OREGON WIRELESS INTEROPERABILITY NETWORK (OWIN) PROJECT

Business Case: - A Statewide Public Safety Radio Network
Deliverable 12-A

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BUSINESS CASE FOR THE OREGON WIRELESS INTEROPERABILITY NETWORK (OWIN)

A STATEWIDE PUBLIC SAFETY RADIO NETWORK

Executive Summary

Oregon faces an imminent crisis in its ability to provide reliable communications for first responders. Today's lack of capabilities interferes with command and control operations and hinders their response to emergency calls made by the citizens of this State. It also endangers personnel when they cannot depend on their radios —their lifelines— in many parts of the state.

This document presents a business case and technical recommendations for further implementation of the Oregon Wireless Interoperability Network (OWIN). It is urgent that the state move forward with the OWIN plan, as personnel in Corrections, Forestry, State Police, Emergency Management, and Transportation are struggling with separate radio communications systems that have limited interoperability and/or are out-of-date and at risk of immediate failure.

Aging systems that can't talk to each other

Not only are intra-agency and inter-agency communications severely lacking at the state level, but these agencies cannot effectively communicate with local, federal, or tribal law enforcement, fire, emergency medical services, and others likely to be involved in many of the same emergency events. There are rural and under-served areas of Oregon with limited or no radio coverage, making communications with emergency personnel impossible.

In routine emergencies (e.g. a 911 call for police or fire services) and during catastrophic emergencies (e.g. an earthquake, a flood, etc.) these communication deficiencies may deprive citizens of key emergency services when they are needed most. When there is a natural or manmade disaster in Oregon, officials and first responders must make quick decisions and implement complex plans to prevent loss of life and property. Their ability to communicate reliably across all jurisdictions is a key part of Oregon's homeland security strategy.

Critical infrastructure and major industries in Oregon, including dams, water reservoirs, hazardous storage sites, electrical substations, communication hubs, livestock, and food supplies need to be protected by personnel with a reliable communications system. The inability of state agencies to communicate with those entrusted with this responsibility is not an option and puts all Oregonians at eminent risk.

While state and local agencies are making every effort to communicate effectively, the radio systems the state operates today provide unacceptable levels of interoperability. The radio technology is older than most of the people using it and manufacturers no longer stock or support much of the equipment deployed throughout the state. Oregon public safety agencies have resorted, in some cases, to searching eBay to purchase parts for their radio systems.

FCC mandate: modernize public safety communications

In an effort to increase scarce radio spectrum, the Federal Communications Commission (FCC) recently mandated that all land mobile radio users that deploy radio systems below 512 MHz, (including public safety agencies) must convert their radio systems from "wideband" to "narrowband" technology by January 1, 2013. Narrowbanding is an effort to expand the number of available channels in an area, by packing them more densely in the same "slice" of radio spectrum.

For the most part, state, local and tribal government agencies in Oregon use wideband systems now, and will have to make the mandated change. By 2008, radio manufacturers will not be allowed to make or sell wideband equipment in the United States, and the state will not be permitted to license any additional wideband channels. If licensees do not comply with narrowbanding requirements, they will face fines, and could possibly lose the licenses to use their current frequencies.

Narrowbanding makes room for more licensed use of spectrum in any given geographic region by essentially cutting one channel into two channels. The State holds several hundred FCC radio licenses, and until its narrowbanding process is completed, agencies that need to license new, channels in the affected public safety band will have to wait.

The importance of upgrading and modernizing the state's communication infrastructure will be more critical as the requirements of public safety agencies grow. Public safety agencies and emergency responders need a modern digital system that meets FCC mandates, improves radio coverage, enables interoperability, and can accommodate rapid advances in technology.

Moving to digital technology is necessary before first responders can begin to deploy and use any advanced mobile communications applications across the public safety wireless communication system on a statewide basis. These include high speed wireless data, Voice over Internet Protocol (VoIP), geographic information systems, images, and situational video. Oregon's public safety arena is already far behind in use of modern wireless technology, and it is falling farther behind the technology curve each day that the community is unable to support the advanced applications available in today's marketplace.

The proposed OWIN design incorporates a high speed wireless wide area network and extensive interoperability features. Its conceptual design includes the capability to provide enhanced service levels to all users including local, tribal, and federal government public safety personnel.

Once the upgrade is completed, public safety communications systems will finally be able to advance technically. This in turn will realize improved efficiencies and effectiveness in operations across all levels of government.

The design of OWIN conforms to the new FCC requirements and follows Department of Homeland Security (DHS) technology guidelines.

One investment to benefit many users

Rather than continue the decades-old practice of each county, tribal, and state agency independently financing, constructing, and maintaining its own radio communications systems, the state has the opportunity to leverage a large public investment to the advantage of first-responder organizations at all levels of government. Through the provision of sustainable and reliable infrastructure throughout the state, OWIN will minimize the need for overlapping public safety investment by local jurisdictions.

The overall effort to create, procure, and operate a consolidated statewide public safety radio system is a major undertaking. We estimate that it will take three biennia to build, test, and implement all phases of the OWIN system.

To complete the required construction, modernization, and narrowbanding by the 2013 deadline imposed by the FCC, construction of OWIN must begin at least six years earlier, or no later than early 2007. Thus, the state has no time to lose to determine its course of action.

The vision of OWIN: today vs. tomorrow

Today, there are four state agencies, operating four separate radio systems in isolation. Tomorrow, we see one integrated, interoperable statewide system that all public safety agencies in the state can share.

Today, we have four state agencies that must form multiple relationships with local government agencies in order to operate emergency communications systems as effectively as possible. There is no normalized business model for these relationships, and many of these relationships are undocumented and informal. Tomorrow, we see the OWIN program creating formal partnerships among local, tribal, and federal government, implementing best practices and cooperative operations models for mission critical, emergency communications statewide.

The implementation of OWIN is an important step toward achieving seamless interoperable communications for first responders at all levels of government.

The complete business case that follows provides:

- more detailed background on the need for and benefits of the proposed system design
- a high level review of the system requirements, design elements, and technology necessary to create OWIN
- estimated costs for constructing and operating the OWIN system
- a summary of the findings of detailed reports developed by the state's consultant, Federal Engineering (***FE*),** that have been reviewed and approved by OWIN and the State Interoperability Executive Council (SIEC) during 2006.
- risks associated with the project, strategies for mitigating risk, and benefits to the state of moving forward with OWIN

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1 Introduction and Background

The State of Oregon must ensure that those who protect its citizens, infrastructure and natural resources have the tools to communicate quickly and reliably. Yet in 2005, as the Oregon Legislature affirmed in House Bill 2101, "The deteriorating condition of our public safety radio systems is of immediate concern because it compromises the safety and well-being of the citizens of the State of Oregon who depend upon lifesaving communications systems used by first responders."

The Oregon Legislature further noted that "the majority of the communications systems in the State of Oregon are unreliable, greatly increasing the danger to first responders and law enforcement officers in carrying out their duty to protect the citizens and property of the State of Oregon." [1]

Based on those findings, the Oregon Legislature established that it is the policy of the State of Oregon to:

- Develop, finance, maintain and operate a single emergency response wireless communications infrastructure that supports both the communications needs of all state agencies and ensures communications interoperability among all state, local, tribal and federal public safety agencies, thereby maximizing shared use of this invaluable public asset; and,
- Meet Federal Communications Commission mandates for the conversion of public safety communications frequencies and spectrum allocation by 2013.[2]

In February 2006, the state contracted with Federal Engineering (***FE***), a national firm specializing in the design and planning of public safety communications systems, to conduct an analysis of the state's public safety wireless communications systems. ***FE*** worked closely with the Oregon Wireless Interoperability Network (OWIN) staff, the State Interoperability Executive Council (SIEC), the subcommittees of the SIEC, and the State Wireless Infrastructure Investment Group (SWIIG) to review and understand the state's operational and interoperability needs for wireless communications. The reports prepared by ***FE*** as part of this project may be found on the Oregon SIEC web site http://www.oregon.gov/SIEC/ or they may be obtained by contacting the OWIN Program Director, Mike Zanon, at (503) 378-3055 x55037 or Michael.zanon@state.or.us .

With these directives in mind, the state engaged ***FE*** to work with the OWIN project team:[3]

[1] Enrolled House Bill 2101
[2] Enrolled House Bill 2101
[3] Department of Administrative Services, RFP 20050901, issued September 2, 2005

- To complete a well reasoned and documented conceptual design for a consolidated statewide public safety wireless communications system based on the state's documented needs for capacity, coverage, reliability, interoperability and affordability.

- To provide estimates, with a high degree of certainty, of the costs to construct and implement the recommended consolidated statewide public safety wireless communications system;

- To incorporate within the recommended conceptual design a plan to meet FCC mandates, state agency operational requirements, and state interoperability requirements, by 2013.

- To incorporate within the recommended conceptual design the anticipated operational capacity and coverage needs of state agencies and the interoperability and collocation needs of other government public safety and emergency responder agencies.

FE analyzed the state’s four independently operated land mobile radio (LMR) radio systems, used by the Department of Corrections (DOC), Oregon Department of Forestry (ODF), Oregon Department of Transportation (ODOT), and Oregon State Police (OSP). These four aging systems were developed independently over decades and do not meet the state's current stated needs for public safety or interoperable communications. With the exception of the ODF system, which has been recently upgraded to a analog narrowband system, the rest of the state’s existing systems and infrastructure are at risk eminent of failure. According to the state's RFP for radio engineering and design services[4], current systems "lack all but the most rudimentary interoperability capability."

In addition, the Federal Communications Commission (FCC) mandated that users of wideband frequencies (below 512 MHz including state and many local systems) are to replace their equipment with narrowband compliant systems by January 1, 2013. Additionally, license holders are to relinquish their wideband frequencies by no later than January 1, 2013.[5] Significant state investment is necessary to comply with this narrowbanding order.

[4] Department of Administrative Services, RFP 20050901, issued September 2, 2005

[5] Federal Communications Commission (FCC) SECOND REPORT AND ORDER AND SECOND FURTHER NOTICE OF PROPOSED RULE MAKING, WT DOCKET NO. 99-87, Adopted: February 12, 2003

2 Problem /Opportunity

Much of the state-owned radio infrastructure is outdated, obsolete, and at "severe risk of failure," as stated in House Bill 2101.[6] The state's request for proposals for a radio system design also stated the following facts[7]:

- Oregon's depleted staffing levels for state agency wireless/radio programs within the operating agencies put the entire state public safety communications system (state, local, federal) at risk.[8]

- Equipment manufacturers have modernized their product lines to digital platforms. The state is still using an analog platform that continues use of decades-old technology.

- Employing and retaining new technicians to support the existing analog infrastructure is difficult because, in general, new technicians lack the skills and can no longer be effectively trained in these antiquated technologies.

- Spare analog parts are increasingly hard to find or aren't available.

- Every dollar spent maintaining the current system is unrecoverable as the system is past the end of its useful life.

The ***FE*** program began with an investigative stage that produced several reports submitted to and accepted by the State's OWIN team and the SIEC. These reports included an "Operational and Needs Analysis," Tower Usability Assessment – Site Report," and "Coverage Analysis." These reports taken as a group provide a measurement of the current state of public safety communications in Oregon. This condition is compared to that which will exist once OWIN is deployed.

- Oregon's existing public safety radio systems provide less than acceptable coverage in many areas of the state. The coverage of the existing systems ranges from 59% to 85% of the area of the state, and is different for each agency. The recommended OWIN system will provide 86% coverage of the state for all agencies, with no county below 71% coverage.

- Oregon's existing radio systems provide limited uncoordinated interoperability. Interoperability is only available where a radio leaves its own channel to communicate on another agency on their channel. OWIN will provide statewide coordinated interoperability between all agencies.

[6] Enrolled House Bill 2101
[7] Department of Administrative Services, RFP 20050901, issued September 2, 2005
[8] Department of Administrative Services, RFP 20050901, issued September 2, 2005

This interoperability can be provided across agency channels, and provide communications with local, tribal, and federal agencies who may choose not to participate with OWIN.

- Currently many agencies must rely on multiple radios for routine communications. Often multiple radios must be used to provide sufficient coverage or to enable interoperability. OWIN will allow a single radio to provide the needed coverage and complete interoperability.

- Oregon State agencies do not have any system to provide mobile data services. Mobile data, not previously available to state agencies, has become a necessity for pubic safety and public service. The lack of mobile data services has a significant impact on the effectiveness and efficiency of the field force. OWIN will provide mobile data service statewide for any agency desiring service. In addition, OWIN will provide high speed data services in key areas of the state.

