Customer Service Request (CSR) Cycle Time - Identifies the average CSR cycle time for severity 1 and severity 2 CSR's for the past 12 months. Average cycle time is graphed using hours elapsed.

System Utilization and Performance supplies the State and Local Governments with the following information:

- Figure of Merit - Measures and relates the systems utilization and performance to a sigma standard. Motorola strives for a 6-Sigma standard.

- System Calls (type and quantity) - This chart identifies all calls made through the system, for a given period of time usually by weeks. Calls are identified by the various types, Group, Private, Emergency, and Interconnect.

- System PTTs - All system Push-to-Talks (PTTs) are graphically displayed for weekly intervals. PTTs are separated into two types, Console PTTs and Non-Console PTTs.

- True Busies vs. Time - For each week busy information is collected and displayed in this graph. The quantity of busies is identified along with the date and time they took. Reason for busies are Call Contention, No Site Resource, or No Zone Resource.

- System Busies (true & apparent) - This chart displays the number of busies that took place for one week. Busies are categorized into Call Contention, No Site Resources, No Zone Resources, or Reject.

- Reason for Reject - This graph identifies the reason and quantity of rejects. Information is displayed in weekly blocks and rejects are shown in quantity and category (reason for reject). The rejects are separated into the following categories, Requester, Target, Console, Group, Invalid Site, and Resource.

6.2.3.4 System Maintenance Services

Network Management Service (NMS)

Network Management Service electronically monitors specific elements of the system for events and alarms using system specific monitoring tools. The Network Management center is staffed with trained technologists, who acknowledge the event, run available diagnostic routines, and initiate an appropriate response.

The necessary hardware and applications for these services will be provided. Connectivity is required to the Network Management Center where a staff of diagnostic technologists that provide 7 x 24 monitoring. Connectivity is either by dial-up PSTN or high-speed (56K) link. Diagnostic connections access via an 800 number line.

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Technical Support

Technical Operations staffs a help desk to provide system level technical support. Product specialists are trained to provide expert troubleshooting assistance and are fully trained on the State and Local Government products

and systems. The technical staff has access to test systems and can simulate the State's configurations to aid in the diagnostic process. Technical Operations is supported by 24 hour monitoring of customer systems, which provides automatic notification of system faults. Technical Operations for severity 2,3,4 issues is supported during regular business hours of 8:00am to 5:00pm.

Radio Repair

We provide depot repair to the component level on two-way and data radios for conventional and trunked technology, including portables, mobiles, desktop equipment, repeaters and consollettes. Trained technicians diagnose the problem and take appropriate action to repair the radios.

Infrastructure Repair

We provide depot repair to the component level on infrastructure equipment. Trained technicians, who utilize specialized test equipment, perform the equipment repairs in our depot facility. All equipment is repaired to factory specifications and complete system testing is available in the laboratory. Coordination and handling of Original Equipment Manufactured (OEM) repairs are also covered.

On-Site Infrastructure Response

On-Site Infrastructure Response provides for on-site technician response as determined by pre-defined severity levels and response times, twenty-four (24) hours a day, three hundred sixty five (365) days a year including holidays. On-Site Infrastructure Response includes a one-time yearly System Survey and Analysis Service, also known as a preventative maintenance check. System Survey & Analysis is an operational test done to ensure our customer's fixed network equipment meets original manufacturer's specifications. Technicians

will be dispatched to perform on-site service, provide information to customer regarding system condition, remove failed components for repair, and reinstall new or reconditioned components. When required, specialized support and advance diagnostic assistance is available from Field Technical Representatives.

Severity Response and Restore Requirements

Severity	Response Time	Restore Time
Severity One: System Down or Degraded ≥ 60%	1 Hour	4 Hours
Severity Two: System < 60% Degraded, Non Public Safety Users Affected	4 Hours	12 Hours
Severity Three: Non-Emergency or Technical Questions	Best Effort	Best Effort

Software Subscription Agreement

Software Subscription Agreement (SSA) program consists of periodic Software Enhancement Releases and Core Releases for use with upgrade-capable equipment. We will issue the State periodic bulletins announcing Enhancement Releases and Core Releases. Installation of Enhancement Releases and Core Releases are not included with the SSA.

