

Appendix L

Request for Information (RFI)

State of Wyoming
Public Safety Mobile Communications Plan

Request for Information
for
An Enhanced Statewide Radio Network

Issued by:
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Section 1 - General Information

1.1 Background

The State of Wyoming presently owns and operates five (5) statewide two-way radio communication systems in the VHF high band (150-174 MHz) for use by the various departments and agencies of the State and for mutual aid between Federal, State, county, and local governments. These networks include: Mutual Aid, Wyoming Highway Patrol, SALECS, WYDOT Maintenance, and State Division of Forestry.

This RFI will assist the State of Wyoming in the development of alternatives to address the current and future radio communications needs of State, County, local and Federal agency users within the State of Wyoming.

It is the desire of these agencies to implement a comprehensive and unified system that corrects the documented deficiencies of the current systems with system enhancements in the following areas:

- Improved interoperability
- Replacement of aging equipment
- Adding data capability
- Adding encryption capability
- Increased reliability
- Adding channels
- Improved coverage
- Meet FCC requirements for refarming.

Detailed needs will be addressed in subsequent sections of this RFI.

This RFI is part of a two phase project that began in October, 2002. Additional background information and a copy of the Assessment Phase 1 (AP1) reports are available on the Internet at Federal Engineering's project website - **FEClientNet**.

URL is <http://www.feclientnet.com/>

Client Code: wyoming

1.2 Existing PSMC Environment

This project is intended to provide all public safety agencies (local, state, and federal) within the state with a unified wireless infrastructure that addresses the existing and future needs of these participating agencies. This plan is not necessarily designed as a total replacement for all existing independent wireless infrastructures, but it is hoped that most of the potential users would realize the benefits of a common infrastructure and migrate to the provided system as funding permits.

In addition to the five major State-operated statewide networks listed in Section 1.1, a significant portion of this network will support the local agencies of county and municipal government and others. This group includes the 23 counties, hundreds of cities and towns, their local governments, police departments, sheriff's offices, fire departments and districts, schools, hospitals, ambulance services, emergency management agencies, roads and bridges, parks and recreation areas, healthcare, hospitals, public service agencies, and interfaces to private/commercial companies such as utilities, railroads, and ranches. It is expected that these agencies will be a valuable asset for potential sites to improve the existing core site's coverage and provide a degree of overlapping redundant coverage. The 46 primary core sites are discussed in Section 3.5.1 and Exhibit 3-1 with an additional 30 secondary core sites listed on Exhibit 3-2 and potential additional sites in Section 3.5.2 and Table A.

1.3 Goals and Objectives

1.3.1 System Goals

The overall goal of the State's public safety community is to build a statewide radio infrastructure to support all interested agencies that chose to join the envisioned new network. It should be noted that the current infrastructure (or portions of them) will be maintained for an indeterminate period of time to allow sufficient time for potential local users to upgrade their subscribers' equipment. In any case, while the enhanced network will be available to any public safety agency in the state, agencies will not be required to use the system.

Although the dominant frequency band used today is VHF high-band (94% of reporting agencies), the State has not ruled out other possible bands that currently have little or no usage, such as: UHF, 700 MHz, and 800 MHz. VHF low-band and 220 MHz systems will not be considered. *In general, vendors should point out the advantages and disadvantages of a particular band selection for the Wyoming set of requirements. At a minimum, this RFI is requesting detailed response in at least two frequency bands.*

1.3.2 System Objectives

The State of Wyoming is inviting qualified vendors to submit responses to this RFI for supplying equipment and designing a state-of-the-art, multi-agency, statewide radio system for two-way wireless communications. *The vendor is responsible for a system that will consist of radio base/repeater stations, desktop control stations, mobile and portable field units (and accessories), network controllers, automatic system diagnostics, upgrading existing consoles as necessary, site alarms, and interfacing with existing base/repeater/control stations during an interim transitional period. The vendor will not be responsible for State-furnished microwave intersite links or existing State/local/Federal towers, shelters,*

emergency generator/UPS power or environmental conditioning.

The State places strong emphasis on ease of use, flexibility of user group programming, priority/shared channel use, excellent signal coverage, richness of the feature set, and high expectation of meeting not only today's needs, but also future needs for the next ten years.

During the information gathering process and as directed by the project Steering Committee, a list of desirable system needs has been compiled (see Exhibit 1-1). These needs are divided into Functional, Operational, Coverage, Interoperability, and Technical areas. They are also further divided into Basic, Optional, and Expandable categories.

- The needs described in the Basic category should be considered essential or mandatory system requirements and designed into the initial system.
- The needs detailed in the Optional category cover items that may not be implemented with the initial system, but the design should accommodate an easy transition.
- The Expandable needs are items that are in a future near-term category that may not be implemented with the initial system unless they can be added without significantly increasing system cost.

Each of these system/agency needs will be addressed in the appropriate RFI sections. *The vendors must include technical and cost information for each of these three categories in their responses.*

Exhibit 1-1. PSMC System Needs

	Basic (B)	Optional (O)	Expandable (E)
Technical (T)	<p>TB-1 Adopt mixed analog/digital capability, if digital is recommended</p> <p>TB-2 Upgrade with only narrowband capable equipment</p> <p>TB-3 Adopt APCO Project 25 standards</p> <p>TB-4 Upgrade network local sites to state standards</p> <p>TB-5 Upgrade state microwave for reliability (closed loops)</p> <p>TB-6 Add generators to all network sites, where necessary</p> <p>TB-7 Upgrade sites with UPS capacity</p>	<p>TO-1 Upgrade towers, where necessary</p> <p>TO-2 Upgrade grounding, where necessary</p> <p>TO-3 Upgrade shelters, where necessary</p> <p>TO-4 Expand generator fuel capacity to 10 days</p> <p>TO-5 Upgrade all network sites for building alarms</p>	<p>TE-1 Add air conditioning, if necessary</p> <p>TE-2 Add/improve site security at remote sites</p>
Functional (F)	<p>FB-1 Add systemwide encryption capability</p> <p>FB-2 Add low-speed (less than 19.2 kbps) data capability</p>	<p>FO-1 Allow casual use capability (i.e., activating sirens)</p> <p>FO-2 Allow paging capability</p> <p>FO-3 Add AVL (automatic vehicle location) capability</p> <p>FO-4 Add subscriber ID capability</p> <p>FO-5 Add high-speed (greater than 19.2 kbps) data capability in selected areas</p>	<p>FE-1 Add mobile video capability</p> <p>FE-2 Add mobile e-mail capability</p> <p>FE-3 Add mobile voice mail capability</p> <p>FE-4 Add mobile card swipe capability</p> <p>FE-5 Add mobile printing capability</p>
Coverage (C)	<p>CB-1 Upgrade statewide mobile coverage</p> <p>CB-2 Upgrade portable coverage in selected areas</p> <p>CB-3 Add statewide roaming capability</p>	<p>CO-1 Upgrade statewide portable coverage</p> <p>CO-2 Upgrade in-building coverage for selected locations</p>	
Interoperability (I)	<p>IB-1 Improve statewide interoperability</p> <p>IB-2 Improve local interagency interoperability</p> <p>IB-3 Improve inter-county/regional interoperability</p> <p>IB-4 Improve interoperability with all state agencies (including WHP)</p> <p>IB-5 Improve interoperability with Federal agencies</p>	<p>IO-1 Add/improve neighboring state interoperability with state networks</p> <p>IO-2 Add/improve neighboring state interoperability with local networks</p>	<p>IE-1 Improve interoperability with all state agencies (excluding WHP)</p>
Operational (O)	<p>OB-1 Add channel(s) for tactical, backup, or reserve needs</p> <p>OB-2 Improve/maximize channel efficiency</p> <p>OB-3 Replace obsolete equipment, only with system upgrades</p> <p>OB-4 Enhance network reliability - add multiple master control points</p>	<p>OO-1 Require panic/emergency button on subscriber units</p>	<p>OE-1 Replace obsolete equipment, short-term</p>

Section 2 - RFI Requirements

2.1 Technical Response

The State is seeking responses to the technical issues and requirements as defined in this RFI. Sufficient materials and explanations should be given for each topic to enable the State to decide the benefits versus the possible disadvantages or limitations of each requirement or solution.

Vendors should propose the approach that they believe is the best solution to the State's requirements. Vendors may offer multiple solutions, but each solution should be treated as a separate submittal. The State encourages the vendors to be creative in their solutions. Vendors should discuss the benefits and disadvantages of each approach in their responses.

The State expects that the vendors will provide more than specification sheets and catalog sheets. Where appropriate, however, vendors may include these with the vendor's proposed offering. The goal is for a complete, well engineered, long-term solution to the stated Wyoming requirements in sufficient detail for the State to determine how it will configure and specify an overall network solution.

2.2 Points of Contact

2.2.1 State - Project Manager

The State's project manager is Robert Wilson. He can be contacted as follows:

Robert Wilson
Telecommunications Program Manager
Wyoming Department of Transportation
State of Wyoming
5300 Bishop Boulevard
Cheyenne, WY 82009-3340
Office: 307-777-4440
Fax: 307-777-4764
Email: Robert.Wilson@dot.state.wy.us

2.2.2 Consultant - Project Manager

The State's consultant is Federal Engineering, Inc. The project manager is Al Rhodes. He can be contacted as follows:

Al Rhodes
Wyoming PSMC Program Manager
Federal Engineering, Inc.
10600 Arrowhead Drive
Fairfax, VA 22030-17306
Office: 703-359-8200
Fax: 703-359-8204
Email: arhodes@fedeng.com

2.2.3 Vendor - RFI Manager

The vendor will provide a single point of contact for the duration of the RFI process. This person will act as the RFI Manager for the vendor and be the primary interface between the State and their Consultant to ask questions or clarify information provided in response to this RFI. The single point of contact should be sent via email to both the State contact Section 2.2.1 and consultant contact Section 2.2.2 as soon as this RFI is received. Vendors should provide the following information on the cover sheet for their response:

Name (of the RFI Manager)
Title
Vendor's name
Mailing address
Phone number
Fax number
Email address.

2.3 Submittal Requirements

Responses to this RFI should be submitted to Robert Wilson at the address listed in Section 2.2.1. Three identical hard copies with CD-ROM discs will be submitted by 3:00 p.m. MDT, on June 24, 2003. It is the sole responsibility of the bidder to ensure that his response arrives at the proper place and time.

This document is a Request For Information to help the State select the best course of action for its enhanced public safety mobile communications system. As such, there is not a mandatory requirement to submit a response to this RFI for eligibility to participate on any future State RFPs.

Vendors should respond to this RFI by inserting their responses directly below each section of the actual RFI text. Submitted items that cannot be inserted should be referenced within your inserted response and included as attachments.

All responses will be clearly marked as follows:

**RESPONSE TO RFI
PSMC PLAN - ENHANCED STATEWIDE RADIO NETWORK
TUESDAY - JUNE 24, 2003 - 3:00 p.m. MDT**

2.4 RFI Schedule

The following tentative dates apply to this RFI:

RFI Milestones	Date
Release of RFI to vendors	June 4, 2003
Vendor questions concerning RFI	ASAP
Vendor responses to RFI due	June 24, 2003
Questions to vendors from state/consultant	July 9, 2003
Vendor responses to questions due	July 16, 2003

Although there is no specific cutoff date for submitting questions concerning the RFI, vendor questions should be submitted as soon as possible to insure sufficient time for State answers. Vendors should direct RFI questions through email to the Consultant's Project Manager as listed in Section 2.2.2.

Vendor questions and State answers will be distributed through the Consultant's Internet website as listed in Section 1.1.

2.5 State Responsibilities

Unless otherwise stated, the vendors submitting responses to this RFI should include all necessary components and services to support this project. The State will assume responsibility for certain management, operational, and infrastructure areas described in subsequent sections.

2.5.1 Management and Operational

At this point in the project planning the State has not determined how the system will be managed or operated. Existing statewide radio networks are managed and operated by WYDOT for the various member agencies. *Vendors are encouraged to describe*

alternative approaches for management and operation as part of their submission.

2.5.2 Infrastructure

2.5.2.1 Site Preparations/Upgrades

The statewide sites managed by WYDOT are under a current renewal project to bring all State sites in line with State standards. Depending on the particular existing core site, this may include: additional shelter space or replacement, tower improvements or replacement, additions to environmental conditioning, improvements to the grounding systems, and additions of generator (and/or UPS) backup capabilities. Sites that are planned for the microwave backbone upgrade will also be handled in a similar manner or they may be totally new sites. *Vendors should assume that adequate infrastructure exists at each site to support the needs in these areas.*

The State will assume the responsibility to upgrade non-State sites that may be used within the scope of this project.

2.5.2.2 Backbone Communications

WYDOT is currently implementing an upgrade to its existing statewide 2/6 GHz analog microwave network. The enhanced 6 GHz digital network is designed to support the capacity needs of a new PSMC network. While capacity has been addressed, microwave links from State sites to local/Federal base/repeater/control station and/or dispatcher's consoles have not been designed into the current implementation plans. *Vendors should assume that all intersite communications will be provided by the State for your proposed system design.* This is a six-year project under current schedules. WYDOT understands it may have to accelerate the implementation schedule to meet the PSMC network expectations.

2.6 Proposed Implementation Schedule

For purposes of this RFI, it should be assumed that the following tentative project schedule will be used:

RFI Milestones	Tentative Date
Completion of initial project plan	October 2003
Legislative approval to proceed	2Q04
Request for Proposals released	3Q04
Contract(s) issued	4Q04

RFI Milestones	Tentative Date
Design approval	1Q05
Pilot phase implemented	3Q05
Core network implemented	3Q06
Initial system expansion	1Q07

These dates are tentative goals at this time and will be determined as the overall project progresses with legislative support and/or funding. The pilot phase would be a regional operational test bed to prove initial design features before implementing the core statewide system. The core network will include sufficient sites for statewide mobile coverage and interconnection to selected initial system agencies. Once the core statewide system is implemented and fully tested, the system will begin expansion to other interested agencies that are ready to transition onto the new network.

2.7 Information Preparation

All preparations related to any responses to this RFI will be at no cost to the State of Wyoming. This RFI does **not** represent any commitment by the State of Wyoming or any State/local/Federal agency to enter into a contract for services or equipment or otherwise obligate the State of Wyoming, WYDOT, or any other public safety organization associated with this project.

2.8 Vendor Experience

Vendors responding to this RFI will have experience in at least three previous projects of similar size and equipment type, delivered to public safety customers. *Vendors will supply the following information for each reference project: the project name, project location, customer contact (name, address, and phone number), quantities of major equipment items, contract value, implementation timetable, contract problems, unique customer situations resolved, and status for each such previous project.* The State or its consultant may contact any or all referenced customers.

2.9 Installation Plan

Vendors should submit a brief, high-level installation plan with a time line that follows the Section 2.6 Proposed Implementation Schedule. The State and its consultant will review the plan to understand how the vendor envisions the steps, milestones, and time line required to successfully implement a project of this scope.