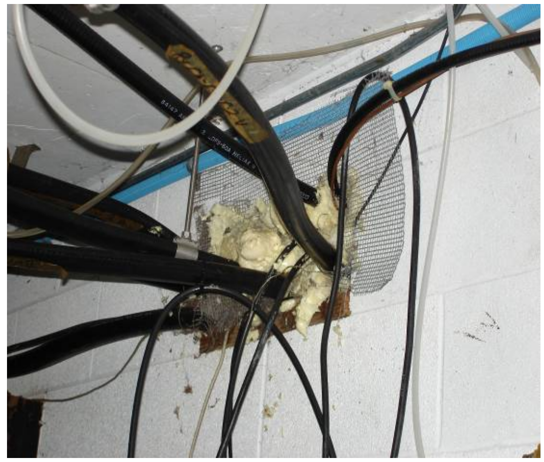
- As many of the radio towers in the State of Oregon cannot be maintained because of the lack of safety provisions required to climb the towers, they need to be modified or replaced. This issue is a matter of unacceptable risk for both the maintenance staff as well as the liability this causes the State of Oregon. Additionally, as OWIN will be migrating to narrowband

Aging tower base at Halfway Hill site

Radio antennas on wooden poles at Nicola Mountain site

technology and new, more robust tower requirements will be specified, those towers that are marginally adequate, will be replaced. Based upon our surveys, over 80% of radio towers in the State of Oregon fall within these two requirements, and therefore will need replacement.

- Our surveys indicated that the majority of radio site buildings do not provide an acceptable environment for electronic equipment, and therefore reduce reliability and add to maintenance costs. OWIN will construct facilities that provide the optimum environment for system operation and longevity, reducing system failures and increasing the states return on the investment in OWIN.



Cable entrance at Baldy Butte site

- Although the state does maintain back up power systems, many of them are in need of replacement or significant repair. Additionally as OWIN is deployed, there will be a need for additional backup system capacity to provide more power than is available at this time. Based upon our surveys less than 6% of the existing radio sites have appropriate back up power systems, either because they are in need of repair or upgrade. This is an unacceptable risk for public safety radio system operations. OWIN will implement reliable, redundant power systems at all sites, reducing downtime and assuring system usability during critical emergencies.

Aging generator at Baldy Butte site

Aging generator at Wallace Butte site

New York City, NY – The Events of September 11 (2001)
As police and firefighters swarmed the buildings searching for survivors, incident commanders outside heard warnings from helicopters circling the scene from above that the towers were beginning to glow and were dangerously close to collapse. Effective radio communications were a lifeline for the hundreds of police officers who received the word to evacuate the building—all but 60 police officers escaped with their lives. Tragically, hundreds of New York firefighters didn't receive that warning—because they were using a different radio communications system. Totally unaware of the impending collapse, at least 121 firefighters, most within striking distance of safety, died, as documented in The New York Times. A report from the University of New Hampshire-based ATLAS Project stated: "From numerous interviews gathered as part of a fire department inquiry into the events of September 11th, it would appear that non-interoperability was at least partially responsible for the loss of 343 firefighters at the World Trade Center."

Why Can't We Talk? Working Together To Bridge the Communication Gap To Save Lives, February 2003. http://www.ojp.usdoj.gov/nij/topics/commtech/ntfi/publications.htm

Furthermore, the FCC narrowbanding prevents the manufacture or purchase of wideband equipment after January 1, 2008. This means that in less than one year, many public safety radio systems across the country—including most of Oregon's state won't be able to replace any broken wideband equipment, or grow existing systems with new wideband equipment.

Over 80% of local government radio system owners responding to "Oregon's Interoperability Inventory and Analysis" in 2005 reported that they operate on radio frequencies below 512 MHz[9]. All of these systems face narrowbanding compliance and interoperability challenges.

By January 1, 2013, Oregon, along with all other users of wideband frequencies below 512 MHz, will have to re-design and convert all radio systems to narrowband operation. Because replacement or modernization of a radio system of this scope takes at least six years from concept approval to completion, and construction of a new system must occur while existing systems still operate, the state has no time to lose in determining its course of action.

It is clear that the State of Oregon has a unique opportunity to leverage a necessary investment for the benefit of many. Seizing this opportunity to address interoperability at the same time as the narrowbanding order will not only improve safety communications and response among state agencies, but among other jurisdictions as well.

Designing a system with the capacity and coverage to serve other non-state agency radio users would dramatically improve communications interoperability statewide. It may also provide a modern public safety radio infrastructure to many

[9] "Public Safety Communications Interoperability: Inventory and Analysis," Sparling Inc., NetCity Inc. and Stevens Institute of Technology, January 2005.

Oregon communities that could not afford to make a similar investment on their own.

3 Development and Comparison of Viable Alternatives

Many different radio services use frequencies allocated by the FCC. These include everything from television broadcasting stations to Doppler radar. This section of this report outlines various radio technologies and the method used to determine the optimum conceptual radio system design for the state.

This section begins with a basic description of land mobile radio (LMR), which is the radio service authorized to use public safety radio frequencies licensed by the FCC. LMR systems comply with a myriad of technical and operational rules designed to prevent radio interference. This section of the document compares public safety LMR to other types of services and describes the advantages of LMR for providing coverage capacity, mobility, and reliability to public safety personnel.

Also discussed are the emerging potential for services like Wi-Fi, cellular and satellite to provide enhanced communication capability, as well as the limitations of these commercial services in the public safety context.

This section of the report also addresses the user requirements that define the relevant dimensions of radio system design (capacity, coverage, reliability, and interoperability). For each of these dimensions, ***FE*** incorporated OWIN's defined levels of performance. The design alternatives recommended by ***FE*** meet or exceed each of the levels required by OWIN.

3.1 Public Safety Land Mobile Radio vs. Other Technologies

Land mobile radio (LMR) is a technology that has matured over several decades. There are three main categories or "pools" of LMR users: military, business/industrial, and public safety. Dedicated spectrum bands are allocated to each pool, and can be licensed only to qualified licensees in the category.

Military uses of LMR systems include combat, aeronautical, ship-to-shore, experimental and policing. Business and industrial uses include communications in manufacturing, security, business operations, transportation and transit, utility systems and other uses. Public safety uses include communications between first responders from multiple agencies for day-to-day situations, task-force situations and emergency or disaster communications.

The FCC governs both the technologies that can be used on LMR licensed frequencies, and the frequency allocations for public safety and business/industrial users. The National Telecommunications and Information

Administration (NTIA) controls Department of Defense and other federal uses of spectrum.

Most often, advances in the LMR industry come from research first developed for the Department of Defense. Land mobile systems for public safety have benefited from years of research and development by the military, and deploy advances pioneered by the military. Some of these advances include encryption, system security, hardened radio equipment, etc.

Over the past decade, advances have also occurred in other types of technologies that use radio frequencies, including cellular, satellite, and wireless data services. These technological developments, in concert with new spectrum policy at the FCC, have allowed a robust industry to emerge and serve a growing consumer and business market. Mobile communications such as high speed data, Internet service, and mobile telephones all use radio spectrum, but in a different way than LMR.

These technologies are spreading, in varying degrees, throughout the country and offer increasingly advanced services and choices to consumers. Although public safety often uses these technologies, they augment —instead of replace— dedicated LMR systems. There are many reasons why dedicated LMR continues to be required in the military, public safety, and business/industrial markets, even though commercial services may seem similar enough to offer an alternative.

3.1.1 Coverage, Capacity, Mobility and Reliability

Commercial services are designed and optimized for consumer use and market conditions. Choices are plentiful and coverage is broad where there are more subscribers (and more revenues), but service can be non-existent where there are fewer subscribers. System economics drive the provider's infrastructure investments, and are optimized for shareholder returns, not for emergency response capability. Back-up power, extra capacity, encryption, system security, maintenance and reliability are all necessities of emergency and public safety communication. Today, commercial services do not approach the level of coverage and instant access required to meet those public safety necessities, and do not provide a reliable, uninterrupted coverage area for wide-ranging field staff and responders.

3.1.2 Control and Cost

Despite the press and marketing efforts of service providers in the wake of Hurricane Katrina and 9/11, there is no commercially available "equivalent-to-public safety" communications system. The fact is that commercial cellular, satellite and Wi-Fi markets do not offer service uniformly across the geographical area that public safety must serve. There are population centers where competition produces robust services at reasonable prices. However, a short distance away, the same service is often not available simply because it is not commercially, economically viable.

A state government would need a dedicated commercial network that could guarantee uniform coverage, pricing, and quality of service across the whole state, regardless of the company's cost to serve each market. The network provided for public safety use would have to be interference free, and protected from coverage gaps, congestion, dropped calls, lack of signal, and all of the other problems that today's commercial network users experience routinely. Such a commercial service offering does not exist today in Oregon. However, the OWIN conceptual design can, where available,, integrate commercial wireless and wire line/optical fiber capabilities to supplement its core services.

3.1.3 System Use and Interoperability

Capacity and other resources are used very differently in military, business/industrial, and public safety radio architectures than they are in cellular and Wi-Fi architectures for the general public. Commercial cellular and Wi-Fi services are designed for one-to-one consumer contacts, over cellular phones or an individual's Internet connection. This is fundamentally different from a public safety system, which connects groups of first responders to their dispatchers and incident commanders.

End user equipment (the actual phones) use different standards, and have features tailored to everyday citizens. Consumer phones and Wi-Fi cards are not interoperable with public safety radios, and are not compatible with public safety radio standards.

Most critically, commercial networks and devices are not secure. They are vulnerable to call-blocking, denial of service attacks, and interference. Wi-Fi radio networks operate on non-licensed radio frequencies, where users have no protection from interference, and have no legal recourse against intentional or unintentional interference.

3.2 Emerging Uses for Cellular, Satellite and Wi-Fi: Non mission critical vs. mission critical communications

Although these technologies are not a suitable substitute for mission critical public safety radio communications, and cannot be used to replace the state's LMR systems by 2013, they do offer ancillary and expanded communications options. Much emerging demand for communications capability falls into the non-mission critical category, and is potentially well served by commercial services.

However, mission critical communication, such as voice in first response events, must use the most reliable, most robust systems possible. (See Figure 4.2.0 below for a comparison of coverage characteristics of alternative technologies.) Public safety radio and data messages are often matters of life and death and therefore require a public safety grade LMR system, where reliability, control, and capability are maximized for first responder requirements.

However, government agencies also operate in non-emergency response mode. This is where commercial services can augment the capabilities of a core public safety system. Many police and fire agencies across the country now use cellular telephones, Wi-Fi and other personal communications devices for non-emergency calls, e-mail and Internet communications. Many also use commercial broadband wireless and wire line technologies as backup or redundant services for communications centers, precincts, radio towers, and other non-mobile, high-capacity locations.

The economies of scale to support a core public safety radio system can only be achieved by aggregating the traffic and financial resources of as many state government, local, tribal, and federal users as possible on one platform. There is always a value proposition that dictates the levels of capability vs. expense to build into a public safety LMR system vs. using commercial alternatives. This value proposition is often more difficult for small towns, than it is for big cities. Statewide network requirements are again, very different from both cities and small towns. State agencies require systems that are robust for mobile users over the state's entire geography. In Oregon, that geography spans over 98,000 square miles (land and water).

Other states have considered these same issues. The potential to use cellular, fiber, Wi-Fi, Wi-Max, and other emerging technologies, while of great interest, is for enhancement, not replacement of LMR technology. These technologies are likely to evolve, as technology inevitably develops over wider portions of the state, over the next decade. Their value to enhance the core OWIN conceptual design will continue emerging over time. While this document focuses on the business case for a statewide public safety LMR conceptual design, OWIN, and the SIEC are independently evaluating the potential for other technologies to augment this LMR design.

Table 1 is our analysis of how today's communication technologies work in a range of public safety and first responder environments:

Technology	***LMR***	***Wi-Fi***	***Cellular***	***Satellite***
High rise	**Yes**	**No**	**Yes**	**No**
Underground	**Yes**	**No**	**No**	**No**
Canyon	**Yes**	**No**	**No**	**Limited**
Wilderness	**Yes**	**No**	**No**	**Yes**
Highway	**Yes**	**No**	**Yes**	**Yes**
Riverbed	**Yes**	**No**	**No**	**Yes**
City, Suburb	**Yes**	**Yes**	**Yes**	**Limited**

Table 1 - Coverage Characteristics of Communication Technologies

3.3 Radio System Requirements: Capacity, Coverage, Interoperability, Reliability.

The statewide requirements for a radio system design can be expressed in four dimensions:

- **Capacity** is the amount of communications the system is able to support. Capacity is typically measured at peak usage times (also called "busy hour"). The goal of the system is to provide enough capacity so the probability of a blocked call is low.

- **Coverage** is the distance and density of signal availability from the transmission tower. Good coverage means that both portable (carried by public safety personnel) and mobile (typically installed in vehicles) radios can use the system within the desired service area. Coverage deteriorates as the user moves farther from a tower. Obstacles that block the "line of sight" from the user to the tower, such as buildings, mountains and canyons, can also affect coverage. Typically, portable radios have a much smaller coverage area than mobile radios have because of more inefficient antennas and added losses caused by body shading of antennas.

