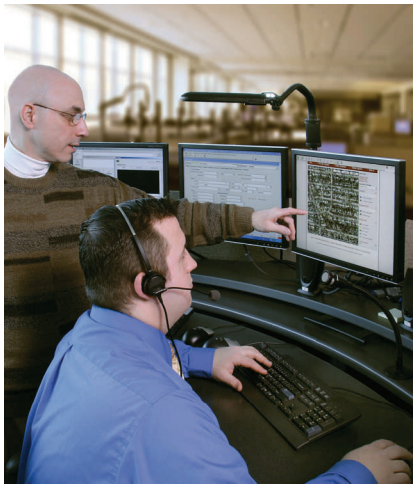

Report for

Consolidation Analysis and Next Generation 9-1-1 Implementation Study

prepared for

State of Oregon

Office of Emergency Management

February 2012 ©

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EXECUTIVE SUMMARY

L.R. Kimball respectfully submits this Consolidation Analysis and Next Generation 9-1-1 (NG9-1-1) Implementation Study report to the State of Oregon (State) Office of Emergency Management (OEM).

Across the country, consolidation is considered for a number of reasons, including service level improvements, personnel, and cost savings. For the State of Oregon, improving service levels is the single most important reason to consider consolidation. 9-1-1 telecommunicators are truly the "first responder on the scene" and can substantially affect the outcome of an incident. Transfer of 9-1-1 calls between PSAPs can be reduced or eliminated, often improving response times and lowering the potential for human or technology errors. In some cases individual agencies no longer wish to support training or handle personnel issues for PSAP staff. Consolidation of PSAPs allows sworn personnel to be redeployed to other law enforcement or fire department responsibilities. And, while cost savings are possible, understanding two main points is critical before consolidating for financial reasons alone. First, not all consolidations result in cost savings. Commonly, the real cost savings come from the elimination of redundant and expensive technology such as computer aided dispatch (CAD) systems, 9-1-1 answering equipment, radio consoles, and logging recorders, as well as maintenance costs associated with these systems.

Customization of four basic consolidation models (full, partial, co-location, and hybrid) is possible to meet unique regional and stakeholder needs. While the consolidation process is complex and difficult, if implemented correctly, it can yield substantial improvements in service levels, regional interoperability, responder safety, employee retention, and potential cost savings. From a state perspective, consolidation encourages inter-agency cooperation, more effective use of resources and large-scale incident management. It could also mean more efficient, streamlined, and cost effective technology.

The dramatic changes in the telecommunications industry over the past 15 years has made it difficult for public safety and emergency communications systems to keep pace. National agencies and associations have developed their visions of the NG systems and the central theme is an Internet Protocol (IP)-enabled broadband network that can share voice, video, and data. With this vision in mind and looking towards the future of 9-1-1, the OEM contracted L.R. Kimball to provide an analysis of NG9-1-1 options. In Phase 1 of this project, L.R. Kimball conducted a cost analysis of NG9-1-1 options to determine the cost of transitioning the current OEM program to an NG9-1-1 system.

In March 2011, L.R. Kimball submitted the "Next Generation 9-1-1 Cost Analysis" report that had two options for implementing NG9-1-1 statewide. *Option One* was a complete replacement of all current call taking equipment in each of the 49 public safety answering points (PSAPs), regardless of where the current legacy equipment is in its lifecycle. *Option Two* analyzed and determined the current call taking equipment throughout the state that is upgradeable to handle NG9-1-1 technologies. In each of the 49 PSAPs, only the equipment that cannot be upgraded would be replaced. Both options describe an environment where more funds would have to be expended initially to save money in the future and describe a short transition period to minimize the amount of money being spent to support both networks. L.R. Kimball determined there are ways in which the State could complete the transition to NG9-1-1 over a longer period of time, but the options would need to be examined in further detail.

The evolution of 9-1-1 and the associated technology, coupled with difficult economic times, has encouraged state, county (where present), and local governments, as well as public safety agencies, to investigate the concept of

shared services or consolidation. Consolidation, at its simplest definition, is the combining of two or more PSAPs into a single facility and/or organization, using a single set of critical PSAP technology and protocols.

With an eye toward NG9-1-1 and an understanding of current and future costs and funding issues, the State contracted L.R. Kimball to provide a high-level consolidation analysis and to perform the next step in NG9-1-1 cost analysis – to outline the most cost effective way of reaching and supporting an NG9-1-1 environment considering the consolidation analysis. L.R. Kimball again worked closely with OEM staff to gather updated information and discuss scenarios.

L.R. Kimball performed the consolidation study as an overview of what consolidation could look like in the state. L.R. Kimball looked at a single statewide PSAP and also determined what would be an optimum number of regional PSAPs. It was not within the project scope for L.R. Kimball to make recommendations as to specific PSAP locations. Analysis should be done at a local-level before consolidation decisions are made.

L.R. Kimball examined the current costs of E9-1-1 in Oregon and the anticipated cost of an NG9-1-1 network and has provided several options based on the consolidation analysis for consideration. There are three scenarios to transition Oregon to an NG9-1-1 capable network:

- Scenario One – Transition current 49 PSAPs and 279 workstations
- Scenario Two – One statewide call center
- Scenario Three – Transition to the recommended number of PSAPs (nine) and workstations utilizing information from the consolidation study

In addition to pricing for these three scenarios, OEM requested that L.R. Kimball provide legacy pricing for two other scenarios:

- Scenario Four – One statewide legacy call center
- Scenario Five – Legacy pricing for the recommended number of PSAPs (nine) and workstations utilizing information from the consolidation study

In Scenario One, all 49 PSAPs and 279 workstations currently in place will transition to an NG 9-1-1 capable network. Scenario One includes a completely new network and new equipment for each PSAP. (The cost breakdown is shown in greater detail in Section 4.5.)

Scenario One	Year 1	Year 2	Year 3	Annually Years 4 – 10
TOTAL	$6,237,096	$9,982,208	$7,657,208	$7,157,208

In Scenario Two, all 9-1-1 calls in the state would route to a single in-state call center. A single statewide call center model refers to the consolidation of all 9-1-1 call answering functions within one large call center. The statewide call center would be the primary 9-1-1 PSAP for all 9-1-1 calls that originate within the state. Upon answering the 9-1-1

calls, the call takers will process the calls to determine the location of the incident, the nature, and then transfer the callers to the appropriate local secondary PSAP for dispatch of field personnel. It is assumed that all 49 current PSAPs would continue to dispatch for their jurisdictions.

When 9-1-1 call takers are located in a separate facility, such as a single statewide 9-1-1 center, the 9-1-1 call taker must conduct a preliminary interview to determine the nature and location of the emergency for each incoming 9-1-1 call. This preliminary interview serves two key purposes. First, it allows the call taker to identify the secondary PSAP to which the call must be transferred. Second, and more importantly, the preliminary interview ensures that the caller's location, at minimum, is received should the call be lost unexpectedly. This allows help to still be sent. The call must then be transferred to the appropriate secondary PSAP for dispatch. The dispatcher then must re-interview the caller to ensure the call has been delivered to the correct dispatch point, that the address and call nature are correct, and to gather further details regarding the incident. At times, a second transfer is needed, which would include a third similar interview, to ensure all needed services such as police, fire and EMS are dispatched. In addition to the frustration experienced by the 9-1-1 caller, this system creates unnecessary delays in the dispatch of emergency personnel. The average length of time added to a call during this process is 30 seconds for each transfer. The transferring of calls creates additional problems by creating a delay in getting vital information to field personnel.

A single statewide 9-1-1 call center does offer some financial benefits. However, the impact on the emergency communications system as a whole is substantial and overwhelmingly negative. From a service level perspective, virtually every 9-1-1 call made across the state would need to be transferred at least once from a single call center to the appropriate dispatch point(s) before field personnel could be sent. This configuration ensures that each call will have at least one inherent delay.

9-1-1 call answering and dispatch functions located together in the same PSAP will provide the best level of emergency communications services.

Scenario Two pricing includes a completely new network and new equipment for a single in-state call center to handle 9-1-1 calls only, a backup call center, and dispatch equipment at each of the 49 current PSAPs. It is important to note that Scenario Two does not include the cost to build out facilities for the call center and backup call center. (The cost breakdown is shown in greater detail in Section 4.6.)

Scenario Two	Year 1	Year 2	Year 3	Annually Years 4 – 10
TOTAL	$5,462,180	$6,362,708	$5,381,708	$4,881,708

Scenario Three utilizes the information gathered in the consolidation study to analyze the cost to migrate the recommended number of PSAPs to NG9-1-1. In L.R. Kimball's opinion, a PSAP configuration of nine regionally-based PSAPs, with a total of 70 workstations, would provide the most equitable and efficient use of resources statewide. There is no recommendation of specific location of PSAPs within the recommended regions.

Keeping 9-1-1 call taking and the dispatch of field personnel together within each regional PSAP best serves the citizens as well as the field personnel and is critical to establishing the best emergency communications system possible. Secondary to 9-1-1 call taking and dispatch functions remaining together, a balancing of call volume, where possible, the State's unique geography, and maintaining existing or planned partnerships were taken into consideration.

A major advantage of this configuration would be improved regional awareness, and, as a result, coordinated response and interoperability during major incidents. Equalizing the distribution of 9-1-1 calls among regions is desirable whenever possible. While the unique geography present in Oregon prevents an equal distribution, the distribution of calls in this regional design would offer redundancy alternatives in the event of a major disruption of 9-1-1 services in any one of the PSAPs. Calls could be rerouted temporarily to one or more of the other regional centers because at least one similarly-sized PSAP exists.

Additional benefits include a more cost effective use of the statewide 9-1-1 system and the trained emergency telecommunicators who utilize it. This regional approach would eliminate or reduce emergency telecommunicators performing non-emergency or ancillary duties and would also reduce the overall number of call takers required to handle the state's call volume. The number of call taking workstations would be significantly reduced, resulting in lower equipment and network costs. For the municipal agencies, personnel and support system equipment costs such as radio and CAD would be shared in a regional configuration.

Scenario Three pricing includes a completely new network and new equipment for all nine PSAPs. It is important to note that Scenario Three does not include the cost to build out facilities if needed for any of the nine regional PSAPs. (The cost breakdown is shown in greater detail in Section 4.7.)

Scenario Three	Year 1	Year 2	Year 3	Annually Years 4 – 10
TOTAL	$3,353,696	$4,937,548	$4,037,548	$3,537,548

Note: Scenario Three will require further review of radio coverage for dispatch within the regions.

The Emergency Communication Tax provides the Oregon 9-1-1 Program with available revenue of approximately $13,857,395 per year for the Enhanced 9-1-1 subaccount. In fiscal year (FY) 2010-11, the State identified costs paid from their Enhanced 9-1-1 account totaling $12,120,443.59. Several costs currently paid by the Emergency Communications Tax may be alleviated once the state has transitioned to NG9-1-1.

L.R. Kimball estimates that approximately $1 million in legacy costs will carry forward after the transition to NG9-1-1 has occurred.

While there are potential cost savings associated with the migration to an NG9-1-1 network, system costs will increase during the transition phase. It is important to consider the potential cost savings in migrating to NG9-1-1 versus the costs of maintaining the legacy system if the State were not to transition to NG9-1-1. Once the

transition period is over, the Oregon 9-1-1 Program should recognize over $5 million per year in savings in an NG environment.

Scenario Four includes a completely new legacy network and new equipment for a single in-state call center to handle 9-1-1 calls only, a backup call center, an IP network to connect the current PSAPs to the call center and backup center, and dispatch equipment at each of the in-place 49 PSAPs. (The cost breakdown is shown in greater detail in Section 4.8.)

Scenario Four	Year 1	Year 2	Year 3	Annually Years 4 – 10
TOTAL	$25,609,652	$16,796,652	$16,796,652	$16,796,652

Scenario Five includes a completely new legacy network and new equipment for the recommended nine regional PSAPs. (The cost breakdown is shown in greater detail in Section 4.9.)

Scenario Five	Year 1	Year 2	Year 3	Annually Years 4 – 10
TOTAL	$15,033,238	$11,498,238	$11,498,238	$11,498,238

Note: Scenario Five will require further review of radio coverage for dispatch within the regions.

Across the state, consolidations have occurred naturally and are still occurring. Some consolidations are related to financial issues, while others are the result of self-realized efficiencies. These agencies deserve recognition for taking the first step forward. In L.R. Kimball's opinion, emergency communications statewide would benefit from further consolidation efforts. The PSAPs already involved in consolidation have shown themselves to be forward thinking and interested in working with neighboring PSAPs towards greater interoperability and efficiency. The nine region model represents a perfect world solution that may or may not be achievable. However, it should be viewed as a long-term goal to work towards statewide. L.R. Kimball believes it provides the best balance of service level standards and cost efficiencies.

In many states, the State manages the funding of the 9-1-1 equipment and network while costs associated with dispatch functions are considered the responsibility of the local municipalities. The method in which these costs are managed varies from state to state. However, across the country this split in control and/or funding has created an environment where the states may become focused on only the portion for which they are financially responsible rather than the whole emergency communications picture.

An effective statewide emergency communications system requires that the State and local entities work together to develop a plan that is cost effective and maintains or improves the integrity of the system as a whole – 9-1-1 call taking and dispatch functions.

1. INTRODUCTION

In the past 15 years there have been dramatic changes in the telecommunications industry, and public safety and emergency communications systems have had to change to keep pace. However, the aging systems that public safety has relied on can no longer keep pace with industry changes. National organizations and associations have developed their visions of the systems needed to operate in the future. The central theme of NG9-1-1 is an IP-enabled broadband network that can share voice, video, and data.

With this vision in mind and looking towards the future and NG9-1-1, the OEM contracted L.R. Kimball to provide an analysis of NG9-1-1 options. Throughout the process, L.R. Kimball worked closely with OEM staff to gather information. The State provided technical and financial information. L.R. Kimball performed the data analysis based on its industry experience and expertise and similar project experience in other states.

In March 2011, L.R. Kimball provided an analysis of the cost for the State of Oregon to reach and support an NG9-1-1 environment. L.R. Kimball examined the current costs of Enhanced 9-1-1 (E9-1-1) in Oregon and the anticipated cost of an NG9-1-1 network. Based on the analysis, L.R. Kimball provided two options for consideration in the "Next Generation 9-1-1 Cost Analysis" report (Phase 1). This Phase 1 report outlined two options for Oregon to migrate to an NG9-1-1 system while maintaining all 49 PSAPs currently in the state. Both options described an environment where more funds would have to be expended initially to save money in the future. The report concludes that there are several ways in which Oregon could complete the transition to NG9-1-1, but these options would need to be examined in further detail with the State.

The evolution of 9-1-1 and the associated technology, coupled with difficult economic times, has encouraged state, county (where present), and local governments, as well as public safety agencies, to investigate the concept of shared services or consolidation. Consolidation, at its simplest definition, is the combining of two or more PSAPs into a single facility and/or organization, using a single set of critical PSAP technology and protocols.

There are four basic models of consolidation – full, partial, co-location, and hybrid – any of which can be customized to meet unique regional and stakeholder needs. While the consolidation process is complex and difficult, if implemented correctly, it can yield substantial improvements in service levels, regional interoperability, responder safety, employee retention, and potential cost savings. From a state perspective, consolidation encourages inter agency cooperation, more effective use of resources and large-scale incident management. It could also mean more efficient, streamlined, and cost effective technology.

The OEM contracted L.R. Kimball to perform a consolidation study and a more in depth analysis of the transition to NG9-1-1; this document is Phase 2 of this study. L.R. Kimball performed the consolidation study as an overview of what consolidation could look like in the state. (It was not within the project scope for L.R. Kimball to make recommendations as to specific PSAP locations.)

L.R. Kimball completed a high-level consolidation study of the information provided by the PSAPs in the state of Oregon as they are currently configured. The result was the recommended number of PSAPs required to handle the 9-1-1 call volume in Oregon while maintaining the current level of services. L.R. Kimball also analyzed the possibility

of transitioning to a single statewide 9-1-1 call center that would handle all 9-1-1 call traffic. The single 9-1-1 center would transfer the 9-1-1 call to the appropriate dispatch center.

Several options allow for transition to NG9-1-1. Working within the constraints of OEM's available budget, L.R. Kimball developed a strategic plan to begin the transition to NG9-1-1 for those services that would take the shortest amount of time. Focusing on the services that can transition quickly allows funding to become available to complete the transition for the remaining services. Legacy pricing has also been provided for each NG transition option strictly for comparison purposes.

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2. METHODOLOGY

2.1 Data Collection

L.R. Kimball worked closely with OEM staff to gather information for this analysis. For the Phase 1 report, the State provided the following technical and financial information:

- Revenue and cost information regarding the state's 9-1-1 tax
- Expenditures from the Enhanced Subaccount to the PSAPs over the last five years
- Technology used at the PSAPs regarding 9-1-1 equipment
- Expenditures from the Enhanced Subaccount to local exchange carriers (LECs) that service the state

For Phase 2, L.R. Kimball worked with the State to update all relevant Phase 1 information. L.R. Kimball met with OEM and the PSAPs to aid in data collection. Table1 highlights the on-site meeting dates and major project deliverables.

Table 1 – On-site Meetings and Project Deliverables

Meeting/Deliverable	Date and Location
Project Kick-off Meeting	September 27, 2011 – OEM office
On-line survey released to PSAPs	October 28, 2011
PSAP Visits	November 7 – 9, 2011
Meeting w/OEM and 9-1-1 Advisory Committee	December 6, 2011
PSAP Focus Group Meeting	December 8, 2011
Draft Report sent to PSAPs for Comment Period	January 24, 2012
Briefing Meeting with Legislative Fiscal Office (LFO) and OEM	January 30, 2012
Final Report Complete	January 31, 2012
Report due to Legislature	February 1, 2012

L.R. Kimball compiled information into this document in the form of charts and tables to further exhibit the current conditions in the state and to facilitate analysis. L.R. Kimball staff held conference calls with OEM staff in addition to on-site meetings to discuss data collection and analysis.

L.R. Kimball assumes that all information collected from the State and PSAPs is correct and accurate. An assessment of the accuracy of the information provided is not within the scope of this project.

OEM provided available information for this project; however, L.R. Kimball also gathered data directly from the PSAPs, as described below, to paint an accurate picture in this report.

2.1.1 PSAP Surveys

L.R. Kimball worked with OEM staff to create a web-based on-line survey to collect necessary data from the PSAPs. This data was used to determine if moving to a single 9-1-1 call center or regional PSAPs would benefit emergency services statewide. The survey was available to PSAPs from October 28, 2011 through November 18, 2011. Individual PSAPs had the responsibility to fill out the surveys completely and accurately. Information asked for included, but was not limited to, the following:

- Basic PSAP information
- PSAP Demographics
- PSAP Staffing
- PSAP Operations
- PSAP Call Volume
- PSAP Support Systems
- PSAP Telephony
- PSAP Radio
- PSAP Building Power
- PSAP Costs
- PSAP Interview Questions

L.R. Kimball aided PSAPs in filling out the survey when requested. Response to the survey was strong – 32 PSAPs filled out the survey completely; 15 PSAPs filled out portions of the survey, but did not complete it; and 2 PSAPs did not fill out the survey. L.R. Kimball compiled the data and analyzed it for consolidation and pricing purposes.

2.1.2 PSAP Site Visits and Stakeholder Interviews

L.R. Kimball staff visited representative large, medium, and small PSAPs selected by OEM. The five PSAPs visited were the following:

- Bureau of Emergency Communications (BOEC), Portland (Large PSAP - November 8, 2011)
- Clackamas County Communications (C-COM) (Medium PSAP - November 7, 2011)
- Willamette Valley Communications Center (WVCC), Salem (Medium PSAP - November 8, 2011)
- Ontario Police Department, Ontario (Small PSAP - November 9, 2011)
- Malheur County, Vale (Small PSAP - November 9, 2011)

During the visits, L.R. Kimball interviewed staff in various positions, such as PSAP directors, Information Technology (IT) managers, training staff, and policy specialists. Call takers and dispatchers were interviewed at each location.

2.1.3 PSAP Focus Groups

L.R. Kimball held two PSAP focus groups during the winter Oregon APCO/NENA[1] Quarterly Meeting. The first focus group was December 6, 2011 with the 9-1-1 Advisory Committee and OEM. This meeting provided a smaller venue for the discussion about the Phase 2 report. The attendees provided L.R. Kimball with many key observations and were able to get answers to questions and concerns about the study.

The second focus group meeting was December 8, 2011; all quarterly meeting attendees were invited. L.R. Kimball was able to communicate the purpose and goals of the Phase 2 study, provide a better understanding of the project, and hear the questions and concerns of those attending. This meeting provided the PSAPs the opportunity to voice feedback to L.R. Kimball prior to the writing of this report. This feedback from the PSAPs was invaluable to the Phase 2 study.

2.2 Data Analysis

L.R. Kimball performed the data analysis using our industry experience and expertise, similar project experience in other states and accepted best practices across the industry. The information and analysis was limited to the operation of emergency communications only. It is understood that many PSAPs may have other functions and a more detailed assessment may be needed to include these other services.

Primary areas of analysis of the data provided included the following:

- Call volume per PSAP
- State distributions to PSAPs from the Emergency Communications Tax
- Current PSAP technology
- Recommended number of PSAPs needed to handle call volume in state
- Single statewide 9-1-1 call center
- Consolidation cost estimates where possible
- Budgetary pricing and timeline for statewide NG9-1-1 implementation
- Potential cost savings at the state level

2.3 Assumptions

L.R. Kimball made assumptions during the analysis. L.R. Kimball assumes that all information collected from the State and PSAPs is correct and accurate. An assessment of the accuracy of the information provided is not within the scope of this project. Each section of this report includes a set of assumptions related to that particular task.

[1] Association of Public-Safety Communications Officials International (APCO)/National Emergency Number Association (NENA)

3. CONSOLIDATION ANALYSIS

3.1 Consolidation Overview

The evolution of 9-1-1 and the associated technology, coupled with difficult economic times, have encouraged state, county (where present), and local governments, as well as public safety agencies, to investigate the concept of shared services or consolidation. The simplest definition of consolidation is the combining of two or more PSAPs into a single facility and/or organization. A single set of critical PSAP technology and protocols is used. In reality, four basic models are commonly used: full, partial, co-location, and hybrid. Customization of each of these four models is possible to meet unique regional and stakeholder needs. While the consolidation process is complex and difficult, if implemented correctly, it can yield improvements in service levels, regional interoperability, responder safety, employee retention, and potential cost savings. From a state perspective, consolidation encourages inter agency cooperation, more effective use of resources and large-scale incident management. It could also mean more efficient, streamlined, and cost effective technology.

This consolidation study was performed at a high-level as an overview of what consolidation could look like in the State. Analysis should be done at a local level before consolidation decisions are made. Although this study was done from a state-level perspective, the following general information on consolidation is provided for clarity and background purposes.

Consolidation is considered for a number of reasons. Commonly cited reasons include the following:

- Service level improvements – This is the single most important reason to consider consolidation. 9-1-1 telecommunicators are truly the "first responder on the scene" and can substantially affect the outcome of an incident. Service improvements typically achieved are noted below.
  - Reduction or elimination of the transfer of 9-1-1 calls between PSAPs improves response times and lowers the potential for human or technology errors.
  - Quicker call processing and dispatch times, which may result in faster on-scene times for field personnel due to the fact that calls may not need to be transferred or calls would most likely be handled by distinct call taker and dispatcher positions.
  - Sharing of physical space facilitates communications between telecommunicators, law enforcement, fire, and emergency medical services (EMS). Improved communications enables field personnel to receive information more quickly and accurately, which is particularly important in multi-jurisdictional incidents. Although this benefit is the least tangible or quantifiable, it is one of the most important.
  - If large enough, a consolidated PSAP can utilize a call taker/dispatcher organizational structure. This structure enables call takers to focus solely on the incoming call and obtain the best information possible. The dispatcher's ability to focus solely on field personnel improves responder safety.
  - Standardized training of all PSAP employees increases consistency of service delivery regionally.
  - A single regional PSAP allows resource management during major incidents from a single point of control rather than fragmenting control among multiple PSAPs.
  - A consolidated environment will offer the opportunity for smaller participants to benefit from state-of-the-art technology, improved training, and expanded career opportunities that would not be otherwise financially or organizationally feasible.

- Personnel – Individual agencies no longer wish to support training or handle personnel issues for PSAP staff. Consolidation of PSAPs allows sworn personnel to be redeployed to other law enforcement or fire department responsibilities.
- Cost savings – While cost savings are possible, understanding two main points is critical before consolidating for financial reasons alone. First, not all consolidations result in cost savings. A common misconception is that consolidating will result in significant personnel reductions, thus significant cost savings. Consolidations do not normally involve large staff reductions unless a reduction in the number of dispatch positions is achieved. Such a reduction would result from agencies sharing dispatch frequencies where possible and practical. Combining separate agencies onto a single dispatch frequency is often politically difficult to achieve and may not be part of an initial consolidation effort.

Commonly, the real cost savings come from the elimination of redundant and expensive technology such as CAD systems, 9-1-1 answering equipment, radio consoles, and logging recorders, as well as maintenance costs associated with these systems. The single set of technology and systems found in a consolidated environment reduces costs associated with procurement, connectivity and maintenance. The level of savings is dependent upon the number of participants and the technology costs for which the municipalities are responsible. For example, in many states all of the costs associated with procuring and maintaining PSAP technology are the responsibility of the PSAP and the participating agencies/municipalities, while in other states, the State bears the cost of the 9-1-1 system network and answering equipment and provides PSAP funding through the 9-1-1 tax.

Second, in scenarios where cost savings are achievable, the actual realization of the savings may not occur for several years. The consolidation process can be expensive and can generate substantial one-time start-up and capital costs for facility and technology needs. These costs can delay the realization of cost savings.

3.2 Current Emergency Communications Environment

The State of Oregon has 49 primary PSAPs statewide that provide emergency communications service to its residents. Each PSAP is connected to a statewide frame relay network, which delivers automatic location identification (ALI) data at faster speeds than conventional methods. Oregon has three incumbent local exchange carriers (ILECs) and more than 20 competitive local exchange carriers (CLECs). Qwest, Frontier and CenturyLink provide E9-1-1 service. Collectively, these carriers supply the selective routing, LEC interface, frame relay, and switching office enabling to all PSAPs. The E9-1-1 Program Office pays for these statewide services; the total cost for FY 2011 was $12,120,444.

Wireless technology was implemented in two phases. Phase I delivers the wireless 9-1-1 call to the correct PSAP with the address of the cell tower from which the call originated. Phase II includes the longitude and latitude (X, Y coordinates) of the caller's location and the caller's phone number with the Phase I data. Each PSAP in Oregon has requested wireless Phase II data and is capable of receiving Phase II data.

All primary PSAPs include both 9-1-1 call taking and dispatching functions. Combined, the 49 PSAPs have 279 call taker workstations. Figures 1 and 2 detail the distribution of positions.