2.10 Warranty and Maintenance

Vendors should provide their standard and optional warranty policies for all items (including software) for this project, including extra costs not included with the system or component pricing.

WYDOT currently does in-house maintenance on the existing State radio and microwave networks, including installations. However, the scope of this project may be beyond either the desire or capability of WYDOT to perform this work for all State/local/Federal agencies. *Vendors should include in their response what maintenance plans are offered, percentage that will be performed by third-party subcontractors, and estimated annual cost for each item proposed in the response to this RFI.*

Vendors should list repair depots that will service equipment supplied for this project, how long-term system support would be provided, and local/factory installation/service locations in or near Wyoming that could be used for this project.

2.11 Assignment and Subcontracting

The State authorizes vendors to use subcontractors in the delivery of the services and equipment described in their proposals. *Vendors should supply a list of anticipated subcontractors, the work each subcontractor will perform, and the approximate value and percentage of the total project for subcontracted work.*

Section 3 - System Specifications and Required Features

3.1 Standards

The State desires standards-based performance wherever possible. *Vendors should specifically address listed standards presented in AP1, Section 4 at a minimum. If a vendor has additional standards that should be addressed, they should provide the applicable standards by name, reference number and a brief description of what the standard addresses.* The State does **not** want the vendors supplying the actual standards' documents.

As presented in Exhibit 1-1:

Basic Requirements

TB-3 Adopt APCO Project 25 - Require network design and equipment to have P25 compatibility.

The State has adopted the APCO Project 25 standards for the new system. The system and all applicable components should be APCO 25 compatible or compliant. Table B lists the current Project 25 standards. Unless otherwise stated, it will be assumed that the proposed system and its components presented are fully compliant. *Vendors should state that their solution is fully compatible and compliant or specifically address P25 standards that are not followed and why.*

Vendors will NOT be required to make site improvements on any site used in this project. This does not apply to required vendor supplied radio and related equipment. Once the required sites have been mutually selected (by the State and successful contractor), the State will provide for the upgrades to meet State standards and/or vendor requirements.

The following ten items, as presented in Exhibit 1-1, fall into this category and should NOT be included in the vendors' response:

Basic Requirements

TB-4 Upgrade network local sites to State standards

TB-6 Add generators to all network sites, where necessary

TB-7 Upgrade sites with UPS

Optional Requirements

TO-1 Upgrade towers, where necessary

TO-2 Upgrade grounding, where necessary

TO-3 Upgrade shelters, where necessary

TO-4 Expand generator fuel capacity to 10 days

TO-5 Upgrade all network sites for building alarms

Expandable Requirements

TE-1 Add air conditioning, if necessary

TE-2 Add/improve site security at remote sites

3.2 System Architecture and Design

The system architecture and design should be capable of supporting all potential users (State, County, local, and Federal), reliable operation (high uptime), and easily expandable (adding sites, channels, and users).

As presented in Exhibit 1-1:

Basic Requirements

OB-2 Improve/maximize channel efficiency - Increase channel loading on underutilized channels (per FCC requirements).

There is a need to improve channel efficiency. Agencies are experiencing both overloaded and underutilized channels. The current design will not allow moving traffic from overloaded to underutilized channels. The new system should address this problem. The State desires to implement a network whereby the number of channels is the “right” number. It is commonly thought that many regions have an excessive number of channels that can be consolidated with the proper design. Other regions have the opposite condition of overloaded channels. A network goal is to implement a design that improves channel efficiency while greatly reducing the overall number of channels (and network equipment needed), thereby reducing long-term costs. *Vendors will suggest the “best” technology approach to achieve this goal and use that technology in their cost estimate.*

OB-3 Replace obsolete equipment, only with system upgrades - Existing obsolete radios will only be replaced during system upgrades with equipment compatible to the selected technology. (Note: Expandable Requirement OE-1 Replace obsolete equipment, short-term - Replace obsolete radios as soon as possible with similar technology radios (*i.e.*, conventional, analog, wideband equipment))

OB-3 and OE-1 seem to be contradictory, but there is an urgent need in some cases to replace obsolete equipment. It is preferred that replacement be delayed until the system is upgraded rather than with short-term replacements that would be temporary. The State desires to delay replacement of existing obsolete equipment in the short-term to the extent possible. The State does not desire to replace obsolete radios with similar technology radios that exist today (*i.e.*, conventional, analog, wideband equipment). Even though replacement equipment may not initially be fully connected to the new network, no State funded equipment will be purchased under a resulting contract with equipment that does not fully meet the standards of the new network. At this time it is not anticipated that the vendor **to** supply information or cost estimates for existing technology equipment.

CB-3 Add statewide roaming capability - The new system should have the capability for any user to operate anywhere in the State on their talk channel and to communicate to their normal talk group.

While all users do not need statewide roaming, many have requested it. Not every user will need this functionality on a day-to-day basis, however some agencies and their officers do. It is highly likely that the majority of users will need this functionality during special events, emergencies, or as they travel throughout the State. The system will have the capability to allow any user on any talk group or channel to roam anywhere in the state and maintain communications within their talk group. *Vendors should provide a system design and cost estimate that will address this need.*

TB-1 Adopt mixed analog/digital capability, if digital is recommended - If a digital system is recommended, the network will support analog channels and subscriber equipment.

During the transition period from existing systems to the enhanced network, it is especially important that users are able to use the existing analog conventional equipment. In that light, the new network should allow both analog and digital subscriber equipment. While the State has chosen to support APCO Project 25 standards (a digital technology) for the new network and subscriber equipment, the network should be capable of supporting existing non-digital, non APCO 25 subscriber equipment during the transition period. *Vendors should describe this capability for their proposed system including limitations that it will have interoperating with the existing wideband, analog, conventional equipment (on the same public safety frequency band). Vendors should disclose any additional costs to meet this requirement and if there are any viable alternatives to accomplishing this goal.*

TB-2 Upgrade with only narrowband capable equipment - Any and all network/subscriber upgrades will be required to have narrowband capability.

FCC refarming is an issue that must be addressed for the vast majority of agencies within the public safety community of Wyoming (those operating below 512 MHz). New equipment must be compliant with the required 12.5 kHz narrowband FCC standards. The State will not accept replacement of this wideband equipment with equipment that does not meet the FCC's refarming requirements. The design of the new infrastructure and cost estimate must fully support this requirement. *Vendors should describe the technical limits of their design to interoperate with existing wideband equipment. Vendors should also explain their plans to further reduce the bandwidth on any newly supplied equipment, if and when the FCC requires a further reduction to 6.25 kHz channels.*

Optional Requirements

FO-3 Add AVL (automatic vehicle location) capability - The infrastructure should support AVL capabilities, if subscriber radios are so equipped.

AVL is an optional requirement. Current systems do not have AVL capability. The

system must be capable of handling AVL from those subscriber units providing AVL information and passing the information to those that need it. All users and subscriber units will not have this requirement. *Vendors should describe how the AVL process works within their proposed system, including what additions will be required to dispatch consoles and administrator facilities to use the AVL information. The network design and infrastructure cost estimates should include AVL capability, while individual subscriber units should be listed as AVL and non-AVL units including associated cost estimates. Vendors should address whether or not AVL can be added to units supplied initially without AVL, and describe the cost and operational implications of such a change.*

Vendors should supply typical system and site block diagrams for their proposed solutions. Vendors should show optional or alternative solutions with notes explaining the cost differentials and functionality/features added or removed by these changes to the basic proposed solution.

3.3 Intersite Backbone Communications

Intersite backbone communication links are a State responsibility. *The vendors must provide site requirements such as a minimum bandwidth per site (control/housekeeping), additional bandwidths per voice/data channel, and specifications of the link. Vendors should briefly discuss the technical and cost benefits versus disadvantages of dedicated circuits versus IP intersite communications, if the vendor supports both. Vendors should select the appropriate technology that is the “best” fit for the State and the proposed network. Cost estimates provided by vendors must use the selected technology and its ancillary components.*

Note: This information is necessary for the State to configure its microwave network and to generate internal cost projections for the changes.

As presented in Exhibit 1-1:

Basic Requirements

TB-5 Upgrade state microwave for reliability (closed loops) - Convert state’s digital microwave into closed rings, to eliminate single point of failure on backbone network.

The State is in the process of reviewing the cost benefits of increasing reliability on their new high-capacity digital microwave network from the existing single-thread design to a closed loop design. Implementation/conversion to this network is currently in development, with expected completion in 2008. *While this is not a vendor responsibility, vendors should describe the possible effects to reliable radio system operation. Vendors should also address the need for accelerated backbone deployment based on their high level radio migration timetable.*

3.4 Equipment/System Characteristics

3.4.1 Technology

While there is strong support for enhancing the existing infrastructure with state-of-the-art equipment, the State is interested in vendor recommendations regarding the merits in two technology areas: analog vs. digital and conventional vs. trunked. *Vendors should contrast the technical benefits and cost differences between these technologies, identifying which would be "better" for Wyoming and why. Vendors' cost estimates must be based on their choice of technologies. Vendors should provide solutions in at least two frequency bands.*

3.4.2 Reliability

As the ultimate goal is for a single, unified statewide system to service all public safety agencies within the State. It is paramount that the system maintains a high degree of reliability. Target goals are:

- Network control 99.999%
- Site operation 99.9%
- Channel operation 99.5%

Certain technologies, such as trunking, allow single (or multiple) channel failures with minimal negative effects to the user community. *Vendors should provide documentation on component and system reliability for their proposed configuration, including associated costs. This documentation should include a block diagram of the control components and a description of how the system reliability is maintained.*

As presented in Exhibit 1-1:

Basic Requirements

OB-4 Enhance network reliability (add multiple master control points - The network should have multiple (at least two) master control points for reliability/backup for natural disasters, terrorist attack, or equipment failure.

While the master network system control must have redundant components to achieve 99.999% availability, the State also would like a duplicate master control physically separated from the primary control point. The network should maintain 100% of its functionality and features while operating under the secondary control. Vendors should discuss how that can be accomplished and identify the costs of adding a second backup control point. Vendors should describe how the two master control points communicate to maintain identical system information.

3.4.3 Performance Goals

It is desired that the enhanced system should have performance goals that are both demonstrable and measurable. These will be required for system test and acceptance and afterwards during the operational phases of the project.

The primary performance goals during the implementation phase will be to verify complete systemwide and site function/feature testing and in-field coverage validation. Once the system has been accepted and becomes operational, the performance goals will shift system reliability, channel usage/blockage, inoperable equipment, and the like.

Vendors should propose specific service level agreements (SLAs) that are offered either as standard or optional (and associated costs) for their proposed system. The SLAs should include at a minimum:

- *Description (what is being monitored)*
- *Parameters¹ (target percentage of successful completions over what period of time)*
- *Measurement (how SLA performance is measured).*

Note 1: Parameter levels should be determined by the effect on system performance (*i.e.*, network/system outages most critical, site outages next, channel outages/subscriber problems lowest).

Typical examples might include:

Description - Response time to service call

Parameters - 95% of service calls will be responded to within two hours

Measurement - Service log entries

Description - Channel availability

Parameters - All channels will maintain 99.5% availability averaged over a calendar month

Measurement - Automated system records/report of channel outages

Service related performance records may require external and manual tracking of events, such as subscriber unit malfunctions or coverage problems.

System performance should be automatically recorded internally by the system's monitoring capability. *Vendors should list and describe all system performance records the vendor's system will track and for what periods of time.*

3.5 Technical Information

3.5.1 Core Sites

The State of Wyoming has a core of existing public safety radio sites providing statewide coverage. These sites are well established, undergoing site improvements, and being upgraded with a digital intersite microwave. The State wishes to build upon these core sites as they expand coverage and provide communications to local/Federal agencies. *The sites listed in Exhibit 3-1 should be used as primary or initial core sites by vendors in developing a system site list to meet coverage requirements.* The secondary sites listed in Exhibit 3-2 are available to expand the system coverage (where coverage gaps exist) to the levels detailed in Section 3.6.

3.5.2 Available Sites

If the vendor still is unable to meet coverage requirements selecting sites from Exhibits 3-1 and 3-2, the vendor should select sites listed in Table A which covers all public safety sites within the State. Additional information that may be useful is contained in AP1 Appendices D, E, F, and G.

*Vendors should indicate which sites were selected for statewide mobile coverage “List of Vendor Suggested Sites for Statewide Mobile Coverage” and on a second list indicate which sites were selected to **augment** the mobile coverage for statewide portable coverage “List of Vendor Suggested Sites to Augment Statewide Mobile Coverage for Statewide Portable Coverage.”*

<i>List</i>	<i>List Title</i>	<i>Contains</i>
<i>#1</i>	<i>List of Vendor Suggested Sites for Statewide Mobile Coverage</i>	<i>All sites needed to meet 95% mobile coverage statewide</i>
<i>#2</i>	<i>List of Vendor Suggested Sites to Augment Statewide Mobile Coverage for Statewide Portable Coverage</i>	<i>Additional sites beyond #1 to meet 90% portable coverage statewide</i>

List #1 will include all vendor suggested sites for statewide mobile coverage. Lists #1 and #2 will include all vendor suggested sites for statewide portable coverage.