- **Interoperability** "is the ability of agencies to talk to one another via radio and to exchange voice or data with one another on demand, in real time, when needed." [10]

- **Reliability** is a function of initial design, redundancy, growth, planned maintenance, system management, and operations practices. It is measured by percentage of time the system is available to any user (availability). Public safety service sets the highest standard for reliability at 99.995% availability: that's less than 30 minutes of downtime per year.

Listed below in Table 2 are the OWIN's minimum requirements for system capacity, coverage, interoperability, and reliability. The OWIN Project Team established requirements that alignment with House Bill 2101, and as a result of the "Needs Analysis" (Deliverable 3-D) preformed by ***FE.*** The ***FE*** engineers use these requirements to determine which system designs may be considered as viable alternatives.

[10] "Why Can't We Talk--A Guide for Local Officials, National Task Force on Interoperability", Washington, D.C., 2002.

Radio System Requirement	State of Oregon Threshold
3.3.1 Capacity	**The system must provide enough capacity for the projected number of state users and accommodate user growth at a factor of 8% compounded annually.**
3.3.2 Coverage	**The radio system must provide equivalent or better coverage in all counties of the state to the best current coverage provided by any of the four existing LMR systems. In other words, all agencies must receive coverage that is at least as good, and often better, than the coverage they receive now from their LMR infrastructure.**
3.3.3 Interoperability	**The system must conform to P25 standards, allow for conventional and analog system interconnections, and provide mutual aid channels, at all tower locations, covering all public safety bands, for local government, tribal, federal and state agency interoperability.**
3.3.4 Reliability	**The system must include appropriate redundancy and fall-back operational modes, to insure a public safety grade of service (99.995% accessibility).**

Table 2 - OWIN Public Safety Radio Design Thresholds

3.4 Consolidation vs. separate agency systems

As with most statewide LMR systems developed over the past four decades, the State of Oregon's four LMR systems developed as separate, agency-specific infrastructures. As part of the needs analysis, ***FE*** assessed the feasibility of consolidating all state radio systems and the affect on users.

In June 2006, ***FE*** issued the "Report and Recommendation for System Consolidation." In that report, ***FE*** recommended a *significant consolidation* of the state's radio systems (including those operated by OSP, ODOT, ODF and DOC) into a "system of systems." This system of systems would include seven sub-systems, and is explained in depth in Section 6 of this report.[11]

The recommended consolidation is expected to:

- Improve and normalize the radio **coverage** for all state public safety agencies.

[11] In July of 2006, the Oregon Legislature enacted HB2101 that directed the consolidation of the State's existing radio systems into a single infrastructure.

- Improve and normalize the state's wireless **capacity** to provide public safety agencies with additional capabilities not currently available to them.

- Increase **reliability** and efficiencies by creating a standardized platform that enables shared utilization of resources, planned expansion, and system maintenance and support.

- Enable economies of scale, allow for system expansion and enhance system performance while increasing **interoperability** as more agencies use the system.

4 Assessing Technical Viability of Alternate Designs

Capacity, coverage, reliability, and interoperability will vary depending on the technical design of a radio system. Available technologies that conform to the state's requirements will have four primary design dimensions:

1. public safety frequency band
2. access control (conventional or trunked)
3. signal processing scheme (analog or digital)
4. wide area interconnection

Each dimension has alternatives, as shown in Table 3 below. Each set of alternatives has associated cost, coverage, reliability, and interoperability impacts.

Design Dimension	*Public Safety Licensed Frequency Band*	*Access Control*	*Signal Processing Scheme*	*Wide Area Interconnection*
Alternatives	**VHF**	**Conventional**	**Analog**	**Microwave**
	700 MHz	**Trunked**	**Digital**	**Landline**

Table 3 - Design dimensions of a public safety radio system

4.1.1 Frequency Band: VHF or 700 MHz

Frequency band refers to the spectrum that the radio system will use. System design engineering requires that an optimum set of frequencies (frequency band) be selected based on:

- availability of frequencies in each band,
- propagation characteristics of each band, and
- availability and expense of equipment and radios in each band.

The state requested that ***FE***'s frequency assessment cover the FCC-licensed public safety radio spectrum currently in use by state radio-owning agencies (the VHF band) and the State-Use[12] 700 MHz band.[13]

4.1.2 Access Control: Conventional or Trunked Technology

There are two types of channel access control schemes generally available for public safety LMR systems; conventional or trunked. Conventional or trunked refers to the technology in the system that controls the way a radio accesses a channel when communicating on the system.

A conventional system dedicates a channel (or frequency) to each specific group of users (for instance State Police, transportation users, corrections personnel and forestry personnel would each have a group of dedicated channels).

A trunked system pools all the licensed frequencies, and serves the next available frequency to the next user that "keys up" to transmit. A computer and software keeps track of specific groups of users. "Talk groups" are programmed into the radio system to segment the groups into virtual channels. Trunked radio systems make more efficient use of a limited number of channels.

4.1.3 Signal Processing Scheme: Analog or Digital Technology

Analog or digital refers to the technological method of signal processing. An **analog** signal is a variable signal continuous in both time and amplitude. **Digital** signals are transmitted as data streams, or discrete bits. Digital transmissions also require less bandwidth and are more efficient in terms of radio spectrum use. Analog systems are an older audio technology, and are in use by the state and many other jurisdictions today. Digital signals tend to process voice transmissions better than the older analog systems.

4.1.4 Wide Area Interconnection: Microwave or Landline Technology

The wide area interconnection links all transmitter locations to control systems and dispatch systems. Often referred to as a “backbone network," this infrastructure is the "spine" and "nervous system" of a mobile radio system.

There is debate within the public safety community regarding the use of microwave technology vs. wireline networks (such as optical fiber, copper, hybrid fiber/coax, etc) or broadband wireless (WiFi, WiMax, etc.) for the backbone network. The quality of service of all of these options can be comparable if proper installation and maintenance routines are followed. Similarly, the reliability of these options can also be comparable if proper design and

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[12] The 700 MHz public safety frequency band has capacity set aside for use by the state, and other channels which can be licensed for general use.

[13] See *FE* Deliverables 4-C Tower Usability Assessment -Site Usability, Frequency Analysis Report, Deliverable 5-A and Frequency Selection Report: Deliverable 7-A, 7-B.

engineering is performed. However, most public safety organizations typically prefer microwave due to the control that they have over the operations, rather than depending on service providers or others for maintenance and repair.

Microwave technology was used for the conceptual design primarily because it can be designed and cost estimates developed as a standalone system. The use of microwave is typically in many public safety networks because of predictable costs and the ability to manage the service levels with minimal dependence on non-state entities. In many cases, installing wireline networks with the required bandwidth and grade of service is extremely expensive especially at mountaintops where many antenna systems are located. Additionally, as microwave systems are usually owned and operated by public safety, their maintenance and repair are provided by agencies that depend upon them for their lifelines.

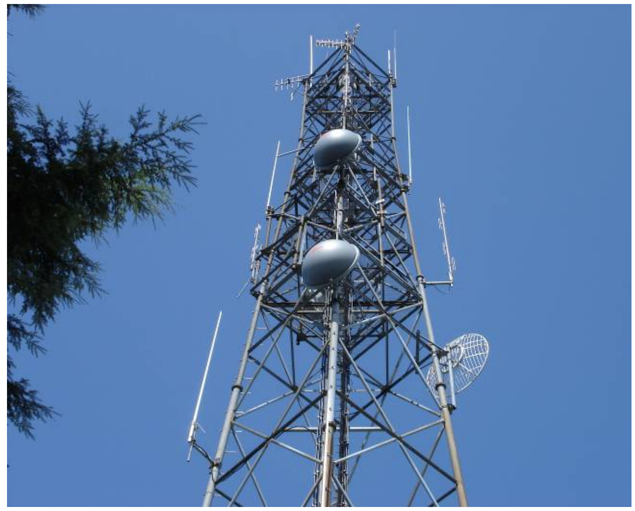
As the detailed design of the system is developed, the state should consider the use of wireline networks where it is economically feasible, through leasing arrangements, ownership by the State or local entities, or through public/private partnerships. In those cases it is possible that a wireline technology will serve the purposes of public safety well and the use of this transport is a good alternative to microwave technology. The specific determination of if and when wireline technology would be used will be made during the detailed design of this project. For the purposes of this report, we will assume that key linkages between mountaintops will be provided via state owned and operated microwave facilities.

4.1.5 The need for useable towers and equipment shelters

As discussed earlier, the large majority of the towers and equipment shelters that are currently used by the state are in dire need of improvement, not just to support the proposed OWIN system but to avoid catastrophic damage and loss of the current systems. The investment in these elements will be needed just to support today's radio systems.

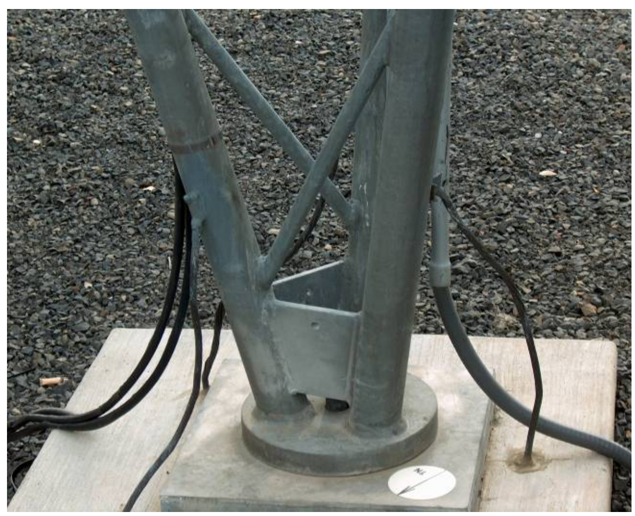
A secured, modern generator at Mt Whitmore

Reliable long term public safety communications occurs when all elements of the communications system from the ground grid to the antennas on the top of the tower are designed, installed and maintained to critical infrastructure specifications and practices. Equipment that is poorly installed or is aged beyond its useful life results in frequent soft failures which reduce the performance of the equipment and an increased incidence of hard failures which reduce the overall reliability of the communications system.



A well-constructed, high-capacity tower at the Table Mountain site

Quality installation and maintenance results in each element in the communication system being able to operate at its opium. With each element in the communications system performing at its best one element can suffer significant degradation before the entire system fails to function. Where installation and maintenance are compromised due to age or poor practices, each element in the system is operating in a somewhat degraded condition. Only minor changes in the performance of one element will cause the entire system to slide into soft or hard failure.



A well-grounded, well-constructed tower base at the Whitmore Rd. site

Sites with towers, equipment shelters, grounding systems, microwave backhaul, AC and DC power systems designed to support public safety communications survive most natural disasters with minimum or no damage and can be quickly restored to service if the site does suffer some damage. One of the lessons learned in Hurricane Katrina was the communications sites constructed to the standards established for OWIN survived and were able to support public safety communications when most other commercial communications including land lines and cell phones were out of service for weeks or months. Public safety communications facilities not constructed to these standards were out of commission until reconstructed weeks after the event.

4.2 Relative Benefits of Alternative Designs

In order to provide a recommendation to the state on system architecture, ***FE*** completed several detailed work products to define the state's present radio communication needs and what they are expected to be in the future.

In the documents listed below, ***FE*** addressed the technical requirements of state agency users and potential local, federal and tribal users. ***FE's*** detailed deliverables include:

- Operational and Systems Needs Analysis, Deliverable 3-D
- Operational and Interoperability Requirements Analysis Deliverable 3-D
- Analysis of Existing Radio Coverage Deliverable 5-B
- Microwave Propagation, Transmission, and Availability Goals for the Future State of Oregon Microwave Network, Deliverable 6-E
- Report and Recommendation for System Consolidation Deliverable 9-B
- Gap Analysis (included in Deliverable 9-C)
- An Overview of Selected Technology Issues(Deliverable 9-A)
- Frequency Selection Report (Deliverable 7A-B)
- OWIN Conceptual Radio Design (Deliverable 9-D)
- OWIN Conceptual Microwave Design (Deliverable 8-B)
- OWIN Implementation Plan (Deliverable 13-A)

In assessing the relative merits of alternative design configurations, ***FE*** sought to balance the following potential benefits:

- Improved statewide coverage for all state radio owning agencies
- Decreased operator complexity
- Improved reliability for each radio owning agency
- Improved reliability of the backbone network
- Improvements in the quality of the system's technical operation, (signal and voice quality, etc
- Improvements in the service level of the system's operation, (availability, etc.)
- Improved system functionality and capabilities, including mutual aid and mobile data
- Improved interoperability with other state, tribal, federal, and local government agencies
- Re-use of existing tower assets: to minimize cost of additional tower development or improvement
- Compatibility with existing and emerging public safety radio standards, known as the P25 standard [14]

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[14] P-25 Standards are discussed in more detail in FE's "Overview of Selected Technology Issues: Deliverable 9-A", June 8, 2006. The goal of P25 standard development is to allow radios from different manufacturers to interoperate over any public safety radio system, and to improve operating efficiency of radio networks. Implementation of the P25 standard is viewed as a way to prevent public safety radio users from being forced to rely on a single vendor for all future

- Viability of alternatives within "system-of-systems" approach
- Ability to "phase-in" the system while ensuring continuity of services

The following sections summarize the findings on conceptual design alternatives and the preferred design dimensions for the state's consolidated public safety radio system.