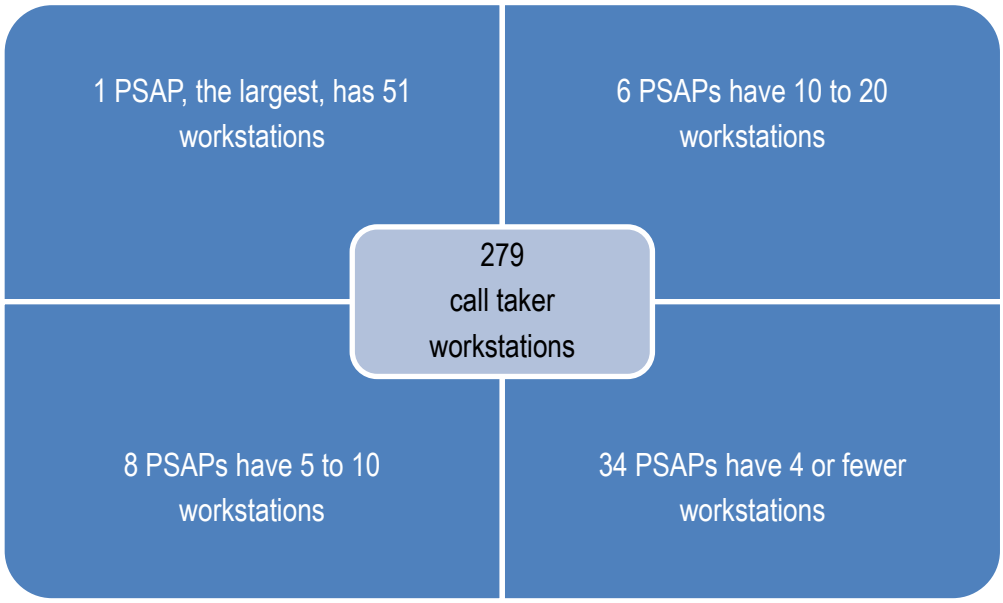

Figure 1 – Call Taker Position Distribution

Of the 34 PSAPs with four or fewer workstations, 12 have two workstations each. No PSAP has only one call taker workstation as State statute requires a minimum of two.[2]

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[2] ORS 403.115(5)(a)

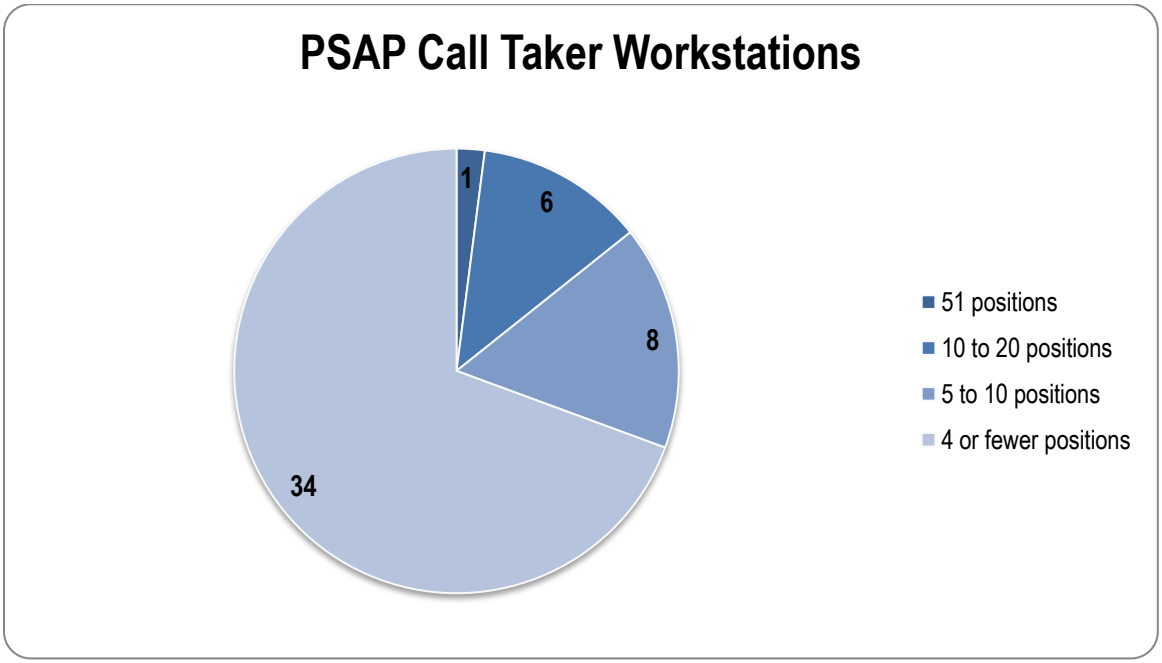

Figure 2 – Call Taker Workstations

At a minimum, each call taker workstation has the equipment listed below:

- Telephony equipment – paid from the Enhanced Subaccount
- CAD system – paid for by local resources, which may include distribution from the Emergency Communications Tax
- Mapping software – paid from the Enhanced Subaccount
- Call management software/equipment – paid for by local resources, which may include distribution from include the Emergency Communications Tax
- Voice recorders – paid for by local resources, which may include distribution from the Emergency Communications Tax

Each PSAP has other ancillary equipment (call loggers and instant recall recording) and emergency backup power capability.

Calls for service for the secondary PSAPs are received at a primary PSAP and then transferred. Data collection revealed that while regional emergency communications centers and PSAPs that provide police, fire, and EMS services exist, the majority of the PSAPs are small, between two and four physical workstations and generally staff a single person per shift. These PSAPs are commonly part of another public safety agency, such as a law enforcement agency. PSAPs are both locally supported and supported by funding through the Emergency Communications Tax. The Emergency Communications Tax pays for 38 percent of the total amount spent at all the PSAPs. Local funding pays the remaining 62 percent of the PSAPs operating costs.

However, the combination of several factors not only in the state of Oregon, but also nationally, have highlighted the need to manage emergency communications at all levels as efficiently and as cost effectively as possible while delivering high quality service to the community through PSAP consolidation. These factors include the following:

- The need to replace outdated telephony equipment and prepare for new IP-based technology including NG9-1-1.
- Recognition that a higher level of interoperability between municipalities/agencies will improve responder safety and the level of service provided to the community.
- Increased training needs for PSAP staff as the role of the telecommunicator continues to become more complex and technology-based.
- Budget constraints at all levels of government.

The sections that follow provide a high-level overview of current conditions statewide.

3.2.1 PSAP Operations

The workload handled by each PSAP is generally comprised of four components: 9-1-1 calls, administrative and/or ten-digit calls, dispatch functions, and ancillary duties. This section provides an overview of each of these components.

3.2.1.1 9-1-1 Call Volume

In 2010, Oregon's PSAPs received and processed 1,693,256 9-1-1 calls. Figures 3 and 4 and Table 2 break down the 9-1-1 number of calls collectively and those received by each PSAP. In addition, the per-PSAP calls are broken down into the average monthly (30 day month), daily, and hourly 9-1-1 call volume. L.R. Kimball understands that in reality 9-1-1 calls are not received equally across months, days, and hours of the day. However, this methodology does establish a benchmark for the actual amount of workload received from the 9-1-1 system, with full acknowledgement that call counts would be higher and lower from month to month, day to day, and hour to hour. Both the charts and the table provide an important snapshot that can be used to identify that the number of PSAPs currently in existence are not cost efficient in terms of 9-1-1 answering equipment and network usage, from the State's perspective, and personnel costs at the local level as compared to actual 9-1-1 call volume.

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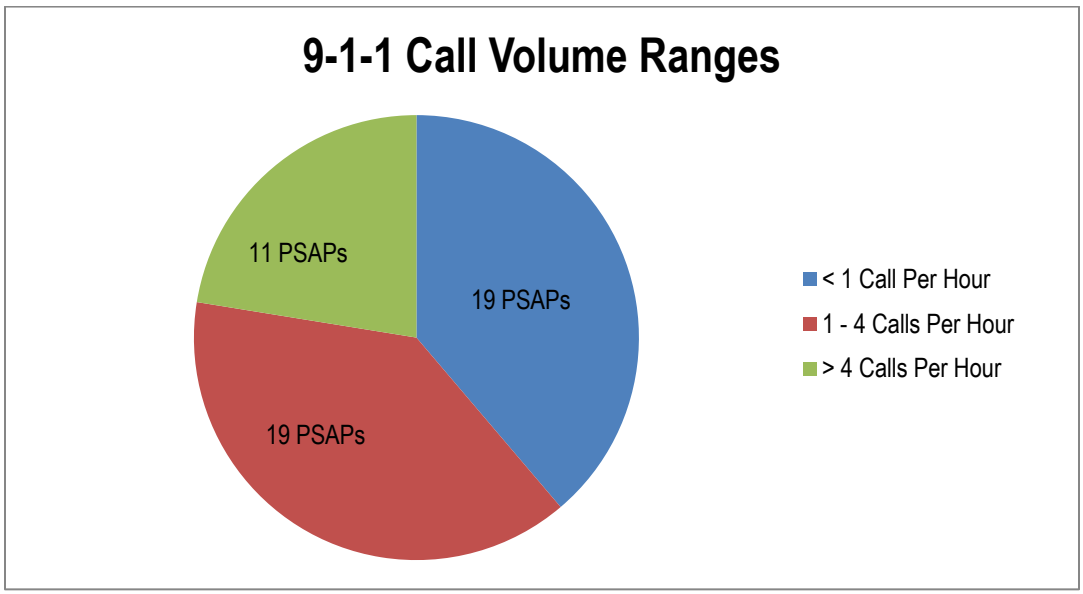

Figure 3 – Call Volume Ranges

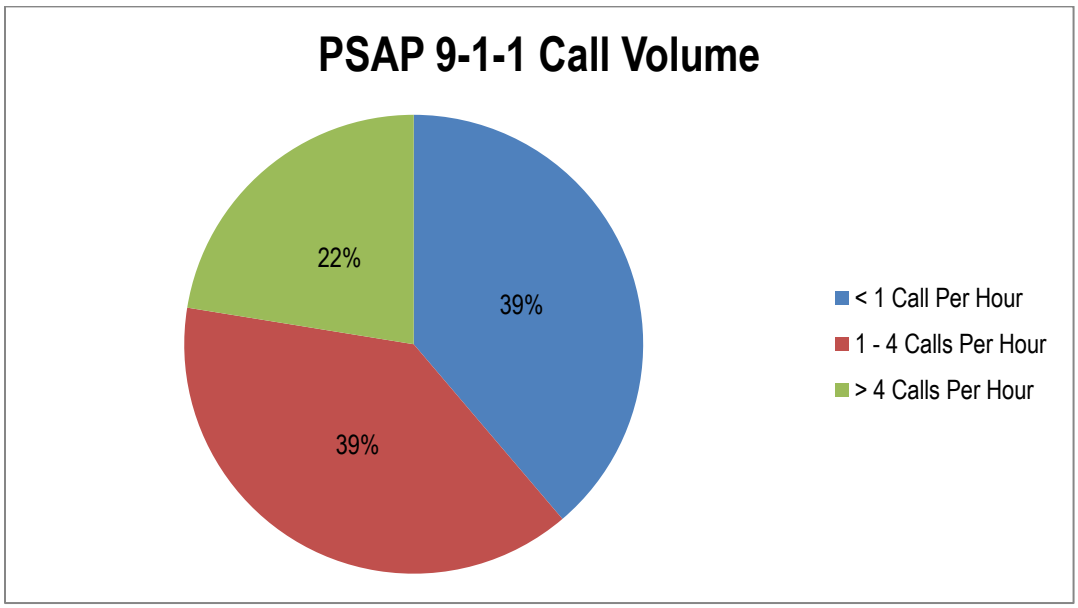

Figure 4 – PSAP Call Volume

Table 2 – 2010 9-1-1 Call Volume

PSAP	2010 9-1-1 Call Volume	Avg. Monthly 9-1-1 Call Volume	Avg. Daily 9-1-1 Call Volume	Avg. Hourly 9-1-1 Call Volume
Baker County Dispatch	9,316	776	26	1.06
Corvallis Regional Communications	21,776	1,815	60	2.49
Clackamas County Communications (C-COM)	123,175	10,265	337	14.06
Lake Oswego Communications (LOCOM)	21,198	1,767	58	2.42
Astoria 9-1-1	12,057	1,005	33	1.38
Seaside Police Department	6,504	542	18	0.74
Columbia 9-1-1	21,143	1,762	58	2.41
Coos Bay Police Department	10,243	854	28	1.17
Coos County Sheriff's Office*	12,737	1,061	35	1.45
Prineville Police Department*	7,844	654	21	0.90
Brookings Police Department*	5,504	459	15	0.63
Curry County Sheriff's Office*	5,516	460	15	0.63
Deschutes 9-1-1	55,220	4,602	151	6.30
Douglas County 9-1-1	48,807	4,067	134	5.57
TRI-County Communications (TRI-COM) (Gilliam County)	2,233	186	6	0.25
John Day Police Department*	1,844	154	5	0.21
Burns Police Department*	1,539	128	4	0.18
Hood River Dispatch*	10,193	849	28	1.16
Emergency Communications of Southern Oregon (ECSO)	91,590	7,633	251	10.46
Jefferson County Sheriff's Office*	9,129	761	25	1.04
Warm Springs Police Department+	2,600	217	7	0.30
Josephine County 9-1-1	37,801	3,150	104	4.32
Klamath County 9-1-1	84,703	7,059	232	9.67
Lake Emergency Telephone System (LETS)*	5,040	420	14	0.58
Central Lane	147,678	12,307	405	16.86
Eastern Lane 9-1-1	2,064	172	6	0.24
South Lane 9-1-1	7,046	587	19	0.80
Western Lane 9-1-1	2,849	237	8	0.33
Lincoln City Police Department	6,538	545	18	0.75
Lincoln County Communications (LINCOM)	14,211	1,184	39	1.62
Toledo Police Department*	1,503	125	4	0.17

PSAP	2010 9-1-1 Call Volume	Avg. Monthly 9-1-1 Call Volume	Avg. Daily 9-1-1 Call Volume	Avg. Hourly 9-1-1 Call Volume
Linn County Sheriff's Office	56,286	4,691	154	6.43
Malheur County Sheriff's Office	5,928	494	16	0.68
Ontario Police Department	5,438	453	15	0.62
North Marion County Communications (NORCOM)	25,967	2,164	71	2.96
Santiam Canyon 9-1-1*	13,538	1,128	37	1.55
Willamette Valley Communications Center (WVCC)	126,878	10,573	348	14.48
Morrow County Sheriff's Office+	5,488	457	15	0.63
City of Portland, Bureau of Emergency Communications (BOEC)	387,923	32,327	1,063	44.28
Tillamook 9-1-1	16,549	1,379	45	1.89
Hermiston Police Department	10,160	847	28	1.16
Milton-Freewater	2,254	188	6	0.26
Umatilla County Sheriff's Office	21,316	1,776	58	2.43
Union County 9-1-1*	9,275	773	25	1.06
Wallowa County Sheriff's Office	1,841	153	5	0.21
Wasco County 9-1-1	10,979	915	30	1.25
Washington County Consolidated Communications Agency (WCCCA)	127,652	10,638	350	14.57
Newberg Police Department	47,309	3,942	130	5.40
Yamhill Communications (YCOM)	28,864	2,405	79	3.29
Total 9-1-1 Call Volume	1,693,246			

*PSAP did not supply survey call volume. Call volume was taken from budget reporting to OEM.

+OEM did not have call volume amounts from the budget reporting; therefore, data from ECATS was used to estimate call volume.

3.2.1.2 Administrative/Non-emergency Calls

In addition to 9-1-1 calls, each PSAP also receives the following types of calls:

- Ten-digit emergency calls – These calls are generally out-of-state alarm companies that report the activation of police, fire and EMS related alarms.
- Seven- or ten-digit non-emergency calls – These calls are received outside the 9-1-1 network, but require a field response. For example, a citizen who discovers property damage upon returning home from vacation may wish to call a non-emergency line to report the crime rather than tie up a 9-1-1 line.
- Administrative calls – These calls do not require a field response and often are not generally considered related to emergency communications. Examples of these types of calls include inquiries about trash

pick-up or fireworks schedules, calls for other municipal departments and personal messages for police, fire or EMS personnel.

The State's combined 9-1-1, seven- and ten-digit emergency and non-emergency, and administrative call volume totaled 2,459,190 calls.[3]

3.2.1.3 Call Transfers

All PSAPs have dispatch functionality. All PSAPs transfer calls to Oregon State Police. According to the PSAP surveys, 74 percent of the 49 primary PSAPs dispatch for all the agencies they serve (excluding Oregon State Police) and do not need to transfer calls. The remaining 26 percent of the PSAPs must either transfer the call or relay the call information to a separate dispatch agency. One-half of the agencies who indicated that they transfer calls listed the Oregon State Police as a law enforcement agency they dispatch. The Oregon State Police has two secondary PSAPs to which 9-1-1 calls are transferred. This information indicates that response to many of the urgent calls for assistance are being delayed because police, fire, and EMS are often not all dispatched from the same PSAP, which results in the transfer of 9-1-1 calls.

When 9-1-1 call takers receive a call that must be transferred, the call taker must conduct a preliminary interview to determine the nature and location of the emergency. The call must then be transferred to the appropriate dispatch agency. The dispatcher then must re-interview the caller and dispatch field personnel. The average length of time added to a call during this process is 30 seconds.

In emergencies, seconds count. Should a call need to be transferred a second time to obtain all necessary services, another 30 seconds is added to the call processing time. Further, additional information that is received from other callers is also delayed when the call is processed in this manner. This means that information critical to responding agencies' safety and ability to effectively manage the emergency is delayed, as the call must be processed by the receiving PSAP first. These lost seconds can literally mean the difference in survival and subsequent quality of life for not only the people in emergency situations, but for police, fire and EMS responders as well. For example, 30 seconds to a minute of lost time can mean the difference between not surviving and being able to resuscitate a heart attack or drowning victim and whether that person will have a meaningful quality of life. In another example, a delay in receiving information regarding suspects with weapons or the presence of hazardous materials on-scene can have potentially fatal consequences for responders. While these examples are dramatic, they accurately illustrate the types of emergencies handled every day in PSAPs across the state.

Transfers increase the likelihood that human and/or technological errors will occur. High levels of training can minimize the amount of human errors, but even the best trained employees will still make errors from time to time. When a caller must speak with a minimum of two call takers, the potential for human error rises.

The quality of technology available today has reduced issues such as calls lost during the transfer process, but the possibility still exists and increases with each transfer. In addition to inherent time delays, secondary PSAPs may not

[3] Data supplied by the PSAPs via L.R. Kimball data collection surveys. OEM call data was used for those PSAPs that did not complete a survey.

have 9-1-1 answering equipment to receive ALI and automatic number identification (ANI). In an NG9-1-1 environment the ability to receive all forms of data will be critical. This information is critical to locating callers when 9-1-1 calls are dropped from the network, when callers are in moving vehicles and when callers are unable to speak. The following points should be noted:

- While the PSAP that originally receives a 9-1-1 call can pass along location information verbally to the appropriate PSAP or secondary PSAP, this verbal exchange adds another opportunity for human error.
- For wireless calls, the PSAP receiving a call from a moving vehicle would need to stay on the phone with the caller and the receiving dispatch-only site to update locations via the re-bid process.
- Given the stakes involved to the emergency responders and the citizens served, national 9-1-1 organizations such as the National Emergency Number Association (NENA) have been clear that, where possible, the transfer of 9-1-1 calls should be minimized.

3.2.1.4 Dispatch of Field Personnel

Even though the Emergency Communication Tax only funds 9-1-1 call taking, PSAPs across the state perform both 9-1-1 call taking and dispatch functions. Not all PSAPs provide dispatch services for all disciplines (police, fire and EMS), however. For example, a PSAP may provide police and fire dispatch services, but transfer calls to another agency for EMS and/or emergency medical dispatch (EMD). This situation is one of the main reasons for the transfer of 9-1-1 callers statewide. These transfers slow the dispatch process and the dissemination of information to field personnel. In addition, NG9-1-1 is likely to add a layer of complexity to these types of transfers. As the technology to receive photos, text, and other types of data becomes a reality, each PSAP will need the ability to forward this data to field personnel, which becomes more complex and potentially expensive if a transfer is involved.

9-1-1 call taking and dispatch functions are intertwined and, depending on the size of the PSAP, often performed by the same person. As the 9-1-1 call taker interviews the caller, he or she either is entering the information into the CAD system for dispatch by another employee in the same room or is dispatching the call themselves. In either case, the information received from the caller is quickly disseminated to responding field personnel. The transfer of information from caller to field responder is quick and efficient. In addition, the benefits of having call takers and dispatchers in the same room cannot be underestimated. All employees have a “big picture” view of active incidents and can function effectively as a team.

Dispatch functions and 9-1-1 call answering located together in the same PSAP will provide the best level of emergency communications services.

3.2.1.5 Ancillary Duties

The final workload component for PSAP staff is the ancillary responsibilities assigned. In small PSAPs, it is not cost effective or logical to have call takers/dispatchers sitting idle for the majority of their shifts. Especially when taking into account that many of the PSAPs statewide receive less than a single 9-1-1 call per hour on average. Therefore, a wide range of additional duties are commonly assigned. Often, these additional duties fall outside the realm of emergency communications. Ninety-four percent of the State’s PSAPs assign their 9-1-1 telecommunicators duties outside of true emergency communications (call taking and dispatching) functions. The number and significance of

the additional assigned tasks is dependent on the PSAP, call volume and the time of day. In many instances, after normal business hours, PSAP personnel are the only ones remaining in the building and interface with citizens looking for a safe haven or in need of assistance. As a 24/7 operation, the PSAP is also often assigned the responsibility for taking after-hours calls for other municipal departments whether or not the calls are related to public safety.

Often, when actual emergency communications responsibilities comprise the smallest portion of job responsibilities, then the employees' focus is primarily on non-emergency communications-related tasks rather than the other way around. Given the stakes associated with emergency communications, creating an environment that allows the employees' focus to be on receiving and processing 9-1-1 calls first is strongly recommended.

Re-assignment of these ancillary duties is a key issue in many consolidation efforts. In order to consolidate, municipalities must either re-assign these duties to existing employees, hire additional staff to handle them, or alter the type and level of service offered to citizens after hours.

Figure 5 depicts some of the ancillary duties assigned to telecommunicators and the percentage of PSAPs in Oregon that use telecommunicators to handle that duty.

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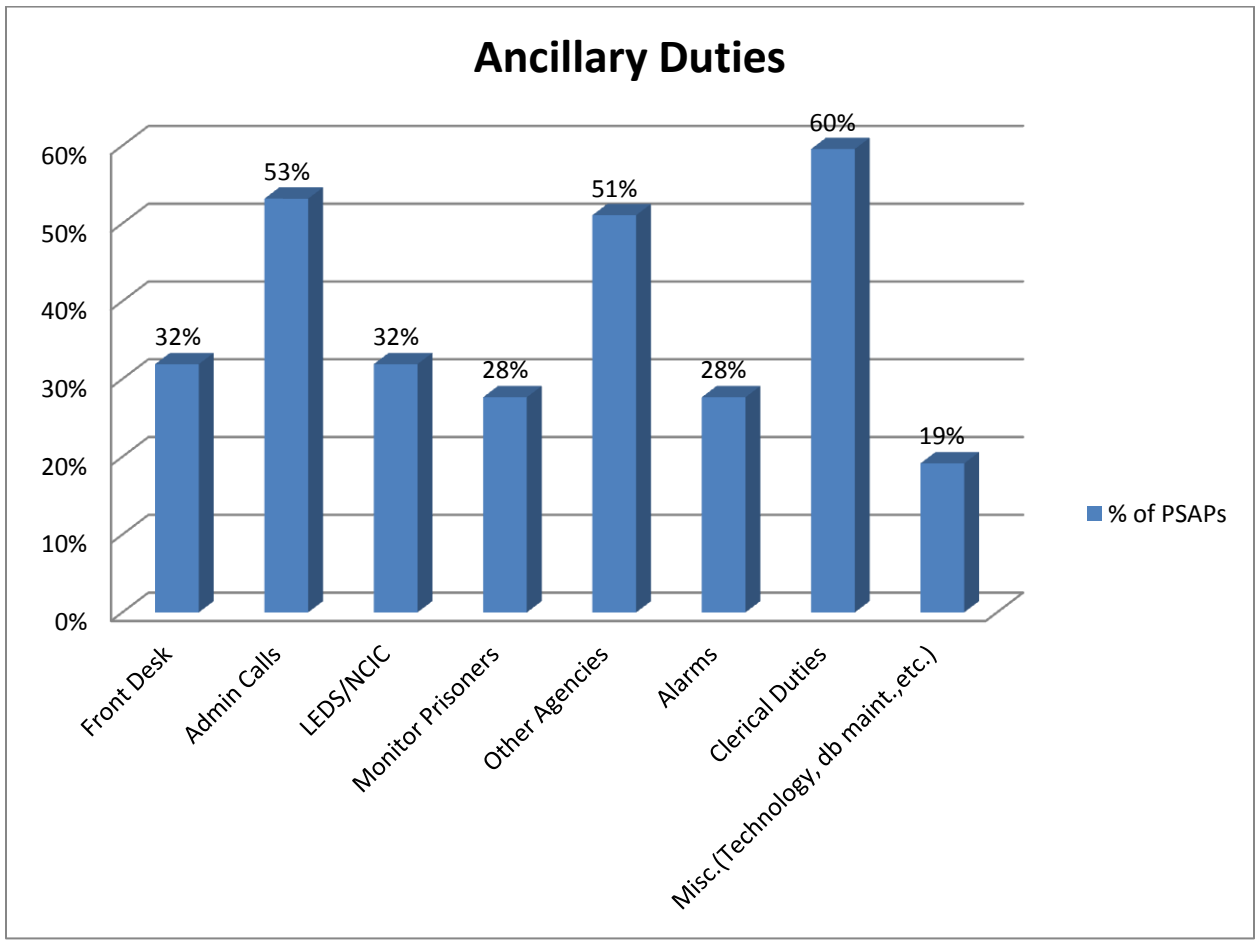

Figure 5 – Ancillary Duties

3.2.2 Technology

3.2.2.1 Computer Aided Dispatch (CAD)

Forty-five PSAPs reported that they use a CAD system, two PSAPs reported that they did not use a CAD system, and two PSAPs did not respond. CAD is not funded by the Enhanced Subaccount; however, the costs may or may not be covered by the Emergency Communications Tax distribution. Thirteen different CAD system vendors were noted. Table 3 summarizes the systems in use statewide.

Table 3 – CAD Systems

CAD System	% Installed	CAD System	% Installed
Custom Micro Inc.	29%	Motorola Premier CAD	2%
Executive Information Systems	13%	Northrop Grumman	2%
Tiburon	13%	PS.NET	2%
New World Systems	9%	Sun Ridge Systems	2%
Vision Air	7%	Sungard HTE	2%
Hitech Systems Inc	4%	Versaterm	2%
Computer Information Systems	4%	Cyrun	2%
Logistic Systems (Logisys)	2%	CAD Pro	2%
* The % installed totals 97%. The remaining 3% reflects the PSAPs that do not have a CAD system or did not provide that information on the survey			

Of the PSAPs reporting they use a CAD system, 70 percent reported CAD was installed more than five years ago. Of these systems, half were installed more than ten years ago. However, the PSAPs also reported that 76 percent of all PSAP CAD system software has been updated in the last two years.