System Survey and Analysis

We will perform annual operational testing to ensure Wyoming's equipment meets original manufacturer's specifications. This service is available between the hours of 8:00 am and 5:00 pm, Monday through Friday, excluding holidays.

Customer Support Management

Customer Support Management provides system life cycle account management in conjunction with our field teams. The Customer Support Manager (CSM) is responsible to oversee the execution of a support agreement contract by serving in the role of customer advocate. They serve as a defined point of contact for issue resolution and escalation, monitoring of our

contractual performance, providing review and analysis of process metrics and fostering a partnership for continuous improvement with customers. As such, the CSM continually analyzes the performance of the system, and the service provided, through the eyes of the State.

A CSM can be located remotely, or may be dedicated to a region of customers and reside in that area. The concept is built upon a model of continuous improvement through the use of metric management and a close working relationship with the customer. The CSM is responsible for development of a documented Customer Support Plan that defines commitments and manages expectations for both the customer and Motorola.

6.2.3.5 Financial Engineering Description

As in Alternative #2, the State and Local Governments can potentially realize a planned payment schedule when procuring and implementing the phased approach. Under Alternative #3, the phases are now networked managed by the private sector and title of the system can stay with the State and Local Governments or with the private provider. This scenario can call for the private sector to build, own, and co-operate the network or the State and Local Governments could consider owning it and continuing with the co-share alliance operation.
Under a co-share operating alliance, a concept could include the State Local Governments paying the private sector provider a monthly fee. It can be based on a service level aspect and would tie in the State and Local Government's current support personnel to meet the specific, contractual levels. Under either case of owning or not, the task to plan and manage out the phases and the direction to lifecycle manage the technology would be the primary responsibility of the private sector.

This frees the State and Local Governments to focus on most of its business initiatives. Through a co-sharing approach, the alliance can:

- **Sharpen the State and Local Government's focus.** The everyday but necessary system management duties are detailed and siphon off huge amounts of resources and attention. It can be standard practice to mitigate the risk for such critical activities by having the system manager attend to this focus. The State and Local Governments can now concentrate on **deploying its limited resources and focus on its core competencies by employing the private sector to do these tasks**

- **Access Best-Class-Capabilities.** This approach can enable the State and Local Governments to meet one of its goals of accessing the best technology and support available. Collaborating with an organization that has these capabilities can offer clients access to new technology, tools, and techniques that their organizations may not currently possess. This strength is almost immediate and saves the exhaustive time for the State and Local Governments to recruit and retain qualified technical support personnel. This helps the State and Local Governments **deploy its limited resources and also focuses on its core competencies.**

- **Allocate and Co-Share Risks.** Technological change and obsolescence creates tremendous risks when organizations make investments in rapidly changing fields such as wireless networks. The State and Local Governments can select to mitigate portions or all risk when meeting these technological, changing opportunities. Having a private sector manager is key when planning for such decisions as well as acting as a neutral, objective, State and Local Governments advocate. This approach out-sources the politics to achieve correct decision-making ability. It helps the State and Local Governments to **maximize its investment.**

- **Enhance Re-engineering Benefits**. This allows the State and Local Governments to immediately realize best-in-class standards and practices and helps the State and Local Governments to effectively **deploy its human resources.**

Through financial engineering and co-sharing, the private sector can help the State and Local Governments with four key tactical goals:

- **Increase the amount of capital funds available.** This approach can be a first step in reducing the need to invest capital funds in non-core business functions. This redirection could allow the State and Local Governments to utilize its capital funds for core areas. By transferring the ownership of assets, clients are better equipped to meet **investment management** goals.

Financing options have not been priced. This pricing is available upon request.