5 OWIN Conceptual Design

The OWIN system will be a combination of "sub-systems" designed to operate in an integrated architecture. The lines between sub-systems are not sharp, and will vary depending on whether the particular discussion is more functional, more operational, or more technical.

For this discussion, the OWIN conceptual design is composed of seven sub-systems which perform in three broad task categories: mobile data services, interoperability functions, and statewide voice and dispatch.

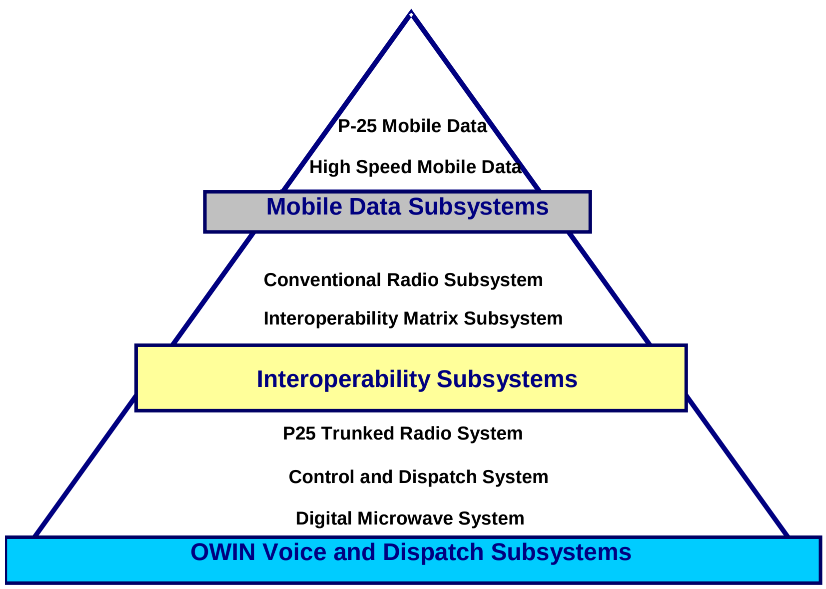

Figure 1 - OWIN System of Systems Architecture: Seven Subsystems

5.1 Recommendation: Trunked, Digital, Project 25 design

The recommended OWIN network conceptual design is a trunked, digital, Project 25 design that can support interfaces to other technologies, including local, tribal, and federal conventional and analog systems.

As explained in the ***FE*** "Conceptual Radio Design" report, this system-of-systems approach will allow state agencies to:

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equipment purchases and system upgrades, by preventing the implementation of proprietary (one-vendor only) systems. In addition, P25 standard development assures a graceful migration to succeeding generations of technology as more capacity and functionality are required.

- Operate on a unified digital trunked system while supporting conventional operation where and when required.
- Continue to utilize conventional radio communications when required to communicate with agencies outside the OWIN system.
- Utilize a dual frequency band solution, employing the public safety VHF and 700 MHz bands.
- Utilize interoperability channels in all public safety bands ensuring that all first responders in the state will have the ability to use the OWIN infrastructure for mutual aid, and disaster communications.
- Incorporate a wide area digital microwave backbone to ensure full statewide connectivity from any location.
- Incorporate high and low speed data systems for mobile data applications.

5.1.1 Benefits of VHF/700 MHz Hybrid Frequency Selection

FE determined that the most appropriate frequency band selection for a statewide radio system in Oregon is a hybrid solution using both the VHF and 700 MHz bands. This hybrid approach has several advantages for the state:

- It provides a high level of interoperability with local jurisdictions' existing public safety radio systems. Where local radio infrastructure is primarily VHF, the state will provide VHF coverage, and where local radio infrastructure is primarily 800MHz, the state will provide 700 MHz coverage.[15]
- The hybrid approach takes advantage of the coverage characteristics of each band. It will deploy the VHF band in the lightly-populated, rural and most remote regions of the state, where the radio signals must travel long distances. It will also deploy the 700 MHz band in the more developed and more populous regions of the state where more towers exist, and more frequency re-use is necessary.
- The hybrid design overcomes the fact that there are not enough licensable VHF frequencies to provide the required level of radio coverage without unacceptable signal interference.
- The hybrid design eliminates the significant cost of constructing enough additional transmission towers to blanket the entire state (especially the rural and wilderness sections of the state) with signal in the 700 MHz frequency range.

[15] Most 800 MHz radios can also tune 700 MHz channels

FE conducted a thorough analysis of channel plan options within both licensed bands (see “Frequency Analysis Report, Deliverable 7-A” and “Frequency Selection Report, Deliverable 7-B”). During the engineering of the “Frequency Analysis Report,” ***FE*** determined that neither a uniformly VHF, nor uniformly 700 MHz approach could be successfully implemented for the OWIN conceptual system design.

A statewide 700 MHz system was eliminated because it would require an excessive number of radio sites to provide statewide coverage.[16] The prohibitive costs of building hundreds of additional towers, and the significant risk that sites might be impossible to acquire and deploy during the implementation time period, eliminated a statewide 700 MHz design from consideration.

FE then turned to a concerted effort to develop a statewide VHF frequency plan. After a complete study of the VHF band use and coverage characteristics, ***FE*** found that the VHF band alone would not meet the state’s coverage and capacity requirements. There are not enough frequencies available to achieve the required level of coverage. Moreover, ***FE’s*** analysis indicated that the re-use of VHF frequencies would introduce unacceptable levels of interference into the design.

FE redirected the project efforts towards the development of a hybrid system using both VHF and 700 MHz. The hybrid design overcame most capacity, cost and coverage limitations associated with the exclusive use of one band. Overall, it provided the best fit to meet capacity, coverage, reliability, and interoperability requirements. This hybrid design is expected to provide the best opportunity for Oregon to implement OWIN successfully.

The ***FE*** conceptual design segments the state into three service regions: two VHF regions and one 700MHz region. The VHF-East region encompasses the area east of the ridge of the Cascades to the Oregon-Idaho state line. The VHF-West region encompasses all areas west of the ridge of the Coast range to the coast. The third region is the 700 MHz region, covering the counties in the I-5 corridor, and Deschutes County. Deschutes was included in the 700 MHz region because the conceptual design will be most compatible with the existing Deschutes County 800 MHz system[17].

5.1.2 Benefits of trunking vs. conventional system design

FE recommends that the conceptual design employ trunking as the access control technology. The major benefits of trunking over conventional designs are:[18]

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[16] ***FE’s*** propagation analysis suggested that at least three times as many radio sites would be needed to achieve the necessary coverage statewide.

[17] The 700 MHz band is contiguous with the 800 MHz band, and manufacturers of LMR equipment provide dual band radios for 700-800 MHz use.

[18] Information in this section is summarized from ***FE's*** "Overview of Selected Technology Issues."

- spectrum efficiency—the ability to serve many more users on fewer frequencies,
- seamless roaming—the ability to provide continuous coverage for mobile users, and
- superior "virtual private radio" calling for several groups of users sharing the same radio infrastructure.

Trunked radio systems are more spectrum-efficient than conventional designs, especially for multi-agency large public safety systems. They have a higher system capacity (usable channel space) for a given number of frequencies.

Additionally, trunked systems enable many agencies to share a radio system while maintaining privacy among the groups. Instead of segmenting agencies or user groups by channel, a trunked system allocates "talk groups." Talk groups communicate on their own "virtual private" channels.

Perhaps most importantly, though trunked systems are generally more expensive to implement than conventional systems, only trunked systems can accommodate growth in the overall number of users, and discrete groups of users can be easily established. The OWIN conceptual design anticipates this growth..

For systems designed to serve multiple agencies over a large area, where there is a need for access to different dispatch centers, trunking is an essential design element. It will provide both the seamless roaming needed by users and the virtual private channels to segment user groups most efficiently, while using less radio spectrum. This efficiency is extremely important in the OWIN conceptual design, where frequency availability is a critical constraint.

5.1.3 Benefits of digital over analog designs

FE concluded through their analysis that digital communications systems would provide many advantages to the state over analog communications systems[19]. One advantage of digital LMR systems is improved audio quality of voice communications. Digital voice quality is much clearer and more consistent throughout the coverage area.

Digital signal processing provides more accurate signal replication at the receiver than analog processing. Voice quality is more than the difference between a call that sounds good or bad. It directly affects reliability and capacity of a radio system. Inadequate voice quality causes users to repeat critical information, tying up communication channels for longer periods. This in turn reduces the capacity of the communication system and the overall effectiveness of those using it.

[19] Information in this section is summarized from more detailed information provided in ***FE's*** "Overview of Selected Technology Issues".

Digital signaling also provides special features tailored to individuals or groups of radios on the system. Many radios can provide an emergency button that could be used to summons a response when a public safety official is in need of assistance. This lifeline can provide immediate assistance to those who are hurt or injured and need immediate assistance. The radio identification (ID) of a transmitting digital radio can be displayed on the receiving digital radio. This is somewhat analogous to caller ID on a telephone. Some of these advanced call types include selective radio-to-radio calling and multi-group calling. System users and operators have increased flexibility to provide a wide range of communications options that promote interoperability.

Priority access capabilities are another feature of digital trunked systems. Digital controllers rank traffic as it enters the network. When excess traffic on a trunked system ties up all the channels, the controller can give higher priority traffic first access to the next available channel. Radio priorities are usually fixed system parameters, but a trunked system allows priority status to be assigned to individual users. This ensures that high-priority users (such as incident commanders) get preferential service and faster access time.

Another very significant advantage of using digital technology is that a single system can transmit both voice and data. Finally, because digital encryption uses superior encryption algorithms, digital systems also provide enhanced voice transmission security.

Digital P25 standard: Digital LMR systems will be P25 compatible, in compliance with national public safety radio equipment compatibility and interoperability standards. The P25 standard refers to a series of standards developed by and for public safety radio users. All radios manufactured to these standards are guaranteed to receive and transmit with each other when on the same frequency. This is a huge step forward for the LMR industry, which has historically built radio systems based upon vendor-specific proprietary designs. These older, vendor specific designs contributed to the problems that we see in Oregon today, when radios manufactured by one company cannot communicate on systems manufactured by another.

A key advantage to the P25 standard is its backward compatibility. The P25 strategy allows both forward migrations to future generations of digital narrowband technology as well as backward compatibility with analog narrowband and wideband radio channels. This feature will allow the state to interoperate with those using older equipment until all radios in the field are upgraded. In addition, because P25 systems encourage interchangeability among several vendors, the state should benefit from a more competitive equipment marketplace and from continued development of new features.

FE reviewed project plans for many state agencies throughout the United States. Based upon our findings we learned that many large-scale P25 systems are now in use, including state government systems for Alaska, Michigan, Wyoming, Montana, Virginia and New Hampshire. Municipalities including Phoenix-Mesa, Arizona; Omaha, Nebraska; and Los Angeles, California are also using P25 systems. Additionally, many states have adopted P25 as their standard for radio interoperability, including Alaska, Colorado, Connecticut, Delaware, Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, New Hampshire, South Carolina, Ohio, South Dakota, Utah, Wisconsin, and Washington.

5.1.4 Benefits of a digital microwave backbone network:

The radio system conceptual design includes a proposed digital microwave backbone network.[20] This network provides the vital transport link between mobile radio base stations located in towers, and mobile radio controllers located at central network control centers. It enables wide area trunking, radio roaming, and bridging between local, federal, and tribal public safety radio systems and the state's OWIN system.

The backbone network is a key interoperability resource. It implements the "system-of-systems" radio design concept for physical communications facilities, supports mobile data capabilities of radio users, and can provide broadband wireless connectivity between dispatch centers and other key locations statewide. These circuits enable real time communications for first responders. The reliability and availability of the backhaul circuits that connect different communications locations are vital to the success of OWIN and are shown in Figure 2 below.

[20] The information in this section is summarized from ***FE's*** "Conceptual Microwave Design Report."

Figure 2 - Proposed OWIN Digital Microwave Backbone Design

Microwave radio lends itself well to the hilltop connectivity requirements of a mobile radio network. Microwave radio equipment and routes are readily available at predictable costs whereas the availability and pricing of optical fiber and other wireline technologies are difficult to estimate until the final detailed network design is completed during the procurement phase of the project. In many cases, since the OWIN sites are in remote, mountaintop areas, thee are no other viable customers for wireline services which may cause OWIN to bear the full cost of construction and maintenance, which could be very high. Digital microwave radio is scalable and would typically be managed by the state, simplifying maintenance and repair compared to situations where service providers may be responsible for those functions. As mentioned earlier, this is an area of discussion for almost all large-scale systems. There are strong feelings within most public safety organizations regarding the need to have full control over all aspects of the network. However, there are radio systems that service both public safety as well as critical utilities such as power companies where both microwave and wireline technologies, particularly optical fiber, are used successfully.