3.6 Radio Coverage

The primary coverage model is for statewide mobile coverage. The target goal is for 95% mobile coverage statewide. All coverage requirements will require measurable and testable in-field validations. *Vendors should provide a statewide coverage plot based on those core sites selected by the vendor in Sections 3.5.1 and/or 3.5.2 (as needed).*

Exhibit 3-1. Wyoming PSMC Primary Core Sites

(Initial core coverage)

ID	Site Name	Coordinates		Elevation (feet)	ID	Site Name	Coordinates		Elevation (feet)
1	1 st Divide	41-16-56	110-46-51	7633	46	Kismet Peak ⁵	43-05-58	110-15-26	8375
2	9 Mile Hill	41-52-52	107-19-21	7723	47	Banner Ridge ⁶	44-36-29	106-55-23	5602
3	77 Hill	42-50-40	104-37-00	5630	48	Basin WTD ⁷	44-22-54	108-02-13	3780
4	Aspen Mountain	41-25-34	109-07-40	8660	49	Casper WTD ⁷	42-51-37	106-17-53	5100
6	Baggs Hill	41-00-21	107-37-19	6685	50	Cheyenne ⁷	41-09-49	104-50-31	6012
8	Casper Mountain	42-44-52	106-18-09	8090	51	Church Buttes ⁶	41-24-55	110-04-55	7040
9	Cedar Mountain	44-29-51	109-09-10	7780	52	Divide Hill ⁶	41-32-56	107-42-59	7325
10	Copper Mountain	43-26-10	107-59-58	8200	53	Flat Top ⁶	42-49-41	105-03-20	5537
11	Dead Indian Hill	44-45-18	109-22-28	8535	54	Laramie ⁷	41-17-00	105-35-20	7185
12	Delaney Rim	41-33-51	108-16-58	7549	55	Lava Mountain ⁶	43-40-30	110-01-49	10350
13	Hogsback	42-19-32	110-19-10	9018	56	Lonetree ⁶	43-23-31	105-23-59	5277
14	Jade Mountain	42-24-04	107-57-33	8191	57	Rock Springs ⁷	41-35-57	109-13-55	6271
15	Jim Creek Hill	44-35-58	106-45-34	4948	58	Rozet Hill ⁶	44-20-19	105-14-54	4820
16	Morton Hill	42-50-24	105-20-06	5557	59	Sheridan ⁷	44-46-23	106-57-22	3745
17	Mount Pisgah	43-59-37	104-09-00	6400	60	Strouss Hill ⁶	41-29-18	106-02-58	7970
18	Muddy Gap Hill	42-21-15	107-29-23	6930	62	Torrington ⁶	42-05-22	104-10-40	4104
19	Oyster Ridge	41-47-26	110-30-29	7775	63	Tisdale Divide ⁶	44-14-01	106-42-00	5330
20	Pine Ridge	42-20-46	105-02-11	5277	64	Waltman Hill ⁶	43-02-14	107-17-17	6434
21	Pumpkin Buttes ²	43-43-22	105-53-00	5990	72	Salt Pass (new) ⁵	42-29-20	110-53-34	8102
23	Sherman (Beacon) Hill	41-15-42	105-25-53	8770					
24	Shirley Mountain	42-09-55	106-34-51	8990					
25	Snow King/Jackson	43-27-08	110-45-11	8005					
26	Torchlite Hill ⁵	44-22-55	107-59-17	4335					
27	Virgin Hill	42-03-35	104-41-43	5484					
28	Windy Ridge	43-29-57	109-41-19	9896					
30	Warren Peak ¹	44-28-50	104-27-30	6657					
31	Sage Junction ⁴	41-50-56	110-50-52	7660					

- Notes:
1. Leased commercial site
 2. WY site w/collocated BLM equipment
 3. Existing BLM site
 4. BLM site (no BLM equipment)
 5. Future State site (radio and/or microwave)
 6. Existing WY microwave relay site
 7. WYDOT office site (with or will have microwave)
 8. Approximate coordinates (needs field survey)

Exhibit 3-2. Wyoming PSMC Secondary Core Sites

(Available for expanded core coverage)

ID	Site Name	Coordinates		Elevation (feet)
32	Limestone Mountain ³	42-34-47	108-42-37	8963
34	Sheep Mountain ³	41-40-44	107-14-14	8134
35	Elk Mountain ³	41-37-58	106-31-38	11200
36	Whiskey Peak ³	42-18-44	107-38-43	9225
37	Buffalo Hill ³	44-21-27	106-39-08	4700
38	Newcastle Hill ³	43-53-08	104-11-01	5056
39	Hunter Mesa ³	44-19-52	106-56-39	7579
40	Black Mountain ³	44-31-49	107-39-45	7096
41	Medicine Butte ³	41-21-05	110-54-27	8599
42	Mount Airy ³	42-50-42	109-56-10	7749
44	Twin Buttes ³	41-50-56	110-50-52	7661
45	Little Mountain ³	41-04-43	109-17-51	8968
65	North Albin ⁵	41-28-37	104-06-06	5368
66	Russell Hill/Pine Bluff ⁵	41-15-29	104-06-17	5344
67	85 South ⁵	41-01-17	104-47-09	6277
68	Whitcomb Hill/County Line ⁵	41-39-01	104-54-06	6035
69	Ruby Knolls ⁵	41-50-17	107-46-21	7183
70	North Flattop ⁵	41-13-17	107-49-58	7823
71	Geneva Summit ⁵	42-19-59	111-08-12	7013
73	Narrows Hill ⁵	42-51-35	110-56-32	7064
74	Rendezvous Peak ⁵	43-35-50	110-52-12	9815
75	Riverton ⁷	43-02-07	108-26-20	5200
76	Diversion Dam ⁵	43-13-42	109-00-29	5157
77	Cedar Ridge ⁵	43-40-14	108-15-41	5185
78	Rattlesnake Ridge ⁵	44-04-02	107-51-56	4599
80	McCullough Peaks ⁵	44-35-14	108-51-06	6397
81	3 Mile Hill ⁵	44-08-23	108-49-19	6598
82	Tisdale Mountain ⁵	43-30-41	106-35-10	5810
83	NW Campbell County ⁸	44-51-00	105-51-52	4185
84	South Pass ⁸	42-34-04	108-40-20	8234

- Notes:
1. Leased commercial site
 2. WY site w/collocated BLM equipment
 3. Existing BLM site
 4. BLM site (no BLM equipment)
 5. Future State site (radio and/or microwave)
 6. Existing W Y microwave relay site
 7. WYDOT office site (with or will have microwave)
 8. Approximate coordinates (needs field survey)

3.6.1 Mobile Coverage

As presented in Exhibit 1-1:

Basic Requirements

CB-1 Improve statewide mobile coverage - Improve mobile coverage in all areas to a common level statewide.

The current systems have different levels of local, regional, and/or statewide coverage. Coverage can and does vary by agency within those areas (i.e., law enforcement may have different coverage from fire protection). The user community desires to equalize coverage for all users within local/regional areas and statewide through a common shared infrastructure. Vendors should design their proposed system to provide 95% mobile coverage statewide.

3.6.2 Portable Coverage

Portable coverage requirements are somewhat different from mobile coverage. While portable coverage may not be economically viable statewide, the State feels that it is a basic requirement to upgrade portable coverage for selected areas (areas that have extensive use of portable units (forest firefighting, municipal officers on foot, etc.) to 90% portable coverage. There are two separate requirements CB-2 and CO-1 listed below. *Vendors should propose solutions for both the basic CB-2 need of selected-area portable coverage and the optional CO-1 need of statewide portable coverage; such as, additional repeater sites, in-vehicle repeaters, or other solutions.*

As presented in Exhibit 1-1:

Basic Requirements

CB-2 Upgrade portable coverage in selected areas - Extend mobile coverage for portables in selected areas (i.e., cities, forests, etc.).

Vendors should propose solutions (including unit costs) that address the basic requirement for selected area portable coverage. This might include the vendor's estimate of typical equipment and costs to increase signal strength for each mobile site to accomplish equivalent portable coverage.

Optional Requirements

CO-1 Upgrade statewide portable coverage - Extend mobile coverage to a similar coverage for portable radios.

The State may decide to provide statewide portable coverage rather than portable coverage in selected areas (see CB-2 above). Vendors should suggest and select additional sites (for a fixed location solution) to be added to those mobile coverage sites selected for Section 3.6.1 or propose an alternate (non-fixed location) solution. Vendors should describe their solution, why it is the best solution for the State to

adopt, point out limitations and negative aspects, and provide cost estimates for their proposed solution.

3.6.3 In-building Coverage

As in statewide portable coverage, the requirement for statewide in-building coverage may not be economically feasible. *Vendors should propose generic technical and cost solutions for selected locations to provide in-building coverage. These solutions can be additional sites for increase margins or in-building solutions.*

As presented in Exhibit 1-1:

Optional Requirements

CO-2 Upgrade in-building coverage for selected locations - *Vendors should recommend method(s) to accomplish in-building coverage.*

Vendors should propose workable solutions with cost estimates to enhance coverage for in-building portable unit use.

3.7 Interfacing/Operating with Existing Systems

The new system must interface and operate with existing in-State systems using different technologies and/or frequencies for at least the transition period or longer if a particular agency chooses not to participate at all. In addition, the State requires interfaces to neighboring states and border communities. *Vendors should provide technical solutions to the various types of possible interfacing concerns likely to be encountered, associated costs, and limitations to interface situations with existing non-Wyoming PSMC project radio systems.*

3.7.1 Mutual Aid

The State operates a statewide mutual aid channel that will probably remain as an analog, conventional, wideband system for the foreseeable future. It will require an interface to the new system to provide interoperability to/from analog, conventional, wideband users.

Vendors should propose a technical solution and cost estimate to interface and integrate the existing State mutual aid network at 24 sites into the new proposed network.

3.7.2 Other Network Components

The earliest migration to the new network is expected to be from agencies using the

existing State and possibly some Federal networks. The pace of transition for the County, local and remaining State agencies may take longer, but these entities will require interoperability with the new network during the interim. To accommodate these agencies, the new system must be capable of interfacing with these existing base/control stations, repeaters, and/or dispatch consoles.

It should be noted that a wide variety of equipment types and manufacturer models will need to be interfaced. *Vendors should describe several typical interface scenarios, limitations, and the associated costs to interface and/or upgrade each typical scenario.*

3.8 Expansion Capacity

3.8.1 Channels

The initial number of talk channels at each existing core site should be five (5). As detailed traffic loading is not available at this time, this would be a desirable compromise between the number of existing talk channels (generally four per site), specific channel loading and the requirements of OB-1. The State desires no fewer than two (2) talk channels at any new site added beyond the core mobile sites for extended portable or in-building coverage. This will maintain a backup channel for redundancy. *Vendors should provide a design that will accommodate additional channel expansion for up to eight talk channels without extensive hardware changes other than the additional channel equipment (i.e., built-in unused and terminated ports for three talk channels at core mobile sites).*

As presented in Exhibit 1-1:

Optional Requirements

OB-1 Add channel(s) for tactical, backup, or reserve needs - Review channel needs at sites and add channel(s) to reduce congestion for tactical, backup or reserve capacity during periods of channel overloading.

Vendors should submit typical site block diagrams of their proposed design and include a text description with estimated the cost of the typical site configuration.

3.8.2 Additional Sites

The system should readily be capable of doubling the initial number of sites without major hardware or software upgrades. The initial number of sites will be based on the number of sites required to provide the 95% mobile coverage specification.

Vendors should provide details describing the process of adding additional sites, including additional network components needed and cost information. Vendors should also provide information on any network system limits that would be of concern to the State, such as the

maximum number of sites that the proposed basic network infrastructure can support.

3.9 Interoperability Requirements

As demonstrated by the requirements in Exhibit 1-1, improved interoperability is a wide spread issue. The interoperability requirements cover local interagency (within a city or county), to regional (between counties), to Federal agencies, neighboring states, and with State agencies. This is due in part to the events of September 11th and the resulting Homeland Security initiatives, but also due to the fact that agencies realize the importance of having to interoperate during natural emergencies or for special events for which the current systems lack capability.

As presented in Exhibit 1-1:

Basic Requirements

IB-1 Improve statewide interoperability - Technical support for interoperability between any PS agency, anywhere within the State.

IB-2 Improve local interagency interoperability - Technical support of local (municipal and county) agency interoperability within the jurisdiction between all PS agencies.

IB-3 Improve inter-county/regional interoperability - Technical support of agency interoperability within a region (multi-county) between all PS agencies.

IB-4 Improve interoperability with all state agencies (including WHP) - Technical support for interoperability between any non-State agency and State agencies including WHP.

IB-5 Improve interoperability with Federal agencies - Technical support for interoperability with all Federal networks.

Optional Requirements

IO-1 Add/improve neighboring state interoperability w/state networks - Technical support for interoperability with neighboring state networks (these may not include local users).

IO-2 Add/improve neighboring state interoperability w/local networks - Technical support for interoperability with neighboring state's local user networks (that are not part of neighboring state's network).

Expandable Requirements

IE-1 Improve interoperability with all state agencies (excluding WHP) - Technical support for interoperability between any non-State agency and State agencies excluding WHP (maintain current exclusive WHP channel).

Note: The current WHP channels are for exclusive use of WHP. Other non-WHP users may not communicate with WHP on these channels. IE-1 and IB-4 are operational rather than technical issues.

The new system should be capable of allowing any subscriber to interoperate with any

other subscriber as will be operationally determined as users are added to the system. The system and its operation must be capable of setting normal routine talk groups and manually creating new talk groups as needed and adding users to them. *Vendors should describe how their solution will meet the above requirements. Further, vendors should indicate how the talk groups are managed, including initially setting up a talk group, adding subscribers to the group, monitoring subscriber use, moving subscribers either permanently or as non-routine situations demand, and should describe where this process occurs. Vendors should detail system limits such as maximum number of talk groups and maximum number of subscribers. The cost model for system infrastructure control and operation should include all necessary items for a complete functional system as proposed by the vendor. Vendors should describe the cost details to expand system capacity beyond the number of sites, number of channels, number of subscribers and features as proposed.*

3.10 System Support Capabilities

The proposed system will have the capability to support voice traffic, mobile and portable data terminals/computers, voice encryption, and automatic vehicle location, status/control systems (user ID, panic alerts, etc.), paging, and other casual use applications as described elsewhere in this RFI. The system and all of its components will be compatible for interconnection and operation with the public switched telephone network (PSTN) and the State's criminal data message switch located at the Wyoming Department of Criminal Investigation (DCI) as an integrated terrestrial and wireless data highway between State and Federal systems.

Vendors should provide a block diagram showing the components of the proposed network and its interfaces to non-network components, and should indicate the degree of compliance with the above-stated requirements for interconnection.

3.11 System Manager Facilities

The proposed system controller will provide control of all the operational and management functions of the proposed multi-site, multi-channel, multi-agency radio system.

The system controller will be provided with a fully redundant, hot-standby controller equipped with an automatic switch over. The system management function will continuously update both controllers for uninterrupted system operation and record keeping.

It is desirable that the system controller(s) be readily expandable for addition sites/channels, dispatch consoles/locations, multiple multi-channel voice recorders, and existing systems. *Vendors should describe how this system controller will operate based*

on their proposal, as well as any configuration and interface limitations as proposed, and identify any associated costs to increase any or all interfaces.

3.12 Subscriber Radio Equipment

Subscriber equipment includes three component types: mobile, portable and control stations. *The vendors will propose subscriber radio equipment that will meet industry standards as shown in the Assessment Phase 1 (AP1) report, Section 4 or as addressed specifically in this section.*

It is estimated that there are more than 6300 mobile and 5000 portable radio units and almost 2700 pagers deployed among Wyoming's public safety community.

3.12.1 Tiers

A minimum of three tiers of mobile and portable subscriber radio units are required (all control stations will be Tier 2):

Tier 1 Basic subscriber radio unit with no added features

Tier 2 Same as Tier 1 with the capability for clear and encrypted voice selection

Tier 3 Same as Tier 2 equipped with DTMF keypad for telephone interconnect applications.

Vendors are encouraged to propose additional tiers or an alternative configuration, if appropriate. Ruggedized portable units will be required for some applications and therefore should be listed as optional under each applicable tier.

3.12.2 Requirements

Vendors should provide subscriber unit information in a matrix detailing the features of each offered subscriber unit. Standard feature and individual optional prices should also be presented.