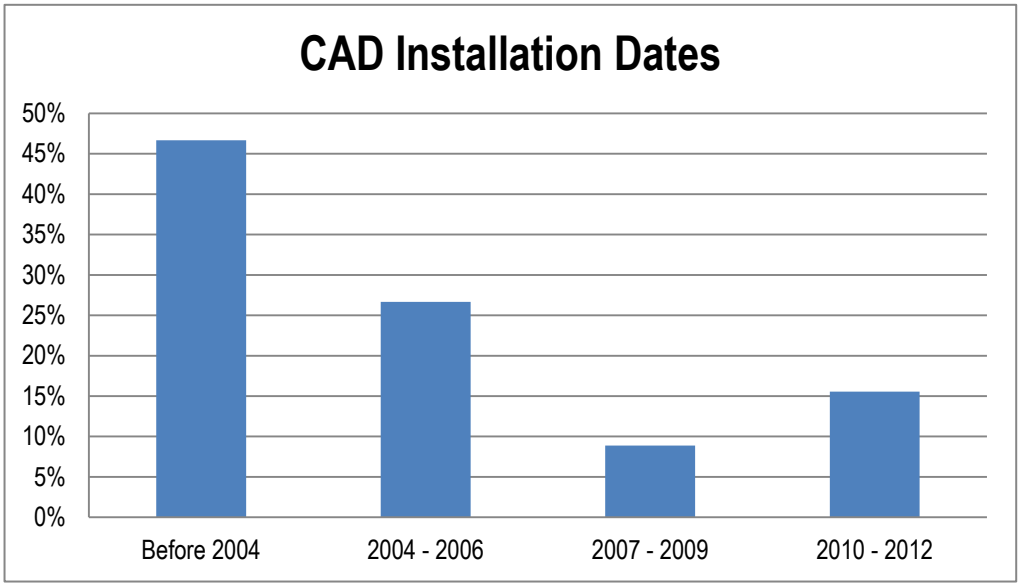

Figure 6 – CAD System Installation Dates

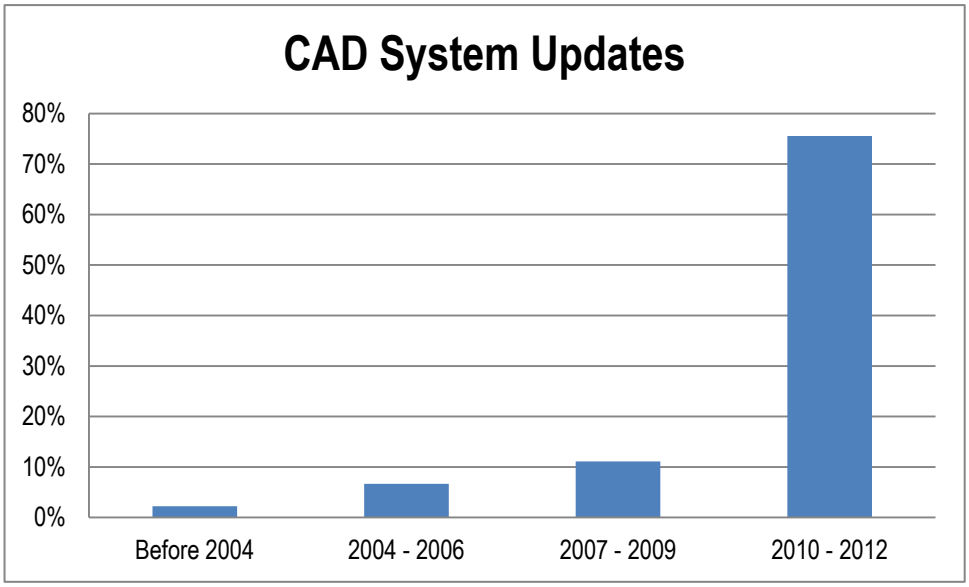

Figure 7 – CAD System Updates

The sharing of data to the CAD system from other PSAP applications and systems and the sharing of data collected by the CAD system with other PSAP applications require a software interface with the CAD system to facilitate the transfer of information. Allowing the CAD system to accept, process and share information is an important feature that assists the agency's call takers and dispatchers in gathering information and passing it along to the field responders.

CAD systems can share information with a variety of programs. All PSAPs that reported an installed CAD system had at least one interface to another application. The most prevalent interfaces are with E9-1-1, Oregon Law Enforcement Data Systems (LEDS) and the National Crime Information Center (NCIC), mobile data systems, mapping, EMD, records management systems (RMS) and Telecommunications Devices for the Deaf/Teletypewriters (TDD/TTY).

While the collected data indicated that PSAP agencies understand the usefulness of CAD system software and use many of the features associated with a CAD system, only about half have a redundant CAD system server in place to ensure no operational interruptions if the primary server fails.

CAD systems generally have a life span of seven to ten years, which means the majority of the PSAPs are already in need of CAD system replacements or will need a replacement in the near future. Although the data collected indicates that the majority of CAD systems are updated, older CAD systems may not be able to take advantage of new capabilities offered by an NG9-1-1 customer premise equipment (CPE) even if well maintained. Consolidating with other agencies and/or municipalities provides an opportunity for the procurement of CAD systems that will

seamlessly integrate with the NG9-1-1 CPE that will be procured by the Oregon 9-1-1 Program and ensure that each PSAP is well positioned to handle new forms of data.

3.2.2.2 Radio

A key component to maximizing interoperability and achieving the most operationally and fiscally effective consolidations is radio. The more commonality that exists in the radio platform used (Ultra high frequency [UHF], Very high frequency [VHF], 800 MHz), the higher the degree of interoperability and cost effectiveness that can be achieved. This section provides an overview of radio usage statewide. Radio is not funded by the Enhanced Subaccount; however, the costs may or may not be covered by the Emergency Communications Tax distribution.

Radio-related data collected indicates the following:

- Over three-quarters of the state of Oregon's PSAP radio consoles are manufactured by Motorola.
- 81 percent of the PSAPs were able to provide installation dates.
- 79 percent of the installed console systems were installed before 2006.
- 66 percent of the responding PSAPs were able to provide information relating to system updates.
- Over half of the PSAPs reported a radio system upgrade within the last three years.
- 17 percent of the PSAPs identified a need and/or plan to update radio equipment.

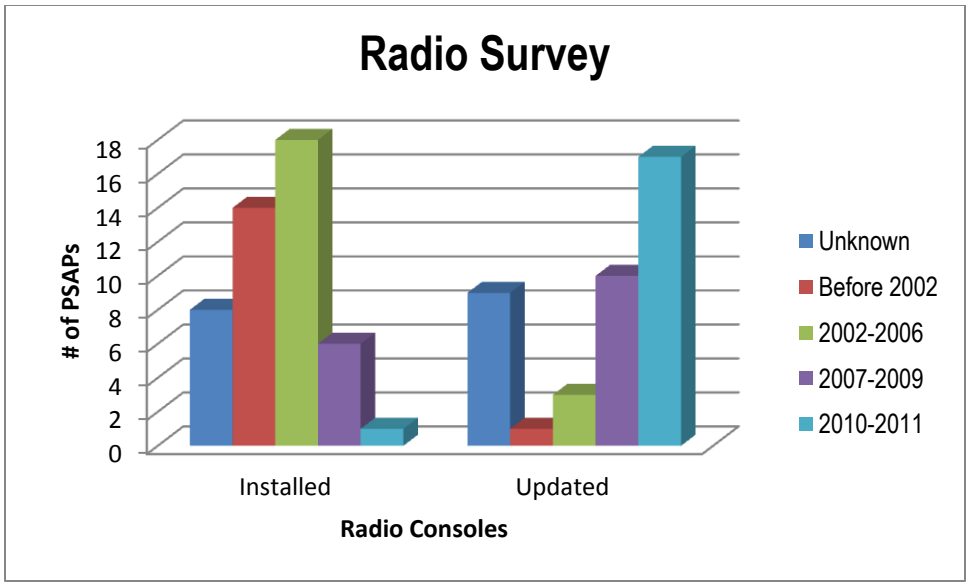

Figure 8 – Radio Consoles

Motorola provides radio consoles for 77 percent or 36 of the responding PSAPs. Zetron provides radio consoles for 15 percent or seven PSAPs. Telex and Moducom each provide radio consoles for two PSAPs.

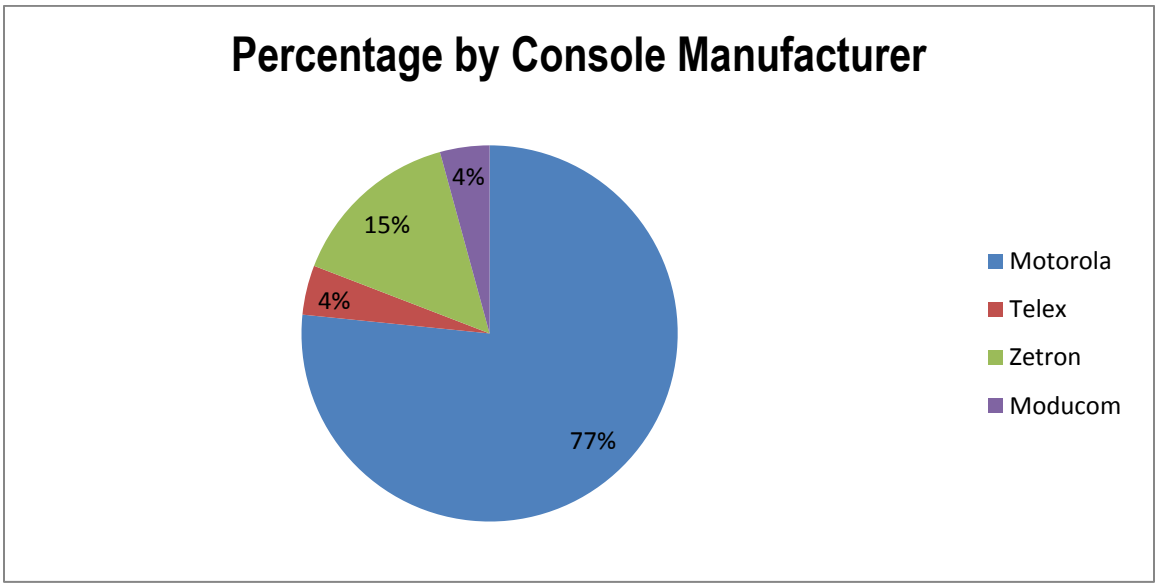

Figure 9 – Console Manufacturer

If manufactured after 1997, radio system equipment in the 150 – 512 MHz range has been required by the Federal Communications Commission (FCC) to be capable of operating in a frequency range one-half the bandwidth of previous allocations. The process of switching over to the reduced bandwidth is called "narrowbanding." Equipment purchased after 1997 and placed into service should be narrowband capable, but may require updating or a programming change to comply with the FCC narrowbanding mandates. Five PSAPs reported radio systems installed prior to 1997. Three of these have upgraded or are planning upgrades, but two gave no indication that an upgrade was performed.

As illustrated in Figure 10 below, the radio frequency band chosen for use is PSAP-specific, depending on function and what best met the needs of system users at the time. Interoperability with neighboring agencies is usually considered. Many PSAPs in Oregon are a result of prior consolidation efforts and have developed regional plans and region-wide radio systems, but there are other Oregon PSAPs employing diverse radio frequency bands for the same use. For example, fire services in two adjacent towns are often on different bands, perhaps UHF and VHF. This difference results in neighboring jurisdictions that cannot easily communicate with each other when response coordination is needed.

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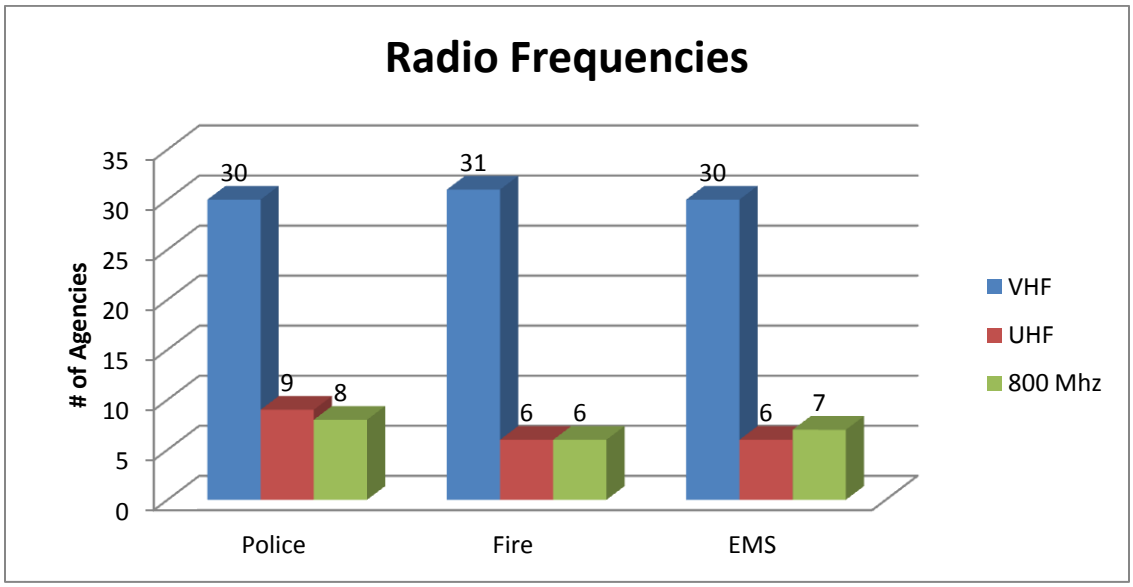

Figure 10 – Radio Frequencies

In a consolidated PSAP environment, often user agencies can be combined into fewer dispatch channels. This equates to fewer dispatch positions that need to be staffed on a 24/7 basis and improves inter-departmental communications. Fewer dispatch positions then translates to decreased personnel and technology costs, and lower facility space needs. Of course, the combining of dispatch channels or talkgroups is more complex than merely moving multiple departments to a single primary channel. The number of units using a channel, the amount of available air time, potential costs and political will are all issues that need to be considered in a feasibility study specific to the agencies involved.

Although common radio platforms and shared channels or talkgroups among consolidation partners help achieve maximum efficiency, disparate platforms is not a roadblock to consolidation. Several options are available for consideration:

- All participants move to the system that can be best expanded to meet the needs of the system users.
- Consolidate and continue utilizing different platforms (although a common console system could be used). Although costs associated with personnel and equipment would not be maximized, the other benefits of consolidation often are still substantial enough to merit moving forward.

Seven PSAPs in Oregon already have agencies on disparate radio platforms.

Information received during data collection indicates that efforts to improve interoperability and/or achieve cost efficiencies through radio regionalization are already underway in many areas.

- A number of agencies are already sharing radios systems or are in the process of funding radio engineering studies.
- Morrow County and Umatilla County share both the same radio system and CAD system and are the backup center for the other.
- Lake Oswego Communications (LOCOM) has end-of-life issues with their radio system and is planning regionally for replacement
- Newberg-Dundee 9-1-1 dispatches off the Washington County Consolidated Communications Agency (WCCCA) radio system through an agreement. Newberg-Dundee 9-1-1 uses the WCCCA/C800 radio system for dispatch through an agreement. LOCOM is a member of C800.
- Wasco County indicated that they share the same radio system with Hood River and Tri-Comm. Wasco County is in the process of having all their radios programmed and upon completion will be able to communicate with each of the other agencies.
- In 2010, Central Lane and WVCC commissioned a feasibility study to provide backup for the other on phones and radios, and are moving forward.
- Tillamook and Clatsop County are using Homeland Security Grant funding to create some redundant radio connections.
- WCCCA and other metro area agencies are using Urban Area Security Initiative (UASI) grant funding to explore the feasibility of a variety of partnerships, including consolidation, co-location, equipment and system partnerships. WCCCA and C-COM are the primary agencies, but the UASI region includes Multnomah County, Columbia County and Clark County, Washington. WCCCA has also been approached to discuss providing dispatch services for the cities of Newberg and Dundee in Yamhill County.
- C-COM, LOCOM, and WCCCA are currently engaged in RFP development for the feasibility of partnerships to include technical project sharing, co-location of facilities, and full operational consolidation. This project is funded through a UASI grant.
- Marion Co PSAP's are currently engaged in RFP development to move to a full operation consolidation.
- WVCC and LINCOM are engaged in negotiation of a contract to consolidate.

3.2.3 Current Environment Summary

Information gathered by L.R. Kimball throughout the data collection process indicates that PSAPs throughout the state are dedicated to providing high-level emergency communications services, including exploring the benefits of regionalization or consolidation. Many examples of planned, in-progress or actually achieved interoperability and consolidation are evident. C-COM shares a CAD system with WCCCA, and WVCC shares a CAD system with several agencies. However, the high-level review contained in this section indicates that further PSAP consolidation would be beneficial and recommended. Based on the information available to L.R. Kimball, the low 9-1-1 call volume handled by a large percentage of the PSAPs; systems that are reaching end-of-life, such as CAD, in the majority of the PSAPs; and the NG9-1-1 initiatives being pursued by OEM suggest that the time is right to explore and plan for consolidation.

3.3 Consolidation Model Options

L. R. Kimball was asked to examine two consolidation options: a single statewide 9-1-1 call center and a consolidated model based on L.R. Kimball's recommended number of PSAPs.

3.3.1 Single Statewide 9-1-1 Call Center Model

A single statewide call center model refers to the consolidation of all 9-1-1 call answering functions within one large call center. The statewide call center would be the primary 9-1-1 PSAP for all 9-1-1 calls (wireline, wireless, Voice over IP [VoIP] and NG9-1-1) that originate within the state. Upon answering those 9-1-1 calls, the call takers will process the calls to determine the location of the incident, the nature, and then transfer the callers to the appropriate local secondary PSAP for dispatch of field personnel. It is assumed that each of the existing 49 current PSAPs will remain as secondary PSAPs and continue dispatch of the disciplines currently dispatched. The local secondary PSAPs would continue to answer and process the local ten-digit emergency and non-emergency phone calls.

3.3.1.1 Emergency Medical Dispatch (EMD) Protocols

There are two options regarding EMD protocols and the operation of the statewide call center:

- The statewide call center would transfer medical calls to the secondary answering points that are certified and provide EMD. The statewide call center would need to provide EMD for the secondary answering points that are not certified and do not provide this service.
- The statewide call center could be tasked to provide EMD for all 9-1-1 calls.

Providing EMD at the local level ensures that all pertinent patient information received in the communications center is being relayed to the local responding agencies. This includes any information and narrative captured in the CAD system that is automatically transferred with the event information on the responders mobile data computers (MDCs). This information is vital to both the responders and those requiring assistance. Providing EMD at the state level most likely would not provide this level of information being passed on to the local responders.

If there are secondary answering points that do not provide EMD protocols, the statewide center would need to provide this service.

3.3.1.2 Technology

The statewide call center will need the following technology installed at each of the call taker and supervisor positions. Each workstation should be identically equipped with the following:

- 9-1-1 answering equipment
- CAD
- Mapping
- Instant Recall Recorder (IRR)
- TDD/TTY

3.3.1.2.1 9-1-1 Answering Equipment

The answering positions will include 9-1-1 trunks, ten-digit phone lines, dedicated ring-down circuits, one button transfers, speed dials and dialer files. The answering positions should be interfaced to the CAD system. The 9-1-1 answering positions should be equipped with integrated telephone IRR and TDD/TTY functionality.

All administrative phone lines should be installed on the 9-1-1 positions. Ten-digit administrative phone lines will be needed to process additional calls (e.g., ability for the secondary PSAPs to call the statewide call center). A bank of ten-digit outgoing phone lines will be needed to provide the ability for the call takers to place outgoing calls, such as call backs, calling the secondary PSAPs and other phone calls.

3.3.1.2.2 Computer Aided Dispatch (CAD)

The statewide call center will need a CAD system to assist the call takers in processing and controlling the calls for service. The CAD system should be used to log all incoming calls and to provide documentation of the disposition of those calls. This includes caller information, locations, call types, notes and narrative of the call. The disposition of the call should also be recorded, such as caller transferred to, hang-up call back information, and other critical call information.

The CAD system will maintain a record for all activity in the call center and provide management, supervisors, trainers and quality assurance personnel with an audit log of call center activity.

The majority of the current CAD systems are mapping/geographic information system (GIS)-based so integrated mapping should be included in the CAD system application. The CAD system should be interfaced to the 9-1-1 answering equipment, TDD/TTY, logging recorder and dispatch software such as EMD.

A statewide CAD system used by not only the call center, but each secondary PSAP, would help minimize the delay inherent in this type of call center configuration. The call center would receive a 9-1-1 call, enter the initial data and send it, at the same time as the 9-1-1 caller is transferred to the secondary PSAP. This provides the secondary PSAP a “head start” in the interview and CAD system process. However, implementing a statewide CAD system to be used by all primary and secondary PSAPs is an expensive and challenging process.

3.3.1.2.3 Mapping

Typically, mapping can be available as an integrated module of the 9-1-1 answering equipment. This model which is used in Oregon PSAPs now works well, but it will not be needed in the statewide center model. An integrated CAD mapping application interfaced with the 9-1-1 equipment would provide the secondary PSAPs with critical visual location information with minimum delay.

3.3.1.2.4 Instant Recall Recorders (IRR)

The 9-1-1 answering equipment and logging recorder typically have the capability to include an integrated IRR module. IRR should be available at each position to allow immediate play back of all telephone and radio console conversations.

3.3.1.2.5 Telecommunications Devices for the Deaf/Teletypewriters (TDD/TTY)

An integrated TDD/TTY module, utilized for communicating with the Deaf or speech/hearing impaired community, should be included with the 9-1-1 answering equipment. The TDD should be interfaced with the CAD system and the logging recorder.

3.3.1.2.6 System Furniture

The call center will need system (console) furniture designed to be utilized 24-hours a day/7-days a week by different users with varying physical sizes and accommodation needs. State-of-the-art console furniture is designed primarily for computerized dispatching/call taking and integrates advanced technology and ergonomically adjustable furniture components to allow employees to sit or stand while working.

3.3.1.2.7 Logging Recorder

A facility logging recorder will be needed to record all telephone calls and radio conversations. The logging recorder is a "back room" installation that is typically installed in the systems equipment room. Depending on operations, all the positions may need access to the recorder, especially if the application is be used to provide operations with IRR. The logging recorder will be needed for investigations, statistics, complaints and quality assurance programs.

3.3.1.2.8 Master Clock

The call center will need a redundant master clock solution. All critical technology, such as the 9-1-1 answering positions, CAD system, logging recorder and radio consoles should be interfaced with this central time system. This will ensure that all systems use a synchronized time source.

3.3.1.2.9 Technology Costs

Capital costs include the technology that will be needed to provide the best possible service and allow the PSAP to operate effectively. Table 4 provides budgetary costs for new technology that may be needed to support a statewide call center and are based on a projected 31 workstations, including call taking, overflow, and training. The number of workstations is what is required to handle 9-1-1 call volume only. Additional workstations would be needed to manage the combined call volume including 9-1-1, seven- and ten-digit emergency and non-emergency, and administrative calls.

Table 4 – Technology Costs

Technology: Systems and Specialized Furniture	Budget Estimates	Total Estimated Cost Range
9-1-1 Workstations[4]		
CAD	$90,000 per position	$2,790,000
System Furniture	$15,000 per Position	$585,000
Intensive Use Chairs	$1,200 per position	$48,000
Digital Logging Recorder	$148,000 approximately	$148,000
Redundant Master Clock Solution	$20,000 approximately	$20,000
		$3,591,000

[4] See Sections 4.7.2 and 4.9.2 - Cost Considerations – for an explanation and reference spreadsheets in Appendices C and E.

It is recommended that the secondary PSAPs have the capabilities that are provided with the 9-1-1 answering equipment, such as ANI/ALI, enhanced wireless Phase I and Phase II data, ability to see Phase II caller locations, manual ANI/ALI search, etc.

3.3.1.3 Facility

The operation of the statewide call center will require the construction of a new facility or the renovation of an existing building. With either option, consideration should be given to industry best practices for PSAPs.

The design of a space intended to support 24/7/365 operations must meet the needs of a modern PSAP. Of great importance is the comfort and safety of the staff and the capacity of the space to address current needs, as well as needs for the next ten to twenty years. A hardened design is desired and intended to allow this operation to continue when the surrounding community is affected by power outages, severe weather events, or man-made and/or natural disasters. There are compromises and decisions required to accommodate limitations in funding, vision and, at times, politics. The effort and attention given to the design of a new facility, and specifically to the allocation of the communications space and support areas by the facility occupants, will determine the capacity and life span of the structure, service and, ultimately, the organization.

The industry standards cited and used to guide the design input and technology best practices recommended include National Fire Protection Association (NFPA) Section 1221, Commission on Accreditation of Law Enforcement Agencies (CALEA), NENA, and APCO. These standards-setting bodies provide standards and guidance in the operations and technical aspects of a modern PSAP. The National Electrical Safety Code (NESC); the latest edition of NFPA 70, National Electrical Code (NEC); American National Standards Institute/Telecommunications Industry Association/Electronic Industries Alliance (ANSI/TIA/EIA) standards; the BICSI Telecommunications Distribution Method Manual; and Motorola R56 Standards and Guidelines for Communication Sites impact the electrical and cable infrastructure. The Institute of Electrical and Electronic Engineers' (IEEE) standards impact electrical, grounding and communications systems design.

Additional consideration must be given to codes adopted by the local jurisdictional authority. For example, if the most recent version of the International Building Code (IBC) is used, specific criteria must be followed to ensure the stability and integrity of buildings identified as critical facilities.

3.3.1.3.1 Spatial Requirements

In emergency communications operations, the number of workstations drives the floor and adjacency needs. Industry standards provide direction in determining the amount of space required to properly support emergency communications within a range of square feet (SF) based on the organizational and operational model. The number of required workstations is developed by first reviewing the future operations of the PSAP and determining the number of personnel required for the workload. The quantity of positions is then determined to support the required staff. Training needs and future expansion must also be taken into consideration.

Programming based on the concept of a consolidated organization provides a range of available SF on a per console basis. To adequately support the anticipated workload, 31 workstations are needed. An additional space allotment on the main floor should be given to accommodate future consoles as well.

The number of workstations projected for an operation is used in combination with the amount of SF per position to project the total work area of the PSAP floor.

Consideration must be given to providing space for areas such as administrative and support offices, a training room, a kitchen, locker space, storage, hallways and bathroom facilities.

3.3.1.3.2 PSAP Workstations

Within the allotted space, each position can require up to 175 SF of floor space per workstation and work area on the operations floor. The 175 SF represents the individual footprint of a position as normally fitting within a 10-foot by 10-foot area (100 SF) with the remaining 75 SF representing the necessary areas surrounding the furniture footprint, such as pathways, open areas, doorway access and clearance allowance in compliance with the Americans with Disabilities Act (ADA). This preliminary spatial allocation number is generally used for planning and can fluctuate with various room configurations and/or system furniture solutions.

3.3.1.3.3 Equipment Rooms

An allowance of 25 SF is standard to accommodate the footprint of each single enclosed equipment cabinet or rack with a minimum 3-foot clearance around. This also includes aisle-ways, accommodations for doors and room shapes/sizes, clearance for wall-mounted equipment, fire suppression and cabling infrastructure.

To project the space needs for an equipment room or rooms, planners must know the number and type of systems and equipment needed to support the consolidated PSAP. This space estimate should include utility considerations and demarcation points for all services. Other uses for this space may include network servers and routers, secure data storage for served agencies' records servers or repositories.

3.3.1.3.4 Training Room

The state PSAP will need to construct an area to provide training for new employees. Call takers must master a wide range of interpersonal and technical skills and must perform their functions in a high-stress mission critical mode. There is an on-going need for call takers to maintain their existing proficiency and skills. A well-equipped systems training room or area will provide the required environment and equipment to carry out this critical training away from the operations floor and from the distractions found inside a 'live' PSAP.

L.R. Kimball recommends a dedicated systems training room or area with positions that are identical to the consoles on the operations floor, equipped with CAD and phone, to support training and live calls

.

The training area can be used for new employee and continuing education training, incident overflow during high periods of call activity (severe weather) and can be staffed with additional call takers for special operations, EOC activations and other activities, and to monitor employee activity and perform QA.