Additionally, there are some mobile radio technologies, which have technical requirements more stringent than those most commonly used by the public switched network. The final detailed design is where the ultimate decisions will be made regarding the use of microwave and/or wireline technologies

After considering all of the options to provide circuit connectivity, OWIN selected digital microwave for its backhaul system. As outlined previously, during the detailed design phase, the successful bidder may consider the use of optical fiber or wire lines for selected routes. The recommended microwave solution uses four redundant microwave radio rings for a reliable and robust public safety wireless infrastructure. Construction of the microwave backbone will be in phases and parallel with the deployment of the mobile radio system.

5.2 Implementation approach/plan

The OWIN radio system conceptual design is based on a four-phase completion schedule over six years. As illustrated in Table 5 below, the implementation plan calls for the OWIN radio system to be constructed in three construction phases, preceded by a detailed design phase.

Phase "Zero" is the planning, vendor selection and detailed design phase. It also includes the implementation of some critical portions of the building/tower infrastructure and of the microwave backbone system. ***FE*** has chosen to refer to this planning phase as phase "zero" because it must be completed before OWIN radio system construction can begin.

Phase 1 is the construction of the eastern section of OWIN (east of the Cascade Mountains).

Phase 2 is the construction of OWIN in southern Oregon.

Phase 3 is the construction of OWIN in northwest Oregon.

Phase 0	Phase 1	Phase 2	Phase 3
Year 1	Year 2	Year 3-4	Year 5-6
Detailed design, vendor selection	Construct eastern section	Construct southern section	Construct northwest section

Time →

Table 5 - OWIN Phases

Subsequent to request for proposal (RFP) award and contract execution, the selected vendor will determine the final, detailed approach to each project phase. Each phase should include the microwave system, buildings and towers, and the radio system, so that each geographical area becomes completely operable at the end of the phase. Subscribers should be loaded into the system as each phase is completed and the service activated. Figure 3 below provides a geographic representation of radio sites that will be completed in each of three construction phases.

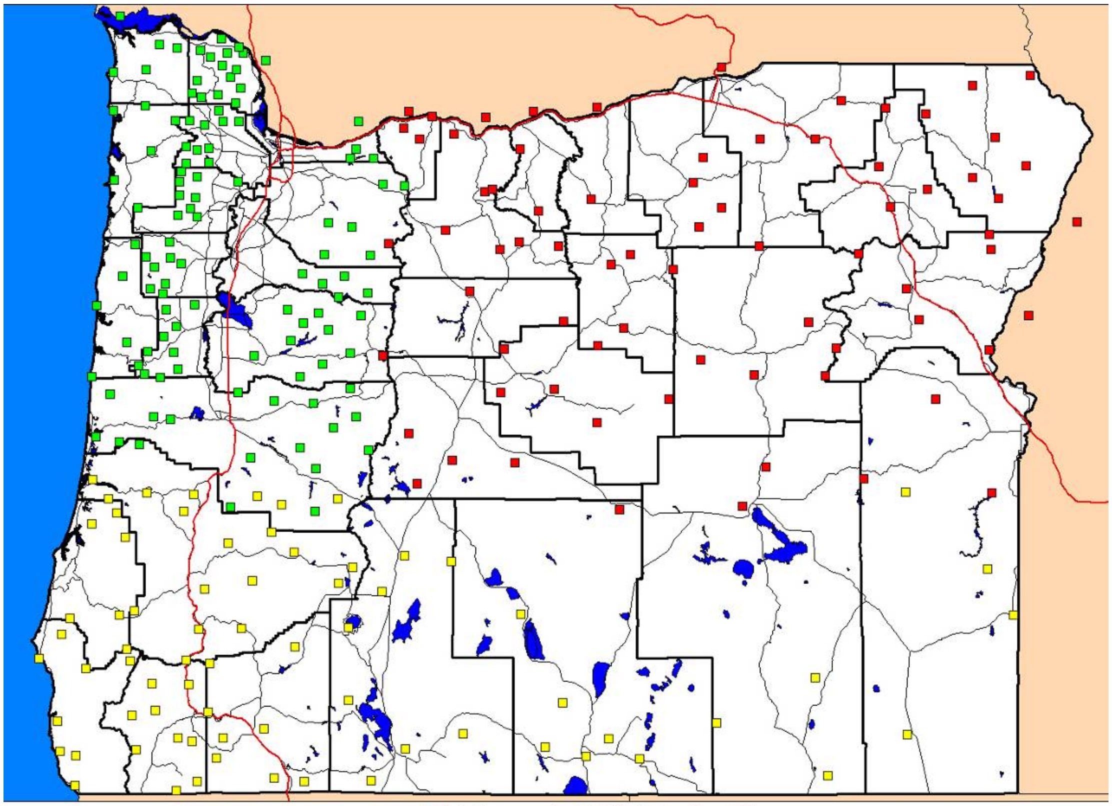

Figure 3 - Radio Sites by OWIN Construction Phase

6 Lifecycle cost estimates

When determining the lifecycle costs for OWIN, we include the one-time investments that the state will be required to make and the operational and maintenance costs that OWIN will incur during implementation. Additionally, we have estimated ongoing operational and maintenance costs associated with OWIN for years 6-10 of this project; these costs are shown as a percentage of the total cost of subscriber equipment and overall infrastructure.

FE conducted the cost estimating process in two phases. In the initial phase, ***FE*** used the required design requirements discussed in Section 4.4 of this report, and the broad assumptions given by OWIN and the SIEC about future growth and excess capacity. These requirements and assumptions were used to create an optimum OWIN conceptual design.

In the second cost estimating phase, ***FE*** in consultation with the SWIIG, created a leaner OWIN conceptual design based on value engineering principles. The value engineering process allowed ***FE*** to refine the design so that OWIN would not lose any capacity or usability for state agencies. Rather, the value engineering process creates a more detailed conceptual design, and offers a scaleable system that is more economical at its inception, and is expandable as funds become available or user need arises.

This section describes costs associated with both the optimum public safety radio system, as well as the recommended value-engineered OWIN system.

6.1 Cost estimate: Optimum System

Based upon the original requirements for OWIN, ***FE*** estimates that the optimum public safety radio system for the State of Oregon would cost approximately $906 Million over three biennia. This figure includes the cost of fully funding all seven sub-systems, land acquisition, licensing expenses, vendor services, spares, maintenance costs, and staffing for six years.

The optimum OWIN system conceptual design priced above meets the radio system minimum requirements discussed in Section 4.4. These requirements set specific targets for capacity, coverage, reliability, interoperability, and infrastructure that the ***FE*** design and engineering team used to develop the conceptual design.

The SWIIG and the OWIN team set the requirements at levels that would dramatically improve the coverage and reliability of radio infrastructure owned by the state, allow for capacity growth, and offer expansive interoperability to local jurisdictions, tribal governments, and federal users. The OWIN conceptual design process included all requirements to comply with HB 2101. The design is compliant with narrowbanding requirements and creates a design that will dramatically improve the state's critical radio infrastructure. The design gives state agencies reliable and interoperable voice and data services to all first responder entities who wish to participate in the OWIN system.

The ***FE*** estimate of $906 Million is substantially higher than the preliminary "working" estimate of $511 Million that was used as a placeholder or "rough order of magnitude" discussion figure prior to the ***FE*** design work. After ***FE*** estimated costs for the required optimum system conceptual design, the OWIN Project team and the SWIIG asked ***FE*** to value engineer the design for a smaller up-front state investment without compromising coverage or capacity for state agencies. The "value engineered" design also had to allow scalability so optimum threshold levels for capacity, reliability, local government participation, and interoperability could be met gradually over time.

Each specific requirement affects the capital cost of the system. In general, reducing the requirements for each requirement can reduce system development and operation costs. If such reductions are made with care, negative impacts on system capabilities, performance, and user experience can be minimized.

6.2 Cost estimate: Value Engineering

As requested, ***FE*** modified the OWIN conceptual design in several areas. The goal was to value engineer the optimum design, using additional assumptions as explained below. These changes reduce initial construction and operations costs, without preventing future upgrade and migration to the optimum design.

Value engineering modifications include:

- The high-speed data network will initially be built in the region served by 700 MHz voice channels (I-5 corridor and Deschutes County).

- The interoperability channels will be available at 110 tower locations instead of all locations. At each location, the number of interoperability channels selected would support the local interoperability requirements. In general the channels have been reduced from 17 to five (two VHF, two 800 MHz, one UHF). This will still provide interoperability coverage throughout the state on all bands, but capacity will be limited.

- The number of trunked control centers is reduced from four to two. Two trunked control centers will still provide redundancy and back-up in case of a failure, but not the level initially specified.

- Digital microwave loop routing was optimized to eliminate six microwave sites. In this case, reducing the number of microwave sites should not affect system performance or reliability. However, it could affect future growth capacity.

- The number of terminal sites is reduced by 20, thereby reducing the need for OWIN to support underused radio sites. This could complicate the transition to OWIN, however, it is not insurmountable.

- Tower height and loading criteria were reduced from "core" site specifications for spur routes. This should not affect system performance or reliability, unless expansion from the spurs is necessary in the future.

- Building specifications and spur route antenna specifications were modified to reflect the less stringent requirements for spur routes in comparison to core sites. This will not affect system performance or reliability.

- The broadband capacity of the digital microwave backbone on spur routes was lowered from DS3 (45 Mbps) to 4-16 DS1s (6-24 Mbps) on 200 paths. There should be no affect on system performance unless radio traffic at spur route towers increases significantly. At that time, affected routes could be upgraded.

- The value engineering design assumes that towers that would have been co-located or near Integrated Wireless Network (IWN), and Columbia River Inter-Tribal Fishery Enforcement (CRITFE) sites can be eliminated, and that OWIN will be able to gain access to those sites, instead of overbuilding.

- The back-up battery power systems at tower locations were reduced in size to smaller batteries. The smaller batteries will be effective in all situations, but will provide less surplus capacity than the original specification. This reduction could increase the cost of future expansion of the systems at the sites.

The value engineering for OWIN will reduce the OWIN project cost estimate from $906 Million to $665 Million. This figure includes $588 Million for the OWIN system capital costs and $77 Million for operating costs (years 1-6) as shown in Table 6 below.

Category	Estimate
Voice subsystem total	$194,000,000
700 MHz data subsystem total	$20,000,000
Microwave subsystem total	$26,200,000
Site infrastructure subsystem total	$54,300,000
Transportable site subsystem total	$3,150,000
Total licensing	$579,000
Total land and environmental cost	$10,800,000
Vendor services total	$242,000,000
Spares total	$24,700,000
Vendor Contract Total	**$576,000,000**
IV&V, QA, and Program Management	$11,500,000
OWIN System Total	**$588,000,000**
Personnel	$30,100,000
Maintenance and repair estimates[21]	$56,200,000
Maintenance costs offset by internal staff	$(9,200,000)
OWIN Project Total (6 years)	**$665,000,000**

Table 6 - Value Engineered Cost for OWIN Conceptual Design

This reduction will not negatively affect OWIN. Although it is less robust than the optimum public safety radio system, it is certainly adequate for the anticipated needs of the state for the next 10 to 15 years. The conceptual design assumes that future expansion will add value and capacity to OWIN as needed without having to re-build any elements of the system.

The cost breakdown of the $665 Million OWIN project is shown in Figure 4 below. The largest expenditures are for the P25 voice and data network[22] (29%)

[21]Ongoing maintenance and repair costs have been estimated at an annual 6% of original equipment costs for system operation and maintenance, with no maintenance and repair in the first year of equipment life. The staffing level for OWIN is anticipated to be 54 people at full staffing, which will ramp up during the construction phases.

[22] Includes the cost of P25 voice and data infrastructure, control systems, transportable systems and services and spares.

and site infrastructure[23] (29%). The categories below include the costs of equipment and vendor services.[24] In addition to the $588 Million for OWIN system expenses, ***FE*** estimates the operating cost for personnel, maintenance and repairs, during Phases 0-3 to be an additional $77 Million. These operating costs represent twelve percent (12%) of total project costs.