General Requirements

Vendors should address the following general requirements:

- *Unit model number*
- *Include both front mount and trunk mount units (mobile only)*
- *Units should be of recent FCC type acceptance to meet narrowband "refarming" requirements and designed for the public safety environment*

- *Minimum transmitter RF power output of 30-50 watts (for mobiles and control), 3-5 watts (for portables) and adjustment ranges (to get matched talk-in/talk-out coverage) - if other power outputs are available, provide additional details*
- *Audio output power*
- *Supply a full line of unit accessories*
- *Dimensions and weight*
- *Availability of dual control heads (mobile/control only)*
- *Channel capacity*
- *Frequency range*
- *MIL-STD 810 test procedures*
- *Programming requirements*
- *User-defined buttons*
- *Software upgrade support*
- *DC power requirements under transmit conditions (mobile terminals only)*
- *AC power requirements under transmit conditions (control terminals only)*
- *Standard and optional batteries, include capacity at a duty cycle of 90% standby, 5% transmit, 5% receive (portable only)*
- *Trunking standards supported*
- *Identify if units are cross or multi-band supported?*
- *Over-the-air programming support*
- *Identify if units are capable of cloning?*
- *Identify if channel scanning is supported between different (legacy, non-Wyoming, or non-network) systems? (Note: Legacy could include existing in-band/analog/wideband systems, non-Wyoming could include systems in neighboring states or private systems, and non-network could include Federal/Local systems not integrated in the PSMC network)*
- *Identify if there is an "out-of-range" audio/visual indicator (mobile/portable)?*
- *Identify if a transmitter timeout is an integral part of the units?*

As presented in Exhibit 1-1:

Basic Requirements

FB-1 Add systemwide encryption capability - If encryption capability is needed, determine how many simultaneous channels will be expected at each site (*i.e.*, two channels per site). *Vendors should describe how encryption works on their proposed network. Encryption will be required for both voice and data applications, describe how data encryption is handled differently from voice transmissions. Vendors should respond to the following:*

- *What standards are supported?*
- *Is OTAR supported?*
- *Are dedicated encryption channels required or can all channels support encryption on an as needed basis?*

Vendors should indicate if there are any extra systemwide costs for encryption, and identify what those costs are. Vendor responses for subscriber units should include both clear and encrypted units with their associated costs.

FB-2 Add low-speed (less than 19.2 kbps) mobile data capability - The network should support low-speed data communications, number of channels will be determined later.

Vendors should provide raw data speeds using wide/narrowband channels for their proposed system. Vendors should detail the additional components needed to support a mix of voice and data traffic. The State prefers not to have dedicated data channels. All channels should be available to both voice and data transmissions. Any additional network components needed to support data applications should be shown on an expanded network block diagram showing data components and outside interfaces, including costs associated for data transmissions.

TB-1 Adopt mixed analog/digital capability - If a digital system is recommended, should the network support analog channels/radios.

With adoption of APCO 25 (see TB-3), the network infrastructure will be digital. This requires support of analog channels and radios. Vendors should describe how this will be accomplished and what limitations will result from supporting analog capability, including any additional costs to support analog channel operation.

TB-2 Upgrade with only narrowband capable equipment - Any and all network/subscriber upgrades will be required to have narrowband capability.

Vendors should confirm that their proposal includes only narrowband-capable equipment.

TB-3 Adopt APCO Project 25 - Require network design and equipment to have P25 compatibility.

Vendors should detail which APCO 25, TIA/EIA 102 standards are met: CAI, IMBE, DES, etc. (see standards listing under Table B). Vendors should detail if any standards are not met and why, including consequences to equipment interoperability. Vendor should indicate their ability to upgrading equipment as P25 evolves, and what if any costs would be associated with that upgrade process.

Optional Requirements

FO-3 Add AVL (automatic vehicle location) capability - the infrastructure should support AVL capabilities if subscriber radios are so equipped.

See vendor requirements under FO-3 in Section 3.2.

FO-4 Add subscriber ID capability - Infrastructure should support user ID capabilities if subscriber radios are so equipped.

See vendor requirements under FO-4 in Section 3.16.

FO-5 Add hi-speed (greater than 19.2 kbps) data capability in selected areas - The network infrastructure should be capable of supporting systemwide hi-speed data communications beyond the capability data transmission rates of voice channels.

Vendors should offer solutions for data speeds above 19.2 kbps. The current thought is to have systemwide availability of low-speed data FB-2 and to add higher speed FO-5 in selected areas. Vendors should indicate how they would "mix" low and high speed capabilities, and identify what if any special equipment would be required. Vendors should identify if any higher speeds are available, and if higher data speeds are available in a single dual purpose voice/data subscriber unit. Vendors should fully describe their proposed approach to accomplishing mixed statewide voice/low-speed data with localized higher speed data locations, as well as indicating any additional technical and cost requirements necessary, both for infrastructure and users.

OO-1 Require panic/emergency buttons on subscriber units - Generally a subscriber unit option/requirement, network support required.

Vendors should highlight subscriber units that have this feature, and identify if it is an extra cost option. Vendors should indicate what if any network support is necessary, and what if any network costs are incurred.

Expandable Requirements

FE-3 Add mobile voice mail capability - Network support for voice mail storage when user radio is off, out-of-range, etc.

Vendors should describe if their proposed system has this capability and how voice mail operates. Vendors should identify what if any technical network support is needed and specify the costs of such support.

Vendors should indicate which requirements are system specifications and which are subscriber unit specifications including unit cost consequences.

3.13 Software/Hardware Support

All of the proposed radio system equipment that requires software programming will be capable of being programmed by means of standard IBM-compatible Personal Computers (PC) under a Microsoft Windows® 98 or later operating system with the vendor's special radio equipment interfaces. *Vendors should identify the minimum PC and Windows requirements and what is/is not included in the proposed system at the estimated cost presented.*

Vendors should provide the unit prices and details for all software and programming accessories required for normal operation, management, and control of the proposed radio system. Vendors should describe their policies for software maintenance (annual fees, only when upgrading, etc.), including how software-defined/programmed options are

handled and *if* the cost of any license fee to activate these features.

3.14 System Partitioning

The proposed radio system will be operationally partitioned to serve the radio communications needs of hundreds of agencies within Wyoming. On average a minimum of eight talk group assignments should be available to each agency. *Vendors should define the limits of their proposed system.*

3.15 Paging and Other Casual Use

The vendor should describe the necessary software and hardware additions to include paging functions within the proposed system. Describe the equipment types offered (i.e., one-way/two-way, tone/voice/text, etc.), the complexity of implementation, and associated system and pager features and unit costs. The vendor should assume a total of 3000 pagers.

General Requirements

For text messaging, screen and total message characters

Maximum number of messages stored in a unit

Unique addressable units

Maximum groupings

Priority levels

As presented in Exhibit 1-1:

Optional Requirements

FO-1 Allow casual use capability (i.e., activating sirens) - Users requested use of PSMC system for casual/low traffic uses.

Vendors should describe how this will be accomplished including a block diagram, system costs (if any) to include this capability. This does not include any actual connections at this time or costs for remote radios, programming, etc.

FO-2 Allow paging capability - The network should support paging functions as described early in this section.

3.16 Mobile Data Support

There are three major components required of the vendor to support mobile data communications:

- Data radio (or voice radio with data capability)

- Mobile data computer (and associated software)
- Interface(s) to external data equipment.

This should be an integrated solution, *i.e.*, radio, MDC, external system interfaces, and software. *Vendors should describe how their proposed system will meet this requirement and provide a block diagram showing a typical routing of traffic with components and software required. Vendors should provide technical and cost information for available radios, MDCs, and interfaces to external data networks. While vendors should include operating system software in their proposal, any additional application software should be shown as optional.*

As presented in Exhibit 1-1:

Optional Requirements

FO-3 Add AVL (automatic vehicle location) capability - The infrastructure should support AVL capabilities on subscriber radios so equipped.

Vendors should describe how AVL operates in their proposed solution, and should address the following:

Does AVL require a data-capable radio or can voice only subscriber units have AVL?

Is AVL available for portable radios?

How is the AVL information presented to dispatch and/or administrative personnel?

Vendors should provide a block diagram of the proposed AVL system including a text description and estimated costs. Costs should be separated for network support components, dispatch locations and unit costs for AVL-capable radios. Also see FO-3 under Section 3.2.

FO-4 Add subscriber ID capability - The network infrastructure should support user ID capabilities, if subscriber radios are so equipped.

Vendors should describe how IDs work in their proposed design including how the administrative and/or dispatch personnel access this information. Vendors should indicate if this is an included standard feature or optional capability, and provide cost details if it is optional. Vendors should also describe the need, if any, for system/dispatch support and identify the maximum number of subscriber units that their proposed network system will support.

Expandable Requirements (these are not vendor responsibilities)

FE-1 Add mobile video capability

FE-2 Add mobile e-mail capability

FE-4 Add mobile card swipe capability

FE-5 Add mobile printing capability

These capabilities are related to the application software or peripheral devices installed on the user's MDC and therefore not required for the RFI. Vendors may

introduce the full capabilities of their proposed MDC and available hardware/software additions into their proposal, and should indicate unit costs for software and hardware if appropriate.

3.16.1 Transmission Rates

The State has a basic systemwide requirement for low-speed mobile data and an optional requirement for high-speed data in selected areas. *Vendors should describe their approaches to meeting these requirements, including but not limited to addressing the following:*

- *Would the low-speed requirement be integrated with the voice infrastructure using the same channels?*
- *Would a separate data radio be needed for high-speed data?*
- *What transmission speeds are available?*

As presented in Exhibit 1-1:

Basic Requirements

FB-2 Add low-speed (less than 19.2 kbps) mobile data capability - The network should support low-speed data communications, number of channels will be determined later.

See Section 3.12.2.

Optional Requirements

FO-5 Add hi-speed (greater than 19.2 kbps) data capability in selected areas - The network infrastructure should be capable of supporting systemwide hi-speed data communications beyond the capability data transmission rates of voice channels.

See Section 3.12.2.

3.16.2 Single Mobile Radio

A single dual-purpose (voice/data) radio is preferred for mobile voice and data. *Vendors should indicate the conditions under which this solution could be offered. Vendors should assess if the State should be considering a mixed solution, where:*

Low-speed data and voice are integrated systemwide using a dual-purpose radio and high-speed data is a second option requiring a separate radio or possibly even a different frequency band/technology.

Vendors should address their “best” suggested approach for the state network, both technically and financially. If separate radios are required for the proposed vendor solution, vendors should give details of both including unit cost.

3.17 Recording Facilities

Two of the current statewide networks, SALECS and WHP, record traffic on shared master recording equipment located at the WHP dispatch facility in Cheyenne. Vendors should assume that most, if not all, public safety agencies (law enforcement, EMA, fire agencies) are recording communications at their dispatch locations. There are no requirements within the plan to upgrade recording facilities. This will be an agency-by-agency decision similar to upgrades on dispatch equipment. Several options may appear appropriate:

- Upgrade existing recording equipment as necessary for system interfaces
- Replace existing equipment
- Implement centralized recording capability (is this possible or practical?)

General Requirements

- Simultaneous recording and playback
- "User friendly" features such as indexing to facilitate playback and remote operation
- Provisions to transfer voice communications to local agencies
- One month archiving.

Vendors should provide comments on possible approaches to statewide voice recording. At a minimum vendors should provide brief descriptions of these approaches with estimated costs.

3.18 Training

Vendors should provide a synopsis of all recommended/available training on the proposed system, including: operation of all equipment, programming of features, and maintenance. Details should be included on each class, including:

- *Length of class (days or hours)*
- *Maximum number of students*
- *Cost (per student or class, as appropriate)*
- *On-site at Wyoming locations or off-site at vendor classrooms.*

The State wishes to retain the right to videotape on-site training sessions for future train-the-trainer classes; vendors should indicate any comments regarding this capability.

3.19 Documentation

The State desires that the successful bidder from the RFP process provide one manual of each type for each component furnished, but in no case less than ten manuals of each type. *Vendors should list and describe available manuals for the system and components*

they have proposed, showing which are available at no additional cost (included with purchased equipment) and those available at additional cost including extra quantities for the RFI. Available manuals should at a minimum include:

- *Equipment Operation and Use*
- *Equipment and System Programming*
- *Equipment and System Maintenance.*

3.20 Testing and Acceptance

Note: This item is for future reference and not a response requirement for the RFI, however the State is soliciting comments and vendor suggestions.

Vendors will be required to submit for approval a detailed test plan and individual test procedures after contract award. Official testing will not begin without approved test procedures. The test plan will include, but not limited to a list of tests to be performed and how they will be administered. The test procedures will cover each major equipment type as a separate test (e.g., system/infrastructure, portables, mobiles, and desktop control stations, etc.) and include all RFP requested and product described features/functions. Only one test is required for each type of portable or mobile unit supplied; however, each desktop control station, repeater, dispatch console interfaced be individually tested. After a period of 30 days of on-line use, those components passing tests will be accepted. Final system testing and acceptance will require repeating the initial tests in addition to full system loading tests and verification of usage/accounting software.

Section 4 - Budgetary Cost Estimates

4.1 As Proposed by Vendor

Vendors should propose a complete and total package solution, including all hardware, software, and services as if the radio network was a turnkey project for items included in their response. Vendors should be specific to detail what items are not included as declared as State responsibilities in previous sections of this RFI. Where exact quantities are unknown, vendors should estimate the required quantities based on the needs of the State of Wyoming as presented in this RFI and the previous Assessment Phase Report, and other information learned in Q/A discussions with the State or Consultant contacts listed in Section 2.2.1 and 2.2.2). The assumed/estimated quantities used by the vendor should be stated in the overall list of proposed equipment and services.

4.2 Itemized Costs

Vendors should show itemized unit costs in the overall list of proposed equipment and services to allow the State to adjust quantities (and their costs) reflecting actual overall project costs as the requirements change, or to subdivide areas of responsibility within the system. For example the State might to decide to provide the common infrastructure, while agencies/users would be responsible for their subscriber units and interfaces to their dispatch facilities.

Proposed unit costs should be based on overall anticipated project size, not specific quantities of equipment. The unit costs should include the discounted cost not list prices. Vendors should use the Table C attachments for listing included components and their costs. The examples shown can and should be modified to suit the proposed vendor actual components.

Section 5 - Procurement Options

The State has not determined the final approach that will be used to contract for these capabilities. *Vendors should provide responses to the purchase alternative, and optionally should address the remaining alternatives.*

5.1 Purchase by State

This alternative reflects an outright purchase by the participating entities of the equipment, design services, and implementation of the proposed wireless system.

5.1.1 Radio Infrastructure

While there is no official or unofficial authorization or direction at this point in time, it appears that the State will be responsible for the funding of the public safety mobile communications infrastructure. This will include the network components such as: system controllers, distribution/switching equipment, remote site radio components (radios, controllers, couplers, coaxial feedlines, antennas, system monitoring alarms, and interfaces into the microwave backbone), and other support pieces. As discussed before, the State has responsibility for site upgrades, including: towers, shelters, HVAC, power, microwave backbone, and related items. *Vendors should not include these items within their pricing.*

5.1.2 Subscriber Equipment

It is expected that each State, local, or Federal agency will purchase its own equipment under the eventual PSMC statewide contract. It is possible that State (or Federal) financial assistance will also be made available.