- **Secure resources not available internally.** Expanding the new system would require the State and Local Governments to recruit qualified personnel. Required, specialized support personnel would be available within the private sector. Again, the risks turn towards the private sector, and the State and Local Governments accomplish its business direction and attracts **new technology resources to the State.**

- **Gain control or help in, out of control functions.** The private sector can help the State and Local Governments to identify and correct any processes that can improve the costs of operating a network, thus improving **cost containment, effectively deploy limited resources, and maximize its investment.**

- **Reduce operating costs.** Similar to the above, best practices and assessments can allow for a reduction in operating costs and **contain or reduce costs over time.**

Alternative #3 can employ many revenue sharing approaches for the State and Local Governments and the private sector. There have been past experiences where the private sector can buy back tower sites , manage, and market them for new State and Local Government revenue streams. Or the private sector can co-share the operational expenses of these sites. Financial engineering allows for the State and Local Governments to budget

every month and plan for both technology improvements and obsolescence reality. This vehicle can also allow for a "refresh of technology" which means that a new value-added technology or upgrade version can be rolled into a lease to enable the State and Local Governments to share in the benefits of the change without abandoning the current network. This option can meet the **revenue generation growth, investment management and ROI maximization goals, resource deployment, cost containment, and customer satisfaction initiatives of the State.**

6.2.3.5.1Rough Order of Magnitude, (ROM)

A ROM is an estimate that is built around educated assumptions. It is not a budgetary cost that the author is bound to deliver. It is a "range of value." This ROM is a value that the State and Local Governments can use to weigh and consider alternatives. This definition of a ROM is applied to the conceptual system estimates below.

6.2.3.5.2Pricing Criteria

The payment schedule below includes costs for the system components, which include, but are not limited to:

- Base station trunked site and all auxiliary equipment
- Network communication transport system(s) to provide site connectivity
- Implementation costs
- Design costs

The price and payment schedule do not include:

- Mobile and portable subscriber units
- Dispatch console positions
- Site improvements, including tower improvement

This pricing is based on a specific system concept that may or may not totally meet the State and Local Government's requirements. Deviation from this concept, based on technical requirements such as site locations, frequencies, and user requirements will change the system concept and system pricing. This is not an offer for sale.

6.2.3.6 System Overview

A Wide Area Digital Trunk Communication network with two (2) zones and fifty (50) RF sites per zone is the basis for this ROM. A one hundred (100) site digital microwave will be used to interconnect the system components.

6.2.3.6.1Private Sector System Responsibilities

Private Sector will be responsible for the performance of all equipment as provided. The State and Local Governments will assume responsibility for the performance of all other equipment necessary for completion of this project not provided by Private Sector.

- Provide a Project Manager and project implementation team that meet the requirements necessary to implement the State and Local Government system
- Schedule the system upgrades and cutover in agreement with the State and Local Governments so as to minimize the downtime of the system and the impact to the State and Local Governments
- Private Sector will be responsible for coordinating the activities of all Private Sector subcontractors
- Administer safety work procedures for construction and installation
- Install and optimize Private Sector provided equipment
- Execute Acceptance Test Plan
- Provide user training on new equipment
- Develop Fleet Map for the system

6.2.3.6.2The State and Local Government System Responsibilities

The State and Local Governments responsibilities include:

- Provide a designated project manager for system design and implementation
- Host all project meetings
- Provide all travel accommodations for State and Local Government visits to factory staging
- Costs of plan check fees, permit fees, and special use fees, or other fees of a similar nature are the responsibility of the State and Local Governments
- Cost of bonds
- Supply primary commercial power, wiring, and cable terminations
- Supply all FCC, FAA, Zoning, Site Access, and other permits (including but not limited to easements, impact studies, planning commission approval, variances) or any other agreements required to gain use of sites

- Posting the RF license for radio sites prior to testing
- Supply the site links (i.e. telephone circuits, leased T1, etc) as required to accommodate the audio and data signals required for the Private Sector system. Private Sector will provide the appropriate link specification to the State and Local Governments
- Secure lease agreements or purchase of new site locations and obtain all necessary approvals and permits prior to the scheduled construction date
- Provide facilities (equipment shelter and tower structures) that meet Private Sector's R56 Installation Standards for equipment installation
- Provide adequate space for all equipment installations
- Provide site access as required for project implementation
- Provide programming and installation for all of the subscriber units
- Sign the System Acceptance certificate upon successful execution of the Acceptance Test Plan