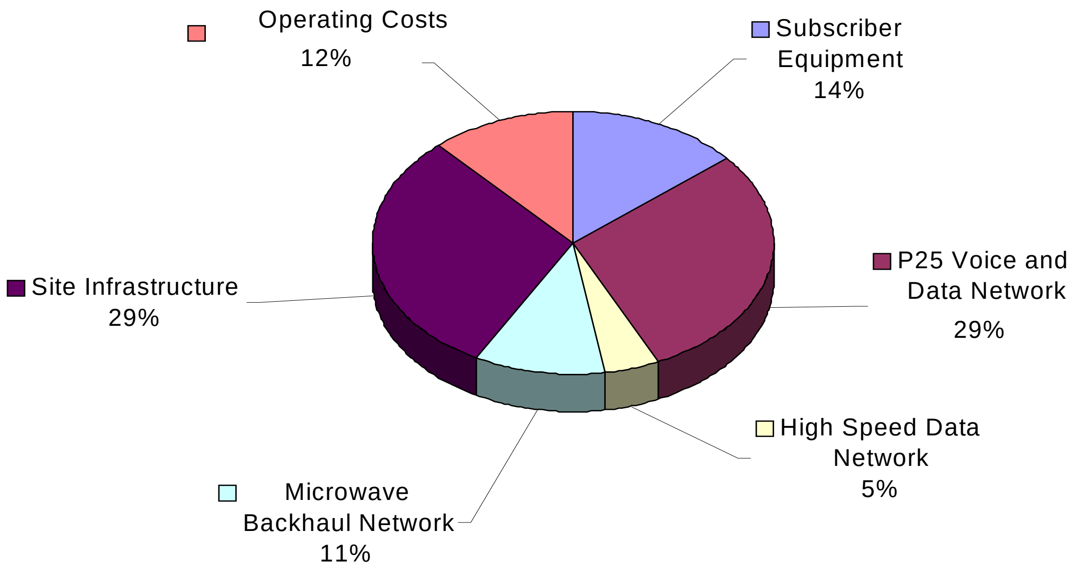

Figure 4 - Breakdown of cost estimates for OWIN system costs

Table 7 below breaks the estimated expenditures of the OWIN project, by phase.

Phase Summary	Timeframe	Capital Costs	Operating Costs	Total Cost[25]
OWIN Phase 0 Total	Year 1	143,000,000	4,000,000	$147,000,000
OWIN Phase 1 Total	Year 2	153,000,000	8,000,000	$161,000,000
OWIN Phase 2 Total	Years 3-4	137,000,000	29,000,000	$166,000,000
OWIN Phase 3 Total	Years 5-6	154,000,000	37,000,000	$191,000,000
OWIN Project Total		**$588,000,000**	**$77,000,000**	**$665,000,000**

Table 7 - OWIN Expenditure by Project Phase

Annual ongoing operations expenses (maintenance, repair, operations, staffing) after the phased construction are estimated in Table 8 below.

[23] Includes the cost of road and site development, towers, battery systems, power systems and security systems.

[24] The vendor contract value for OWIN is estimated to be $576,000,000. Of this amount, 42% is services and 58% is equipment. Services include: design review, trunked group mapping, equipment staging and programming, system integration, installation, optimization, technical training, system acceptance testing, coverage acceptance testing, system documentation, and vendor supplied program management service

[25] Totals are rounded

	Year 7	Year 8	Year 9	Year 10
Personnel (fully loaded)	6,180,000	6,300,000	6,430,000	6,560,000
Maintenance and repair	17,900,000	17,900,000	17,900,000	17,900,000
Maintenance and repair offset[26]	(3,100,000)	(3,100,000)	(3,100,000)	(3,100,000)
Annual Operating Cost	**$ 20,980,000**	**$ 21,100,000**	**$ 21,230,000**	**$ 21,360,000**

Table 8 - OWIN Estimated On-Going Operating Expenses Years 7-10

6.3 Partnerships

The OWIN team sees opportunity for the state to collaborate with federal and local governments to share infrastructure and existing system capacities. Projects such as the federal Integrated Wireless Network (IWN) may provide buildings, towers, and even radio or microwave services that can be shared. Such infrastructure-sharing agreements could lower the overall cost of the system. Exploring and initiating such partnerships will be an important effort during the next phase of planning and development of OWIN. Cooperative agreements to share towers, buildings and other infrastructure are not in place today, and were not included in the ***FE*** estimated cost. Thus, the ***FE*** “value-engineered” lifecycle cost estimate discussed here should be viewed as the cost to construct and operate the system without infrastructure-sharing arrangements.

OWIN also provides local and regional hospitals the ability to utilize its state-of-the-art digital radio and microwave systems if needed to supplement their existing telecommunications and networking capabilities. The OWIN radio and microwave backbone systems can be used, in addition to the existing hospital-to-ambulance radio systems, for communications with other hospitals as well as state, local, federal, and tribal agencies in emergency situations.

Partnerships can also be forged with the private sector telecommunications firms if there are potential cost-effective opportunities to utilize wireline technologies to supplement, or in place of the microwave backbone. Similar partnerships may also be possible for the sharing of tower and building infrastructure once the detailed system design is developed.

7 Risk Assessment

Risks are potential events or outcomes that could negatively influence the implementation of OWIN as described in the conceptual design.

[26] It is assumed that some personnel will perform routine maintenance and repair, and the value of their labor for these functions has been backed out of the 6% maintenance and repair figure.

This section covers anticipated risks and mitigation strategies for accepting, transferring, or reducing the affect of each risk throughout the project's life cycle.

Clearly, any project of this magnitude is a risky venture. Because OWIN will take six years to complete, the project timeframe itself creates risk from anticipated and unanticipated internal and external forces.

The state has significant experience with complex and expensive projects, including building schools, hospitals, prisons, roads, bridges, park facilities, and many other projects. However OWIN presents additional challenges and risks that must be carefully managed throughout the implementation.

7.1 Risk Categories for the OWIN Project

FE categorized the OWIN risk assessment into five categories. These represent lessons learned in other states and municipalities implementing public safety land mobile radio networks.

7.1.1 Coordination and management risks

A significant risk factor in the OWIN project, due to its size, complexity, and cost is enabling the correct management and organization of OWIN during all phases of its development, and on an ongoing basis. We have listed a series of anticipated risks and associated mitigation strategies in tables below. For the purposes of discussion, risks are categorized into five major headings:

- Coordination, organization and management
- Technical risks
- Spectrum and site acquisition
- Financial
- Governance

Each risk in independent of each other, and are not listed in degrees of magnitude. It is our opinion that risk should be anticipated and to the extent possible addressed.

Coordination, organization and management risks
• Potential opposition to OWIN by private sector or local government entities • Potential for OWIN "scope creep" to accommodate the emergency communication needs and requirements of non-public safety communities of interest across Oregon • Inability to acquire/lease sites or site needed building/towers in a timely manner • Inability to properly respond to adverse changes in siting authority or guidelines during the project lifecycle • Lack of a sufficient number of resources with the required management and technical capabilities to successfully manage and oversee the OWIN project • Lack of rules, standards, guidelines and procedures required to effectively implement, operate, maintain, and support OWIN • Overly optimistic planned timeline for roll-out • Inefficiency in the procurement process • Inadequate testing processes
Mitigation Strategies
• Adopt and implement formal project management, quality management, change management, risk management and systems development lifecycle methodologies. Ensure that OWIN has the management and technical capabilities required to effectively implement and sustain the use of these methods over time. • Involve stakeholders early in implementation planning. Identify champions of the project who are outside of the state government and the SIEC but willing to work with both entities • Begin executing letters of intent to participate and intergovernmental agreements between the state and other jurisdictions • Create a formal review process for site selection which involves local government • Integrate the OWIN project with other major telecommunications initiatives underway or planned in the state

7.1.2 Technical risks

Although ***FE*** took every precaution to insure non-interference from radio signals during the conceptual design phase of this report, unknown factors such as new license acquisition and new towers being built between ***FE***'s report and the time of actual implementation may create unanticipated interference. The OWIN staff, the SIEC and ***FE*** all recommend that OWIN strictly adhere to national public safety radio standards to lessen any effects that may occur due to proprietary requirements. There may be new technologies available in the future that will function as “well as”, or “better than” the technologies available today at equal or less cost. As with any technology, there is always a risk that an emerging technology could overtake the system design, causing early obsolescence of equipment or functionally shortening the useful life of the system.

Technical Risks
• Unanticipated delays in approval of required frequency plans • Uncoordinated technology deployment by federal, regional, tribal, and local governments that could limit available siting, create new interoperability issues or create unanticipated signal interference • Changes in the availability of technology • Vendor product line changes mid-stream introducing system integration issues • Failure of equipment purchased to meet industry standards
Mitigation Strategies
• Retain competent and experienced external engineering firms for the duration of the project to provide both project management and quality and design control • Contract instruments will be especially important with vendors. There should be flexibility in product and pricing so that new technology can be incorporated into the system as it comes to market • Following established technology standards will help extend the lifecycle of the systems • Require the ability of system management and contractors to quickly respond to changing market conditions, for instance offering new capabilities and products within their product line, or establishing strategic partnerships among vendors to respond to the OWIN RFPs

7.1.3 Spectrum and Site Acquisition risks

Spectrum in the VHF public safety band is licensed only after a complex and time-consuming frequency coordination process. The process does not allow potential licensees such as OWIN to "reserve" available spectrum during the interference study process. It also requires the potential licensee to conduct the interference studies and coordination process on a transmitter by transmitter basis.

The frequency coordination process for a system the size of OWIN will be extremely complicated; it encompasses hundreds of transmitters, and many current license holders. The VHF band is already congested, which will only add to the complexity of the coordination process. The 700 MHz band is currently available and indeed the state already holds a license for the State Use pool of frequencies. However, should Oregon require more licenses than are reserved for state use under FCC rules, coordination with the Region 35 Regional Planning Committee (RPC) will be necessary. A frequency plan for the state must be filed by the RPC and approved by the FCC prior to any licenses being granted in this band.

To meet coverage goals, the state needs to acquire many sites that it does not currently own. This introduces a risk to construction deadlines if the state cannot get access to building sites on time. If site acquisition costs are significantly higher than expected, or the environmental impact studies are more costly, this too can impact the construction schedule and budget.

Spectrum and Site Acquisition Risks
• Uncoordinated radio system deployment by federal, regional, tribal, and local governments that could limit available siting or create unanticipated signal interference for OWIN • Inability to pool state-owned VHF frequencies across the state • Adverse changes in FCC policies or licensing procedures • Failure to properly identify coverage contours or available frequencies • Failure to license frequencies needed • Failure to gain site access agreements
Mitigation Strategies
• Retain professional assistance to complete spectrum coordination and license applications • Design and implement a site acquisition process that involves local jurisdictions to a very high degree • Implement project management tools and hire project management for both spectrum and site acquisition responsibilities • Prioritize and monitor these efforts in the roll-out

7.1.4 Financial risks

Financial risk to the state's general fund could be significant if capital investment is financed dependent on future system revenues from subscriber usage fees. No subscriber contracts or agreements currently exist that obligate users to pay.

OWIN will also require significant operational and maintenance funding on an ongoing basis. The sources of these funds have not been identified or guaranteed.

Financial Risks
• Competing priorities of government may lead to reductions in available funding for OWIN • Lack of participation, support, and/or utilization of OWIN by federal, state, and local government entities • Uncoordinated investment by federal, regional, tribal, and local governments • Significant changes in the price of technology due to inflation or other factors • Changes to Oregon Revised Statutes by the Oregon legislature (e.g. expansion, reduction, or elimination of direction provided in 2005 through House Bill 2101) • Severe changes in the state's economy that impact the state's ability to borrow or repay debt through the general fund
Mitigation Strategies
• Finance the project in phases, starting with the detailed design phase and moving to the vendor selection phase • Develop phase-by-phase performance measures for the project • Begin a detailed assessment of revenue potential and rate-setting strategies for participation of local, tribal and federal stakeholders • Evaluate the possibility of outside funding, including lease-back, federal grants, bond measures and other financing options.

7.1.5 Governance risks

Statewide, large-scale projects, like OWIN, require executive level commitment, support, and sustained involvement throughout the project. Without this type of executive level involvement (typically through some form of project steering committee or governing board) enterprise projects are subject to losing support, losing sight of their goals, conflicting with individual agency needs and direction, and/or making poor decisions. Projects in this situation often fail outright or fade to insignificance.

Operation of the system, including the ability to earn revenue from multiple jurisdictions to offset operations and maintenance costs, will require the state to develop a governance and revenue structure for OWIN. It will have to be satisfactory to the stakeholder entities, and work within the structure of state government. Any governance structure must be participatory and fair to all entities expected to participate financially in the system.

Governance Risks
• Inconsistent or unstable OWIN project and program governance across the project's six year lifecycle • Changes in administration and government funding priorities midway through the OWIN project • Inconsistent or lack of local and regional participation in the project • Failure to establish governance/decision making process • Failure to provide inclusive governance
Mitigation Strategies
• Form an OWIN project governing board that can effectively prioritize project scope, gain appropriate attention from the program and management sides of agencies and address project and political issues that may arise throughout the project's lifecycle. • Convene a formal process with stakeholders to suggest, vet, and evaluate governance options • Review and respond to county interoperability plans and UASI plans in the development of the governance process • Look to other multi-jurisdictional projects, and models from other states as possible models for OWIN • Work with the SIEC to recommend a governance model. Once adopted, affirm that model with the legislature

The complexities of the OWIN project promise to challenge the best executive management and project team that Oregon can offer. Effective project management techniques will be crucial. ***FE*** recommends that OWIN contract for outside, independent project management and quality assurance resources to work in concert with OWIN staff and the eventual vendor who will build OWIN. One firm with a strong background in project management and quality assurance can provide this capability, or, the state may choose to use multiple firms. By providing OWIN staff with appropriate project management and quality assurance expertise, OWIN has a high probability of staying on schedule, on budget and on scope. These additional capabilities will help ensure that OWIN has the level of support required to deliver this project to the state as promised on time, on budget and as promised.