5.1.3 Dispatch Facilities

5.1.3.1 Upgrades

Necessary upgrades to agency dispatch facilities is more uncertain at this point. However the State requests the vendor to propose upgrading solutions for typical types of dispatch consoles. *Vendors should list typical "industry" console types with appropriate assumptions and the required upgrades to become fully functional with the proposed new design and all of its features.*

5.1.3.2 Replacement

Dispatch console replacement is not a requirement for this RFI. As under section 5.1.2, funding for replacement dispatching facilities is not anticipated at this time for inclusion in this project. Therefore agencies wishing to replace their dispatching facilities would enter into contracts on their own off the basic State contract.

5.2 Leasing

The State would like to explore various leasing opportunities for the procurement effort. *Vendors should present an approach to leasing and provide a comparative analysis of the alternatives considered and reasons that this alternative should be considered, if appropriate.*

5.3 Other Vendor Proposals

Vendors are encouraged to suggest other possible approaches to procuring the proposed system.

The State may be interested in partnership agreements whereby the vendor and State partner on co-development of sites. Under a partnership arrangement, the State could offer its sites for development of vendor commercial opportunities in exchange for “services” offered by the vendor. In this scenario the vendor would own and operate the equipment/system and the State would get reduced rates for per subscriber communications. The future network upgrades and network refresh would be included as part of the fixed monthly cost. *Vendors should provide comments on this alternative indicating the advantages and disadvantages to the State.*

The State is interested in exploring trade-in rebates for existing equipment as sites and networks are replaced. As an optional component of their proposal, vendors may suggest their terms and conditions for such an arrangement and identify the advantages and disadvantages of this approach to the State.

Table A - Available Sites

Site Name (CAPS)	Antenna height (above ground in feet)	Unique Lat	Unique Long	Site elevation (above sea level in feet)	Exhibits
BAGGS	39	40.8683	-107.5642	6490	12, 13, 20, & 21
BAGGS	105	41.0058	-107.6219	6686	16, 17, 20, & 21
BAGGS	59	41.0058	-107.6300	6644	10, 11, 20, & 21
BAGGS	80	41.0058	-107.6219	6685	4, 5, 20, & 21
DIXON	26	41.0356	-107.5350	6243	12, 13, 20, & 21
BAGGS	59	41.0369	-107.6572	6243	8, 9, 20, & 21
CHEYENNE1	39	41.0408	-104.7703	5981	14, 15, 20, & 21
LITTLE MOUNTAIN	60	41.0786	-109.2975	8968	18, 19, 20, & 21
GRANITE CA	98	41.0797	-105.1986	7300	10, 11, 20, & 21
LARAMIE	26	41.0958	-105.9758	9600	12, 13, 20, & 21
WOODS LAND	30	41.0972	-105.9761	9557	12, 13, 20, & 21
LONETREE	98	41.1067	-110.2083	8701	8, 9, 20, & 21
CHEYENNE	46	41.1094	-104.7986	6007	12, 13, 20, & 21
LONETREE	69	41.1139	-110.2333	8501	10, 11, 20, & 21
CHEYENNE1	49	41.1158	-104.7708	5984	16, 17, 20, & 21
CHEYENNE1	39	41.1164	-104.7708	5984	10, 11, 20, & 21
CHEYENNE1	98	41.1175	-104.8100	6001	10, 11, 20, & 21
CHEYENNE2	161	41.1214	-104.8394	6001	10, 11, 20, & 21
CHEYENNE	26	41.1283	-104.7100	5942	12, 13, 20, & 21
PINE BLUFF	112	41.1333	-104.0850	5289	14, 15, 20, & 21
CHEYENNE3	39	41.1342	-104.8186	6171	10, 11, 20, & 21
CHEYENNE2	59	41.1350	-104.8217	6001	10, 11, 20, & 21
CHEYENNE	89	41.1361	-104.8219	6076	12, 13, 20, & 21
CHEYENNE	89	41.1383	-104.8219	6076	12, 13, 20, & 21
CHEYENNE	30	41.1386	-104.7869	6083	14, 15, 20, & 21
CHEYENNE	39	41.1392	-104.8200	6076	12, 13, 20, & 21
CHEYENNE	79	41.1408	-104.8208	6093	12, 13, 20, & 21
CHEYENNE1	112	41.1408	-104.8150	6086	14, 15, 20, & 21
CHEYENNE	82	41.1411	-104.8208	6099	4, 5, 20, & 21
CHEYENNE	135	41.1425	-104.7842	6076	12, 13, 20, & 21
PINE BLUFF	98	41.1428	-104.0392	5371	10, 11, 20, & 21
WARREN AFB	39	41.1500	-104.8508	6142	14, 15, 20, & 21
PINE BLUFF	89	41.1564	-104.0700	5341	4, 5, 20, & 21
CHEYENNE3	161	41.1594	-104.7219	6115	14, 15, 20, & 21
CHEYENNE	49	41.1636	-104.8419	6063	16, 17, 20, & 21
CHEYENNE2	10	41.1653	-104.8383	6086	10, 11, 20, & 21
LARAMIE	59	41.1667	-105.8956	7356	12, 13, 20, & 21
PINE BLUFF	56	41.1669	-104.0700	5098	12, 13, 20, & 21
CHEYENNE1	30	41.1697	-104.7611	6129	8, 9, 20, & 21
CHEYENNE	46	41.1706	-104.8419	6191	12, 13, 20, & 21
CHEYENNE	30	41.1847	-104.8931	6335	12, 13, 20, & 21

Site Name (CAPS)	Antenna height (above ground in feet)	Unique Lat	Unique Long	Site elevation (above sea level in feet)	Exhibits
CHEYENNE2	36	41.1883	-104.8925	6362	14, 15, 20, & 21
BURNS	75	41.1897	-104.3569	5541	10, 11, 20, & 21
BURNS	151	41.1897	-104.3528	5509	12, 13, 20, & 21
BURNS	79	41.1908	-104.3639	5489	14, 15, 20, & 21
CHEYENNE2	30	41.2028	-104.8272	6204	8, 9, 20, & 21
ENCAMPMENT1	59	41.2031	-106.8056	7434	10, 11, 20, & 21
ENCAMPMENT	49	41.2075	-106.7933	7339	10, 11, 20, & 21
ENCAMPMENT2	49	41.2081	-106.7944	7339	10, 11, 20, & 21
MOUNTAIN V	59	41.2097	-110.1050	8599	12, 13, 20, & 21
CHEYENNE	161	41.2142	-104.8589	6381	12, 13, 20, & 21
LIMESTONE MOUNTAIN	18	41.2211	-107.8342	7822	18, 19, 20, & 21
EVANSTON1	79	41.2394	-110.9672	7402	8, 9, 20, & 21
EVANSTON	39	41.2486	-111.0464	6745	10, 11, 20, & 21
EVANSTON	59	41.2525	-110.8500	5942	12, 13, 20, & 21
EVANSTON1	39	41.2583	-110.9500	7034	10, 11, 20, & 21
CHEYENNE	120	41.2622	-105.4308	8770	4, 5, 20, & 21
MOUNTAIN V	20	41.2625	-110.3447	7028	16, 17, 20, & 21
LARAMIE1	112	41.2625	-105.4306	8750	16, 17, 20, & 21
EVANSTON2	69	41.2633	-110.9589	6749	10, 11, 20, & 21
EVANSTON3	82	41.2656	-110.9728	7001	14, 15, 20, & 21
EVANSTON2	69	41.2658	-110.9681	6900	10, 11, 20, & 21
EVANSTON	39	41.2661	-110.9639	6749	10, 11, 20, & 21
EVANSTON1	36	41.2664	-110.9211	6821	16, 17, 20, & 21
LARAMIE1	79	41.2683	-105.4344	8822	14, 15, 20, & 21
MOUNTAIN V	20	41.2692	-110.3361	6791	8, 9, 20, & 21
EVANSTON	62	41.2694	-110.9172	6768	12, 13, 20, & 21
EVANSTON	80	41.2819	-110.7814	7633	4, 5, 20, & 21
EVANSTON	60	41.2822	-110.7808	7633	4, 5, 20, & 21
EVANSTON	80	41.2839	-110.7708	7633	4, 5, 20, & 21
EVANSTON	98	41.2842	-110.7703	7635	10, 11, 20, & 21
LARAMIE	79	41.2878	-105.5936	7169	12, 13, 20, & 21
CENTENNIAL	59	41.2975	-106.1378	2241	12, 13, 20, & 21
FORT BRIDG	20	41.3083	-110.3861	6657	8, 9, 20, & 21
LARAMIE	69	41.3083	-105.5833	7320	12, 13, 20, & 21
LARAMIE	39	41.3100	-105.5867	7280	12, 13, 20, & 21
LARAMIE1	26	41.3100	-105.5806	7159	10, 11, 20, & 21
LARAMIE	151	41.3103	-105.5756	2192	12, 13, 20, & 21
LARAMIE	95	41.3114	-105.5908	7162	10, 11, 20, & 21
LARAMIE	167	41.3114	-105.5533	7349	10, 11, 20, & 21
LARAMIE	121	41.3114	-105.1867	7349	12, 13, 20, & 21
LARAMIE1	98	41.3119	-105.5925	7165	8, 9, 20, & 21
LARAMIE	112	41.3128	-105.8931	7169	12, 13, 20, & 21
LARAMIE	151	41.3128	-105.5750	7195	12, 13, 20, & 21
LARAMIE2	10	41.3131	-105.5692	7159	10, 11, 20, & 21

Site Name (CAPS)	Antenna height (above ground in feet)	Unique Lat	Unique Long	Site elevation (above sea level in feet)	Exhibits
LARAMIE2	75	41.3133	-105.5561	7254	14, 15, 20, & 21
LARAMIE	95	41.3136	-105.5833	7182	12, 13, 20, & 21
LARAMIE	82	41.3142	-105.5967	7300	12, 13, 20, & 21
FORT BRIDG	16	41.3153	-110.4519	6699	12, 13, 20, & 21
LARAMIE	49	41.3164	-105.5833	7231	12, 13, 20, & 21
LARAMIE	49	41.3167	-105.6667	7277	12, 13, 20, & 21
LARAMIE	49	41.3167	-105.5833	0	12, 13, 20, & 21
LYMAN	112	41.3169	-110.2869	6795	10, 11, 20, & 21
D	0	41.3333	-110.5000	0	8, 9, 20, & 21
CENTENNIAL	49	41.3347	-106.1875	9121	14, 15, 20, & 21
LYMAN	59	41.3389	-110.2917	6696	4, 5, 20, & 21
EVANSTON	79	41.3481	-110.9000	8901	16, 17, 20, & 21
MEDICINE BUTTE	36	41.3514	-110.9075	8599	18, 19, 20, & 21
EVANSTON3	98	41.3525	-110.9072	8550	8, 9, 20, & 21
EVANSTON	98	41.3536	-110.9086	8560	12, 13, 20, & 21
CHEYENNE	102	41.3653	-105.1467	6306	12, 13, 20, & 21
SARATOGA	26	41.4222	-106.8069	6785	12, 13, 20, & 21
ALBINE	364	41.4247	-104.1300	5430	12, 13, 20, & 21
ROCKSPRINGS	80	41.4258	-109.1283	8660	4, 5, 20, & 21
ROCK SPRIN	98	41.4261	-109.1278	8659	10, 11, 20, & 21
ROCK SPRIN	79	41.4328	-109.1175	8619	12, 13, 20, & 21
SEDSKADE-ASPEN MTN	40.02756	41.4344	-109.1161	8654.856	18, 19, 20, & 21
ROCK SPRIN	98	41.4350	-109.1175	8520	4, 5, 20, & 21
SARATOGA	59	41.4453	-106.8083	6939	12, 13, 20, & 21
ROCK SPRIN	98	41.4583	-109.0944	8661	4, 5, 20, & 21
SARATOGA	49	41.4658	-106.8064	6706	8, 9, 20, & 21
ROCK SPRIN	79	41.4972	-109.3433	7644	12, 13, 20, & 21
GREEN RIVE	39	41.5142	-109.4819	7001	12, 13, 20, & 21
GREEN RIVE	39	41.5144	-109.4822	6693	8, 9, 20, & 21
ALBIN	49	41.5600	-104.0600	5335	14, 15, 20, & 21
WAMSUTTER	80	41.5642	-108.2831	80	4, 5, 20, & 21
ROCK SPRIN	39	41.5903	-109.2275	6460	10, 11, 20, & 21
ROCK SPRIN	75	41.5911	-109.2200	6250	8, 9, 20, & 21
ROCK SPRIN	39	41.5958	-109.0672	6745	12, 13, 20, & 21
GREEN RIVE	20	41.6128	-109.4700	6175	10, 11, 20, & 21
RAWLINS1	79	41.6192	-107.3908	8540	10, 11, 20, & 21
ELK MOUNTA	49	41.6283	-106.5333	11001	12, 13, 20, & 21
ELK MOUNTAIN	10	41.6328	-106.5272	11200	18, 19, 20, & 21
ELK MOUNTA	59	41.6336	-106.5250	11161	8, 9, 20, & 21
RAWLINS	16	41.6344	-106.5250	11155	12, 13, 20, & 21
RAWLINS	60	41.6356	-107.3894	8540	14, 15, 20, & 21
ROCK SPRIN	30	41.6381	-109.2489	6319	12, 13, 20, & 21
LAGRANGE	131	41.6383	-104.1531	4659	8, 9, 20, & 21
RAWLINS	59	41.6400	-107.2458	7789	12, 13, 20, & 21