6.2.3.6.3General Project Guidelines

- Soil will be normal as defined in electronics industries association standards for steel antenna towers and antennas supporting structures
- Criteria for tower loading is based on the new system implementation only
- Price does not include furnishing plot plans, legal descriptions or site surveys
- No professional engineering inspections are required

6.2.3.7 Project Pricing (Alternative #3)

Private Sector provided equipment services and System Manager. Range +/- 20%

Estimated Alternative #3 pricing example:

Phase 1 = Albany, Laramie and Carbon Counties
Phase 2 = Natrona, Fremont, Sublette, Converse, Niobrara, Platte, and Goshen Counties
Phase 3 = Sweetwater, Uinta, Lincoln, and Teton Counties
Phase 4 = Park, Hot Springs, Washakie, Big Horn, Sheridan, Johnson, Campbell, Crook, and Weston Counties

Phase-1; (1 year build-out)

- 20– 5-Channel IR sites, 1- Zone Master, Digital microwave for each site, all support services, implementation services, installation services, and system management services as outlined in verbiage.

PHASE-1 TOTALS; $24,997,000

Phase-2; (1 year build-out)

- 30– 5-Channel IR sites, 1- Zone Master, Digital microwave for each site, all support services, implementation services, installation services and system management services as outlined in verbiage.

PHASE-2 TOTALS; $28,661,000

Phase-3; (1 year build-out)

- 30– 5-Channel IR sites, Digital microwave for each site, all support services, implementation services, installation services and system management services as outlined in verbiage.

PHASE-3 TOTALS; $20,160,000

Phase-4; (1 year build-out)

- 20– 5-Channel IR sites, Digital microwave for each, all support services, implementation services installation services and system management services, as outlined in verbiage

PHASE-4 TOTALS; $15,671,000

Alternative three project total, based on a four year build-out $89,489,000

Equipment requirements to be procured by agency / department / division / etc.

- Mobiles and portable price range; $2,500 – $3,500 each
- Radio console dispatch positions, price range; $10,000 – $50,000 per position

Caveats: This cost estimate does not include applicable tax or freight
This is an estimate only. Not an offer for sale.
These fees are subject to change. This pricing is not transferable.
Assumes industry standard tax exempt structure and non-appropriation clauses.
Various end of term options are available for discussion.

6.2.3.8 Value Proposition

Alternative #3 can help the State and Local Governments implement a phased statewide system complete with a co-shared private sector alliance that allows for a predictable revenue and payment stream. It will permit the State and Local Governments to meet its initiatives and control costs. Most importantly, it will shift the risks over to the private sector so that the State and Local Governments can return to core competencies without fear of technology obsolescence.

STATE AND LOCAL GOVERNMENTS OF WYOMING

SECTION VII: IMPACT ANALYSIS

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7. IMPACT ANALYSIS

This section will describe the impact that the three alternative solutions will have upon the State and Local Governments. It will describe what the State and Local Governments can anticipate as a result of their decision. Since timing was of the essence to deliver this study, a more visually friendly matrix will help rank the impact for each conceptual solution.

7.1 ALTERNATIVE # 1

Staying with the "as is" system will only increase the liabilities for the State and Local Governments. Given the budgets, personnel, and processes available, the aged system has been operated and maintained well by WYDOT and independent private service providers. Even with these "best efforts," the system will further deteriorate over time, and is likely to be the most expensive option over time. This alternative continues to increase the risk and liability in life threatening situations. If the trend of recruiting and retaining qualified technicians continues to decrease for the State and Local Government, what happens to the support structure? Do the State and Local Governments want to take that chance?

Alternative 1 does not meet any of the State's valued business outcomes and initiatives, but does , on the surface, identify yearly costs and the support personnel are very familiar with the operational characteristics of the system. The State and Local Governments know the limitations of the system and can adapt: however, there are several, independent systems scattered throughout the State that are not connected with the system. They also do not offer any revenue streams to combat the operating costs. There is no need to question the procurement and legal charters of the State and Local Governments, since the "as is" is just that. There is no need to "push" the legislature for a new system given this alternative. Hopefully the State and Local Governments would get by with doing more with less.