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7.2 Risk Mitigation Strategies

The complexities of the OWIN project promise to challenge the best executive management and project team that Oregon can offer. Effective project techniques will be crucial. ***FE*** recommends that OWIN contract for outside, independent project management and quality assurance resources to work in concert with OWIN staff and the eventual vendor who will build OWIN. One or more firms with a strong background in public safety mobile communications systems project management and quality assurance can provide this capability. Proven experience working with the procurement and implementation phases of similar programs is an important consideration. By providing OWIN staff with appropriate project management and quality assurance expertise, OWIN has a high probability of staying on schedule, on budget and on scope. These additional capabilities will help ensure that OWIN has the level of support that will enable this project to be delivered to the state as promised, on time and on budget by the eventual detailed design and construction vendor(s).

Adherence to a formal system development lifecycle process, with the appropriate level of oversight by state government fiscal authorities, will also be critical. The implementation plan provides a flexible approach that can anticipate and adjust to unforeseen occurrences or variables. Regular monitoring of implementation progress and expenditures, procurement methods, risk mitigation, and performance measures will allow the state to make the necessary adjustments over time. For the OWIN project, the practical effects of such adjustments could include revisions in network design, refinements in how funding is managed, and enhancements to organizational responsibilities and operational policies over time.

8 Conclusion

Oregon has four radio systems: communication lifelines for the public safety agencies and first responders who protect the lives and property of all Oregonians on a daily basis. Today, these systems are inadequate and unreliable, at-risk of failure, and do not provide needed levels of statewide coverage or interoperability. In most cases, state, local, tribal, and federal agencies that need to communicate with each other during a statewide crisis cannot effectively communicate across jurisdictions and geography.

At no other time in Oregon's history has the need for upgraded, interoperable communications been as great as it is today. However, with these challenges comes opportunity. For the first time Oregon can leverage its investment in public safety wireless communications infrastructure to benefit all state public safety agencies, and extend that infrastructure to local, tribal and federal agencies. This approach benefits all Oregonians, and stakeholders in the form of the Oregon Wireless Interoperability Network (OWIN), the SIEC and the public safety agencies that they represent, embrace it.

Once implemented, OWIN will not just meet FCC mandates to migrate to narrowband technologies, it will provide a consolidated, robust, shared communications system that is more reliable and functional than before. Partnerships among state, local, tribal, and federal agencies will be routine rather than notable exceptions. With public safety community working together, all Oregonians can live, play, and enjoy this great state, without fear that a call for help will go unanswered.

APPENDICES

8.1 Appendix - OWIN Project Budget

The following pages present tables showing a breakdown the estimated costs of the system for each of the implementation phases.

The following descriptions are provided as an aid to understanding these charts.

- Voice subsystem total
  - Total of site radio equipment, control equipment and subscriber equipment required to implement the voice radio subsystem.
- 700 MHz data subsystem total
  - Total of site radio equipment, control equipment and subscriber equipment required to implement the 700 MHz data radio subsystem.
- Microwave subsystem total
  - Total of microwave radio equipment, multiplex equipment and control equipment required to implement the microwave network subsystem.
- Site infrastructure subsystem total
  - Total of building, tower and other infrastructure required to implement OWIN.
- Transportable site subsystem total
  - Total of transportable site equipment and support systems required to implement four transportable OWIN sites
- Total licensing
  - Total estimated cost of radio and microwave licensing services.
- Total land and environmental cost
  - Total estimated cost of site environmental impact studies and remediation.
- Vendor services total
  - Total estimated cost of all vendor implementation services, including installation and other labor
- Spares total
  - Total estimated cost of spare equipment for each subsystem implement

- Vendor Contract Total
  - Total estimated cost of vendor contracts for the above items

- IV&V, QA, and Program Management
  - Total cost of independent validation and verification services, quality assurance and program management. Estimated at two percent of vendor contracted amount

- OWIN System Total
  - Total of vendor and IV&V, QA, and Program Management contact estimates

- Management and staffing costs
  - Estimate of OWIN internal management and staffing costs

- Maintenance and repair estimates
  - Estimate of maintenance costs for OWIN during the phase

- Maintenance costs offset by internal staff
  - Estimate of maintenance costs for OWIN which are offset by internal staffing

- OWIN Phase Total
  - Total of estimated costs for OWIN

Phase 0 Costs

Category	Cost Estimate
Voice subsystem total	$59,100,000
700 MHz data subsystem total	$5,660,000
Microwave subsystem total	$7,080,000
Site infrastructure subsystem total	$11,500,000
Transportable site subsystem total	$0
Total licensing	$228,000
Total land and environmental cost	$1,230,000
Vendor services total	$48,400,000
Spares total	$7,270,000
Vendor Contract Total	**$140,000,000**
IV&V, QA, and Program Management	$2,810,000
OWIN System Total	**$143,000,000**
Management and staffing costs	$3,730,000
Maintenance and repair estimates	$0
Maintenance costs offset by internal staff	$0
OWIN Phase 0 Total	**$147,000,000**

Phase 1 Costs

Category	Cost Estimate
Voice subsystem total	$47,800,000
700 MHz data subsystem total	$4,070,000
Microwave subsystem total	$6,680,000
Site infrastructure subsystem total	$15,300,000
Transportable site subsystem total	$3,150,000
Total licensing	$149,000
Total land and environmental cost	$3,050,000
Vendor services total	$63,600,000
Spares total	$6,280,000
Vendor Contract Total	**$150,000,000**
IV&V, QA, and Program Management	$3,000,000
OWIN System Total	**$153,000,000**
Management and staffing costs	$3,800,000
Maintenance and repair estimates	$5,000,000
Maintenance costs offset by internal staff	($610,000)
OWIN Phase 1 Total	**$161,000,000**

Phase 2 Costs

Category	Cost Estimate
Voice subsystem total	$47,600,000
700 MHz data subsystem total	$4,980,000
Microwave subsystem total	$7,060,000
Site infrastructure subsystem total	$12,000,000
Transportable site subsystem total	0
Total licensing	$154,000
Total land and environmental cost	$1,970,000
Vendor services total	$54,900,000
Spares total	$6,050,000
Vendor Contract Total	**$135,000,000**
IV&V, QA, and Program Management	$2,690,000
OWIN System Total	**$137,000,000**
Management and staffing costs	$10,400,000
Maintenance and repair estimates	$21,400,000
Maintenance costs offset by internal staff	($3,100,000)
OWIN Phase 2 Total	**$166,000,000**

Phase 3 Costs

Category	Cost Estimate
Voice subsystem total	$39,500,000
700 MHz data subsystem total	$5,320,000
Microwave subsystem total	$5,380,000
Site infrastructure subsystem total	$15,500,000
Transportable site subsystem total	0
Total licensing	$47,600
Total land and environmental cost	$4,590,000
Vendor services total	$75,600,000
Spares total	$5,120,000
Vendor Contract Total	**$151,000,000**
IV&V, QA, and Program Management	$3,020,000
OWIN System Total	**$154,000,000**
Management and staffing costs	$12,200,000
Maintenance and repair estimates	$29,800,000
Maintenance costs offset by internal staff	($5,500,000)
OWIN Phase 3 Total	**$191,000,000**

OWIN Total Costs

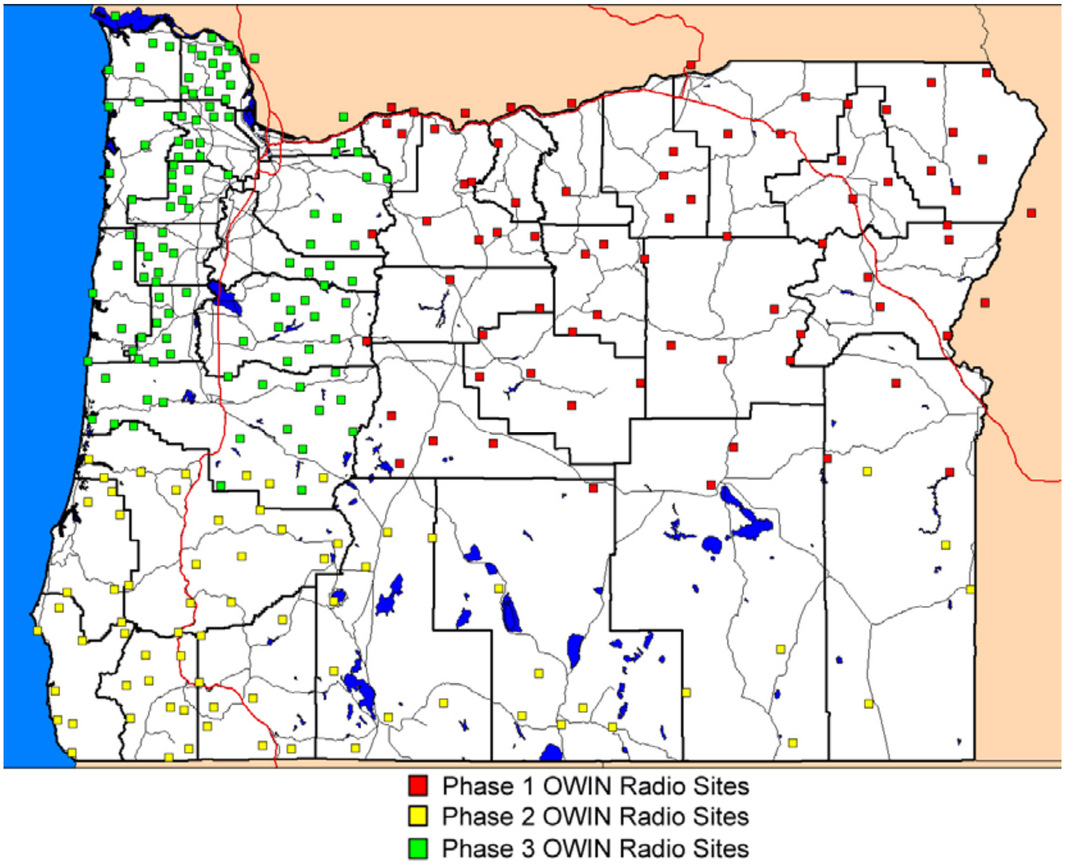
Category	Cost Estimate
Voice subsystem total	$194,000,000
700 MHz data subsystem total	$20,000,000
Microwave subsystem total	$26,200,000
Site infrastructure subsystem total	$54,300,000
Transportable site subsystem total	$3,150,000
Total licensing	$579,000
Total land and environmental cost	$10,800,000
Vendor services total	$242,000,000
Spares total	$24,700,000
Vendor Contract Total	**$576,000,000**
IV&V, QA, and Program Management	$11,500,000
OWIN System Total	**$588,000,000**
Management and staffing costs	$30,100,000
Maintenance and repair estimates	$56,200,000
Maintenance costs offset by internal staff	($9,200,000)
OWIN Project Total By Phase	**$665,000,000**

8.2 Appendix - OWIN Staffing Detail

Biennia	Positions	Total FTEs	Estimate including 2% COLA (including 38% fringe and overhead)
2006 (current level) (Baseline)	Director Manager Assistant Manager Engineers (3) Draftsman Support specialist	8	$684,000 ($943,000)
2007	Director Manager Assistant Manager Engineers (3) Draftsman Support specialist New positions Supervisor communication Eng Supervisor maintenance Microwave technician (2) Radio technician Spectrum engineer Support specialist Purchasing aid Accounting clerk	17	$1,420,000 ($1,960,000)
2008-2009	Director Manager Assistant Manager Engineers (3) Draftsman Support specialist Supervisor communication Eng Supervisor maintenance Microwave technician (2) Radio technician Spectrum engineer Support specialist Purchasing aid Accounting clerk New positions Engineers (3) Draftsman Microwave technician (6) Radio technician (6) Support specialist	33	$2,670,000 ($3,730,000) = FY 2008 $2,750,000 ($3,800,000) = FY 2009 $5,450,000 ($7,530,000) = FY 08-09
2010-2111	Director Manager Assistant Manager Engineers (6) Draftsman (2) Support specialist (2) Supervisor communication Eng Supervisor maintenance Microwave technician (10)	48	$3,710,000 ($5,130,000)= FY 2010 $3,790,000 ($5,230,000) = FY 2011 $7,500,000 ($10,400,000) = FY 10-11

Biennia	Positions	Total FTEs	Estimate including 2% COLA (including 38% fringe and overhead)
	Radio technician (8) Spectrum engineer Purchasing aid Accounting clerk New positions Assistant Manager Radio technicians (4) Spectrum engineer Supervisor Communications Eng Maintenance supervisor Support services (2) Communications specialist (2)		
2012-2113	Director Manager Assistant Manager (2) Engineers (6) Draftsman (2) Support specialist (6)) Supervisor communication Eng (2) Supervisor maintenance (2) Microwave technician (10) Radio technician (12) Spectrum engineer (2) Communications specialists (2) Purchasing aid Accounting clerk New positions Radio technicians (5) Microwave technicians (1)	54	$4,390,000 ($6,060,000) FY 2012 $4,480,000 ($6,180,000) FY 2013 $8,870,000 ($12,200,000) = FY 12-13

8.3 Appendix - Counties by OWIN Construction Phase



8.4 Appendix - HB 2101

73rd OREGON LEGISLATIVE ASSEMBLY--2005 Regular Session

Enrolled
House Bill 2101

Ordered printed by the Speaker pursuant to House Rule 12.00A (5). Presession filed (at the request of Governor Theodore R. Kulongoski for Office of the Governor)

CHAPTER ....