Site Name (CAPS)	Antenna height (above ground in feet)	Unique Lat	Unique Long	Site elevation (above sea level in feet)	Exhibits
ELK MOUNTA	39	41.6778	-106.4144	7290	8, 9, 20, & 21
SHEEP MOUNTAIN	72	41.6789	-107.2372	8134	18, 19, 20, & 21
RAWLINS	39	41.6811	-107.2378	8110	12, 13, 20, & 21
WAMSUTTER1	66	41.6894	-107.9814	6749	10, 11, 20, & 21
ELK MOUNTA	33	41.6919	-106.4239	7264	16, 17, 20, & 21
LARAMIE	49	41.7067	-105.9133	7408	12, 13, 20, & 21
ROCK RIVER	20	41.7311	-106.0061	6998	12, 13, 20, & 21
ROCK RIVER	20	41.7433	-105.9767	6411	12, 13, 20, & 21
ROCK RIVER2	20	41.7442	-105.9739	6411	10, 11, 20, & 21
CRESTON	121	41.7447	-107.8289	7234	14, 15, 20, & 21
HAWK SPRIN	151	41.7483	-104.4978	5430	8, 9, 20, & 21
ROCK RIVER	49	41.7494	-105.9717	7080	12, 13, 20, & 21
RAWLINS	66	41.7614	-107.2161	6726	12, 13, 20, & 21
CHUGWATER1	46	41.7619	-104.8139	5279	16, 17, 20, & 21
CHUGWATER	49	41.7650	-104.8350	5249	12, 13, 20, & 21
SINCLAIR	30	41.7672	-107.1250	6588	12, 13, 20, & 21
RAWLINS4	89	41.7711	-107.2375	6699	10, 11, 20, & 21
SINCLAIR	33	41.7792	-107.1164	6749	8, 9, 20, & 21
DIAMONDVIL	36	41.7803	-110.5361	6886	12, 13, 20, & 21
RAWLINS	49	41.7861	-107.2472	6739	12, 13, 20, & 21
RAWLINS5	98	41.7883	-107.2386	6785	10, 11, 20, & 21
RAWLINS	98	41.7897	-107.2642	6870	14, 15, 20, & 21
KEMMERER	80	41.7903	-100.5081	7775	4, 5, 20, & 21
KEMMERER1	49	41.7906	-110.5428	6778	14, 15, 20, & 21
KEMMERER	7	41.7906	-110.5361	6923	10, 11, 20, & 21
KEMMERER	121	41.7906	-110.5075	7776	16, 17, 20, & 21
KEMMERER	20	41.7914	-110.5081	6969	12, 13, 20, & 21
RAWLINS	49	41.7917	-107.2367	6706	12, 13, 20, & 21
RAWLINS	69	41.7933	-107.2283	6739	10, 11, 20, & 21
HAWK SPRIN	59	41.7997	-104.1378	4281	8, 9, 20, & 21
HANNA	26	41.8372	-106.5653	6778	12, 13, 20, & 21
KEMMERER2	69	41.8389	-110.5039	7956	14, 15, 20, & 21
QUELAY PEAK	36	41.8389	-110.5028	8018	18, 19, 20, & 21
KEMMERER	70	41.8389	-110.5039	7256	8, 9, 20, & 21
FOSSLBUT-CHICKEN CREEK	43.3084	41.8472	-110.7767	6771.654	18, 19, 20, & 21
SAGE	80	41.8489	-110.8478	7660	4, 5, 20, & 21
HANNA1	20	41.8500	-106.5667	6811	8, 9, 20, & 21
HANNA	79	41.8556	-106.5761	6788	8, 9, 20, & 21
HANNA2	49	41.8722	-106.5611	6801	8, 9, 20, & 21
RAWLINS	105	41.8811	-107.3225	7723	16, 17, 20, & 21
RAWLINS3	98	41.8811	-107.3244	7320	10, 11, 20, & 21
FOSSLBUT-DEMPSEY RIDGE	43.3084	41.8928	-110.7772	8057.743	18, 19, 20, & 21
MEDICINE B	30	41.8950	-106.2047	6581	10, 11, 20, & 21
SEDSKADE-GREEN RIVER	49.87008	41.9003	-109.8414	6059.711	18, 19, 20, & 21

Site Name (CAPS)	Antenna height (above ground in feet)	Unique Lat	Unique Long	Site elevation (above sea level in feet)	Exhibits
YODER	49	41.9172	-104.2953	4472	12, 13, 20, & 21
VETERAN1	39	41.9458	-104.3950	4229	8, 9, 20, & 21
COKEVILLE	49	41.9578	-110.8133	8399	12, 13, 20, & 21
VETERAN2	49	41.9653	-104.3800	4219	8, 9, 20, & 21
MEDICINE B	39	41.9889	-106.2017	6558	12, 13, 20, & 21
WHEATLAND	59	42.0089	-104.8225	4970	12, 13, 20, & 21
WHEATLAND	30	42.0353	-105.0822	4800	12, 13, 20, & 21
RIVERTON	59	42.0417	-108.4297	5098	12, 13, 20, & 21
WHEATLAND	180	42.0458	-104.6981	5390	12, 13, 20, & 21
WHEATLAND	46	42.0525	-105.0603	4741	4, 5, 20, & 21
WHEATLAND	39	42.0547	-104.9550	4760	12, 13, 20, & 21
TORRINGTON	20	42.0547	-104.1756	4101	12, 13, 20, & 21
WHEATLAND	66	42.0567	-104.9606	4747	8, 9, 20, & 21
WHEATLAND2	59	42.0572	-104.9592	4774	10, 11, 20, & 21
WHEATLAND	120	42.0597	-104.6961	5484	4, 5, 20, & 21
WHEATLAND	171	42.0600	-104.6958	5486	10, 11, 20, & 21
TORRINGTON	39	42.0622	-104.1808	4160	10, 11, 20, & 21
TORRINGTON	135	42.0644	-104.1875	4101	12, 13, 20, & 21
TORRINGTON2	26	42.0650	-104.1831	4160	10, 11, 20, & 21
TORRINGTON	79	42.0736	-104.1919	4101	12, 13, 20, & 21
TORRINGTON	46	42.0783	-104.1900	4193	12, 13, 20, & 21
TORRINGTON	82	42.0828	-104.1911	4213	14, 15, 20, & 21
TORRINGTON	59	42.0831	-104.1914	4101	14, 15, 20, & 21
TORRINGTON	59	42.0833	-104.1917	4104	8, 9, 20, & 21
COKEVILLE	79	42.0853	-110.9208	6191	12, 13, 20, & 21
LINGLE	161	42.0964	-104.4653	4820	12, 13, 20, & 21
LINGLE	151	42.0964	-104.4644	4833	16, 17, 20, & 21
FORT LARAM	190	42.1125	-104.4806	4701	12, 13, 20, & 21
LINGLE	36	42.1344	-104.3453	4170	12, 13, 20, & 21
LINGLE	89	42.1358	-104.3214	4219	8, 9, 20, & 21
NO PLATT-SEMINOE PEAK	79.39764	42.1453	-106.9089	7276.903	18, 19, 20, & 21
FARSON	49	42.1556	-109.2903	6841	10, 11, 20, & 21
MEDICINE B	98	42.1644	-106.5769	8990	16, 17, 20, & 21
MEDICINEBOW	80	42.1644	-106.5769	8990	4, 5, 20, & 21
FTLARAMI-FT LARAMIE	30.18504	42.2106	-104.5239	4238.845	18, 19, 20, & 21
FORT LARAM	30	42.2189	-104.5183	4229	10, 11, 20, & 21
LINGLE	85	42.2283	-104.3639	4856	8, 9, 20, & 21
BAIROIL	20	42.2389	-107.5622	6939	12, 13, 20, & 21
NO PLATT-WHALEN DAM	59.7126	42.2481	-104.6283	4232.284	18, 19, 20, & 21
LA BARGE	56	42.2589	-110.1950	6601	8, 9, 20, & 21
DOUGLAS	98	42.2681	-105.4422	10236	12, 13, 20, & 21
WHEATLAND	39	42.2686	-104.6639	4354	12, 13, 20, & 21
LARAMIE PEAK	80	42.2692	-105.4444	10164	18, 19, 20, & 21
GUERNSEY1	30	42.2700	-104.7492	4301	10, 11, 20, & 21

Site Name (CAPS)	Antenna height (above ground in feet)	Unique Lat	Unique Long	Site elevation (above sea level in feet)	Exhibits
WHEATLAND	66	42.2708	-105.4389	10236	4, 5, 20, & 21
WHISKEY PEAK	30	42.3122	-107.6453	9225	18, 19, 20, & 21
LABAEGE	80	42.3258	-110.3189	9018	4, 5, 20, & 21
BIG PINEY	72	42.3264	-110.3208	9006	12, 13, 20, & 21
LA BARGE	79	42.3269	-110.3203	9009	14, 15, 20, & 21
GLENDO	20	42.3464	-105.0361	4645	4, 5, 20, & 21
NO PLATT-PINE RIDGE	59.7126	42.3486	-105.0306	5213.255	18, 19, 20, & 21
MUDDY GAP	20	42.3514	-107.4569	6309	16, 17, 20, & 21
MUDDY GAP	89	42.3544	-107.4892	6929	16, 17, 20, & 21
JEFFERYCITY	20	42.4014	-107.9586	8191	4, 5, 20, & 21
EDGERTON	120	42.4125	-106.2483	4905	14, 15, 20, & 21
SHIRLEY RI	20	42.4131	-106.3831	6467	16, 17, 20, & 21
SOUTH PASS	98	42.4611	-108.8036	7805	4, 5, 20, & 21
JEFFREY CI	59	42.4947	-107.7944	6325	12, 13, 20, & 21
GLENDO	36	42.5050	-105.0133	4718	12, 13, 20, & 21
SOUTH PASS	20	42.5278	-108.7228	8291	16, 17, 20, & 21
LANDER	69	42.5783	-108.7128	8990	10, 11, 20, & 21
LIMESTONE MOUNTAIN	80	42.5797	-108.7103	8963	18, 19, 20, & 21
LANDER	59	42.5831	-108.7100	9501	12, 13, 20, & 21
MARBLETON	46	42.5844	-110.0919	6864	16, 17, 20, & 21
AFTON	80	42.5917	-110.8897	8000	4, 5, 20, & 21
AFTON	121	42.5919	-110.8892	7999	16, 17, 20, & 21
AFTON	46	42.6314	-110.9911	6230	14, 15, 20, & 21
DOUGLAS	59	42.7231	-105.3056	5259	14, 15, 20, & 21
AFTON	98	42.7250	-110.9300	6240	8, 9, 20, & 21
NO PLATT-CASPER MTN	210.6312	42.7364	-106.3081	7883.859	18, 19, 20, & 21
DOUGLAS	20	42.7386	-105.3803	4869	12, 13, 20, & 21
CASPER	100	42.7389	-106.3611	8125	14, 15, 20, & 21
CASPER1	141	42.7406	-106.3603	8045	10, 11, 20, & 21
CASPER1	161	42.7414	-106.3086	8045	14, 15, 20, & 21
CASPER2	141	42.7431	-106.3072	8018	10, 11, 20, & 21
DOUGLAS	79	42.7431	-105.3331	5558	12, 13, 20, & 21
CASPER MOUNTAIN	70	42.7444	-106.3000	8199	18, 19, 20, & 21
CASPER	120	42.7475	-106.3031	8090	4, 5, 20, & 21
CASPER	171	42.7478	-106.3025	8091	10, 11, 20, & 21
CASPER	20	42.7481	-106.3417	7900	12, 13, 20, & 21
CASPER	20	42.7494	-106.3356	7920	14, 15, 20, & 21
LUSK	62	42.7578	-104.4500	4961	10, 11, 20, & 21
DOUGLAS1	82	42.7586	-105.3817	5358	14, 15, 20, & 21
DOUGLAS	98	42.7600	-105.3819	4806	12, 13, 20, & 21
DOUGLAS1	56	42.7606	-105.3739	4875	10, 11, 20, & 21
DOUGLAS1	56	42.7606	-105.3739	4875	8, 9, 20, & 21
LUSK	112	42.7619	-104.4506	4760	14, 15, 20, & 21
DOUGLAS	49	42.7647	-105.3903	4800	12, 13, 20, & 21

Site Name (CAPS)	Antenna height (above ground in feet)	Unique Lat	Unique Long	Site elevation (above sea level in feet)	Exhibits
LUSK	49	42.7661	-104.4481	5007	12, 13, 20, & 21
LUSK	59	42.7667	-104.4667	5039	10, 11, 20, & 21
DOUGLAS	30	42.7689	-105.4075	4990	10, 11, 20, & 21
LUSK	49	42.7714	-104.4508	5007	12, 13, 20, & 21
PINEDALE	46	42.8153	-109.8336	7110	16, 17, 20, & 21
LANDER1	39	42.8156	-108.7292	5404	14, 15, 20, & 21
LANDER	59	42.8169	-108.7072	5486	12, 13, 20, & 21
LANDER	49	42.8172	-108.7272	5358	14, 15, 20, & 21
LANDER	20	42.8189	-108.7247	5561	12, 13, 20, & 21
LANDER	59	42.8192	-108.7286	5453	8, 9, 20, & 21
LANDER	20	42.8194	-108.7397	4751	12, 13, 20, & 21
LANDER	59	42.8200	-108.7353	5417	8, 9, 20, & 21
LANDER	59	42.8311	-108.7375	5381	12, 13, 20, & 21
LANDER	39	42.8333	-108.7222	5358	12, 13, 20, & 21
CASPER	40	42.8333	-106.3261	5480	10, 11, 20, & 21
CASPER	16	42.8361	-106.3000	5128	12, 13, 20, & 21
LANDER	98	42.8364	-108.7283	5358	14, 15, 20, & 21
DOUGLAS2	180	42.8403	-105.3331	5558	10, 11, 20, & 21
DOUGLAS	121	42.8403	-105.3347	0	16, 17, 20, & 21
MILLS	69	42.8411	-106.3719	5121	10, 11, 20, & 21
LANDER	30	42.8428	-108.7106	5361	12, 13, 20, & 21
MILLS	49	42.8428	-106.3683	5125	12, 13, 20, & 21
LUSK	80	42.8442	-104.6169	5630	4, 5, 20, & 21
MANVILLE	121	42.8444	-104.6167	5630	16, 17, 20, & 21
MANVILLE	121	42.8444	-104.6167	5630	10, 11, 20, & 21
PINEDALE	79	42.8450	-109.9361	7710	10, 11, 20, & 21
LANDER	59	42.8450	-108.7464	5351	12, 13, 20, & 21
BAR NUNN	36	42.8456	-106.3822	5131	12, 13, 20, & 21
MANVILLE	82	42.8464	-104.5958	5610	10, 11, 20, & 21
CASPER	108	42.8481	-106.3078	5801	12, 13, 20, & 21
AFTON	56	42.8486	-110.9681	6401	14, 15, 20, & 21
DOUGLAS2	49	42.8500	-105.3794	4816	8, 9, 20, & 21
CASPER2	180	42.8514	-106.3253	5108	10, 11, 20, & 21
GLENROCK	75	42.8536	-105.8583	5154	12, 13, 20, & 21
CASPER	59	42.8569	-106.2786	5141	14, 15, 20, & 21
EVANSVILLE	56	42.8597	-106.2697	5125	10, 11, 20, & 21
CASPER	36	42.8600	-106.2936	5161	12, 13, 20, & 21
GLENROCK	59	42.8606	-105.8706	5010	10, 11, 20, & 21
CASPER	39	42.8611	-106.2925	5102	12, 13, 20, & 21
PINEDALE	69	42.8617	-109.8694	7201	10, 11, 20, & 21
EVANSVILLE	20	42.8617	-106.2697	5125	12, 13, 20, & 21
CASPER	36	42.8625	-106.2992	5079	12, 13, 20, & 21
CASPER	33	42.8628	-106.3444	5341	10, 11, 20, & 21
PINEDALE	59	42.8647	-109.8614	7175	14, 15, 20, & 21