3.3.1.3.5 Facility Costs

The largest one time capital cost is usually associated with the construction or renovation of an appropriate facility. It is rare that an existing structure is found to be suitable to house a PSAP operation. While it may be possible to locate a facility of adequate size, typically the costs to renovate the floor space to current public safety industry

standards for a hardened facility with adequate cable infrastructure become as costly as new construction. Costs associated with both renovation and new construction options include site selection, evaluation and acquisition, and facility design, programming[5] and construction.

Site acquisition costs are difficult to project as they are based on land values for a specific place and time. If stakeholders identify municipal-owned land that may be viable for locating a consolidated communications center and if a site evaluation shows the site to be a good location, then site acquisition costs could be minimal.

Projecting accurate costs for a new facility requires a much higher level of detail and planning than is within the scope of this project. However, broad budgetary numbers can be developed and used as a planning starting point.

To determine a budgetary estimate, L.R. Kimball combined industry best practices, average hardened facility construction costs per square foot, and some basic assumptions about the programming of the facility. Combining these criteria with 20-year growth projections and 31 recommended console workstations, an overall estimate for building size and cost can be calculated.

Table 6 details size and cost options. These estimates include the general base building and minimal site development. It does not include site acquisition and improvement costs, if needed. As with any planning estimate, costs will need to be adjusted once a complete and in-depth space programming study is completed and other decisions regarding amenities, service area, staffing and number of work positions are made. Potential partnerships creating collocation opportunities will affect space needs, costs and funding.

The initial high level estimate for needed square footage indicated a facility size of around 14,500 square feet to accommodate the workstations and administrative office space, equipment room(s), and other adjacencies. For comparison, several options below and above this estimated size are provided. Based on an estimated cost of $325 to $425 per square foot for construction/renovation, L.R. Kimball projects facility costs to be within $4,062,500 and $7,012,500. It is important to note that these cost ranges are an average of what is found nationally. Square footage costs may vary greatly in specific areas so it is important to check the local market to verify estimated square footage costs.

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[5] The process of defining space needs for a facility through identifying use of facility and individual office/floor square footage and costs.

Table 5 – Facility Cost Estimates

Single PSAP Facility Cost Estimates			
# of Positions	Building Sq Footage	Cost/Per Sq Foot	Total Estimate
31	12,500	$325	$4,062,500
31	13,500	$325	$4,387,500
31	14,500	$325	$4,712,500
31	15,500	$325	$5,037,500
31	16,500	$325	$5,362,500
# of Positions	Building Sq Footage	Cost/Per Sq Foot	Total Estimate
31	12,500	$400	$5,000,000
31	13,500	$400	$5,400,000
31	14,500	$400	$5,800,000
31	15,500	$400	$6,200,000
31	16,500	$400	$6,600,000
# of Positions	Building Sq Footage	Cost/Per Sq Foot	Total Estimate
31	12,500	$425	$5,312,500
31	13,500	$425	$5,737,500
31	14,500	$425	$6,162,500
31	15,500	$425	$6,587,500
31	16,500	$425	$7,012,500

1. The figures indicated above are to be used for preliminary building planning purposes only.
2. Estimates for required system technology and/or site acquisition, design and preparation are not included.
3. Conceptual pricing and cost of materials will vary based on decisions made during the design phases and market conditions at time of bid.
4. Square footage per position includes operational workspace and all adjacencies. Adjacencies are defined as pathways, walls, doorways, administrative offices, conference rooms, training rooms and work or support areas outside the operations floor.
5. ECSO's recent construction costs were $356 per square foot, with total costs at $421 per square foot.

3.3.1.4 Backup

If the planning of a statewide call center moves forward and a single new or renovated facility is selected, there will be a need to identify, plan for and equip a long-term backup facility. In the event a PSAP had to be evacuated or was rendered uninhabitable, there will be a need to maintain and relocate to a backup facility at another location.

A backup PSAP is essential to maintaining an acceptable level of 9-1-1 call processing. Without a backup center, call processing would be severely compromised if operations at the statewide call center ceased for whatever reason. Evacuation and relocation of staff from the PSAP may be caused by environmental and/or technical infrastructure failure. Failures of the 9-1-1 internal or external telecommunications or electrical service equipment are situations when evacuation to a backup PSAP could be warranted.

A backup facility should be reviewed for specific requirements by state. It will require robust and diverse systems that share operational and functional redundancy and physical capabilities with the primary facility. The selected backup facility can also serve as a cost-effective location for off-site installation of backup servers or database maintenance for any or all critical systems in use at the primary facility. The primary and backup facility can provide systems redundancy for each other. It is best if the facility has sufficient hardening and redundant power/telecommunications connectivity to function in this capacity.

It is recommended that the backup center be sized to accommodate a minimum of 60 percent of the full capacity of a statewide call center; this is approximately 20 positions.

The facility should have the ability to support a temporary short-term and long-term loss of the primary facility. Short-term would be designated as two to five days and long-term would be considered a longer period (for example, days, weeks, months).

Redundancy in the 9-1-1 system is critical to avoid a single point of failure. There are three back-up options that can be considered for the statewide call center.

- Dedicated Backup Facility
- Regional Call Centers
- Secondary PSAPs

3.3.1.4.1 Dedicated Backup Facility

A dedicated backup facility could be constructed with the required technology installed. On a daily basis this center would sit idle and not be used. However, there is significant cost associated with a backup solution such as this. If a sufficient facility cannot be found, then one would need to be constructed and the cost to procure, install and maintain the needed technology in the backup facility would be significant. A minimum of 20 positions would be required at the backup facility.

With the proper connectivity to the primary facility, the backup facility can augment operations at the primary facility during times of disaster or high call volume when additional call taking and/or dispatching resources are needed.

The backup facility should be geographically diverse for weather-related or other localized disasters and emergencies. The backup facility should be served by alternate utilities (telephone home office, power grid, etc.).

3.3.1.4.2 Regional Call Center

Instead of operating a ‘single’ statewide call center, two regional centers that are geographically diverse could be considered. The two regional centers could be sized and equipped to provide redundancy and backup to each other.

As with the dedicated backup facility option, this option would have additional costs associated with it – the most significant being the need to construct, equip and maintain two facilities. In addition, it would be anticipated that some additional staff would be needed mostly in the management, administrative and support staff areas, especially if the facilities were a significant distance from each other.

3.3.1.4.3 Secondary PSAPs

The third and final option could be that some or all of the secondary PSAPs could act as a backup. If for any reason 9-1-1 calls could not be processed at the statewide call center, calls could be transferred to all or some of the local secondary PSAPs.

3.3.1.5 Model Pros and Cons

Pros

- Call taking standardization with one center taking all 9-1-1 calls. Everyone in the state will get same level of service.
- Quality assurance will be easier to implement and maintain with one center.
- Misrouted calls should be at a minimum with one statewide center and large geographical area.
- Costs associated with 9-1-1 networks should be reduced with an NG solution (a legacy solution would be significantly higher)
- Secondary PSAPs still have to have call takers for ten-digit emergency and non-emergency, which minimizes job loss at the local level.
- Expanded career path for employees.

Cons

- All 9-1-1 calls will have to be transferred to the appropriate secondary PSAP(s) for dispatch of field personnel. The transfer of 9-1-1 calls is a significant issue that is explored in greater depth below.
- Ability for secondary PSAP to get ANI/ALI and other benefits of enhanced 9-1-1 and NG9-1-1 may be lost or may have additional costs.
- Ability for secondary PSAP to capture any communications between the caller and the primary.
- Heavier reliance on technology in regards to state geography rather than local knowledge.
- EMD becomes more complex by either offering at the single call center for all citizens, which delays the relay of updates to secondary PSAPs and field personnel, or by transferring to each secondary PSAP for EMD, which also delays the process.

3.3.1.6 Transfer of 9-1-1 Calls in Single Statewide PSAP

When 9-1-1 call takers are located in a separate facility, such as a single statewide 9-1-1 center, the 9-1-1 call taker must conduct a preliminary interview to determine the nature and location of the emergency for each incoming 9-1-1 call. This preliminary interview serves two key purposes. First, it allows the call taker to identify the secondary PSAP to which the call must be transferred. Second, and more importantly, the preliminary interview ensures that the caller's location, at minimum, is received should the call be lost unexpectedly. This allows help to still be sent. The call must then be transferred to the appropriate secondary PSAP for dispatch. The dispatcher then must re-interview the caller to ensure the call has been delivered to the correct dispatch point, that the address and call nature are correct, and to gather further details regarding the incident. At times, a second transfer is needed, which would

include a third similar interview, to ensure all needed services such as police, fire and EMS are dispatched. In addition to the frustration experienced by the 9-1-1 caller, this system creates unnecessary delays in the dispatch of emergency personnel. The average length of time added to a call during this process is 30 seconds for each transfer. While 30 seconds seems like a short period of time, consider that 30 seconds may be the difference between:

- A person being rescued from a house fire or becoming a fatality
- A violent criminal being apprehended or escaping
- A heart attack victim being resuscitated or dying
- A drowning victim suffering brain damage or recovering fully
- A hunting accident victim bleeding to death or recovering

While these are dramatic examples, they are examples of real situations that occur daily in public safety. In emergencies, seconds count. Should a call need to be transferred a second time, another 30 seconds is added to the call processing time.

The transferring of calls creates additional problems by creating a delay in getting vital information to field personnel. For example, multiple calls are often received for the same incident. Each caller often has different information to share. If each 9-1-1 caller is routed to the statewide center first and then transferred to the secondary PSAP, the dissemination of information critical to field personnel is delayed. This delay may be the difference between:

- A police officer knowing that a domestic disturbance now involves a gun or the officer walking in to a more dangerous situation unaware
- A fire company knowing exactly where a victim is located upon arrival or having to search for them, thereby delaying rescue and treatment
- All emergency responders being aware of toxic chemicals at a scene, taking appropriate preventative measures or not knowing and entering the scene and sustaining personal injury

There are states that have implemented a single or two statewide call centers. In one case, the call transfer delays are minimized by the use of a statewide CAD system. However, delays cannot be eliminated and, depending on the specific nature of a call, three-way conversations between the call taker, dispatcher and 9-1-1 caller are necessary. This adds an unnecessary complexity to the handling of 9-1-1 calls.

While implementation of a statewide CAD system mitigates the delays inherent in a single call center configuration, mandating use of a single system would be politically unpopular to say the least and would be a massive undertaking for the State. Finally, if a statewide CAD system was mandated by the State, local municipalities would likely look to the State to pay for the costs of the new system, which would have to be present in both the call center and each dispatch point. The costs associated with a system large enough to support all of the PSAPs and the single call center would be extremely expensive without taking into account issues associated with the different RMS systems used locally that must interface with the CAD system.

3.3.1.7 State-mandated Consolidation

In many states, the State manages the funding of the 9-1-1 equipment and network while costs associated with dispatch functions are considered the responsibility of the local municipalities. The method in which these costs are managed varies from state to state. However, across the country this split in control and/or funding has created an environment where the states may become focused on only the portion for which they are financially responsible rather than the whole emergency communications picture. As the following example illustrates, efforts to increase efficiencies and lower costs through mandated consolidation can result in unanticipated consequences.

Several years ago, one state attempted to reduce the number of PSAPs (call taking and dispatching) by mandating a reduction over the portion under their control – the 9-1-1 call processing portion. A goal number of PSAPs was established and existing PSAPs were left to work out where the reductions would occur. While the goal number of PSAPs was reached, consolidation efforts were primarily limited to the 9-1-1 portion of emergency communications. In other words, while many PSAPs contracted with other PSAPs to receive and transfer their 9-1-1 calls, the dispatch of field personnel stayed with the municipality. The end result was a decrease in the number of PSAPs that receive 9-1-1 calls, thereby reducing costs managed by the State, but an **increase** in the number of secondary PSAPs, which brought with it all of the concerns outlined in the above section. The overall impact statewide is an emergency communications system that is fractured, inefficient, and more costly at the local level as municipalities had to contract with another entity for 9-1-1 call services and maintain dispatch services. While costs at the state level may have decreased, service levels to the citizens decreased and costs to the municipalities increased.

An effective statewide emergency communications system requires that the State and local entities work together to develop a plan that is cost effective and maintains or improves the integrity of the system as a whole – 9-1-1 call taking and dispatch functions.

3.3.1.8 Single Statewide 9-1-1 Call Center Summary

A single statewide 9-1-1 call center does offer some financial benefits. However, the impact on the emergency communications system as a whole is substantial and overwhelmingly negative. From a service level perspective, virtually every 9-1-1 call made across the state would need to be transferred at least once from a single call center to the appropriate dispatch point(s) before field personnel could be sent. This configuration ensures that each call will have at least one inherent delay.

L.R. Kimball strongly recommends against this configuration.

3.3.2 Recommended Number of PSAPs Model

L.R. Kimball was tasked with recommending a statewide PSAP consolidation configuration that would provide the most effective level of emergency communications and produce cost efficiencies. Typically, at the core of any recommendation, 9-1-1 call volume represents the baseline of how regions are formed so as to balance call volume throughout the state and provide realistic back-up capabilities from one center to another. However, numerous pre-existing variables within Oregon must be strongly considered and taken into account before a statewide PSAP configuration recommendation is proposed. These variables include existing current regional communications centers, interest in consolidation and the geography that essentially splits the central and eastern portions of the state from the west coast.

In any high-level recommended configuration a number of assumptions must be made. For this model L.R. Kimball assumed the following:

- Political support to form these regions is present.
- Radio systems are either already compatible within each region or would be upgraded to be compatible.
- A facility large enough to house each regional PSAP exists or could be built.
- Other critical PSAP systems such as CAD and logging recorders would be upgraded to accommodate a regional PSAP or an appropriate replacement would be procured.

Clearly, these assumptions are each obstacles in their own right to any consolidation effort. L. R. Kimball views the recommended model as a long-term goal to work towards through consolidation efforts at the local level rather than a model that would be implemented as a single project goal.

3.3.2.1 Recommended Number of PSAPs

In determining the recommended or "perfect world" number of PSAPs statewide, L.R. Kimball's approach focused on what best serves the emergency communications system as a whole rather than focusing on 9-1-1 calls only. In L.R. Kimball's opinion, keeping 9-1-1 call taking and the dispatch of field personnel together within each regional PSAP best serves the citizens as well as the field personnel and is critical to establishing the best emergency communications system possible. Secondary to 9-1-1 call taking and dispatch functions remaining together, a balancing of call volume, where possible, the State's unique geography, and maintaining existing or planned partnerships were taken into consideration. In L.R. Kimball's opinion, a PSAP configuration of nine regionally based PSAPs would provide the most equitable and efficient use of resources statewide. The following is a list of the criteria used in determining the regions.

- 9-1-1 call taking and dispatch functions remain together.
- 9-1-1 call volume – Where possible, the call volumes were balanced among the regions to ensure the maximum number of redundancy or backup options.
- Back-up or redundancy planning – Multnomah was identified as its own region. Although consolidating with Washington and Clackamas Counties would make sense, redundancy planning would be much more complex in a PSAP that is so much larger than any other in the state.
- Existing partnerships – Survey results and on-site interviews indicate that sharing of systems and the exploration of potential consolidations are being discussed across the state. Therefore, it would be logical to group these PSAPs together.
- State geography – Equalizing the distribution of 9-1-1 calls among regions is desirable whenever possible. However, the unique geography present in Oregon prevents an across the board equal distribution. The call volume per region is much higher on the western coast of the state than it is in the central and eastern portion. In fact, the call volume in some central and eastern regions is low enough that, under different circumstances, placement of 9-1-1 workstations would not be cost effective. However, this set of circumstances illustrates that the number of PSAPs cannot be decided by call volume, or by extension, cost alone.

The map below illustrates the nine recommended regions as well as a topographical overlay that demonstrates the geographical challenges that impacted call distribution statewide.

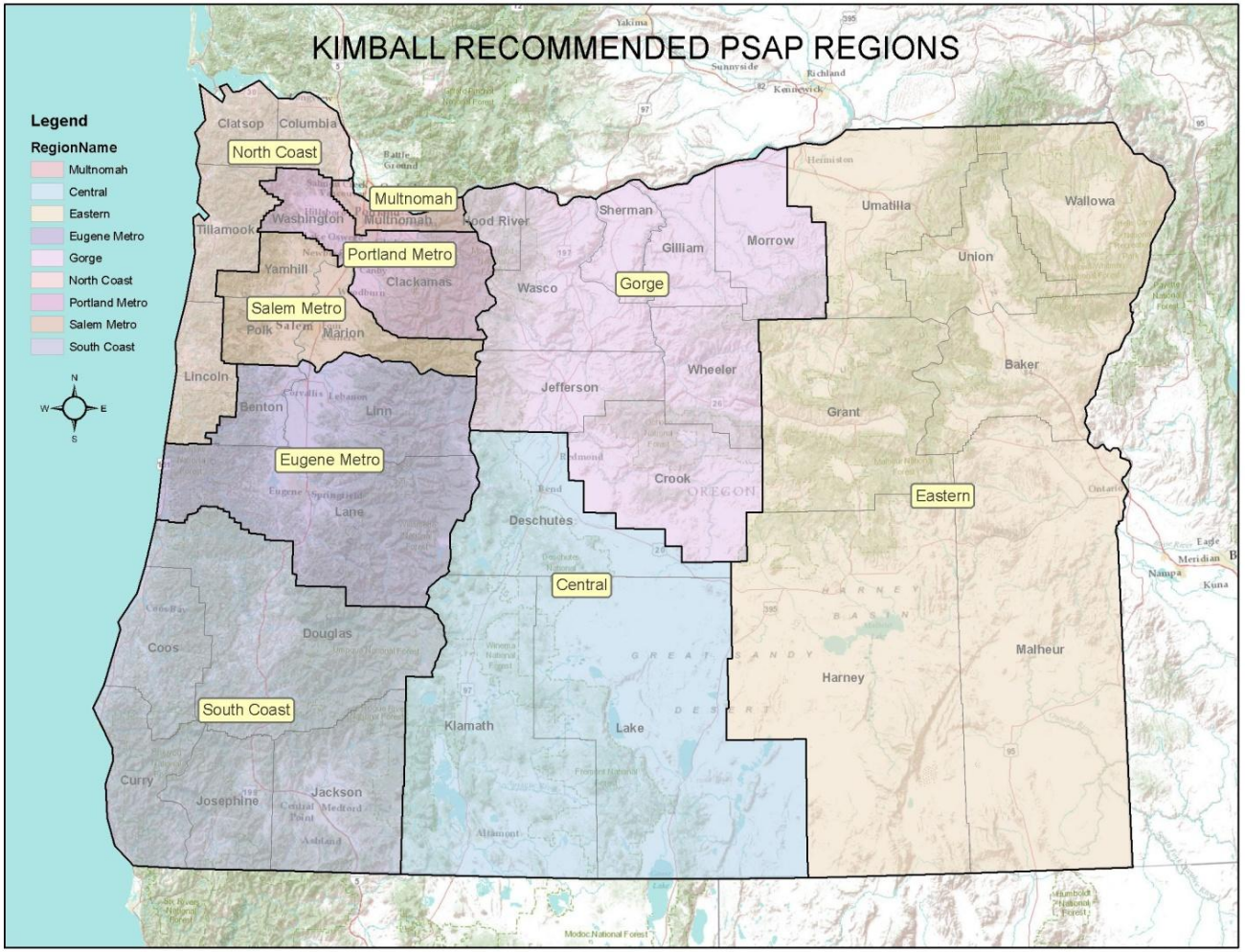

Figure 11 **– Recommended PSAP Regions**

A major advantage of this configuration would be improved regional awareness, and, as a result, coordinated response and interoperability during major incidents. The distribution of calls in this regional design would offer redundancy alternatives in the event of a major disruption of 9-1-1 services in any one of the PSAPs. Calls could be rerouted temporarily to one or more of the other regional centers because at least one similarly-sized PSAP exists. Additional benefits include a more cost effective use of the statewide 9-1-1 system and the trained emergency telecommunicators who utilize it. This regional approach would eliminate or reduce emergency telecommunicators performing non-emergency or ancillary duties and would also reduce the overall number of call takers required to handle the state's call volume. The number of call taking workstations would be significantly reduced, resulting in lower equipment and network costs. For the municipal agencies, personnel and support system equipment costs such as radio and CAD would be shared in a regional configuration.

3.3.2.2 9-1-1 Call Volume Distribution

Table 6 provides a sample 9-1-1 call distribution among the nine regions. The sample is based on 2010 9-1-1 call volume as reported to L.R. Kimball by the PSAPs. This distribution does not include emergency calls from out-of-state alarm companies, non-emergency or administrative calls. Although the chart uses monthly, daily, and hourly averages, in real-life circumstances the call volume would not be evenly distributed around the clock.

Table 6 – 9-1-1 Call Distribution

	# of Current PSAPs	2010 9-1-1 Call Volume	Avg. Monthly Call Volume	Avg. Daily Call Volume	Avg. Hourly Call Volume
North Coast	7	78,505	6,542	215	9
Salem Metro	5	242,556	20,213	665	28
South Coast	7	212,198	17,683	581	24
Multnomah	1	387,923	32,327	1,063	44
Eugene Metro	6	237,699	19,808	651	27
Portland Metro	3	272,025	22,669	745	31
Eastern	10	68,911	5,743	189	8
Central	3	144,963	12,080	397	17
Gorge	7	48,466	4,039	133	6
Totals	49	1,693,246	141,104	4,639	193

3.3.2.3 Staffing

Staffing estimates to handle the projected 9-1-1 call volume for each regional PSAP could be determined. However, to provide a complete staffing picture the following is needed:

- The number of call types other than 9-1-1 that each regional PSAP would be likely to receive. General rules of thumb suggest that the ratio of these additional call types is in the 3:1 to 5:1 range. More simply, for every 9-1-1 call received the PSAP would receive between three and five additional calls of varying types such as administrative type calls or non-emergency calls.

- The number of dispatch positions. The number of dispatch positions that will need to be staffed 24/7/365 is key to estimating total staffing levels with any accuracy. One of the benefits of consolidation is that often two or more small agencies (i.e., multiple police departments) are able to combine onto a single dispatch channel resulting in more efficient radio frequency usage and lower staffing levels. However, combining agencies onto fewer radio frequencies is more complex than is indicated here and requires a full examination of options during a consolidation study done at the local level.
- The organizational structure decided upon. The presence and role of shift supervision will impact overall staffing estimates as well. Whether shift supervisors will be present and if they will be assigned to work a console position or will work as a true supervisor must be determined.

While overall staffing estimates could not be provided for each regional PSAP, the number of workstations needed to manage 9-1-1 call volume is discussed in section 3.2.1.1. It should be noted that a comparison of the number of workstations estimated in this report is based on the 9-1-1 call volume only. Since each PSAP has additional workstations to handle seven- and ten-digit emergency, non-emergency and administrative calls as well as equipping additional dispatch positions with call answering equipment, it is not an apples-to-apples comparison.

3.3.2.4 Technology

In any consolidation effort it is important that, at a minimum, law enforcement, fire, and EMS agencies served by the new PSAP retain the same level of technology. Ideally, the level of technology available to the agencies served would be increased. However, it is critical to the success of the consolidation effort that no agency sees a reduction in available technology.

3.3.2.4.1 CAD

In any regional PSAP configuration there needs to be a single CAD system. CAD is a critical system that assists call takers and dispatch personnel in processing, prioritizing, dispatching and controlling calls for service for the respective agencies. For a consolidated communications center, the selected CAD system must be capable of accommodating multiple disciplines, agencies, types of service, and provide interfaces to other jurisdictions, local sub-systems (e.g., mapping, mobile data, E9-1-1, fire station alerting, paging,) and state and federal databases (LEDS and NCIC). All agencies need to have access in order to identify the status of on-duty personnel and equipment. The PSAP needs to be able to assign personnel to emergency calls and request safety checks. Each regional PSAP would need to assess whether a CAD system in one of the existing PSAPs could be expanded and utilized in a regional PSAP. Two key points among many that need to be considered is overall functionality for managing multiple disciplines and the age of the systems. If an existing CAD system is not available for use, then a new CAD system would need to be procured.

An important part of dispatch software is the RMS interface. The RMS is used to document the events surrounding each emergency call and other calls for service. It will be used for court or required reporting regulations for law enforcement, fire and EMS agencies, yearly statistics, etc. Each type of agency needs to have the RMS for the services they provide. RMS requirements are different for law enforcement, fire and EMS. A regional CAD system must provide interfaces for each type of RMS.

Another important interface for the CAD system is mobile data terminals (MDTs). MDTs provide mobile emergency personnel with the location and type of incident while the call taker is still on the phone with the caller. Updates can be made while the responders are en route to the scene.

3.3.2.4.2 Radio

Radio is a key component in the consolidation process. A common misconception exists that all participants in a consolidated PSAP must be on the same radio system. This is simply not correct. Usage of multiple radio platforms (UHF, VHF, 800 MHz) is not a roadblock to consolidation. However, the more platforms in use, the more dispatch positions that will be needed. This can often lead to inefficient usage of radio frequencies and PSAP staff.

Radio coverage within a specific platform can be a roadblock to successful consolidation. A new regional PSAP will need to be able to transmit and receive from any position within the coverage area of a specific platform. For example, if Agency A uses UHF, then the new PSAP must be able to transmit and receive all UHF traffic within Agency A's coverage area. If coverage is lacking than infrastructure upgrades may be needed.

Ideally, all agencies and the regional PSAP should function on a single platform. This scenario maximizes efficiencies across the board. However, implementing a new region-wide radio system or expanding an existing one is expensive. Each region would need to assess its own set of variables to determine the best course of action.

3.3.2.5 Facility

The facility needs of the nine regional PSAPs must be determined at the regional level. Several options are available. First, one of the existing PSAP facilities may be able to expand enough to accommodate all agencies. Second, renovation of a suitable facility may be possible within the region. Each of these options requires an engineering or architectural assessment before cost estimates can be determined. The final option is the construction of a new facility. Section 4.3.1.3.5 provides an overview of how budgetary costs can be estimated.

3.3.2.6 Regional PSAP Costs

The costs associated with a regional consolidation effort cannot be estimated within the scope of this high-level report. Each regional consolidation brings its own set of variables to the process for which decisions must be made before costs can be determined. These variables include the following:

- Personnel costs (salaries and benefits), based on staffing estimates for a consolidated center and the decided upon pay scales.
- Technology costs will depend on whether specific technology, such as a CAD system and radio consoles can be expanded and re-used in the new PSAP or if new systems must be procured.
- Facility costs will depend on whether an existing facility is available or if renovation or new construction is necessary.
- Identification of one-time project costs, such as initial employee training, hiring of management staff, and professional services fees.
- Municipality-specific costs (how much each municipality will contribute each year) cannot be determined until a cost distribution model is agreed upon by all participants.