7.2 ALTERNATIVE # 2

Alternative #2's impact begins to improve the condition of the State and Local Government's wireless communication system. Having a phased, purchased and implemented plan will permit the State and Local Governments to reduce risks and liability and provide for increased coverage, capability, control, and capacity. The value of this approach will increase the State and Local Government's user group base. This option can help meet cost containment, investment management, and, to some extent, a more efficient deployment of its limited technical resources.

The impact for this alternative involves the revenue stream marketing programs, and core competencies goals of the State and Local Governments. Since Alternative #2 calls for the State and Local Governments to system manage and maintain the network. Will the State and Local Government have the sufficient resources to market and operate a much larger user base, providing that all the independent systems join in?
From a service perspective, private sector support programs can increase the State's technical deployment of resources, but does not manage the network nor help plan out the migration, refresh, and technology selection decisions throughout the life cycle of the technology. Technically, the personnel impact is low, however, with a new technology, these resources will be encountering the need for new skill sets, both technically and operationally.
Can the State and Local Governments recruit and keep qualified technicians? Does a State and Local Government system operated and maintained meet the return to core competencies goal of the State? The costs of this approach overtime will be somewhat stable only if the current State and local support structure is trained and is accountable for best-in-class processes over the lifecycle of the system.

In addition, the State would have to research and challenge the existing procurement laws and charters to enable this plan to work.

7.3 ALTERNATIVE # 3

This option attempts to meet all of the State and Local Government's valued business outcomes as well as offer the State and Local Governments a public/private alliance in designing, implementing, managing, and maintaining a new solution. The phased approach could be owned by the private sector but would be co-managed and maintained by the alliance. The existing State and Local support personnel would be integral in the operation plan. Through this alliance, the State and Local Governments would be able to refocus more on core competencies since the operation and service level risks are now mitigated to the private sector, not to the public. This option allows for increased control, capability, coverage, and capacity. By contractually having the private sector be responsible for a level of service and for the technology planning and selection functions (migration, refresh strategies, etc.), the State and Local Governments uses the network as an operational tool, much like a telephone system.
The private sector now is accountable for the uptime of the network, and the State can now maximize the investment of this technology selection through best practices. Best practices can impact the State and Local Governments because costs can be contained, resources can be deployed better, public safety and confidence can be taken to a higher level, and innovative revenue stream programs can be implemented.
Over time, costs can be on a downslope since the alliance can leverage off processes and personnel to affect the optimum operation. Like Alternative #2 above, the State and Local Governments would have to enable this plan through procurement and legislative changes.

The following is a matrix depicting each alternative and its impact:

Selection Criteria

	Cost	Coverage	Capability	Control	Capacity	Value	Focus	Safety
#1								
#2								
#3								

Legend:

 No Benefit

 Little Benefit

 Average Benefit

 Good Benefit

 Best in Class Benefit

STATE AND LOCAL GOVERNMENTS OF WYOMING

SECTION VIII: RECOMMENDATIONS

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8. RECOMMENDATIONS

The State and Local Governments need to select an alternative. They should rank the alternatives given the solution criteria discussed. The antiquated equipment, obsolete, non-interoperable, hardware-based systems, and the operational processes are at present beyond beneficial use to the entities and general public. The risk and liability to the State and Local Governments are severe. The aforementioned alternative choices attempt to offer the State and Local Governments concepts to address the opportunity areas.

The opportunity areas identified were:

- Improving an aged and outdated system
- Developing best-in-class operational system management and service support processes
- Focusing on creating a more proactive political and legislative voice in funding
- Launching the next communications network solution

The State and Local Governments should consider taking these "next steps"

- Develop strategic alliances with the Private Sector
- Identify a Legislative "Torch Bearer" to drive the budget and focus on a new communication solution
- Appoint a Budget Owner and develop a Phased Implementation Plan
- Elicit aid from an Executive Sponsor

A well-executed solution will accomplish the State and Local Government's initiatives, increase public safety, augment tourism, and reduce risk and liability.