Site Name (CAPS)	Antenna height (above ground in feet)	Unique Lat	Unique Long	Site elevation (above sea level in feet)	Exhibits
PINEDALE	36	42.8661	-109.8628	7201	12, 13, 20, & 21
LABARGE	62	42.8664	-109.8831	9006	16, 17, 20, & 21
CASPER	13	42.8675	-106.3344	5299	12, 13, 20, & 21
PINEDALE	30	42.8708	-109.8578	7192	14, 15, 20, & 21
GLENROCK	69	42.8717	-105.8714	4980	14, 15, 20, & 21
CASPER	121	42.8736	-106.3397	5341	8, 9, 20, & 21
CASPER3	121	42.8736	-106.3397	5341	10, 11, 20, & 21
CASPER	26	42.8739	-106.2808	5453	12, 13, 20, & 21
GLENROCK	79	42.8914	-105.8678	5285	10, 11, 20, & 21
GLENROCK1	98	42.8914	-105.8678	5285	8, 9, 20, & 21
CASPER	23	42.8978	-106.4475	5262	12, 13, 20, & 21
HUDSON	59	42.9058	-108.5822	5085	12, 13, 20, & 21
DOUGLAS3	98	42.9097	-105.3269	5558	8, 9, 20, & 21
DOUGLAS	80	42.9100	-105.3303	5557	4, 5, 20, & 21
DOUGLAS	80	42.9101	-105.3304	5557	4, 5, 20, & 21
MANVILLE	82	42.9167	-104.5894	5610	12, 13, 20, & 21
WIND RV-LE-ARAPAHOE	49.87008	42.9833	-108.4847	5019.685	18, 19, 20, & 21
FORT WASHA1	125	43.0036	-108.8858	5577	10, 11, 20, & 21
WIND RV-FT WASHAKIE	131.8911	43.0036	-108.8858	5452.756	18, 19, 20, & 21
PINEDALE	20	43.0081	-110.1428	8150	4, 5, 20, & 21
RIVERTON	59	43.0192	-108.6353	5400	12, 13, 20, & 21
RIVERTON	30	43.0219	-108.3561	4908	14, 15, 20, & 21
RIVERTON	49	43.0239	-108.3908	5381	12, 13, 20, & 21
LANDER	59	43.0239	-108.3850	4964	12, 13, 20, & 21
RIVERTON	59	43.0242	-108.3714	4941	12, 13, 20, & 21
RIVERTON	59	43.0264	-108.4000	4964	12, 13, 20, & 21
RIVERTON	39	43.0311	-108.4256	5105	12, 13, 20, & 21
RIVERTON	95	43.0333	-108.3833	4964	12, 13, 20, & 21
RIVERTON	59	43.0361	-108.3881	4967	12, 13, 20, & 21
RIVERTON	49	43.0500	-108.4403	5381	14, 15, 20, & 21
PINEDALE	80	43.0581	-110.1428	8150	4, 5, 20, & 21
DANIEL	121	43.0583	-110.1422	8199	16, 17, 20, & 21
DANIEL2	121	43.0583	-110.1422	8199	10, 11, 20, & 21
FORT WASHA2	98	43.1458	-108.9239	6211	10, 11, 20, & 21
WIND RV-WINKLEMAN DOME	131.8911	43.1458	-108.9183	6089.239	18, 19, 20, & 21
KINNEAR	59	43.1517	-108.6764	5410	12, 13, 20, & 21
ALPINE	39	43.1772	-111.0417	5620	14, 15, 20, & 21
MIDVALE	59	43.1858	-108.3442	4967	12, 13, 20, & 21
PAVILLION	59	43.2447	-108.6922	5459	12, 13, 20, & 21
PAVILLION	59	43.2456	-108.6928	5689	12, 13, 20, & 21
CROWHEART	59	43.3094	-108.1936	6089	12, 13, 20, & 21
JACKSON1	49	43.3222	-110.7311	5919	8, 9, 20, & 21
JACKSON	49	43.3222	-110.7311	5919	12, 13, 20, & 21
SHOSHONI	20	43.4044	-108.1736	4741	4, 5, 20, & 21

Site Name (CAPS)	Antenna height (above ground in feet)	Unique Lat	Unique Long	Site elevation (above sea level in feet)	Exhibits
EDGERTON	39	43.4125	-106.2483	4905	12, 13, 20, & 21
MIDWEST	39	43.4133	-106.2764	4852	12, 13, 20, & 21
MIDWEST1	36	43.4172	-106.2783	4849	16, 17, 20, & 21
BONNEVILLE	82	43.4319	-107.9872	8104	14, 15, 20, & 21
RIVERTON	60	43.4358	-108.0000	7040	4, 5, 20, & 21
SHOSHONI1	59	43.4361	-107.9994	8199	16, 17, 20, & 21
SHOSHONI	98	43.4361	-107.9994	8199	4, 5, 20, & 21
SHOSHONI	80	43.4361	-107.9994	8200	4, 5, 20, & 21
COPPER MOUNTAIN	36	43.4372	-107.9667	8199	18, 19, 20, & 21
JACKSON	80	43.4522	-110.7531	8005	4, 5, 20, & 21
JACKSON	121	43.4525	-110.7525	8005	10, 11, 20, & 21
JACK ELK-SNOW KING MTN	19.68504	43.4528	-110.7639	7985.565	18, 19, 20, & 21
COPPER MOUNTAIN	18	43.4536	-107.9667	8199	18, 19, 20, & 21
NO PLATT-BOYSEN PEAK	69.55512	43.4578	-108.1936	7503.281	18, 19, 20, & 21
JACKSON	20	43.4611	-110.7569	8005	12, 13, 20, & 21
JACKSON	60	43.4633	-110.7622	7800	12, 13, 20, & 21
THERMOPOLI1	43	43.4639	-108.3028	7556	8, 9, 20, & 21
JACKSON2	72	43.4728	-110.7708	6312	14, 15, 20, & 21
JACKSON	39	43.4728	-110.7689	6220	12, 13, 20, & 21
JACKSON	79	43.4781	-110.7586	6243	10, 11, 20, & 21
JACKSON2	79	43.4783	-110.7575	6270	8, 9, 20, & 21
JACKSON	69	43.4789	-110.7589	6270	12, 13, 20, & 21
JACKSON3	69	43.4789	-110.7589	6270	8, 9, 20, & 21
GR TETON-JACKSON	59.7126	43.4808	-110.7572	6115.486	18, 19, 20, & 21
DUBOIS	80	43.4828	-109.6881	9896	4, 5, 20, & 21
DUBOIS	66	43.4994	-109.6881	9895	16, 17, 20, & 21
DUBOIS	66	43.4994	-109.6881	9895	10, 11, 20, & 21
WINDYRIDGE	80	43.4994	-109.6881	9896	4, 5, 20, & 21
WILSON	49	43.5022	-110.8706	6161	8, 9, 20, & 21
WILSON	49	43.5022	-110.8706	6161	12, 13, 20, & 21
TISDALE MO	121	43.5292	-106.5292	5827	10, 11, 20, & 21
DUBOIS2	79	43.5333	-109.6289	7201	10, 11, 20, & 21
DUBOIS	39	43.5372	-109.6433	6975	12, 13, 20, & 21
DUBOIS	20	43.5375	-109.6403	6949	16, 17, 20, & 21
CROWHEART	26	43.5400	-109.2150	10174	12, 13, 20, & 21
WIND RV-LE-BLACK MTN	59.7126	43.5403	-109.2064	10124.67	18, 19, 20, & 21
BLACK MOUN	75	43.5486	-109.2231	10174	10, 11, 20, & 21
ATLANTIC C	79	43.5831	-108.7097	8904	12, 13, 20, & 21
JACKSON	46	43.5972	-110.8700	6201	14, 15, 20, & 21
SRAO E-RENDEZVOUS PEAK	29.52756	43.5972	-110.8703	10374.02	18, 19, 20, & 21
THERMOPOLI1	98	43.6489	-108.2075	4636	10, 11, 20, & 21
THERMOPOLI	20	43.6506	-108.2044	4367	12, 13, 20, & 21
GR TETON-MOOSE	76.1168	43.6564	-110.7147	6397.638	18, 19, 20, & 21
THERMOPOLI	85	43.6708	-108.2603	5217	14, 15, 20, & 21

Site Name (CAPS)	Antenna height (above ground in feet)	Unique Lat	Unique Long	Site elevation (above sea level in feet)	Exhibits
KAYCEE1	36	43.7147	-106.6375	4682	16, 17, 20, & 21
WRIGHT1	98	43.7244	-105.8817	5988	10, 11, 20, & 21
PUMPKIN BUTTE	45	43.7264	-105.8833	5994	18, 19, 20, & 21
GILLETTE	80	43.7325	-105.8833	5990	4, 5, 20, & 21
WRIGHT	121	43.7328	-105.8828	5899	10, 11, 20, & 21
WRIGHT	121	43.7328	-105.8828	5991	16, 17, 20, & 21
THERMOPOLI2	79	43.7333	-108.2528	5010	10, 11, 20, & 21
WRIGHT	157	43.7447	-105.4669	5151	14, 15, 20, & 21
WRIGHT	49	43.7472	-105.5072	4931	12, 13, 20, & 21
GR TETON-JENNY L	26.9042	43.7542	-110.7217	6788.058	18, 19, 20, & 21
WRIGHT	46	43.7583	-105.4900	4970	12, 13, 20, & 21
WRIGHT	151	43.7625	-105.4667	4911	12, 13, 20, & 21
BUFFALO	371	43.7875	-105.9500	6050	14, 15, 20, & 21
ALTA	43	43.7950	-110.8825	10138	12, 13, 20, & 21
THERMOPOLI	59	43.8156	-108.2075	4636	12, 13, 20, & 21
MORAN	39	43.8294	-110.3342	7726	12, 13, 20, & 21
NEWCASTLE	213	43.8325	-104.2189	4439	10, 11, 20, & 21
MORAN	49	43.8417	-110.5067	6719	12, 13, 20, & 21
MORAN	49	43.8417	-110.5067	6719	8, 9, 20, & 21
GR TETON-BUFFALO FORK	19.68504	43.8433	-110.5106	6722.441	18, 19, 20, & 21
NEWCASTLE	66	43.8464	-104.2125	0	12, 13, 20, & 21
GR TETON-SIGNAL MTN	49.87008	43.8492	-110.5667	7644.357	18, 19, 20, & 21
NEWCASTLE1	59	43.8528	-104.2097	4491	10, 11, 20, & 21
NEWCASTLE2	39	43.8539	-104.2150	4373	14, 15, 20, & 21
NEWCASTLE	82	43.8561	-104.1994	4459	14, 15, 20, & 21
SRAO E-JACKSON LAKE	40.02756	43.8581	-110.5894	6771.654	18, 19, 20, & 21
NEWCASTLE	20	43.8614	-104.1947	4334	12, 13, 20, & 21
NEWCASTLE	69	43.8833	-104.1922	4925	10, 11, 20, & 21
NEW CASTLE HILL	70	43.8856	-104.1836	5056	18, 19, 20, & 21
NEWCASTLE	95	43.8917	-104.1875	5161	14, 15, 20, & 21
GR TETON-COLTER BAY VILLAGE	30.18504	43.9031	-110.6428	6784.777	18, 19, 20, & 21
WORLAND	404	43.9722	-107.9500	4245	12, 13, 20, & 21
NEWCASTLE	80	43.9936	-104.1500	6400	4, 5, 20, & 21
NEWCASTLE3	151	43.9939	-104.1469	6401	10, 11, 20, & 21
NEWCASTLE	121	43.9939	-104.1497	6401	16, 17, 20, & 21
NEWCASTLE	20	44.0000	-104.2167	5902	12, 13, 20, & 21
WORLAND	75	44.0156	-107.9072	4058	14, 15, 20, & 21
ORLAND2	98	44.0156	-107.9628	4072	8, 9, 20, & 21
WORLAND	20	44.0214	-107.9769	4245	14, 15, 20, & 21
WORLAND1	59	44.0319	-107.9486	4072	10, 11, 20, & 21
WORLAND	30	44.0667	-107.8639	4669	10, 11, 20, & 21
MEETEETSE	69	44.0742	-108.8700	5797	14, 15, 20, & 21
UPTON	49	44.0983	-104.6264	4236	12, 13, 20, & 21
GR TETON-FLAGG RANCH	30.18504	44.1050	-110.6653	6827.428	18, 19, 20, & 21

Site Name (CAPS)	Antenna height (above ground in feet)	Unique Lat	Unique Long	Site elevation (above sea level in feet)	Exhibits
UPTON	98	44.1122	-104.6156	4331	12, 13, 20, & 21
YELLWSTN-SNAKE RIVER	23.62336	44.1361	-110.6664	6791.339	18, 19, 20, & 21
MEETEETSE	89	44.1397	-108.8219	6726	10, 11, 20, & 21
YELLWSTN-BECHLER	79.39764	44.1494	-111.0464	6354.987	18, 19, 20, & 21
MEETEETSEE	39	44.1528	-108.8667	6001	14, 15, 20, & 21
WORLAND2	49	44.1583	-107.2242	9259	10, 11, 20, & 21
GILLETTE	16	44.2067	-106.2211	4426	16, 17, 20, & 21
POLE CREEK	20	44.2164	-106.9222	8366	16, 17, 20, & 21
GILLETTE	459	44.2292	-105.4694	4783	12, 13, 20, & 21
GILLETTE1	157	44.2431	-105.4897	4754	10, 11, 20, & 21
MOORCROFT1	16	44.2653	-104.9528	4439	10, 11, 20, & 21
GILLETTE	16	44.2700	-105.4189	4580	12, 13, 20, & 21
MOORCROFT2	98	44.2708	-104.9333	4423	10, 11, 20, & 21
GILLETTE2	79	44.2747	-105.5175	4715	14, 15, 20, & 21
MOORCROFT	49	44.2772	-104.9578	4452	12, 13, 20, & 21
GILLETTE2	194	44.2775	-105.5117	4590	10, 11, 20, & 21
GILLETTE	79	44.2778	-105.4475	4524	12, 13, 20, & 21
GILLETTE	49	44.2792	-105.4917	4557	12, 13, 20, & 21
GILLETTE1	121	44.2828	-105.5172	4685	10, 11, 20, & 21
GILLETTE	33	44.2831	-105.5169	4596	12, 13, 20, & 21
GILLETTE	49	44.2844	-105.5175	4685	12, 13, 20, & 21
MANDERSON	20	44.2847	-107.9583	3881	8, 9, 20, & 21
GILLETTE	56	44.2875	-105.5181	4754	12, 13, 20, & 21
GILLETTE2	79	44.2903	-105.5014	4580	10, 11, 20, & 21
GILLETTE	449	44.3028	-105.4500	4610	12, 13, 20, & 21
HUNTER MESA	50	44.3311	-106.9442	7579	18, 19, 20, & 21
BUFFALO	59	44.3339	-106.7072	5830	14, 15, 20, & 21
BUFFALO	49	44.3375	-106.7569	4951	4, 5, 20, & 21
GILLETTE	98	44.3406	-105.2469	4813	12, 13, 20, & 21
BUFFALO	100	44.3456	-106.7000	4750	14, 15, 20, & 21
BUFFALO	43	44.3475	-106.6939	4649	14, 15, 20, & 21
BUFFALO	49	44.3481	-106.7058	4669	12, 13, 20, & 21
BUFFALO	59	44.3483	-106.7017	4675	8, 9, 20, & 21
BUFFALO	20	44.3503	-106.7111	4678	12, 13, 20, & 21
BUFFALO HILL	18	44.3575	-106.6522	4700	18, 19, 20, & 21
BASIN	16	44.3708	-108.0403	3921	4, 5, 20, & 21
BASIN1	39	44.3753	-108.0389	3930	10, 11, 20, & 21
BASIN	39	44.3753	-108.0389	3671	8, 9, 20, & 21
BUFFALO	46	44.3783	-106.7089	4902	14, 15, 20, & 21
BASIN2	79	44.3786	-108.0431	3930	10, 11, 20, & 21
YELLWSTN-GRANT VILLAGE	102.3635	44.3808	-110.5467	7864.173	18, 19, 20, & 21
POLE CREEK	49	44.3831	-106.9222	8366	16, 17, 20, & 21
SUNDANCE1	105	44.3883	-104.3758	5830	10, 11, 20, & 21
YELLWSTN-GRANT VILLAGE	49.87008	44.3944	-110.5667	7801.838	18, 19, 20, & 21