3.3.2.7 Regional PSAP Model Pros and Cons

Pros

- Service level improvements - **This is the single most important reason to consider consolidation.** 9-1-1 call takers and dispatchers are truly the "first responder on the scene" and can substantially affect the outcome of an incident. The types of service improvements typically achieved include:
  - Reduction or elimination of the transfer of 9-1-1 calls between PSAPs improves response times and lowers the potential for human or technology errors.
  - Quicker call processing and dispatch times, resulting in faster on-scene times for field personnel.
  - Sharing of physical space enables communications between call takers, law enforcement, fire, and EMS dispatchers to be virtually instantaneous. This improved communications enables field personnel to receive information more quickly and accurately which is particularly important in multi-jurisdictional incidents. This communication is the least tangible or quantifiable benefit of consolidation, but is one of the most key.
  - If large enough, a consolidated PSAP can utilize a call taker/dispatcher organizational structure. This structure enables the call takers to focus solely on the incoming call and obtain the best information possible. The dispatcher's ability to focus solely on field personnel improves field personnel safety.
  - Standardized training of all PSAP employees increases regional consistency.
  - A single regional PSAP allows resource management during major incidents from a single point of control rather than fragmenting control among multiple PSAPs.
  - A consolidated environment will offer the opportunity for smaller participants to benefit from state-of-the-art technology, improved training, and expanded career opportunities that would not be otherwise financially or organizationally feasible.
- Reassigning sworn personnel functioning as PSAP management and support staff to other positions is possible by eliminating the PSAP through consolidation.
- Potential cost savings. While cost savings are possible, two points are critical. First, not all consolidations result in cost savings. A common misconception is that consolidating will result in significant personnel reductions thus significant cost savings. Consolidations do not normally involve large staff reductions. The real cost savings come from the elimination of redundant and expensive technology such as CAD systems, 9-1-1 answering equipment, radio consoles, and logging recorders. The single set of technology and systems found in a consolidated environment reduces costs associated with procurement, connectivity, and maintenance costs.

  Second, in those scenarios where cost savings are achievable the actual realization of the savings may not occur for several years. The consolidation process can be expensive and can generate substantial one-time start-up and capital costs for facility and technology needs. These costs delay the actual cost savings.

Cons

- Perceived loss of control at the local level.
- If cost savings are achievable, it may be several years before they are realized at the local level.
- Ancillary duties performed by telecommunicators in existing PSAPs will need to be addressed. Options include:
  - Re-assigning duties to other employees within a municipality

- Hiring additional clerical staff to perform those duties formerly done by telecommunicators.
- Arranging for some or all of the tasks to migrate to the regional PSAP. However, this option is not recommended and may cost the municipalities additional dollars to pay for "extra" services.
- Changing the manner in which a service is delivered. For example, maintaining a police department is accustomed to having a telecommunicator staff a walk-up window on a 24/7 basis. If consolidation occurred, no one would be available to perform this service. One solution is to install a phone in the lobby with a direct connection to the regional PSAP so that the appropriate service can be delivered. However, this solution may or may not be acceptable to a municipality which views it as a service reduction.

3.3.2.8 Recommended Regional Model Summary

In L.R. Kimball's opinion, emergency communications statewide would benefit from further consolidation efforts. PSAPs across the state have already shown themselves to be forward thinking and interested in working with neighboring PSAPs towards greater interoperability and efficiency. The nine region model presented here represents a perfect world solution that may or may not be achievable. However, it should be viewed as a long-term goal to work towards statewide. L.R. Kimball believes it provides the best balance of service level standards and cost efficiencies.

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4. NG9-1-1 AND LEGACY SYSTEM FUNDING AND PRICING

4.1 Next Generation 9-1-1 Overview

The dramatic changes in the telecommunications industry over the last 15 years have caused public safety and emergency communications systems to change to keep pace. The widespread adoption of communications technologies such as wireless phones, texting, video messaging, VoIP, and telematics have changed people's expectations of 9-1-1 services. Texting and video messaging are the favored means of communication for many young people and members of the Deaf and Hard of Hearing community. In many cases, these groups are unaware of the limitations of today's 9-1-1 system.

The 9-1-1 system in Oregon was built on a core telephony-based infrastructure that is unable to support these new communications technologies as the standards evolve. Transitioning to NG9-1-1 will enhance the current 9-1-1 system by supporting new forms of multi-media and should also allow for easier migration to future technologies.

Some enhancements that would be provided by NG9-1-1 include the following:

- Improved first response based on crash data delivered from telematics providers to call takers
- Better access to 9-1-1 for persons with disabilities through text or video chat with 9-1-1
- Ability to re-route calls in the event of a disaster
- Robust and redundant system that will meet the needs of the state now and is scalable to meet the needs well into the future
- More flexible system to allow for newer technologies adopted by the consumer

Additionally, NG9-1-1 would allow for information sharing among multiple entities. For example, based on services provided by the carriers, a 9-1-1 caller could take a photograph of a person or license plate and transmit that photograph to the call taker at the time of the 9-1-1 call. The call taker could then share the information with emergency responders in their jurisdiction, surrounding counties or statewide. PSAPs could also have the ability to share crash data with emergency responders and send that information to nearby hospitals.

4.2 Funding Mechanisms

4.2.1 Emergency Communications Tax

In Oregon, 9-1-1 is funded by an Emergency Communications Tax of 75 cents per month. The tax is imposed on a per instrument basis on subscribers who have telecommunication services with access to the 9-1-1 system. Subscribers are responsible for paying the tax. Communications providers collect the tax from their subscribers on a monthly basis and remit it to the Department of Revenue each quarter.[6] The Department of Revenue pays the moneys received to the State Treasury, which credits the Emergency Communications Account.

[6] ORS 403.215

Thirty-five percent of the amount in the Emergency Communications Account on the date of credit is then credited to the Enhanced 9-1-1 subaccount. All moneys in both accounts are continuously appropriated to the OEM. The funds are administered in compliance with the Oregon Administrative Rules (OAR) for E9-1-1 Emergency Telephone Systems,[7] which establishes the allowable expenditures at the primary PSAP.

The Department of Revenue is then paid their actual cost or up to one-half of 1 percent for their cost of collecting the tax, whichever is less. Up to 4 percent is used by OEM to provide administration of the 9-1-1 Program. The OEM is charged with distributing the entire amount of money in the Emergency Communications Account every quarter.

After the appropriate amounts are paid to the Enhanced 9-1-1 subaccount and the administrative costs have been paid to the Department of Revenue and the OEM, OEM distributes the remaining balance to the 240 cities on a per capita basis and to the 36 counties on a per capita basis of each county's unincorporated area. Each county receives at least 1 percent of the account balance, but may get more based on the population of the county itself. Counties and cities receive these funds regardless of whether they have a PSAP within their borders. Within 45 days of receiving the funds, the counties and cities must distribute the funds to each 9-1-1 jurisdiction whose 9-1-1 service area includes all or part of the city or county.

According to the State, the distribution of the Emergency Communications Tax to the Cities and Counties is approximately 25 percent of the total resources available to operate a PSAP. The remainder of 9-1-1 funding for a respective PSAP is funded through various local sources depending on the locality.[8] No State General Fund or other monies are used to pay for 9-1-1 costs, only Emergency Communications Tax and local money.

Figure 12 illustrates the distribution breakdown of the Oregon Emergency Communications Account for one quarter, assuming the account holds $13 million on the day of distribution.

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[7] Oregon Administrative Rules 104-080
[8] Ibid, 403.235

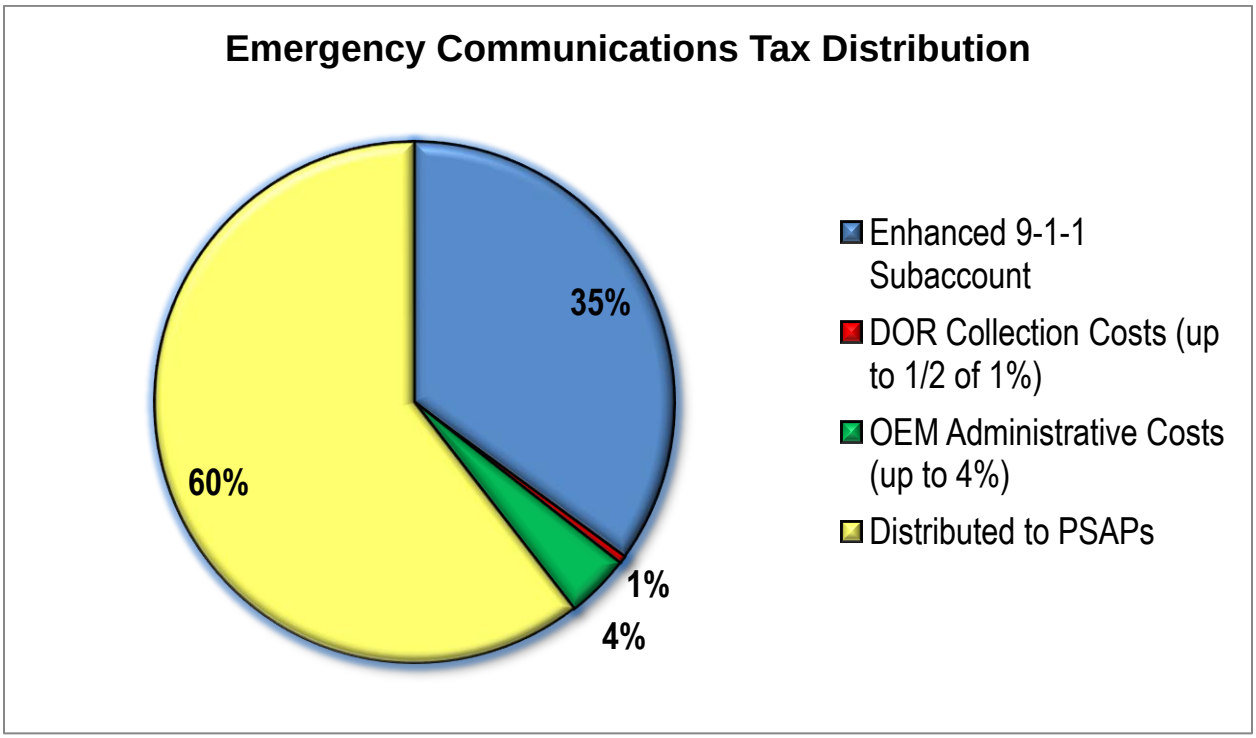

Figure 12 – Emergency Communications Tax Distribution Breakdown

4.2.1.1 Enhanced 9-1-1 Subaccount

The Enhanced 9-1-1 subaccount pays for costs incurred for E9-1-1 telephone service established pursuant to ORS 403.115. Funds are distributed on a request for reimbursement basis. A 9-1-1 jurisdiction may request reimbursement for recurring and non-recurring charges necessary to provide E9-1-1 telephone service only if the jurisdiction has an approved final plan as required in section 7, chapter 743, Oregon Laws 1991.[9] The OEM is required to limit the disbursements for costs incurred before the last quarter to database development, network and on-premises equipment.[10]

4.2.1.2 Eligible Costs

Funds from the Emergency Communications Account can only be used to:

[9] Ibid, 403.240(3)
[10] Ibid, 403.240(4)

> pay for planning, installation, maintenance, operation and improvement of a 9-1-1 emergency reporting system as it relates to getting the call from the member of the public to the primary public safety answering point and in transmitting the information from the primary public safety answering point to the secondary public safety answering point or responding police, fire, medical or other emergency unit by telephone, radio or computerized means.[11]

The majority of PSAPs use most of this funding to pay for 9-1-1 call taking personnel.

The Enhanced 9-1-1 subaccount has specific eligible costs. From this subaccount, a 9-1-1 jurisdiction can request reimbursement for recurring and non-recurring charges necessary to provide E9-1-1 telephone service. Reimbursable costs are only those incurred for the following items:

- Modification of central office switching and trunking equipment
- Network development, operation and maintenance
- Database development, operation and maintenance
- On-premises equipment procurement, maintenance and replacement
- Conversion of pay station telephones
- Collection of the tax
- Addressing, if the reimbursement request is consistent with rules adopted by the Office[12]

Eligible costs related to both the Emergency Communications Account and the Enhanced 9-1-1 subaccount are further developed in the OAR for E9-1-1 Emergency Telephone Systems Program, Funding Considerations 104-080-0060.

4.2.2 Accounting Reports

9-1-1 jurisdictions are required to submit an accounting report to the OEM annually.[13] PSAPs are responsible for self-reporting their budgetary information; this is a requirement for every PSAP, with the exception of the Warm Springs Police Department, which is located within tribal territory. PSAPs must provide information regarding how much Emergency Communications Tax money they received. PSAPs must also indicate the percentage of their total funds that came from the Emergency Communications Account and how the funds were used. The OEM compiles the information into a summary budget report for all PSAPs each fiscal year.

4.3 Expenditures

The Emergency Communications Tax through the Enhanced Subaccount funds all costs associated with the statewide network, databases and PSAP CPE. In 2011, the State identified the 9-1-1 expenses listed below, which were paid from the Enhanced 9-1-1 subaccount and totaled $12,120,443.59. The costs associated with following categories are listed in Table 3 – Enhanced Subaccount Expenditures.

[11] Ibid, 403.245
[12] Ibid, 403.240(3)
[13] Ibid, 403.240

- **Administrative costs** – This includes a variety of costs, such as consultative fees, separate from the up to 4 percent account to fund OEM operations.

- **CPE** – This includes purchasing, replacing or upgrading PSAP equipment.

- **CPE maintenance** – This includes recurring charges for PSAP CPE annual maintenance.

- **GIS/Mapping equipment** – This includes 9-1-1 PSAP hardware and software, as well as purchasing replacements and upgrades.

- **MSAG[14]/GIS maintenance** – This includes software and the personnel to maintain the data, specifically:
  - Recurring charges for PSAP software upgrades, annual maintenance, and technical support
  - Development costs for new GIS data layers
  - PSAP reimbursements for work completed to ensure GIS data layers and MSAG databases are up to date

- **Network recurring and nonrecurring costs** – This includes the frame relay network currently in place. The cost is divided evenly among the 49 PSAPs and specifically includes the following:
  - 9-1-1 PSAP call reporting contract
  - Frame relay equipment
  - Frame relay maintenance
  - Frame relay monthly access
  - OEM terminal lines

- **PSAP circuits** – This includes the 9-1-1 PSAP phone bills for recurring charges for circuits from the selective routers to carry 9-1-1 service.

- **PSAP facility** – This includes replacement or upgrades based on PSAP facility needs for CPE.

- **UPS[15] equipment and maintenance** – This includes UPS hardware purchases and recurring maintenance costs.

- **Wireless needs** – These costs are divided evenly among the 49 PSAPSs and include the items listed below, which are not all inclusive:
  - Wireless accuracy testing
  - Wireless equipment
  - Wireless service charges
  - Database charges
  - Pseudo automatic number identification (pANI) charges

[14] Master Street Address Guide
[15] Uninterruptible power supply

Table 7 depicts the State's FY 2010 - 2011 expenditures by category.

Table 7 – Enhanced Subaccount FY 2010-2011 Expenditures

Expenditure	Cost
Administrative	$220,567.59
CPE	$1,335,869.98
CPE maintenance	$1,058,436.20
GIS/Mapping equipment	$57,592.59
MSAG/GIS maintenance	$988,394.03
Network	$642,330.67
PSAP circuits	$4,972,552.86
PSAP facility	$12,089.75
UPS and maintenance	$48,678.37
Wireless needs	$2,608,869.68
Services	$175,061.87
Total	**$12,120,443.59**

Individual localities are responsible for the remaining costs to operate their PSAPs.

The figures in Table 3 are a snapshot for FY 2010 – 2011. The expenditures from the Enhanced Subaccount will fluctuate from quarter to quarter and from year to year.

4.3.1 Available Funds for Next Generation Expenditure

The Emergency Communications Tax provides the Oregon 9-1-1 Program with available revenue of approximately $13,857,395 per year. As shown in Table 7, above, the State expenditures are $12,120,444 per year from the Enhanced 9-1-1 subaccount. This leaves the Enhanced Subaccount with approximately $1.737 million per year for NG9-1-1 implementation. Again, these figures are a snapshot in time and will fluctuate from year to year.

4.4 Next Generation 9-1-1 Transition Overview

In the Phase 1 report, L.R. Kimball presented two options for implementing NG9-1-1 statewide. *Option One* was a complete replacement of all current call taking equipment in each of the 49 PSAPs, regardless of where the current legacy equipment is in its lifecycle. *Option Two* analyzed and determined the current call taking equipment throughout the state that is upgradeable to handle NG9-1-1 technologies. In each of the 49 PSAPs, only the equipment that cannot be upgraded would be replaced. Both options describe an environment where more funds would have to be expended initially to save money in the future and describe a short transition period to minimize the amount of money being spent to support both networks. The scenarios described below expand upon *Option One* and *Option Two* from the Phase 1 analysis.

L.R. Kimball analyzed three scenarios to transition Oregon to an NG9-1-1 capable network:

- Scenario One – Transition current 49 PSAPs and 279 workstations
- Scenario Two – One statewide call center
- Scenario Three – Transition the recommended number of PSAPs and workstations utilizing information from the consolidation study

In addition to pricing for these three scenarios, OEM requested L.R. Kimball provide legacy pricing for two other scenarios:

- Scenario Four – One statewide legacy call center
- Scenario Five – Legacy pricing for the recommended number of PSAPs and workstations utilizing information from the consolidation study

4.4.1 NG9-1-1 Implementation Overview

As noted in the Phase 1 report, Oregon is in the early stages of NG9-1-1 planning and, as such, has not yet developed a system design. A conceptual design is necessary to perform an in-depth budgetary cost analysis. Figure 13 illustrates a conceptual design for an NG9-1-1 system and is the basis for L.R. Kimball's cost analysis.

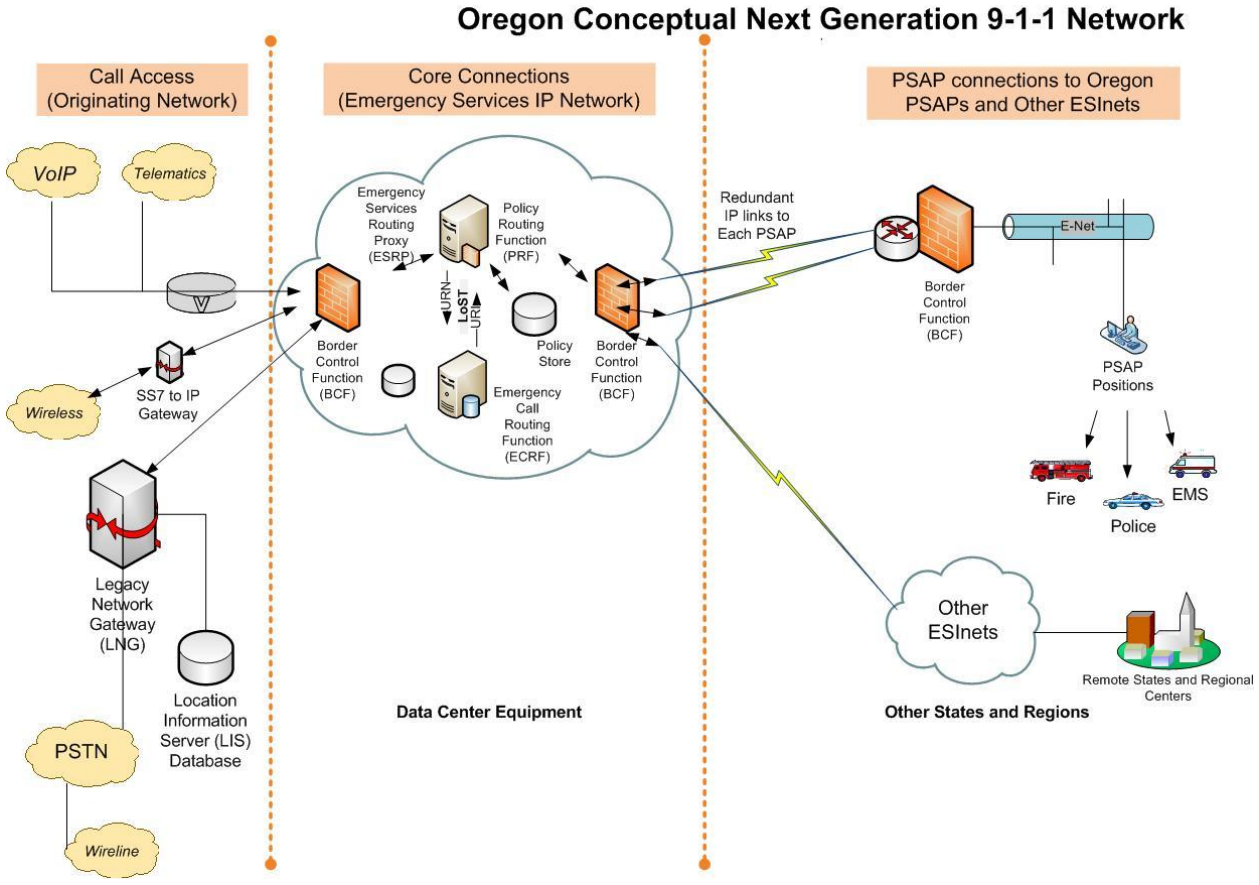

Figure 13 – Conceptual System Design

Note: For cost analysis, the drawing is separated into "call access," "core connections," and "PSAP connections;" this is done to separate costs associated with carrier interconnections, call processing and delivery of calls to PSAP locations. Each vendor depicts these processes differently. Some vendors show all network connections and do not differentiate if the connection is to a carrier or the PSAP. Some vendors price and configure all hardware as a single cost element.

The transition of the current 9-1-1 system in Oregon to an NG capable network will not happen overnight, but rather in incremental steps to ensure the integrity of the network. The Department of Transportation NG9-1-1 Initiative acknowledges that "the path to NG9-1-1 implementation will depend on the underlying infrastructure involved and the characteristics of the PSAPs and 9-1-1 authorities in a defined geographic area." L.R. Kimball based the recommended transition plan on experience in transitioning other similar states and the Oregon funding requirements.

4.4.2 NG9-1-1 Transitional Cost Considerations

As explained in the Phase 1 report, there are many costs associated with transition from a legacy 9-1-1 system to an NG9-1-1 system. The costs described in this section are not included in L.R. Kimball's analysis, but are significant and must be considered in the decision-making process. In most cases, these costs are non-recurring.

During the initial transition phase from the legacy system to the NG9-1-1 system, there will be a period during which it will be necessary to pay current legacy system costs, while also paying for the NG9-1-1 system. It is difficult to estimate the exact length of time necessary to maintain the two systems simultaneously as there are many factors that contribute to this timeframe. L.R. Kimball has used knowledge and experience from other transitions to estimate the length of time needed; however, it is subject to change based on the selected vendors and the necessary coordination with current wireline, wireless, and VoIP providers in Oregon, which takes time and a great deal of scheduling. L.R. Kimball assumes that the transition period would be tightly managed to minimize the time the two systems would operate in parallel, thereby minimizing transition costs.

As mentioned in the Phase 1 report, another consideration is the cost of public education and outreach needed for the transition to NG9-1-1. It will be necessary to educate the public on new services available as a result of NG9-1-1 and on the appropriate use of these services. Outreach to stakeholders, PSAPs and other entities will be necessary during the NG9-1-1 planning and transition phases. The State will need to coordinate an effort, possibly through focus groups meetings, to address the following concerns:

- System participation
- Interconnection to other entities within the system
- Governance planning
- Other regional needs based on the new system

Oregon will need to determine the level of education and outreach and factor the associated costs into its NG9-1-1 transition plan.

In the transition to NG9-1-1, PSAP telecommunicators may be faced with changing job responsibilities. Training will be needed on new data, new protocols, equipment, and other media that expand traditional functions within the PSAP. There may also be a need for additional staff in the PSAPs.

There will be administrative costs involved with planning and implementing the transition to NG9-1-1. For example, developing a request for proposal (RFP) for the procurement of system components will require extensive time and effort. Finally, there will be future costs that are unforeseen at this time, but must be taken into consideration.

If the State determines that PSAP consolidation is necessary in some regions, or if the State decides to implement a single statewide call center, the cost of new facilities will need to be factored into the overall cost for NG9-1-1. It may not always be feasible to utilize existing facilities for consolidation. As an example, if a region has four PSAPs with two equipment positions each, a single PSAP with five positions may be more cost effective. However, it may not be possible to add three equipment positions to an existing facility and still have room for future growth.

4.5 Oregon Conceptual Design – Transition Current PSAPs and Workstations

4.5.1 Scenario One – Transition Current PSAPs and Workstations

In Scenario One, all 49 PSAPs and 279 workstations currently in place will transition to an NG 9-1-1 capable network. L.R. Kimball compared the pricing models delivered to OEM in the Phase 1 report with actual vendor services and software pricing from implementations in several states with similar configurations. The comparison indicates that pricing from the Phase 1 report accurately reflects current implementations. In addition, L.R. Kimball obtained updated expenditure information from OEM for current network costs. The pricing presented in this scenario reflects the updated expenditure amounts.

As in the Phase 1 report, L.R. Kimball has made assumptions for the purposes of cost analysis. Multi-protocol label switching (MPLS) technology is used in the conceptual design, although other network technologies may be chosen. MPLS is a data-carrying mechanism that belongs to the family of packet-switched networks. The most important advantages to MPLS are to promote any-to-any (multi-point) IP connectivity, the ability to classify data by type (i.e. voice, data, and video), and to assign priorities to these types of traffic.

4.5.2 Transition Approach

L.R. Kimball based the conceptual design on implementing the core IP network and relocating wireless and nomadic voice services to the new IP network from the current wireline selective routers in the first year; however, relocation of the wireline call services and implementation of the NG9-1-1 Location to Service Translation (LoST) functionality will not be implemented until the second year. The LoST protocol is used for location based routing. NENA refers to the core IP network as an Emergency Services IP network (ESInet.) An ESInet is a managed IP network that provides the infrastructure upon which core functional processes can be deployed. ESInets may be interconnected at local, regional, state, federal, national and international levels to form a network-of-networks.

Once the ESInet is in place and connected to all of the Oregon PSAPs, cellular and nomadic VoIP 9-1-1 calls can be transitioned to the new network. This will be accomplished by relocating the wireless and nomadic VoIP providers

currently connected to the wireline selective routers. Relocation of these call types first will eliminate those connections to the current wireline selective routers, leaving only wireline calls being serviced by that equipment (legacy selective routers). This eliminates the current monthly costs attributed to processing these call types and will enable the next stage of the conversion process to an NG9-1-1 network. Relocation of wireless and nomadic VoIP calls first will also allow setting up and testing of databases associated with emergency call processing.

Once the cellular and VoIP providers have transitioned to the new network and completed established test plans, they will be able to disconnect from the selective routers. Existing data being transmitted on the in-place frame relay network will be migrated to the new ESInet. Bandwidth to carry the current frame relay traffic as well as the emergency call traffic has been allocated into the budgetary analysis. Elimination of the current frame relay charges and wireless routing charges in the first year saves the Oregon 9-1-1 Program $2.94 million, which can be applied to the charges incurred in the next step of the implementation (year two).

Figure 14 below illustrates the conceptual design to implement the core IP network and transition wireless and nomadic VoIP services.