Site Name (CAPS)	Antenna height (above ground in feet)	Unique Lat	Unique Long	Site elevation (above sea level in feet)	Exhibits
SUNDANCE1	59	44.4061	-104.3775	4754	8, 9, 20, & 21
SUNDANCE	62	44.4067	-104.3797	4751	12, 13, 20, & 21
BASIN	92	44.4250	-108.0503	0	14, 15, 20, & 21
BURLINGTON	79	44.4511	-108.4319	4442	14, 15, 20, & 21
YELLWSTN-OLD FAITHFUL	30.18504	44.4517	-110.8317	7483.596	18, 19, 20, & 21
YELLWSTN-OLD FAITHFUL	49.87008	44.4578	-110.8319	7326.116	18, 19, 20, & 21
WARREN PEAK	45	44.4778	-104.4011	6657	18, 19, 20, & 21
SUNDANCE4	98	44.4789	-104.4506	6657	10, 11, 20, & 21
SUNDANCE2	98	44.4789	-104.4506	6657	16, 17, 20, & 21
GREYBULL	39	44.4800	-108.0669	3799	12, 13, 20, & 21
SUNDANCE	180	44.4806	-104.4583	6657	14, 15, 20, & 21
GREYBULL	39	44.4883	-108.0519	3786	10, 11, 20, & 21
CEDAR MOUNTAIN	36	44.4964	-109.1547	7598	18, 19, 20, & 21
CODY	49	44.4972	-109.4897	7700	14, 15, 20, & 21
CODY	98	44.4972	-109.1564	7700	12, 13, 20, & 21
CODY	121	44.4975	-109.1528	7779	16, 17, 20, & 21
SUNDANCE	98	44.5033	-104.5219	5666	16, 17, 20, & 21
SUNDANCE	98	44.5033	-104.5219	5666	10, 11, 20, & 21
NO PLATT-BUFFALO BILL RESERVOIR	69.55512	44.5050	-109.1697	5511.811	18, 19, 20, & 21
CODY	23	44.5133	-109.0281	5089	8, 9, 20, & 21
SHELL	62	44.5194	-107.6578	6617	10, 11, 20, & 21
CODY	20	44.5253	-109.0656	7890	12, 13, 20, & 21
CODY	128	44.5253	-109.0617	4980	12, 13, 20, & 21
BUFFBILL-CODY	29.52756	44.5258	-109.0542	4970.473	18, 19, 20, & 21
BLACK MOUNTAIN	81	44.5303	-107.6625	8681	18, 19, 20, & 21
CODY	89	44.5328	-109.0653	4951	12, 13, 20, & 21
YELLWSTN-MARINE/NGOVT-BRIDGE BAY	49.87008	44.5333	-110.4375	7703.412	18, 19, 20, & 21
YELLWSTN-LAKE	69.55512	44.5511	-110.3947	7683.727	18, 19, 20, & 21
POWELL	59	44.5714	-108.8206	6319	8, 9, 20, & 21
SHERIDAN2	121	44.5847	-107.0625	7201	14, 15, 20, & 21
CODY5	49	44.5872	-108.8517	6549	10, 11, 20, & 21
DEVLSTWR-DEVILS TOWER	13.12336	44.5903	-104.7044	3868.11	18, 19, 20, & 21
DEVLSTWR-DEVILS TOWER	30.18504	44.5906	-104.7208	4229.003	18, 19, 20, & 21
SHERIDAN	80	44.5994	-106.7594	4948	4, 5, 20, & 21
SHERIDAN	121	44.5997	-106.7589	4948	16, 17, 20, & 21
YELLWSTN-MADISON JUNCTION	23.62336	44.6358	-110.8622	6791.339	18, 19, 20, & 21
SHERIDAN	131	44.6556	-106.7694	4400	12, 13, 20, & 21
THERMOPOLI3	59	44.7333	-108.2528	5010	10, 11, 20, & 21
YELLWSTN-NORRIS GEYSER	49.87008	44.7378	-110.6947	7447.507	18, 19, 20, & 21
YELLWSTN-CANYON	30.18504	44.7400	-110.4989	7887.139	18, 19, 20, & 21
POWELL	69	44.7544	-108.7514	4380	14, 15, 20, & 21
CODY2	98	44.7550	-109.3744	8533	10, 11, 20, & 21
CODY	49	44.7556	-109.3736	8599	12, 13, 20, & 21
POWELL	75	44.7564	-108.7444	4383	10, 11, 20, & 21

Site Name (CAPS)	Antenna height (above ground in feet)	Unique Lat	Unique Long	Site elevation (above sea level in feet)	Exhibits
SHERIDAN	36	44.7722	-106.9783	3940	12, 13, 20, & 21
RECLUSE	79	44.7722	-105.8028	4521	10, 11, 20, & 21
BURGESS JU	20	44.7744	-107.5217	8045	16, 17, 20, & 21
GILLETTE3	121	44.7858	-105.5333	4268	10, 11, 20, & 21
BYRON	46	44.7872	-108.5039	4019	12, 13, 20, & 21
SHERIDAN	79	44.7917	-106.9583	3743	4, 5, 20, & 21
BYRON	79	44.7958	-108.5139	4040	14, 15, 20, & 21
MAMMOTH	46	44.7972	-110.4306	10243	14, 15, 20, & 21
YELLWSTN-MOUNT WASHBURN	36.74672	44.7975	-110.4339	10223.1	18, 19, 20, & 21
SHERIDAN1	118	44.8083	-106.9756	3875	14, 15, 20, & 21
SHERIDAN	141	44.8153	-106.9558	3783	10, 11, 20, & 21
LOVELL	39	44.8164	-107.9036	10020	12, 13, 20, & 21
SHERIDAN	59	44.8186	-106.9550	3753	12, 13, 20, & 21
GILLETTE	75	44.8300	-105.0986	4951	12, 13, 20, & 21
LOVELL	79	44.8347	-108.3875	3914	10, 11, 20, & 21
BIGHORN-LOVELL	49.87008	44.8372	-108.3775	3776.247	18, 19, 20, & 21
LOVELL	30	44.8386	-108.3889	3829	12, 13, 20, & 21
LOVELL	49	44.8403	-108.3919	3816	14, 15, 20, & 21
DAYTON	30	44.8750	-107.2681	3921	12, 13, 20, & 21
COWLEY	79	44.8825	-108.4681	0	14, 15, 20, & 21
DEAVER	79	44.8883	-108.5883	4104	14, 15, 20, & 21
YELLWSTN-LAMAR RIVER	30.18504	44.8956	-110.2356	6538.714	18, 19, 20, & 21
YELLWSTN-TOWER JUNCTION	30.18504	44.9164	-111.4200	6660.105	18, 19, 20, & 21
YELLWSTN-BEARTOOTH	49.87008	44.9289	-109.6300	8599.082	18, 19, 20, & 21
YELLWSTN-BUNSEN PEAK	43.3084	44.9331	-110.7072	8536.746	18, 19, 20, & 21
DEAVER	26	44.9333	-108.5028	4088	12, 13, 20, & 21
BIGHORN-HORSESHOE BEND MARINA	21.9042	44.9581	-108.2619	3654.856	18, 19, 20, & 21
BIGHORN-HORSESHOE BEND	46.58924	44.9617	-108.2658	3645.013	18, 19, 20, & 21
YELLWSTN-ELK PLAZA	66.27428	44.9864	-110.7156	6748.688	18, 19, 20, & 21
YELLWSTN-COLTER PASS	30.18504	45.0283	-109.9003	8005.25	18, 19, 20, & 21

Table B - APCO Project 25 Standards

Designation	Title	Deals With	Issued
TSB102BAAD	CAI Operational Description for Conventional Channels	CAI	09/90
TSB102AABA	Trunking, Overview	Trunking	03/91
TSB102-A	Project 25 System & Standard Definition		10/91
TSB102BABD	Vocoder Selection Process	Vocoder	04/92
TSB102BABD	Vocoder Selection Process Tapes	Vocoder	04/92
TSB102AABG	Conventional Control Messages	Trunking	06/92
TSB102BACC	ISSI Overview		11/92
TSB102BACA	ISSI Messages Definition		11/92
TSB102AABD	Trunking Procedures	Trunking	09/93
ANSI/EIA/TIA 603-A1	Land Mobile FM or PM Communications Equipment		02/94
ANSI/TIA/EIA102BABA	Vocoder Description	Vocoder	04/94
TSB102BAAB-A1	CAI Conformance Testing	CAI	03/95
ANSI/TIA/EIA102BABC	Vocoder Reference Test	Vocoder	03/95
ANSI/TIA/EIA102BABB-A	Vocoder Mean Opinion Score (MOS) Test	Vocoder	04/95
ANSI/TIA/EIA102CAAA	Transceiver Measurements and Methods		05/95
TSB102BAFA-A	Network Management Interface Definition		06/95
ANSI/TIA/EIA102BAAA	Common Air Interface (CAI) Phase	CAI	08/95
ANSI/TIA/EIA102BADA	Telephone Interface Requirements and Definitions (Voice Service)		02/96
ANSI/TIA/EIA102AABB	Trunking Control Channel Formats	Trunking	04/96
ANSI/TIA/EIA102BAEC	Circuit Data Specification	Data	05/96
ANSI/TIA/EIA102AAAC	DES Encryption Conformance	Encryption & OTAR	01/97
ANSI/TIA/EIA102AAAA	DES Encryption Protocol	Encryption & OTAR	01/97
ANSI/TIA/EIA102BAAC	CAI Reserved Values	CAI	05/97
ANSI/TIA102AAAD	Block Encryption Protocol	Encryption & OTAR	07/98
ANSI/TSB102AACC	OTAR Conformance	Encryption & OTAR	07/98
TSB102CAAC	Mobile Radio PTT and Audio Interface Definitions and Methods of Measurement		08/98
ANSI/TIA/EIA102BAEB	Packet Data Specification	Data	08/98
ANSI/TIA/EIA102BAEE	Radio Control Protocol Specification	Data	08/98
TSB102AAAB	Security Services Overview		08/98
ANSI/TIA/EIA102BAEA	Data, Overview	Data	09/98
ANSI/EIA/TIA102CAAB	Transceiver Performance Recommendations		09/98
ANSI/TIA102.AACB	OTAR Operational Description	Encryption & OTAR	11/98
ANSI/EIA/TIA102AACA-1	OTAR Protocol	Encryption & OTAR	11/98
TSB102AABF	Link Control Words	Trunking	12/98
ANSI/EIA/TIA102AABC-1	Trunking Control Channel Messages	Trunking	12/98
102BACB	ISSI Conformance		
P25.940811.2.2	Lock Down Overview		03/00

Note: Prefixes change as document changes status

Table C.1 - Cost Format (Network Components)

Model #	Description	Quan.	Unit Price	Extended Price
	Controller		\$	\$
	Redundant Components		\$	\$
	Network Interfaces (to intersite communications)		\$	\$
	Data Interfaces (switches, routers, etc.)			
	Design/Engineering		\$	\$
	Training		\$	\$
	Overall Project Management		\$	\$
	Software		\$	\$
	Programming		\$	\$
	Installation		\$	\$
	Basic Warranty		\$	\$
	Extended Warranty		\$	\$
			\$	\$
	<i>These entries are suggestions that vendor should expand on. Use as many sheets as are necessary.</i>		\$	\$
			\$	\$
			\$	\$
			\$	\$
			\$	\$
			\$	\$
			\$	\$
			\$	\$
			\$	\$

Grand Total - Network Components (as proposed) \$ _____

Table C.2 - Cost Format (Repeater Site Components)

Model #	Description	Quan.	Unit Price	Extended Price
	Controller		\$	\$
	Redundant Components		\$	\$
	Network Interfaces		\$	\$
	Design/Engineering		\$	\$
	Repeaters		\$	\$
	Miscellaneous (couplers, multiplexers, filters, preamps, antennas, coax feed, etc.) list separately		\$	\$
	Training		\$	\$
	Software		\$	\$
	Programming		\$	\$
	Installation		\$	\$
	Basic Warranty		\$	\$
	Extended Warranty		\$	\$
			\$	\$
	<i>These entries are suggestions that vendor should expand on. Use as many sheets as are necessary.</i>		\$	\$
			\$	\$
			\$	\$
			\$	\$
			\$	\$
			\$	\$
			\$	\$
			\$	\$

Grand Total - Repeater Site Components (as proposed) \$ _____

Table C.4 - Cost Format (Subscriber Components)

Model #	Description	Quan.	Unit Price	Extended Price
	Mobile Radios		\$	\$
	Mobile Accessories		\$	\$
	Mobile Data Computers		\$	\$
	Mobile Installation		\$	\$
	Portable Radios		\$	\$
	Portable Accessories		\$	\$
	Control Stations		\$	\$
	Control Station Interfaces		\$	\$
	Control Station Installation		\$	\$
	Pagers		\$	\$
	Training		\$	\$
	Software		\$	\$
	Programming		\$	\$
	Basic Warranty		\$	\$
	Extended Warranty		\$	\$
			\$	\$
	<i>These entries are suggestions that vendor should expand on. Use as many sheets as are necessary.</i>		\$	\$
			\$	\$
			\$	\$
			\$	\$
			\$	\$
			\$	\$

Grand Total - Subscriber Components (as proposed) \$ _____