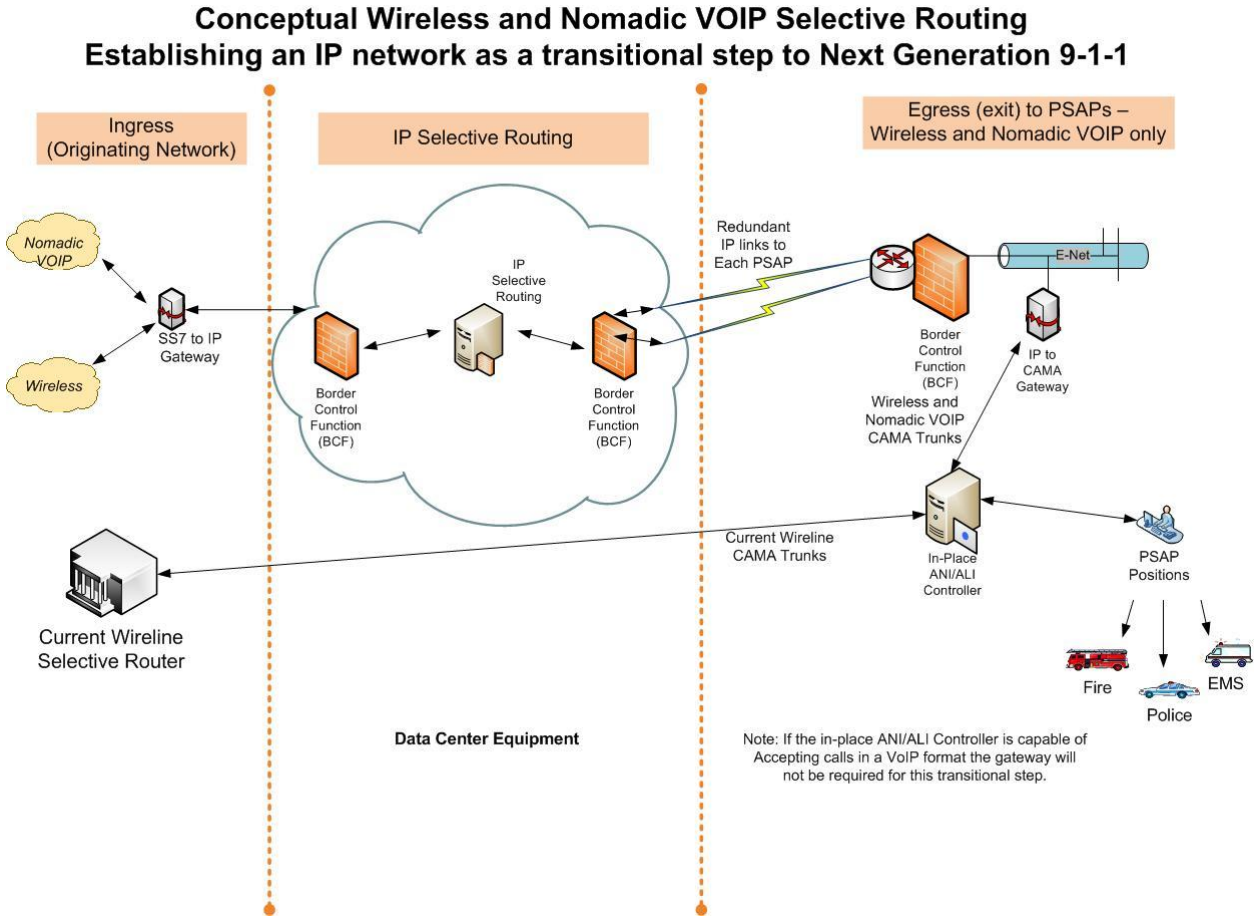

Figure 14 – Conceptual Design

Database conversion to support NG services can be started at this point in the conversion process. The State will have several decision points on how they want vendors to handle automatic number identification (ANI)/ALI databases, pANI databases, and integration of the MSAG with the GIS data going forward.

Year two of the conversion will initiate transition of wireline emergency calls to the ESInet and replacement of PSAP equipment. All costs associated with PSAP equipment are based on a ten-year lease with zero down and 7 percent interest. However, the State may choose to purchase the equipment outright.

The new NG capable equipment will be integrated with existing PSAP equipment such as call loggers and recorders. Call takers will be trained on the new CPE equipment and functionality. This process can happen on a PSAP by PSAP basis once the process is established.

After the ESInet is in place and operating – processing wireless and nomadic VoIP calls – conversion of wireline call processing can occur. This conversion can be either at the same time NG LoST routing occurs or it can be scheduled at a later date.

4.5.3 Budgetary Assumptions

Many details could affect budgetary costs in a system design and several assumptions were made in order to complete the conceptual design. These assumptions are as follows:

- There will be no change in the amount of the levy for Emergency Communications Tax, positive or negative.
- Costs are based on implementing the core ESInet in year one and transitioning cellular and nomadic VoIP calls.
- LoST protocol will be implemented in year two, either concurrently with wireline transition or after.
- New equipment will be installed in year two and will be leased for ten years with zero down and 7 percent interest.
- Budgetary circuit size for a provider MPLS network are based on the number of workstations at each location.
- Budgetary pricing of the MPLS network was based on analysis of costs in three other states with state contract pricing.
- Commercial off-the-shelf equipment and retail pricing were used.
- Budgetary estimates for infrastructure were based on replacing the frame relay network that currently exists in Oregon and the need for fiber connections to the larger PSAPs. Pricing is based on a five-year build out commitment, which is incorporated into the recurring line charges. Carrier fiber build out pricing is incorporated into the estimate.
- Wireline carrier connections will occur in year two.
- Costs for staff to manage the system are not included as it was assumed full-time employees would not be added.
- In many cases, software is new or still in development; additional features may be needed in the future, which may increase the cost.
- Software maintenance is based on 15 percent of initial purchase prices.

- While it is unknown what the inflation rate will be moving into the future, L.R. Kimball used current dollar value as current technology costs have gone down at a similar rate to inflation in the past ten years.
- Budgetary estimates are based on a rough order of magnitude.

4.5.4 Scenario One Cost Analysis

Table 8 displays *Scenario One* pricing, which includes a completely new network and new equipment for each PSAP. Non-recurring installation costs for call access services will be spread out over the first two years. Centralized automatic message accounting (CAMA) gateways will not be needed until year two; therefore, the recurring charges begin in year two. Within the core connections pricing, the year one through three totals include non-recurring costs that will be encountered for installation of the core ESInet. Recurring pricing for the LoST protocol begins in year two. Non-recurring installation charges for PSAP equipment will be encountered in year two. The total for years four through ten includes recurring costs per year. Appendix A contains detailed spreadsheets.

Table 8 – Scenario One Cost Analysis

	Year 1	Year 2	Year 3	Annually Years 4 – 10
Call Access Services Non-recurring Costs	$400,000	$400,000	$0	$0
Call Access Services Recurring Costs	$356,940	$530,940	$530,940	$530,940
Core Connections Non-recurring Costs	$500,000	$500,000	$500,000	$0
Core Connections Recurring Costs	$1,623,456	$2,349,984	$2,349,984	$2,349,984
PSAP Connections Non-recurring Costs	$0	$1,925,000	$0	$0
PSAP Connections Recurring Costs	$3,356,700	$4,276,284	$4,276,284	$4,276,284
Total Non-Recurring Costs	**$900,000**	**$2,825,000**	**$500,000**	**$0**
Total Recurring Costs	**$5,337,096**	**$7,157,208**	**$7,157,208**	**$7,157,208**
TOTAL	**$6,237,096**	**$9,982,208**	**$7,657,208**	**$7,157,208**

4.6 Oregon Conceptual Design – Single In-state Call Center

In Scenario Two, all 9-1-1 calls in the state would route to a single in-state call center. The 9-1-1 call would then be transferred to the appropriate PSAP for dispatch. It is assumed that all 49 current PSAPs would continue to dispatch for their jurisdictions. The 49 current PSAPs would utilize the ESInet to connect with the single statewide call center in order to receive transferred calls and data.

4.6.1 Scenario Two Cost Analysis

Table 9 displays *Scenario Two* pricing, which includes a completely new network and new equipment to be placed in a single in-state call center to handle 9-1-1 calls only, new equipment and network for a backup call center, and

dispatch equipment at each of the 49 current PSAPs. Non-recurring installation costs for call access services will be spread out over the first two years. CAMA gateways will not be needed until year two; therefore, the recurring charges begin in year two. Within the core connections pricing, the year one through three totals include non-recurring costs that will be encountered for installation of the core ESInet. Recurring pricing for the LoST protocol begin in year two. Non-recurring installation charges for PSAP equipment will be encountered in year two. The total for years four through ten includes recurring costs per year. Appendix B contains detailed spreadsheets.

Table 9 – Scenario Two Cost Analysis

	Year 1	Year 2	Year 3	Annually Years 4 – 10
Call Access Services Non-recurring Costs	$400,000	$400,000	$0	$0
Call Access Services Recurring Costs	$356,940	$530,940	$530,940	$530,940
Core Connections Non-recurring Costs	$500,000	$500,000	$500,000	$0
Core Connections Recurring Costs	$1,623,456	$2,349,984	$2,349,984	$2,349,984
Call Center Connections Non-recurring Costs	$217,000	$217,000	$0	$0
Call Center Connections Recurring Costs	$146,136	$146,136	$146,136	$146,136
Dispatch Connections Non-recurring Costs	$364,000	$364,000	$0	$0
Dispatch Connections Recurring Costs	$1,854,648	$1,854,648	$1,854,648	$1,854,648
Total Non-Recurring Costs	**$1,481,000**	**$1,481,000**	**$500,000**	**$0**
Total Recurring Costs	**$3,981,180**	**$4,881,708**	**$4,881,708**	**$4,881,708**
TOTAL	**$5,462,180**	**$6,362,708**	**$5,381,708**	**$4,881,708**

4.6.2 Cost Considerations

It is important to note that Scenario Two does not include the cost to build out facilities for the call center and backup call center. Oregon currently has one PSAP with 51 positions that might possibly be expanded to account for the additional positions needed; however, there is not another PSAP with enough space to act as a backup call center. L.R. Kimball anticipates that a new facility may need to be built, which would greatly increase the costs associated with this option.

4.7 Oregon Conceptual Design – Recommended Number of PSAPs

Scenario Three utilizes the information gathered in the consolidation study to analyze the cost to migrate the recommended number of PSAPs to NG9-1-1. Based on this information, the recommended number of PSAPs to handle the call volume in Oregon is nine PSAPs with a total of 70 workstations.

4.7.1 Scenario Three Cost Analysis

Table 10 displays *Scenario Three* pricing, which includes a completely new network and new equipment for all nine PSAPs. Non-recurring installation costs for call access services will be spread out over the first two years. CAMA gateways will not be needed until year two; therefore, the recurring charges begin in year two. Within the core connections pricing, the year one through three totals include non-recurring costs that will be encountered for installation of the core ESInet. Recurring pricing for the LoST protocol begin in year two. Non-recurring installation charges for PSAP equipment will be encountered in year two. The total for years four through ten includes recurring costs per year. Appendix C contains detailed spreadsheets.

Table 10 – Scenario Three Cost Analysis

	Year 1	Year 2	Year 3	Annually Years 4 – 10
Call Access Services Non-recurring Costs	$400,000	$400,000	$0	$0
Call Access Services Recurring Costs	$356,940	$530,940	$530,940	$530,940
Core Connections Non-recurring Costs	$500,000	$500,000	$500,000	$0
Core Connections Recurring Costs	$1,623,456	$2,349,984	$2,349,984	$2,349,984
PSAP Connections Non-recurring Costs	$0	$500,000	$0	$0
PSAP Connections Recurring Costs	$473,300	$656,624	$656,624	$656,624
Total Non-recurring Costs	**$900,000**	**$1,400,000**	**$500,000**	**$0**
Total Recurring Costs	**$2,453,696**	**$3,537,548**	**$3,537,548**	**$3,537,548**
TOTAL	**$3,353,696**	**$4,937,548**	**$4,037,548**	**$3,537,548**

4.7.2 Cost Considerations

It is important to note that Scenario Three does not include the cost to build out facilities if needed for any of the nine regional PSAPs. Scenario Three contains the cost for the number of workstations needed to handle 9-1-1 call traffic; it is possible that additional workstations would be needed to cover non-emergency calls or backup facilities. Those costs can be estimated utilizing the per workstation cost provided in the detailed spreadsheets in Appendix C.

A single radio system will not be needed within each of the nine regional PSAPs to achieve consolidation. However, a single radio system would improve interoperability and operational efficiencies. At this time it is not possible to determine what each region may elect to pursue. This could result in a substantial cost for each region and should be considered when evaluating this option.

4.7.3 Timeline Considerations

An RFP process will need to be performed prior to the start of implementation. This process will need to be very thorough in order to transition successfully within the current funding structure. Once the RFP is complete and

contracts have been signed, the actual transition timeline can begin. L.R. Kimball estimates this part of the project could take 18 to 24 months to complete.

L.R. Kimball believes that transition to the new network will take at least three years after a vendor has been selected and contracts signed. It is possible once CPE equipment has been upgraded to transition the PSAPs on a PSAP-by-PSAP basis.

4.7.4 Timeline

Prior to the beginning of the transition timeline, OEM will need to make decisions regarding the ALI databases, such as the following:

- Location and providers of ALI databases
- Access methodologies
- Integration into ESInet

Figure 15 on the following page illustrates a sample timeline.

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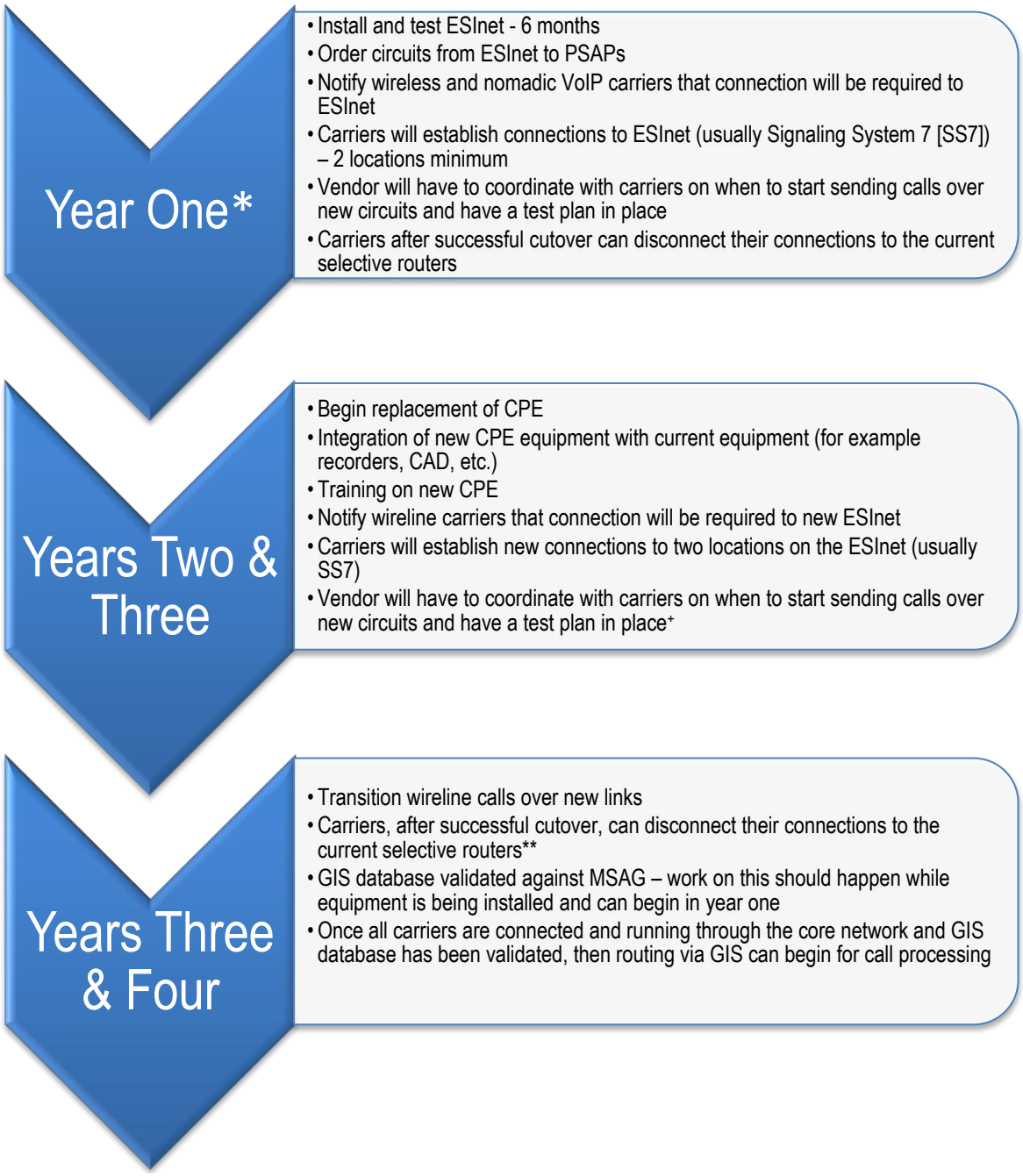

Figure 15 - Timeline

*Note: The timeline for year one begins once the RFP is complete, vendors have been selected, and a contract signed. It is possible (and quite probable) that year one would not actually happen in 2012, but rather 2013.
+Note: This can happen on a PSAP-by-PSAP basis.
**Note: The network will still be IP selective routing at this point.

4.8 Oregon Conceptual Design – Single In-state Legacy Call Center

OEM requested L.R. Kimball provide an estimate of what it would cost to remain on the legacy platform currently in use today for each of the NG transition scenarios depicted above. The legacy pricing for option one, 49 PSAPs, is exactly what is paid today or $12,220,444. The two scenarios listed below provide pricing to remain on the legacy platform, but transition to either a single statewide call center or transition to the recommended number of PSAPs.

It is important to note that remaining on a legacy platform will not position the Oregon 9-1-1 system to prepare for future communications technologies or support current communications technology like texting and video messaging.

4.8.1 Scenario Four – One Statewide Legacy Call Center

Table 11 displays *Scenario Four* pricing, which includes a completely new legacy network and new equipment for a single in-state call center to handle 9-1-1 calls only, new equipment and legacy network for a backup call center, an IP network to connect the current PSAPs to the call center and backup center, and dispatch equipment at each of the in-place 49 PSAPs. Appendix D contains detailed spreadsheets.

Table 11 – Scenario Four Cost Analysis

	Year 1	Year 2	Year 3	Annually Years 4 – 10
Call Center Connections Non-recurring Costs	$3,561,000	$0	$0	$0
Call Center Connections Recurring Costs	$3,264,000	$3,264,000	$3,264,000	$3,264,000
Current Carry Forward Recurring Costs	$7,380,252	$7,380,252	$7,380,252	$7,380,252
Dispatch Connections Non-recurring Costs	$5,252,000	$0	$0	$0
Dispatch Connections Recurring Costs	$6,152,400	$6,152,400	$6,152,400	$6,152,400
Total Non-Recurring Costs	**$8,813,000**	**$0**	**$0**	**$0**
Total Recurring Costs	**$16,796,652**	**$16,796,652**	**$16,796,652**	**$16,796,652**
TOTAL	**$25,609,652**	**$16,796,652**	**$16,796,652**	**$16,796,652**

It is important to note that Scenario Four does not include the cost to build out facilities for the call center and backup call center. Oregon currently has one PSAP with 51 positions that might possibly be expanded to account for the additional positions needed; however, there is not another PSAP with enough space to act as a backup call center. L.R. Kimball anticipates that a new facility may need to be built, which would greatly increase the costs associated with this option.

4.9 Oregon Conceptual Design – Legacy Recommended Number of PSAPs

Scenario Five utilizes the information gathered in the consolidation study to analyze the cost to migrate the 49 current PSAPs to the recommended number of legacy PSAPs. Based on this information, the recommended number of PSAPs to handle the call volume in Oregon is nine PSAPs with a total of 70 workstations.

4.9.1 Scenario Five – Legacy Recommended Number of PSAPs

Table 12 displays *Scenario Five* pricing, which includes a completely new legacy network and new equipment for all PSAPs. Appendix E contains detailed spreadsheets.

Table 12 – Scenario Five Cost Analysis

	Year 1	Year 2	Year 3	Annually Years 4 – 10
PSAP Connections Non-recurring Costs	$3,535,000	$0	$0	$0
PSAP Connections Recurring Costs	$3,072,000	$3,072,000	$3,072,000	$3,072,000
Current Carry Forward Recurring Costs	$8,426,238	$8,426,238	$8,426,238	$8,426,238
Total Non-Recurring Costs	**$3,535,000**	**$0**	**$0**	**$0**
Total Recurring Costs	**$11,498,238**	**$11,498,238**	**$11,498,238**	**$11,498,238**
TOTAL	**$15,033,238**	**$11,498,238**	**$11,498,238**	**$11,498,238**

4.9.2 Cost Considerations

It is important to note that Scenario Five does not include the cost to build out facilities if needed for any of the nine regional PSAPs. Facility needs would be determined within each regional PSAP consolidation effort. It is possible that an existing PSAP within a region would be capable of expanding to serve as a regional facility. If not, a suitable facility would need to be renovated or built. Scenario Five contains the cost for the number of workstations needed to handle 9-1-1 call traffic only; it is possible that additional workstations would be needed to cover administrative, emergency and non-emergency seven- and ten-digit calls or backup facilities. Those costs can be estimated utilizing the per workstation cost provided in the detailed spreadsheets in Appendix E.

A single radio system will not be needed within each of the nine regional PSAPs to achieve consolidation. However, a single radio system would improve interoperability and operational efficiencies. At this time it is not possible to determine what each region may elect to pursue. This could result in a substantial cost for each region and should be considered when evaluating this option.

5. SUMMARY/CONCLUSION

5.1 Funding Analysis

The Emergency Communication Tax provides the Oregon 9-1-1 Program with available revenue of approximately $13,857,395 per year for the Enhanced 9-1-1 subaccount. In FY2010-11, the State identified costs paid from the Enhanced 9-1-1 account totaling $12,120,443.59. Several costs currently paid by the Enhanced Subaccount may be alleviated once the state has transitioned to NG9-1-1. Some of these costs may be utilized in different ways in an NG environment. These costs include the following:

- Wireless charges – $2,608,870
- PSAP circuit charges – $4,972,553
- Frame relay network charges – $642,331

In addition to the above charges, the Enhanced Subaccount also pays $988,394 for MSAG maintenance, some of which may not exist in NG9-1-1. L.R. Kimball estimates that at least $200,000 will no longer need to be paid out by the State for MSAG maintenance. Finally, the Enhanced Subaccount paid $1.335 million for new equipment and $1.058 million for equipment maintenance in FY2010-11, which is included in the costs below. Together, these costs total $10,818,059, which will be available to contribute to future costs in an NG environment once the transition to NG9-1-1 has been completed. L.R. Kimball estimates that approximately $1 million in legacy costs will carry forward after the transition to NG9-1-1 has occurred.

While there are potential cost savings associated with the migration to an NG9-1-1 network, system costs will increase during the transition phase. It is important to consider the potential cost savings in migrating to NG9-1-1 versus the costs of maintaining the legacy system if the State were not to transition to NG9-1-1. Once the transition period is over, the Oregon 9-1-1 Program should recognize about $5 million per year in savings in an NG environment.

The State will need to sustain both the legacy and NG9-1-1 networks for a period of time while the transition to NG9-1-1 is in process. However, once the transition period is over and the State NG9-1-1 network is fully implemented, most costs of maintaining the legacy network will be eliminated, providing more funds to maintain the NG9-1-1 network. The amount of these funds and the timeframe they will become available depends on the method of transition to NG and the transition timeframe.

Table 13 summarizes the costs of Scenario One where all 49 PSAPs are transitioned to an IP network in year one, allowing some of the legacy costs to become available to pay for NG costs.

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Table 13 – Scenario One Costs

Year	Total Revenue	Legacy Costs	Scenario One	Available Funding	Total Cost for Year	Difference
2011	$13,857,395	$12,120,444	0	$1,692,021	$12,120,444	
2012	$13,857,395	$6,782,660	$6,237,096	$7,074,735	$13,019,756	**$837,639**
2013	$13,857,395	$1,277,323	$9,982,208	$12,580,072	$11,259,531	**$2,597,864**
2014	$13,857,395	$1,000,000	$7,657,208	$12,857,395	$8,657,208	**$5,200,187**
2015	$13,857,395	$1,000,000	$7,157,208	$12,857,395	$8,157,208	**$5,700,187**
2016	$13,857,395	$1,000,000	$7,157,208	$12,857,395	$8,157,208	**$5,700,187**
2017	$13,857,395	$1,000,000	$7,157,208	$12,857,395	$8,157,208	**$5,700,187**
2018	$13,857,395	$1,000,000	$7,157,208	$12,857,395	$8,157,208	**$5,700,187**
2019	$13,857,395	$1,000,000	$7,157,208	$12,857,395	$8,157,208	**$5,700,187**
2020	$13,857,395	$1,000,000	$7,157,208	$12,857,395	$8,157,208	**$5,700,187**
2021	$13,857,395	$1,000,000	$7,157,208	$12,857,395	$8,157,208	**$5,700,187**

Table 14 summarizes the costs of Scenario Two where a single statewide call center replaces the 49 current PSAPs for 9-1-1 call taking and is transitioned to an IP network in year one, allowing some of the legacy costs to become available to pay for NG costs.

Note: This Scenario does not include costs to build out a facility for the statewide call center or the backup call center.

Table 14 – Scenario Two Costs

Year	Total Revenue	Legacy Costs	Scenario Two	Available Funding	Total Cost for Year	Difference
2011	$13,857,395	$12,120,444	0	$1,736,951	$12,120,444	
2012	$13,857,395	$7,533,374	$5,462,180	$6,324,021	$12,995,554	**$861,841**
2013	$13,857,395	$3,896,690	$6,362,708	$9,960,705	$10,259,398	**$3,597,997**
2014	$13,857,395	$1,000,000	$5,381,708	$12,857,395	$6,381,708	**$7,475,687**
2015	$13,857,395	$1,000,000	$4,881,708	$12,857,395	$5,881,708	**$7,975,687**
2016	$13,857,395	$1,000,000	$4,881,708	$12,857,395	$5,881,708	**$7,975,687**
2017	$13,857,395	$1,000,000	$4,881,708	$12,857,395	$5,881,708	**$7,975,687**
2018	$13,857,395	$1,000,000	$4,881,708	$12,857,395	$5,881,708	**$7,975,687**

Year	Total Revenue	Legacy Costs	Scenario Two	Available Funding	Total Cost for Year	Difference
2019	$13,857,395	$1,000,000	$4,881,708	$12,857,395	$5,881,708	**$7,975,687**
2020	$13,857,395	$1,000,000	$4,881,708	$12,857,395	$5,881,708	**$7,975,687**
2021	$13,857,395	$1,000,000	$4,881,708	$12,857,395	$5,881,708	**$7,975,687**

Note: Within the Scenario Two costs, approximately $1.85 million dollars are now pushed out to the local governments each year. These are costs that will be needed for the dispatch functions if dispatch is separated from 9-1-1.

Table 15 summarizes the costs of Scenario Three where nine PSAPs transition to an IP network in year one, allowing some of the legacy costs to become available to pay for NG costs.

Table 15 – Scenario Three Costs

Year	Total Revenue	Legacy Costs	Scenario Three	Available Funding	Total Cost for Year	Difference
2011	$13,857,395	$12,120,444	0	$1,736,951	$12,120,444	
2012	$13,857,395	$5,951,327	$3,353,696	$7,906,068	$9,305,023	**$4,552,372**
2013	$13,857,395	$3,896,690	$4,937,548	$9,960,705	$8,834,238	**$5,023,157**
2014	$13,857,395	$1,000,000	$4,037,548	$12,857,395	$5,037,548	**$8,819,847**
2015	$13,857,395	$1,000,000	$3,537,548	$12,857,395	$4,537,548	**$9,319,847**
2016	$13,857,395	$1,000,000	$3,537,548	$12,857,395	$4,537,548	**$9,319,847**
2017	$13,857,395	$1,000,000	$3,537,548	$12,857,395	$4,537,548	**$9,319,847**
2018	$13,857,395	$1,000,000	$3,537,548	$12,857,395	$4,537,548	**$9,319,847**
2019	$13,857,395	$1,000,000	$3,537,548	$12,857,395	$4,537,548	**$9,319,847**
2020	$13,857,395	$1,000,000	$3,537,548	$12,857,395	$4,537,548	**$9,319,847**
2021	$13,857,395	$1,000,000	$3,537,548	$12,857,395	$4,537,548	**$9,319,847**

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Table 16 summarizes the costs of Scenario Four where a single statewide call center replaces the 49 current PSAPs for 9-1-1 call taking in a legacy environment.

Table 16 – Scenario Four Costs

Year	Total Revenue	Previous Costs	Scenario Four	Difference
2011	$13,857,395	$12,120,444	0	
2012	$13,857,395	$12,120,444	$25,609,652	($11,752,257)
2013	$13,857,395	$12,120,444	$16,796,652	($2,939,257)
2014	$13,857,395	$12,120,444	$16,796,652	($2,939,257)
2015	$13,857,395	$12,120,444	$16,796,652	($2,939,257)
2016	$13,857,395	$12,120,444	$16,796,652	($2,939,257)
2017	$13,857,395	$12,120,444	$16,796,652	($2,939,257)
2018	$13,857,395	$12,120,444	$16,796,652	($2,939,257)
2019	$13,857,395	$12,120,444	$16,796,652	($2,939,257)
2020	$13,857,395	$12,120,444	$16,796,652	($2,939,257)
2021	$13,857,395	$12,120,444	$16,796,652	($2,939,257)

Note: Within the Scenario Four costs, approximately $6.15 million dollars are now pushed out to the local governments each year. These are costs that will be needed for the dispatch functions if dispatch is separated from 9-1-1.

Table 17 summarizes the costs of Scenario Five where the recommended number of PSAPs (nine) replaces the 49 current PSAPs for 9-1-1 call taking and dispatch in a legacy environment.

Table 17 – Scenario Five Costs

Year	Total Revenue	Previous Costs	Scenario Five	Difference
2011	$13,857,395	$12,120,444	0	
2012	$13,857,395	$12,120,444	$15,033,238	($1,175,843)
2013	$13,857,395	$12,120,444	$11,498,238	**$2,359,157**
2014	$13,857,395	$12,120,444	$11,498,238	**$2,359,157**
2015	$13,857,395	$12,120,444	$11,498,238	**$2,359,157**

Year	Total Revenue	Previous Costs	Scenario Five	Difference
2016	$13,857,395	$12,120,444	$11,498,238	**$2,359,157**
2017	$13,857,395	$12,120,444	$11,498,238	**$2,359,157**
2018	$13,857,395	$12,120,444	$11,498,238	**$2,359,157**
2019	$13,857,395	$12,120,444	$11,498,238	**$2,359,157**
2020	$13,857,395	$12,120,444	$11,498,238	**$2,359,157**
2021	$13,857,395	$12,120,444	$11,498,238	**$2,359,157**

5.2 Consolidation Recommendations Summary

L.R. Kimball was tasked with evaluating two specific call center consolidation scenarios: a single statewide call center that would receive all 9-1-1 calls and transfer them to a secondary PSAP or dispatch center and a recommended number of regional PSAPs to be determined by L.R. Kimball.

A single statewide 9-1-1 call center does offer some financial benefits. However, the impact on the emergency communications system as a whole is substantial and overwhelmingly negative. From a service level perspective, virtually every 9-1-1 call made throughout the state would need to be transferred at least once from a single call center to the appropriate dispatch point(s) before field personnel could be sent. This configuration ensures that each call will have at least one inherent delay.

L.R. Kimball strongly recommends against this configuration.

In L.R. Kimball's opinion, emergency communications statewide would benefit from further consolidation efforts. PSAPs across the state have already shown themselves to be forward thinking and interested in working with neighboring PSAPs towards greater interoperability and efficiency. The nine region model represents a perfect world solution, which may or may not be achievable. However, it should be viewed as a long-term goal to work towards statewide. In L.R. Kimball's opinion, this model provides the best balance of service level standards and cost efficiencies.

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GLOSSARY

Call Access Services

All services and equipment required by carriers to send emergency data and calls to the Oregon answering points. Circuits for these connections are also included.

Circuit

A circuit is a connection between two points that can be made through various media, such as fiber and coaxial cable.

Core Connections

The core of the next generation network, which contains the servers performing the call routing functionality as well as the data centers. NG9-1-1 services and databases are included in this section of the network. This section of the network correctly identifies where the emergency call is to be delivered and applies supplemental information to the call flow.

Emergency Services IP Network (ESInet)

ESInet is an IP-based inter-network (network-of-networks) shared by all agencies that may be involved in any emergency.

Geographic Information System (GIS)

GIS is a computer software system that enables one to visualize geographic aspects of a body of data. It contains the ability to translate implicit geographic data (such as a street address) into an explicit map location. It has the ability to query and analyze data in order to receive the results in the form of a map. It also can be used to graphically display coordinates on a map (i.e. latitude/longitude) from a wireless 9-1-1 call.

Internet Protocol (IP)

IP is the method by which data is sent from one computer to another on the Internet or other networks. IP is part of the Transmission Control Protocol (TCP)/IP family of protocols describing software that tracks Internet addresses of nodes, routes outgoing messages, and recognizes incomplete messages. IP is used in gateways to connect networks to the Open Systems Interconnection (OSI) network level 3 and above.

LoST

LoST is an XML-based protocol for mapping service identifiers and geodetic or civic location information to service contact uniform resource identifiers (URIs). LoST can be used to determine the location-appropriate PSAP for emergency calls for service.

Master Street Address Guide (MSAG)

MSAG is a database of street names and house number ranges within their associated communities defining Emergency Service Zones (ESZs) and their associated Emergency Service Numbers (ESNs) to enable proper routing of 9-1-1 calls.

Multi-protocol Label Switching (MPLS)

MPLS is a data-carrying mechanism that belongs to the family of packet-switched networks. MPLS operates at an OSI Model layer that is generally considered to be between traditional definitions of Layer 2 (Data-Link Layer) and Layer 3 (Network Layer), and thus is often referred to as a "Layer 2.5" protocol. MPLS was designed to provide a unified data-carrying service for both circuit-based clients and packet-switching clients that provide a datagram service model.

PSAP Connections

All the equipment (hardware and software), connections to the network, and firewalls needed to allow the PSAP to receive NG9-1-1 traffic from the call processing section of the network. This includes workstations.

Router

A router is a device that connects like and unlike LANs.

Service Provider

SP is an entity providing one or more of the following 9-1-1 elements: network, CPE, or data base service.

Switch

A switch is a device that opens or closes circuits, completes or breaks electrical paths, or selects paths or circuits. Switches look at incoming data to determine the destination address.

T1

T1 is a digital transmission link with a signaling speed of 1.544 Mbps; it is a standard for digital transmissions in North America. T1 is part of the progressive digital transmission pipes commonly referred to as DS.

Transmission Control Protocol (TCP)

TCP is the end-to-end reliability protocol that recognizes and corrects lower layer errors caused by connectionless networks. TCP provides reliable byte stream communication between pairs of processes in hosts attached to interconnected networks. It is the portion of the TCP/IP protocol suite that governs the exchange of sequential data.

Voice over Internet Protocol (VoIP)

VoIP is a general term for a family of transmission technologies for delivery of voice communications over IP networks such as the Internet or other packet-switched networks. The IP address assigned to the user's telephone number may be static or dynamic.

APPENDIX A – DETAILED PRICE BREAKDOWN FOR REPLACING THE EXISTING NETWORK WITH A NG9-1-1 NETWORK

Appendix A may be found on the following pages.

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	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Call Access Services Non-Recurring Costs	$400,000	$400,000	$0	$0	$0	$0	$0	$0	$0	$0
Call Access Services Recurring Costs	$356,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940
Core Connections Non-Recurring Costs	$500,000	$500,000	$500,000	$0	$0	$0	$0	$0	$0	$0
Core Connections Recurring Costs	$1,623,456	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984
PSAP Connections Non-Recurring Costs	$0	$1,925,000	$0	$0	$0	$0	$0	$0	$0	$0
PSAP Connections Recurring Costs	$3,356,700	$4,276,284	$4,276,284	$4,276,284	$4,276,284	$4,276,284	$4,276,284	$4,276,284	$4,276,284	$4,276,284
Total Non-Recurring Costs	**$900,000**	**$2,825,000**	**$500,000**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Total Recurring Costs	**$5,337,096**	**$7,157,208**	**$7,157,208**	**$7,157,208**	**$7,157,208**	**$7,157,208**	**$7,157,208**	**$7,157,208**	**$7,157,208**	**$7,157,208**
TOTAL	**$6,237,096**	**$9,982,208**	**$7,657,208**	**$7,157,208**	**$7,157,208**	**$7,157,208**	**$7,157,208**	**$7,157,208**	**$7,157,208**	**$7,157,208**

Replacing all equipment within Oregon NG-911 Network

Gateway Services Non-Recurring Costs				$400,000	$400,000	$0	$0	$0	$0	$0	$0	$0	$0
Item	Description	Assumptions	Notes	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Call Access													
Border Control Equipment	Equipment Installation, Configuration, and Setup of Firewall	$800,000/One-Time Fee		400,000	$400,000.00								

Notes on Gateway Non-Recurring Costs: No special instructions or assumptions for Non-recurring costs. This portion includes the setup the Core Call Routing Data Centers with respective communications device configuration and staging with initial lab testing.

Gateway Services Recurring Costs				$356,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940
Item	Description	Assumptions		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Call Access													
IP Routing	Redundant Routers / Legacy Gateway (10-year Plan/Lease)	2 @ 200,000 ($400,000)	$4645/month	55,740	55,740	55,740	55,740	55,740	55,740	55,740	55,740	55,740	55,740
CAMA Gateways	Gateway to CAMA Trunks	25 @ 300			90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000
ALI Circuits and Gateways	Connection to 6 ALI Circuits	6 @ 1000	A-links and SS7 Circuits	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000
Commercial Internet Access	DS-3 Internet Connection | Two Data Centers ($ Cost / month)	7000	Each DS3 over 40 Mbps / site with BGP Fail Over		84,000	84,000	84,000	84,000	84,000	84,000	84,000	84,000	84,000
Firewall Capabilities	Firewall Management | Two Data Centers ($ Cost / month)	1000		12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Data Center Hardware	(2) Data Center Border Control Access ($ Cost / month)	2100		25,200	25,200	25,200	25,200	25,200	25,200	25,200	25,200	25,200	25,200
Border Control Maintenance	System Monthly Maintenance Fee ($ Cost / month)	8000		96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
Border Control Equipment	Equipment Installation, Configuration, and Setup of Firewall ($cost/mo	8000		96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000

Notes on Gateway Services Recurring Costs: The 10-year Plan/Lease - Kimball took the Recurring Cost and added 10 % to that final Costing value. The lease assumptions are; 10 years, $ 0 down, 7% Interest Rate, 0 PMI.

Network IP Routing, Gateways, and Data Center hardware with Border Control installations and maintenance begin in 2012-2013.

Commercial Internet Access will be immediately available for server IOS software and anti-virus updates that is inclusive of Firewall Management by MPLS Provider.

Core Connections Non-Recurring Costs				$500,000	$500,000	$500,000	$0	$0	$0	$0	$0	$0	$0
Item	Description	Assumptions	Notes	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Call Routing (ESRP Functions)													
Vendor Services	Professional Services/Installation	$1,500,000 (One time fee)	over 3 years	500,000	500,000	500,000							

Notes on Core Connections Non-Recurring Costs: Assumes vendor will spread Non-recurring costs over three years. This portion includes the setup the Core Call Routing Data Centers with respective communications device configuration and staging with initial lab testing.

Core Connections Recurring Costs				$1,623,456	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984
Item	Description	Assumptions		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Call Routing (ESRP Functions)													
Routing Servers	Hardware	$2,200,000 (10-year Plan/Lease)	$25544/month	250,000	306,528	306,528	306,528	306,528	306,528	306,528	306,528	306,528	306,528
Routing Servers	Software	$1,100,000 (10-year Plan/Lease)	$12772/month	153,264	153,264	153,264	153,264	153,264	153,264	153,264	153,264	153,264	153,264
Vendor Software	Software	$3,300,000 (10-year Plan/Lease)	$38316/month	259,792	459,792	459,792	459,792	459,792	459,792	459,792	459,792	459,792	459,792
Call Routing Infrastructure	2 Racks at two locations	2 @ 2100		50,400	50,400	50,400	50,400	50,400	50,400	50,400	50,400	50,400	50,400
Network Interconnection	2 DS3 connections to Data Centers	2 @ 5000		120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Call Routing Vendor Software	Software Licenses ($ Cost / month)	15,000		90,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Call Routing Vendor Software	Maintenance ($ Cost / month)	55,000		330,000	660,000	660,000	660,000	660,000	660,000	660,000	660,000	660,000	660,000
Call Routing Hardware	Maintenance ($ Cost / month)	35,000		370,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000

Notes on Core Connections Recurring Costs: 10-year Plan/Lease - Kimball took the Recurring Cost and added 10 % to that final Costing value. The lease assumptions are; 10 years, $ 0 down, 7% Interest Rate, 0 PMI.

The racks are commercial grade with a DS3 Intranet MPLS backup circuit connection ensuring Data Center IP Redundancy. The Data Centers are provider managed such that in the event of any equipment or circuit failure, active real-time troubleshooting occurs immediately. Being that data centers are redundant with applications, no one service will be affected during any equipment/circuit failures.

Routing Servers Hardware & Software - Hardware for 2 Data Centers - $1,100,000 each site. Routing Software at 2 Data Centers - $550,000 each site

Call routing Vendor Software to each answering position at each PSAP (Software Costs per position (280) - $11,786)

We will only do a database for the pANIs for wireless & VoIP. Vendor will coordinate with Neustar who administers the pANI.

The ESInet will be implemented in year 1, but we will not implement Lost protocol until year 2. Wireless & VoIP calls would transition in year 1.

PSAP Connections Non-Recurring Costs				$0	$1,925,000	$0	$0	$0	$0	$0	$0	$0	$0
Item	Description	Assumptions	Notes	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
PSAP Workstations	Installation/Professional Services (One Time Fee)	1,925,000			1,925,000								

Notes on PSAP Non-Recurring Costs: This is a 10 Year Implementation Plan with Vendor Management and Equipment leases. The professional services are inclusive of workstation and respective software installations at each PSAP Site.

PSAP Connections Recurring Costs				$3,356,700	$4,276,284	$4,276,284	$4,276,284	$4,276,284	$4,276,284	$4,276,284	$4,276,284	$4,276,284	$4,276,284
Item	Description	Assumptions		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
PSAP Workstations	Workstation Hardware (10-year Plan/Managed Service)	$3,850,000 = 280 @ $13,750	$44702/month	0	536,424	536,424	536,424	536,424	536,424	536,424	536,424	536,424	536,424
PSAP Workstations	Workstation Software (10-year Plan/Managed Service)	$275,0000 = 280 @ $9,821	$31930/month	0	383,160	383,160	383,160	383,160	383,160	383,160	383,160	383,160	383,160
DS-1 PSAP	Connection to an estimated 49 PSAPs. Each will have Two DS-1 Core Network with One DS-1 to neighbor | Six Sites of DS3 Backup require 4 DS-1 (or 24 DS1s).	150 @ 1100		1,980,000	1,980,000	1,980,000	1,980,000	1,980,000	1,980,000	1,980,000	1,980,000	1,980,000	1,980,000
DS-3 PSAP Redundancy	7 Sites DS3 to those PSAPs, 1 Site with DS3 Redundancy.	8 @ 5000		480,000	480,000	480,000	480,000	480,000	480,000	480,000	480,000	480,000	480,000
End Site Router	24 Ports with POE	49 @ 250		147,000	147,000	147,000	147,000	147,000	147,000	147,000	147,000	147,000	147,000
End Site Firewall	Managed Firewall for each end site with 48 port switch	49 @ 650		382,200	382,200	382,200	382,200	382,200	382,200	382,200	382,200	382,200	382,200
Site Maintenance	Maintenance on 49 sites	49 @ 625		367,500	367,500	367,500	367,500	367,500	367,500	367,500	367,500	367,500	367,500

Notes on PSAP Recurring Costs: These are hard circuit costs for a Provider MPLS Network considering numbers of workstations at each location. Kimball is assuming 300 Kbps for each workstation including the design of two (2) Data Centers for NG-911 Network.

10-year Plan/Lease - Kimball took the Recurring Cost and added 10 % to that final Costing Value. The lease assumptions are; 10 years, $ 0 down, 7% Interest Rate, 0 PMI.

Notes on PSAP Installation and Setup: PSAP Workstation (Hardware and Software) with complete PSAP IP Redundancy begins in 2012-2013. Each PSAP will be given at least two (2) DS1 MPLS Circuits for the required workstation bandwidth with another MPLS circuit to a neighboring Emergency Services Location. If any one circuit fails, that site will be available through that backup MPLS circuit.

Router and Firewall devices will be installed at all PSAP locations beginning in 2012.

It was assumed the 280 Workstation and Software costs are $23,571.00/unit including computers, software applications, new furniture, and VOIP Handsets. ($13,750.00 Hardware | $9,821.00 Software / Workstation)

Year	Total Revenue	Legacy Costs	Scenario One	Available Funding	Total Cost for Year	Difference
2011	$13,857,395	$12,120,444	0	$1,692,021	$12,120,444	
2012	$13,857,395	$6,782,660	$6,237,096	$7,074,735	$13,019,756	$837,639
2013	$13,857,395	$1,277,323	$9,982,208	$12,580,072	$11,259,531	$2,597,864
2014	$13,857,395	$1,000,000	$7,657,208	$12,857,395	$8,657,208	$5,200,187
2015	$13,857,395	$1,000,000	$7,157,208	$12,857,395	$8,157,208	$5,700,187
2016	$13,857,395	$1,000,000	$7,157,208	$12,857,395	$8,157,208	$5,700,187
2017	$13,857,395	$1,000,000	$7,157,208	$12,857,395	$8,157,208	$5,700,187
2018	$13,857,395	$1,000,000	$7,157,208	$12,857,395	$8,157,208	$5,700,187
2019	$13,857,395	$1,000,000	$7,157,208	$12,857,395	$8,157,208	$5,700,187
2020	$13,857,395	$1,000,000	$7,157,208	$12,857,395	$8,157,208	$5,700,187
2021	$13,857,395	$1,000,000	$7,157,208	$12,857,395	$8,157,208	$5,700,187

APPENDIX B – DETAILED PRICE BREAKDOWN FOR REPLACING THE EXISTING NETWORK WITH A SINGLE NG9-1-1 STATEWIDE CALL CENTER

Appendix B may be found on the following pages.

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	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Call Access Services Non-Recurring Costs	$400,000	$400,000	$0	$0	$0	$0	$0	$0	$0	$0
Call Access Services Recurring Costs	$356,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940
Core Connections Non-Recurring Costs	$500,000	$500,000	$500,000	$0	$0	$0	$0	$0	$0	$0
Core Connections Recurring Costs	$1,623,456	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984
Call Center Connections Non-Recurring Costs	$217,000	$217,000	$0	$0	$0	$0	$0	$0	$0	$0
Call Center Connections Recurring Costs	$146,136	$146,136	$146,136	$146,136	$146,136	$146,136	$146,136	$146,136	$146,136	$146,136
Dispatch Connections Non-Recurring Costs	$364,000	$364,000	$0	$0	$0	$0	$0	$0	$0	$0
Dispatch Connections Recurring Costs	$1,854,648	$1,854,648	$1,854,648	$1,854,648	$1,854,648	$1,854,648	$1,854,648	$1,854,648	$1,854,648	$1,854,648
Total Non-Recurring Costs	**$1,481,000**	**$1,481,000**	**$500,000**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Total Recurring Costs	**$3,981,180**	**$4,881,708**	**$4,881,708**	**$4,881,708**	**$4,881,708**	**$4,881,708**	**$4,881,708**	**$4,881,708**	**$4,881,708**	**$4,881,708**
TOTAL	**$5,462,180**	**$6,362,708**	**$5,381,708**	**$4,881,708**	**$4,881,708**	**$4,881,708**	**$4,881,708**	**$4,881,708**	**$4,881,708**	**$4,881,708**

Replacing all equipment for a single Oregon Call Center - NG-911 Network

Gateway Services Non-Recurring Costs				$400,000	$400,000	$0	$0	$0	$0	$0	$0	$0	$0
Item	Description	Assumptions	Notes	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Call Access													
Border Control Equipment	Equipment Installation, Configuration, and Setup of Firewall	$800,000/One-Time Fee		400,000	400,000								

Notes on Gateway Non-Recurring Costs: No special instructions or assumptions for Non-recurring costs. This portion includes the setup the Core Call Routing Data Centers with respective communications device configuration and staging with initial lab testing.

Gateway Services Recurring Costs				$356,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940
Item	Description	Assumptions		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Call Access													
IP Routing	Redundant Routers / Legacy Gateway (10-year Plan/Lease)	2 @ 200,000 ($400,000)	$4645/month	55,740	55,740	55,740	55,740	55,740	55,740	55,740	55,740	55,740	55,740
CAMA Gateways	Gateway to CAMA Trunks	25 @ 300			90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000
ALI Circuits and Gateways	Connection to 6 ALI Circuits	6 @ 1000	A-links and SS7 Circuits	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000
Commercial Internet Access	DS-3 Internet Connection | Two Data Centers ($ Cost / month) *May be a private connection	7000	Each DS3 over 40 Mbps / site with BGP Fail Over		84,000	84,000	84,000	84,000	84,000	84,000	84,000	84,000	84,000
Firewall Capabilities	Firewall Management | Two Data Centers ($ Cost / month)	1000		12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Data Center Hardware	(2) Data Center Border Control Access ($ Cost / month)	2100		25,200	25,200	25,200	25,200	25,200	25,200	25,200	25,200	25,200	25,200
Border Control Maintenance	System Monthly Maintenance Fee ($ Cost / month)	8000		96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
Border Control Equipment	Equipment Installation, Configuration, and Setup of Firewall ($cost/mo	8000		96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000

Notes on Gateway Services Recurring Costs: The 10-year Plan/Lease - Kimball took the Recurring Cost and added 10 % to that final Costing value. The lease assumptions are; 10 years, $ 0 down, 7% Interest Rate, 0 PMI.

Network IP Routing, Gateways, and Data Center hardware with Border Control installations and maintenance begin in 2012-2013.

Commercial Internet Access will be available for server IOS software and anti-virus updates that is inclusive of Firewall Management by MPLS Provider. Only secure connections will be allowed over this access.

Core Connections Non-Recurring Costs				$500,000	$500,000	$500,000	$0	$0	$0	$0	$0	$0	$0
Item	Description	Assumptions	Notes	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Call Routing (ESRP Functions)													
Vendor Services	Professional Services/Installation	$1,500,000 (One time fee)	over 3 years	500,000	500,000	500,000							

Notes on Core Connections Non-Recurring Costs: Assumes vendor will spread Non-recurring costs over three years. This portion includes the setup the Core Call Routing Data Centers with respective communications device configuration and staging with initial lab testing.

Core Connections Recurring Costs				$1,623,456	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984
Item	Description	Assumptions		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Call Routing (ESRP Functions)													
Routing Servers	Hardware	$2,200,000 (10-year Plan/Lease)	$25544/month	250,000	306,528	306,528	306,528	306,528	306,528	306,528	306,528	306,528	306,528
Routing Servers	Software	$1,100,000 (10-year Plan/Lease)	$12772/month	153,264	153,264	153,264	153,264	153,264	153,264	153,264	153,264	153,264	153,264
Vendor Software	Software	$3,300,000 (10-year Plan/Lease)	$38316/month	259,792	459,792	459,792	459,792	459,792	459,792	459,792	459,792	459,792	459,792
Call Routing Infrastructure	2 Racks at two locations	2 @ 2100		50,400	50,400	50,400	50,400	50,400	50,400	50,400	50,400	50,400	50,400
Network Interconnection	2 DS3 connections to Data Centers	2 @ 5000		120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Call Routing Vendor Software	Software Licenses ($ Cost / month)	15,000		90,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Call Routing Vendor Software	Maintenance ($ Cost / month)	55,000		330,000	660,000	660,000	660,000	660,000	660,000	660,000	660,000	660,000	660,000
Call Routing Hardware	Maintenance ($ Cost / month)	35,000		370,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000

Notes on Core Connections Recurring Costs: 10-year Plan/Lease - Kimball took the Recurring Cost and added 10 % to that final Costing value. The lease assumptions are; 10 years, $ 0 down, 7% Interest Rate, 0 PMI.

The racks are commercial grade with a DS3 Intranet MPLS backup circuit connection ensuring Data Center IP Redundancy. The Data Centers are provider managed such that in the event of any equipment or circuit failure, active real-time troubleshooting occurs immediately. Being that data centers are redundant with applications, no one service will be affected during any equipment/circuit failures.

Routing Servers Hardware & Software - Hardware for 2 Data Centers - $1,100,000 each site. Routing Software at 2 Data Centers - $550,000 each site

Call routing Vendor Software to each answering position at each PSAP (Software Costs per position (280) - $11,786)

We will only do a database for the pANIs for wireless & VoIP. Vendor will coordinate with Neustar who administers the pANI.

The ESInet will be implemented in year 1, but we will not implement Lost protocol until year 2. Wireless & VoIP calls would transition in year 1.

Call Taking Connections Non-Recurring Costs				$217,000	$217,000	$0	$0	$0	$0	$0	$0	$0	$0
Item	Description	Assumptions	Notes	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Call Taking Workstations	Installation/Professional Services (One Time Fee)	434,000		217,000	217,000								

Notes on PSAP Non-Recurring Costs: This is a 10 Year Implementation Plan with Vendor Management and Equipment leases. The professional services are inclusive of workstation and respective software installations at each PSAP Site.

Call Taking Connections Recurring Costs				$146,136	$146,136	$146,136	$146,136	$146,136	$146,136	$146,136	$146,136	$146,136	$146,136
Item	Description	Assumptions		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Call Taking Workstations	Workstation Hardware (10-year Plan/Managed Service)	$852,500 = 62 @ $13,750	$7104/month	85,248	85,248	85,248	85,248	85,248	85,248	85,248	85,248	85,248	85,248
Call Taking Workstations	Workstation Software (10-year Plan/Managed Service)	$608,902 = 62 @ $9,821	$5074/month	60,888	60,888	60,888	60,888	60,888	60,888	60,888	60,888	60,888	60,888

Notes on Call Taking Recurring Costs: These are hard circuit costs for a Provider MPLS Network considering numbers of workstations at each location. Kimball is assuming 300 Kbps for each workstation including the design of two (2) Data Centers for NG-911 Network.

10-year Plan/Managed Service - Kimball took the Recurring Cost and added 10 % to that final Costing Value. The Managed Service assumptions are; 10 years, $ 0 down, 7% Interest Rate, 0 PMI.

Notes on Call Taking Installation and Setup: Call Taking Workstation (Hardware and Software) with complete PSAP IP Redundancy begins in 2012-2013. Each Call Center will be given at least two (2) DS1 MPLS Circuits for the required workstation bandwidth with another MPLS circuit to a neighboring Emergency Services Location. If any one circuit fails, that site will be available through that backup MPLS circuit.

Router and Firewall devices will be installed at all PSAP locations beginning in 2012.

It was assumed the 62 Workstation and Software costs are $23,571.00/unit including computers, software applications, new furniture, and VOIP Handsets. ($13,750.00 Hardware | $9,821.00 Software / Workstation)

2 Call Centers w/31 positions each

***May not be DS3 - redundant, resiliant, alternate transport should be considered. DS3 used for budgeting reasons only.**

Dispatch Connections Non-Recurring Costs				$364,000	$364,000	$0	$0	$0	$0	$0	$0	$0	$0
Item	Description	Assumptions	Notes	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Dispatch Workstations	Installation/Professional Services (One Time Fee)	$728,000		364000	364,000								

Notes on Dispatch Non-Recurring Costs: This is a 10 Year Implementation Plan with Vendor Management and Equipment leases. The professional services are inclusive of workstation and respective software installations at each PSAP Site.

PSAP Connections Recurring Costs				$1,854,648	$1,854,648	$1,854,648	$1,854,648	$1,854,648	$1,854,648	$1,854,648	$1,854,648	$1,854,648	$1,854,648
Item	Description	Assumptions		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Dispatch 911 Workstations	Workstation Hardware (10-year Plan/Managed Service)	$1,430,000 = 104 @ $13,750	$11917/month	143,004	143,004	143,004	143,004	143,004	143,004	143,004	143,004	143,004	143,004
Dispatch 911 Workstations	Workstation Software (10-year Plan/Managed Service)	$1,021,384 = 104 @ $9,821	$8512/month	102,144	102,144	102,144	102,144	102,144	102,144	102,144	102,144	102,144	102,144
DS-1 PSAP	Connection to an estimated 49 dispatch PSAPs. An estimated 5 will require a second DS1 connection	54 @ 1100	$59400/month	712,800	712,800	712,800	712,800	712,800	712,800	712,800	712,800	712,800	712,800
End Site Router	24 Ports with POE	49 @ 250		147,000	147,000	147,000	147,000	147,000	147,000	147,000	147,000	147,000	147,000
End Site Firewall	Managed Firewall for each end site with 48 port switch	49 @ 650		382,200	382,200	382,200	382,200	382,200	382,200	382,200	382,200	382,200	382,200
Site Maintenance	Maintenance on 49 sites	49 @ 625		367,500	367,500	367,500	367,500	367,500	367,500	367,500	367,500	367,500	367,500

Notes on Dispatch Recurring Costs: These are hard circuit costs for a Provider MPLS Network considering numbers of workstations at each location. Kimball is assuming 300 Kbps for each workstation including the design of two (2) Data Centers for NG-911 Network.

10-year Plan/Managed Service - Kimball took the Recurring Cost and added 10 % to that final Costing Value. The managed service assumptions are; 10 years, $ 0 down, 7% Interest Rate, 0 PMI.

Notes on Dispatch Installation and Setup: Dispatch Workstation (Hardware and Software) with complete PSAP IP Redundancy begins in 2012-2013. Each Dispatch PSAP will be given at least two (2) DS1 MPLS Circuits for the required workstation bandwidth with another MPLS circuit to a neighboring Emergency Services Location. If any one circuit fails, that site will be available through that backup MPLS circuit.

Router and Firewall devices will be installed at all PSAP locations beginning in 2012.

It was assumed the 104 Workstation and Software costs are $23,571.00/unit including computers, software applications, new furniture, and VOIP Handsets. ($13,750.00 Hardware | $9,821.00 Software / Workstation)

Year	Total Revenue	Legacy Costs	Scenario Two	Available Funding	Total Cost for Year	Difference
2011	$13,857,395	$12,120,444	0	$1,736,951	$12,120,444	
2012	$13,857,395	$7,533,374	$5,462,180	$6,324,021	$12,995,554	$861,841
2013	$13,857,395	$3,896,690	$6,362,708	$9,960,705	$10,259,398	$3,597,997
2014	$13,857,395	$1,000,000	$5,381,708	$12,857,395	$6,381,708	$7,475,687
2015	$13,857,395	$1,000,000	$4,881,708	$12,857,395	$5,881,708	$7,975,687
2016	$13,857,395	$1,000,000	$4,881,708	$12,857,395	$5,881,708	$7,975,687
2017	$13,857,395	$1,000,000	$4,881,708	$12,857,395	$5,881,708	$7,975,687
2018	$13,857,395	$1,000,000	$4,881,708	$12,857,395	$5,881,708	$7,975,687
2019	$13,857,395	$1,000,000	$4,881,708	$12,857,395	$5,881,708	$7,975,687
2020	$13,857,395	$1,000,000	$4,881,708	$12,857,395	$5,881,708	$7,975,687
2021	$13,857,395	$1,000,000	$4,881,708	$12,857,395	$5,881,708	$7,975,687

APPENDIX C - DETAILED PRICE BREAKDOWN FOR CONSOLIDATING TO 9 RECOMMENDED NG9-1-1 PSAPS

Appendix C may be found on the following pages.

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	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Call Access Services Non-Recurring Costs	$400,000	$400,000	$0	$0	$0	$0	$0	$0	$0	$0
Call Access Services Recurring Costs	$356,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940
Core Connections Non-Recurring Costs	$500,000	$500,000	$500,000	$0	$0	$0	$0	$0	$0	$0
Core Connections Recurring Costs	$1,623,456	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984
PSAP Connections Non-Recurring Costs	$0	$500,000	$0	$0	$0	$0	$0	$0	$0	$0
PSAP Connections Recurring Costs	$473,300	$656,624	$656,624	$656,624	$656,624	$656,624	$656,624	$656,624	$656,624	$656,624
Total Non-Recurring Costs	**$900,000**	**$1,400,000**	**$500,000**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Total Recurring Costs	**$2,453,696**	**$3,537,548**	**$3,537,548**	**$3,537,548**	**$3,537,548**	**$3,537,548**	**$3,537,548**	**$3,537,548**	**$3,537,548**	**$3,537,548**
TOTAL	**$3,353,696**	**$4,937,548**	**$4,037,548**	**$3,537,548**	**$3,537,548**	**$3,537,548**	**$3,537,548**	**$3,537,548**	**$3,537,548**	**$3,537,548**

Optimum Number of PSAPs within Oregon NG-911 Network

PSAP	# of Workstations
North Coast	5
Salem Metro	9
South Coast	9
Multnomah	12
Eugene Metro	9
Metro	9
Eastern	5
Central	7
Gorge	5
Total # of 9-1-1 Workstations	70

Gateway Services Non-Recurring Costs				$400,000	$400,000	$0	$0	$0	$0	$0	$0	$0	$0
Item	Description	Assumptions	Notes	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Call Access													
Border Control Equipment	Equipment Installation, Configuration, and Setup of Firewall	$800,000/One-Time Fee		400,000	$400,000.00								

Notes on Gateway Non-Recurring Costs: No special instructions or assumptions for Non-recurring costs. This portion includes the setup the Core Call Routing Data Centers with respective communications device configuration and staging with initial lab testing.

Gateway Services Recurring Costs				$356,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940	$530,940
Item	Description	Assumptions		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Call Access													
IP Routing	Redundant Routers / Legacy Gateway (10-year Plan/Lease)	2 @ 200,000 ($400,000)	$4645/month	55,740	55,740	55,740	55,740	55,740	55,740	55,740	55,740	55,740	55,740
CAMA Gateways	Gateway to CAMA Trunks	25 @ 300			90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000
ALI Circuits and Gateways	Connection to 6 ALI Circuits	6 @ 1000	A-links and SS7 Circuits	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000
Commercial Internet Access	DS-3 Internet Connection | Two Data Centers ($ Cost / month)	7000	Each DS3 over 40 Mbps / site with BGP Fail Over		84,000	84,000	84,000	84,000	84,000	84,000	84,000	84,000	84,000
Firewall Capabilities	Firewall Management | Two Data Centers ($ Cost / month)	1000		12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Data Center Hardware	(2) Data Center Border Control Access ($ Cost / month)	2100		25,200	25,200	25,200	25,200	25,200	25,200	25,200	25,200	25,200	25,200
Border Control Maintenance	System Monthly Maintenance Fee ($ Cost / month)	8000		96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
Border Control Equipment	Equipment Installation, Configuration, and Setup of Firewall ($cost/mo	8000		96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000

Notes on Gateway Services Recurring Costs: The 10-year Plan/Lease - Kimball took the Recurring Cost and added 10 % to that final Costing value. The lease assumptions are; 10 years, $ 0 down, 7% Interest Rate, 0 PMI.

Network IP Routing, Gateways, and Data Center hardware with Border Control installations and maintenance begin in 2012-2013.

Commercial Internet Access will be immediately available for server IOS software and anti-virus updates that is inclusive of Firewall Management by MPLS Provider.

Core Connections Non-Recurring Costs				$500,000	$500,000	$500,000	$0	$0	$0	$0	$0	$0	$0
Item	Description	Assumptions	Notes	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Call Routing (ESRP Functions)													
Vendor Services	Professional Services/Installation	$1,500,000 (One time fee)	over 3 years	500,000	500,000	500,000							

Notes on Core Connections Non-Recurring Costs: Assumes vendor will spread Non-recurring costs over three years. This portion includes the setup the Core Call Routing Data Centers with respective communications device configuration and staging with initial lab testing.

Core Connections Recurring Costs				$1,623,456	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984	$2,349,984
Item	Description	Assumptions		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Call Routing (ESRP Functions)													
Routing Servers	Hardware	$2,200,000 (10-year Plan/Lease)	$25544/month	250,000	306,528	306,528	306,528	306,528	306,528	306,528	306,528	306,528	306,528
Routing Servers	Software	$1,100,000 (10-year Plan/Lease)	$12772/month	153,264	153,264	153,264	153,264	153,264	153,264	153,264	153,264	153,264	153,264
Vendor Software	Software	$3,300,000 (10-year Plan/Lease)	$38316/month	259,792	459,792	459,792	459,792	459,792	459,792	459,792	459,792	459,792	459,792
Call Routing Infrastructure	2 Racks at two locations	2 @ 2100		50,400	50,400	50,400	50,400	50,400	50,400	50,400	50,400	50,400	50,400
Network Interconnection	2 DS3 connections to Data Centers	2 @ 5000		120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Call Routing Vendor Software	Software Licenses ($ Cost / month)	15,000		90,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Call Routing Vendor Software	Maintenance ($ Cost / month)	55,000		330,000	660,000	660,000	660,000	660,000	660,000	660,000	660,000	660,000	660,000
Call Routing Hardware	Maintenance ($ Cost / month)	35,000		370,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000

Notes on Core Connections Recurring Costs: 10-year Plan/Lease - Kimball took the Recurring Cost and added 10 % to that final Costing value. The lease assumptions are; 10 years, $ 0 down, 7% Interest Rate, 0 PMI.

The racks are commercial grade with a DS3 Intranet MPLS backup circuit connection ensuring Data Center IP Redundancy. The Data Centers are provider managed such that in the event of any equipment or circuit failure, active real-time troubleshooting occurs immediately. Being that data centers are redundant with applications, no one service will be affected during any equipment/circuit failures.

Routing Servers Hardware & Software - Hardware for 2 Data Centers - $1,100,000 each site. Routing Software at 2 Data Centers - $550,000 each site

Call routing Vendor Software to each answering position at each PSAP (Software Costs per position (280) - $11,786)

We will only do a database for the pANIs for wireless & VoIP. Vendor will coordinate with Neustar who administers the pANI.

The ESInet will be implemented in year 1, but we will not implement Lost protocol until year 2. Wireless & VoIP calls would transition in year 1.

PSAP Connections Non-Recurring Costs				$0	$500,000	$0	$0	$0	$0	$0	$0	$0	$0
Item	Description	Assumptions	Notes	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
PSAP Workstations	Installation/Professional Services (One Time Fee)	500,000			500,000								

Notes on PSAP Non-Recurring Costs: This is a 10 Year Implementation Plan with Vendor Management and Equipment leases. The professional services are inclusive of workstation and respective software installations at each PSAP Site.

PSAP Connections Recurring Costs				$473,300	$656,624	$656,624	$656,624	$656,624	$656,624	$656,624	$656,624	$656,624	$656,624
Item	Description	Assumptions		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
PSAP Workstations	Workstation Hardware (10-year Plan/Managed Service)	$962,500 = 70 @ $13,750	$8912/month	0	106,944	106,944	106,944	106,944	106,944	106,944	106,944	106,944	106,944
PSAP Workstations	Workstation Software (10-year Plan/Managed Service)	$687,470 = 70 @ $9,821	$6365/month	0	76,380	76,380	76,380	76,380	76,380	76,380	76,380	76,380	76,380
DS-1 PSAP	Connection to an estimated 9 PSAPs. Six will have Two DS-1 Core Network with One DS-1 to neighbor | Three will have one DS-1 to the core and one DS-1 backup to it's neighbor.	23 @ 1100		303,600	303,600	303,600	303,600	303,600	303,600	303,600	303,600	303,600	303,600
DS-3 PSAP Redundancy	1 Sites DS3	5000		5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
End Site Router	24 Ports with POE	9 @ 250		27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000
End Site Firewall	Managed Firewall for each end site with 48 port switch	9 @ 650		70,200	70,200	70,200	70,200	70,200	70,200	70,200	70,200	70,200	70,200
Site Maintenance	Maintenance on 49 sites	9 @ 625		67,500	67,500	67,500	67,500	67,500	67,500	67,500	67,500	67,500	67,500

Notes on PSAP Recurring Costs: These are hard circuit costs for a Provider MPLS Network considering numbers of workstations at each location. Kimball is assuming 300 Kbps for each workstation including the design of two (2) Data Centers for NG-911 Network.

10-year Plan/Lease - Kimball took the Recurring Cost and added 10 % to that final Costing Value. The lease assumptions are; 10 years, $ 0 down, 7% Interest Rate, 0 PMI.

Notes on PSAP Installation and Setup: PSAP Workstation (Hardware and Software) with complete PSAP IP Redundancy begins in 2012-2013. Each PSAP will be given at least two (2) DS1 MPLS Circuits for the required workstation bandwidth with another MPLS circuit to a neighboring Emergency Services Location. If any one circuit fails, that site will be available through that backup MPLS circuit.

Router and Firewall devices will be installed at all PSAP locations beginning in 2012.

It was assumed the 280 Workstation and Software costs are $23,571.00/unit including computers, software applications, new furniture, and VOIP Handsets. ($13,750.00 Hardware | $9,821.00 Software / Workstation)

Year	Total Revenue	Legacy Costs	Scenario Three	Available Funding	Savings after transition	Total Cost for Year	Difference
2011	$13,857,395	$12,120,444	0	$1,736,951	0	$12,120,444	
2012	$13,857,395	$5,951,327	$3,353,696	$7,906,068	$6,169,117	$9,305,023	$4,552,372
2013	$13,857,395	$3,896,690	$4,937,548	$9,960,705	$8,223,753	$8,834,238	$5,023,157
2014	$13,857,395	$1,000,000	$4,037,548	$12,857,395	$11,120,444	$5,037,548	$8,819,847
2015	$13,857,395	$1,000,000	$3,537,548	$12,857,395	$11,120,444	$4,537,548	$9,319,847
2016	$13,857,395	$1,000,000	$3,537,548	$12,857,395	$11,120,444	$4,537,548	$9,319,847
2017	$13,857,395	$1,000,000	$3,537,548	$12,857,395	$11,120,444	$4,537,548	$9,319,847
2018	$13,857,395	$1,000,000	$3,537,548	$12,857,395	$11,120,444	$4,537,548	$9,319,847
2019	$13,857,395	$1,000,000	$3,537,548	$12,857,395	$11,120,444	$4,537,548	$9,319,847
2020	$13,857,395	$1,000,000	$3,537,548	$12,857,395	$11,120,444	$4,537,548	$9,319,847
2021	$13,857,395	$1,000,000	$3,537,548	$12,857,395	$11,120,444	$4,537,548	$9,319,847

APPENDIX D - DETAILED PRICE BREAKDOWN FOR A SINGLE STATEWIDE LEGACY CALL CENTER

Appendix D may be found on the following pages.

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	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Call Center Connections Non-Recurring Costs	$3,561,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Call Center Connections Recurring Costs	$3,264,000	$3,264,000	$3,264,000	$3,264,000	$3,264,000	$3,264,000	$3,264,000	$3,264,000	$3,264,000	$3,264,000
Current Carry Forward Recurring Costs	$7,380,252	$7,380,252	$7,380,252	$7,380,252	$7,380,252	$7,380,252	$7,380,252	$7,380,252	$7,380,252	$7,380,252
Dispatch Connections Non-Recurring Costs	$5,252,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Dispatch Connections Recurring Costs	$6,152,400	$6,152,400	$6,152,400	$6,152,400	$6,152,400	$6,152,400	$6,152,400	$6,152,400	$6,152,400	$6,152,400
Total Non-Recurring Costs	**$8,813,000**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Total Recurring Costs	**$16,796,652**	**$16,796,652**	**$16,796,652**	**$16,796,652**	**$16,796,652**	**$16,796,652**	**$16,796,652**	**$16,796,652**	**$16,796,652**	**$16,796,652**
TOTAL	**$25,609,652**	**$16,796,652**	**$16,796,652**	**$16,796,652**	**$16,796,652**	**$16,796,652**	**$16,796,652**	**$16,796,652**	**$16,796,652**	**$16,796,652**

Replacing all equipment for a single legacy Oregon Call Center

Call Center Connections Non-Recurring Costs				$3,561,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
				2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Item	**Description**	**Assumptions**	**Notes**										
Call Taking Single Center Workstations	Purchase equipment, installation & training	$3,100,000 = 62 @ $50,000		$3,100,000									
UPS	UPS at each workstation	62 @ $500		$31,000									
UPS	UPS for server room	2 @ $7,000		$14,000									
Routers at Call Taking Center	At primary center & back up center - 2 DS3 routers	2 @ 200000		$400,000									
Channel Bank	To terminate the incoming calls from selective routers	16 @ 1,000		$16,000									

Notes on PSAP Non-recurring Costs: It was assumed the 224 Workstation costs are $50,000.00/unit including computers, software applications, and VOIP Handsets. Furniture will be an additional expense. A generator will also be extra.

2 Statewide call centers (primary & backup) w/60 positions each and then reducing the current number of positions at each of the 147 remaining dispatch PSAPs.

	Call Center Connections Recurring Costs			$3,264,000	$3,264,000	$3,264,000	$3,264,000	$3,264,000	$3,264,000	$3,264,000	$3,264,000	$3,264,000	$3,264,000
				2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Item	**Description**	**Assumptions**											
Inter-lata costs*	connections to current selective routers from statewide call center and backup call center	16 @ 1500	$24000/month	$288,000	$288,000	$288,000	$288,000	$288,000	$288,000	$288,000	$288,000	$288,000	$288,000
DS-1 Point to Point	Connection to ALI links for statewide call center and backup center	6 @ 1000	$6000/month	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000
DS-3 Call Taking Redundancy**	2 Sites DS3 with DS3 Redundancy.	4 @ 5000	$20000/month	$240,000	$240,000	$240,000	$240,000	$240,000	$240,000	$240,000	$240,000	$240,000	$240,000
Workstation equipment maintenance	For all call taking workstations	62 @ 3500	$217000/month	$2,604,000	$2,604,000	$2,604,000	$2,604,000	$2,604,000	$2,604,000	$2,604,000	$2,604,000	$2,604,000	$2,604,000
Router Maintenance	maintance for routers in call taking centers	2 @ 2500	$5000/month	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000
	Current Carry Forward Recurring Costs			**$7,380,252**	**$7,380,252**	**$7,380,252**	**$7,380,252**	**$7,380,252**	**$7,380,252**	**$7,380,252**	**$7,380,252**	**$7,380,252**	**$7,380,252**
Current Selective Routing charges	Connections to current selective routers			$4,893,652	$4,893,652	$4,893,652	$4,893,652	$4,893,652	$4,893,652	$4,893,652	$4,893,652	$4,893,652	$4,893,652
Current Wireless Charges	selective routing, ALI, pANI, etc.			$2,486,600	$2,486,600	$2,486,600	$2,486,600	$2,486,600	$2,486,600	$2,486,600	$2,486,600	$2,486,600	$2,486,600

Notes on PSAP Recurring Costs:

Notes on PSAP Installation and Setup: PSAP Workstation with complete PSAP IP Redundancy to the 2 Call Center locations begins in 2012-2013. Each PSAP will be given at least two (2) DS1 MPLS Circuits for the required workstation bandwidth with another MPLS circuit to a neighboring Emergency Services Location. If any one circuit fails, that site will be available through that backup MPLS circuit.

***In reality carriers don't support this option and it may require legislatative action to accomplish.**

****May not be DS3 - redundant, resiliant, alternate transport should be considered. DS3 used for budgeting reasons only.**

Dispatch Connections Non-Recurring Costs				$5,252,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
				2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Item	**Description**	**Assumptions**	**Notes**										
PSAP Dispatch Workstations	Purchase equipment, installation & training	$5,200,000 = 104 @ $50,000		$5,200,000									
UPS	UPS at each workstation	104 @ $500		$52,000									

	Dispatch Connections Recurring Costs			$6,152,400	$6,152,400	$6,152,400	$6,152,400	$6,152,400	$6,152,400	$6,152,400	$6,152,400	$6,152,400	$6,152,400
				2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Item	**Description**	**Assumptions**											
DS-1 Dispatch	Connection to an estimated 49 dispatch PSAPs. Six sites will require redundant DS-1 connections for failover anfd backup.	55 @ 1100	$60500/month	$726,000	$726,000	$726,000	$726,000	$726,000	$726,000	$726,000	$726,000	$726,000	$726,000
Workstation equipment maintenance	For all dispatch workstations	104 @ 3500	$364000/month	$4,368,000	$4,368,000	$4,368,000	$4,368,000	$4,368,000	$4,368,000	$4,368,000	$4,368,000	$4,368,000	$4,368,000
Dispatch site Router	98 managed routers*	98 @ 250	$24500/month	$294,000	$294,000	$294,000	$294,000	$294,000	$294,000	$294,000	$294,000	$294,000	$294,000
Dispatch Site Firewall	Managed Firewall for each end site with 48 port switch	98 @ 650	$63700/month	$764,400	$764,400	$764,400	$764,400	$764,400	$764,400	$764,400	$764,400	$764,400	$764,400
Router Maintenance	maintance for routers in call taking centers	0		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

*could be done w/49

Year	Total Revenue	Previous Costs	Scenario Four	Difference
2011	$13,857,395	$12,120,444	0	
2012	$13,857,395	$12,120,444	$25,609,652	($11,752,257)
2013	$13,857,395	$12,120,444	$16,796,652	($2,939,257)
2014	$13,857,395	$12,120,444	$16,796,652	($2,939,257)
2015	$13,857,395	$12,120,444	$16,796,652	($2,939,257)
2016	$13,857,395	$12,120,444	$16,796,652	($2,939,257)
2017	$13,857,395	$12,120,444	$16,796,652	($2,939,257)
2018	$13,857,395	$12,120,444	$16,796,652	($2,939,257)
2019	$13,857,395	$12,120,444	$16,796,652	($2,939,257)
2020	$13,857,395	$12,120,444	$16,796,652	($2,939,257)
2021	$13,857,395	$12,120,444	$16,796,652	($2,939,257)

APPENDIX E - DETAILED PRICE BREAKDOWN FOR CONSOLIDATING TO 9 RECOMMENDED PSAPS – LEGACY

Appendix E may be found on the following pages.

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	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
PSAP Connections Non-Recurring Costs	$3,535,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
PSAP Connections Recurring Costs	$3,072,000	$3,072,000	$3,072,000	$3,072,000	$3,072,000	$3,072,000	$3,072,000	$3,072,000	$3,072,000	$3,072,000
Current Carry Forward Recurring Costs	$8,426,238	$8,426,238	$8,426,238	$8,426,238	$8,426,238	$8,426,238	$8,426,238	$8,426,238	$8,426,238	$8,426,238
Total Non-Recurring Costs	**$3,535,000**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Total Recurring Costs	**$11,498,238**	**$11,498,238**	**$11,498,238**	**$11,498,238**	**$11,498,238**	**$11,498,238**	**$11,498,238**	**$11,498,238**	**$11,498,238**	**$11,498,238**
TOTAL	**$15,033,238**	**$11,498,238**	**$11,498,238**	**$11,498,238**	**$11,498,238**	**$11,498,238**	**$11,498,238**	**$11,498,238**	**$11,498,238**	**$11,498,238**

Replacing all equipment for an optimum number of legacy Oregon PSAPs

PSAP	# of Workstations
North Coast	5
Salem Metro	9
South Coast	9
Multnomah	12
Eugene Metro	9
Metro	9
Eastern	5
Central	7
Gorge	5
Total # of 9-1-1 Workstations	70

PSAP Connections Non-Recurring Costs				$3,535,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
				2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Item	**Description**	**Assumptions**	**Notes**										
Call Taking Workstations	Purchase equipment, installation & training	$3,500,000 = 70 @ $50,000		$3,500,000									
UPS	UPS at each workstation	70 @ $500		$35,000									

Notes on PSAP Non-recurring Costs: It was assumed the 70 Workstation costs are $50,000.00/unit including computers, software applications, and VOIP Handsets. Furniture will be an additional expense. A generator will also be extra.

9 regional PSAPs to provide call taking and dispatch w/a total 70 positions.

	PSAP Connections Recurring Costs			$3,072,000	$3,072,000	$3,072,000	$3,072,000	$3,072,000	$3,072,000	$3,072,000	$3,072,000	$3,072,000	$3,072,000
				2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Item	**Description**	**Assumptions**											
Inter-lata costs*	connections to current selective routers from 9 call centers across latas - assuming 7 inter-lata connections	7 @ 1500		$126,000	$126,000	$126,000	$126,000	$126,000	$126,000	$126,000	$126,000	$126,000	$126,000
DS-1 Point to Point	Connection to ALI links across latas	6 @ 1000		$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000
Workstation equipment maintenance	For all call taking workstations	70 @ 3500	$245000/month	$2,940,000	$2,940,000	$2,940,000	$2,940,000	$2,940,000	$2,940,000	$2,940,000	$2,940,000	$2,940,000	$2,940,000
	Current Carry Forward Recurring Costs			**$8,426,238**	**$8,426,238**	**$8,426,238**	**$8,426,238**	**$8,426,238**	**$8,426,238**	**$8,426,238**	**$8,426,238**	**$8,426,238**	**$8,426,238**
Current Selective Routing charges	Connections to current selective routers			$4,893,652	$4,893,652	$4,893,652	$4,893,652	$4,893,652	$4,893,652	$4,893,652	$4,893,652	$4,893,652	$4,893,652
Current Wireless Charges	selective routing, ALI, pANI, etc.			$2,486,600	$2,486,600	$2,486,600	$2,486,600	$2,486,600	$2,486,600	$2,486,600	$2,486,600	$2,486,600	$2,486,600
Mapping/MSAG	current costs for Mapping/GIS and MSAG			$1,045,986	$1,045,986	$1,045,986	$1,045,986	$1,045,986	$1,045,986	$1,045,986	$1,045,986	$1,045,986	$1,045,986

Notes on PSAP Recurring Costs:

Notes on PSAP Installation and Setup:

***In reality carriers don't support this option and it may require legislatative action to accomplish.**

****May not be DS3 - redundant, resiliant, alternate transport should be considered. DS3 used for budgeting reasons only.**

Year	Total Revenue	Previous Costs	Scenario Five	Difference
2011	$13,857,395	$12,120,444	0	
2012	$13,857,395	$12,120,444	$15,033,238	($1,175,843)
2013	$13,857,395	$12,120,444	$11,498,238	$2,359,157
2014	$13,857,395	$12,120,444	$11,498,238	$2,359,157
2015	$13,857,395	$12,120,444	$11,498,238	$2,359,157
2016	$13,857,395	$12,120,444	$11,498,238	$2,359,157
2017	$13,857,395	$12,120,444	$11,498,238	$2,359,157
2018	$13,857,395	$12,120,444	$11,498,238	$2,359,157
2019	$13,857,395	$12,120,444	$11,498,238	$2,359,157
2020	$13,857,395	$12,120,444	$11,498,238	$2,359,157
2021	$13,857,395	$12,120,444	$11,498,238	$2,359,157