AN ACT

Relating to Oregon security; creating new provisions; amending ORS 401.025, 401.270, 401.305, 401.515, 453.307, 453.317, 453.520, 453.825, 466.620 and 654.196; repealing ORS 453.510, 453.517 and 453.527; limiting expenditures; and declaring an emergency.

Be It Enacted by the People of the State of Oregon:

SECTION 1. (1) The Oregon Legislative Assembly finds that:

(a) The public safety communications infrastructure of the State of Oregon is rapidly aging, outdated and at severe risk of failure;

(b) The adopted policies and standards and specific deadlines mandated by the Federal Communications Commission will require replacement of statewide public safety communications infrastructure in the State of Oregon;

(c) The reliability of mission-critical public safety communications infrastructure during a man-made or natural disaster is crucial to saving lives and property and to protecting the public during an emergency;

(d) The deteriorating condition of our public safety radio systems is of immediate concern because it compromises the safety and well-being of the citizens of the State of Oregon who depend upon lifesaving communications systems used by first responders;

(e) The majority of the communications systems in the State of Oregon are unreliable, greatly increasing the danger to first responders and law enforcement officers in carrying out their duty to protect the citizens and property of the State of Oregon;

(f) It is in the public interest of Oregonians to plan for improvement of the public safety communications infrastructure to ensure long-term stability; and

(g) Federal funding for homeland security may be available to facilitate all or part of the development and implementation of a plan for improvement of the public safety communications infrastructure in the State of Oregon.

(2) It is the policy of the State of Oregon:

(a) To develop, finance, maintain and operate a single emergency response wireless communications infrastructure that supports both the communications needs of all state agencies and ensures communications interoperability among all state, local, tribal and federal public safety agencies, thereby maximizing shared use of this invaluable public asset.

(b) To meet Federal Communications Commission mandates for the conversion of public safety communications frequencies and spectrum allocation by 2013.

SECTION 2. (1) Under the direction of the Governor, the Office of Emergency Management shall coordinate the work of public safety agencies in the state and the State Interop-

erability Executive Council, created under section 3 of this 2005 Act, to develop a Public Safety Wireless Infrastructure Replacement Plan that:

(a) Guides consolidation of existing radio infrastructure;

(b) Provides for future management of the infrastructure;

(c) Details the engineering and technology specifications for replacement and modernization of the public safety communications infrastructure, allowing for alternative options and phased system development; and

(d) Describes the overall benefits and cost of the system including, but not limited to, specific descriptions of:

(A) The capability of the system to facilitate interconnections among state, local and federal systems;

(B) How the system will comply with Federal Communications Commission requirements; and

(C) Avoided costs the shared system can provide.

(2) The Office of Emergency Management shall:

(a) Submit reports on the progress of plan development to the Emergency Board and the Joint Legislative Committee on Information Management and Technology on or before November 30, 2005, and June 30, 2006.

(b) Submit the final plan to the Governor, the President of the Senate and the Speaker of the House of Representatives on or before January 12, 2007.

(c) Concurrent with submission of the final plan, submit to the Legislative Assembly one or more proposals for financing implementation of the plan that include consideration of the following financial resources:

(A) Federal funding sources;

(B) Existing or new fee income or excise taxes; and

(C) Cooperative local and state financing components.

SECTION 3. (1) The State Interoperability Executive Council is created within the Office of Emergency Management. The membership of the council shall consist of:

(a) Two members from the Legislative Assembly, as follows:

(A) The President of the Senate shall appoint one member from the Senate with an interest in public safety communications infrastructure; and

(B) The Speaker of the House of Representatives shall appoint one member from the House of Representatives with an interest in public safety and wireless communications infrastructure.

(b) The following members appointed by the Governor:

(A) One member from the Department of State Police;

(B) One member from the Office of Emergency Management;

(C) One member from the State Forestry Department;

(D) One member from the Department of Corrections;

(E) One member from the Department of Transportation;

(F) One member from the Oregon Department of Administrative Services;

(G) One member from the Department of Human Services;

(H) One member from the Oregon Military Department;

(I) One member from the Department of Public Safety Standards and Training;

(J) One member of an Indian tribe as defined in ORS 97.740;

(K) One member from a nonprofit professional organization devoted to the enhancement of public safety communications systems; and

(L) One member from the public.

(c) The following members appointed by the Governor with the concurrence of the President of the Senate and the Speaker of the House of Representatives:

(A) One member from the Oregon Fire Chiefs' Association;

(B) One member from the Oregon Association Chiefs of Police;

(C) One member from the Oregon State Sheriffs' Association;

(D) One member from the Association of Oregon Counties;

(E) One member from the League of Oregon Cities; and

(F) One member from the Special Districts Association of Oregon.

(2) Each agency or organization identified in subsection (1)(b)(A) to (I) and (1)(c) of this section shall recommend a person from the agency or organization for membership on the council.

(3) Members of the council are not entitled to compensation, but in the discretion of the Director of the Office of Emergency Management may be reimbursed from funds available to the Office of Emergency Management for actual and necessary travel and other expenses incurred by them in the performance of their official duties in the manner and amount provided in ORS 292.495.

(4) Members of the Legislative Assembly appointed to the council are nonvoting members and may act in an advisory capacity only.

SECTION 4. The State Interoperability Executive Council created under section 3 of this 2005 Act shall:

(1) Work with public safety agencies in the state to develop a Public Safety Wireless Infrastructure Replacement Plan as provided under section 2 of this 2005 Act.

(2) Develop an Oregon Interoperable Communication Plan. The goal of the plan shall be to achieve statewide interoperability within six years of the effective date of this 2005 Act. In developing the plan, the council shall:

(a) Recommend strategies to improve wireless interoperability among state and local public safety agencies;

(b) Develop standards to promote consistent development of existing and future wireless communications infrastructures;

(c) Identify immediate short-term technological and policy solutions to tie existing wireless communications infrastructures together into an interoperable communications system;

(d) Develop long-term technological and policy recommendations to establish a statewide public safety radio system to improve emergency response and day-to-day public safety operations; and

(e) Develop recommendations for legislation and for the development of state and local policies to promote wireless interoperability in Oregon.

(3) Approve, subject to approval by the Director of the Office of Emergency Management, investments by the State of Oregon in public safety communications systems.

(4) Coordinate state and local activities related to obtaining federal grants for support of interoperability.

(5) Develop and provide technical assistance, training and, if requested, appropriate dispute resolution services to state and local agencies responsible for implementation of the Oregon Interoperable Communication Plan.

(6) Report, in the manner required by ORS 192.245, to the Legislative Assembly on or before February 1 of each odd-numbered year on the development of the Oregon Interoperable Communication Plan and the council's other activities.

(7) Adopt rules necessary to carry out its duties and powers.

SECTION 5. (1) The Director of the Office of Emergency Management shall advise the State Interoperability Executive Council on the implementation of the Oregon Interoperable Communication Plan and coordinate interoperability among all state agencies.

(2) State agencies that own or operate public safety communications systems shall coordinate their efforts and investments to achieve the statewide interoperability goal set by the council and implement the Oregon Interoperable Communication Plan approved by the director.

SECTION 6. Notwithstanding any other law limiting expenditures, the limitation on expenditures established by section 2, chapter ___, Oregon Laws 2005 (Enrolled House Bill 5167), for the biennium beginning July 1, 2005, as the maximum limit for payment of expenses from fees, moneys or other revenues, including Miscellaneous Receipts, but excluding lottery funds and federal funds, collected or received by the Office of Emergency Management is increased by $382,000 for the purpose of carrying out the provisions of sections 2, 3, 4 and 5 of this 2005 Act.

SECTION 7. (1) The Interagency Hazard Communication Council is abolished. On the operative date of this section, the tenure of the members of the council ceases.

(2) All the duties, functions and powers of the Interagency Hazard Communication Council are imposed upon, transferred to and vested in the office of the State Fire Marshal.

(3) The chairperson of the Interagency Hazard Communication Council shall deliver to the office of the State Fire Marshal all records and property within the jurisdiction of the council that relate to the duties, functions and powers transferred by this section.

SECTION 8. (1) The Oregon Homeland Security Council is created within the Office of Emergency Management. The council shall:

(a) Receive briefings on security matters for which the office is responsible at least annually from state agencies and organizations as determined by the council; and

(b) Advise state agencies with responsibility for security matters on the future direction of the office's planning, preparedness, response and recovery activities.

(2) The membership of the council shall consist of:

(a) Four members from the Legislative Assembly appointed as follows:

(A) Two members from the Senate appointed by the President of the Senate; and

(B) Two members from the House of Representatives appointed by the Speaker of the House of Representatives;

(b) The Governor;

(c) The Adjutant General;

(d) The Superintendent of State Police;

(e) The Director of the Office of Emergency Management; and

(f) Additional members appointed by the Governor who the Governor determines necessary to fulfill the functions of the council, including state agency heads, elected state officials, local government officials, a member of the governing body of an Indian tribe and representatives from the private sector.

(3) Each member appointed to the council under subsection (2)(a) and (f) of this section serves at the pleasure of the appointing authority. The membership of a public official ceases upon termination of the office held by the official at the time of appointment to the council.

(4) The Governor shall be chairperson of the council.

(5) Members of the council are not entitled to compensation but, at the discretion of the director, may be reimbursed, in the manner and amount provided in ORS 292.495, from funds available to the office for actual and necessary travel and other expenses incurred in the performance of their duties as members of the council.

SECTION 9. ORS 401.025 is amended to read:

401.025. As used in ORS 401.015 to 401.105, 401.260 to 401.325 and 401.355 to 401.580, unless the context requires otherwise:

(1) "Beneficiary" has the meaning given that term in ORS 656.005.

(2) "Commission" means the Seismic Safety Policy Advisory Commission established under ORS 401.337.

[*(3) "Director" means the Director of the Office of Emergency Management.*]

[*(4)*] (3) "Emergency" includes any [*man-made*] **human caused** or natural event or circumstance causing or threatening loss of life, injury to person or property, human suffering or financial loss, and includes, but is not limited to, fire, explosion, flood, severe weather, drought, earthquake, volcanic activity, spills or releases of oil or hazardous material as defined in ORS 466.605, contam-

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ination, utility or transportation emergencies, disease, blight, infestation, crisis influx of migrants unmanageable by the county, civil disturbance, riot, sabotage and war.

[*(5)*] **(4)** "Emergency management agency" means an organization created and authorized under ORS 401.015 to 401.105, 401.260 to 401.325 and 401.355 to 401.580 by the state, county or city to provide for and assure the conduct and coordination of functions for comprehensive emergency program management.

[*(6)*] **(5)** "Emergency program management" includes all the tasks and activities necessary to provide, support and maintain the ability of the emergency services system to prevent or reduce the impact of emergency or disaster conditions which includes, but is not limited to, coordinating development of plans, procedures, policies, fiscal management, coordination with nongovernmental agencies and organizations, providing for a coordinated communications and alert and notification network and a public information system, personnel training and development and implementation of exercises to routinely test the emergency services system.

[*(7)*] **(6)** "Emergency program manager" means the person administering the emergency management agency of a county or city.

[*(8)*] **(7)** "Emergency service agency" means an organization within a local government which performs essential services for the public's benefit prior to, during or following an emergency. This includes, but is not limited to, organizational units within local governments, such as law enforcement, fire control, health, medical and sanitation services, public works and engineering, public information and communications.

[*(9)*] **(8)** "Emergency service worker" means an individual who, under the direction of an emergency service agency or emergency management agency, performs emergency services and:

(a) Is a registered volunteer or independently volunteers to serve without compensation and is accepted by the [*office*] **Office of Emergency Management** or the emergency management agency of a county or city; or

(b) Is a member of the Oregon State Defense Force acting in support of the emergency services system.

[*(10)*] **(9)** "Emergency services" includes those activities provided by state and local government agencies with emergency operational responsibilities to prepare for and carry out any activity to prevent, minimize, respond to or recover from an emergency. These activities include, without limitation, coordination, preparedness planning, training, interagency liaison, fire fighting, oil or hazardous material spill or release cleanup as defined in ORS 466.605, law enforcement, medical, health and sanitation services, engineering and public works, search and rescue activities, warning and public information, damage assessment, administration and fiscal management, and those measures defined as "civil defense" in section 3 of the Act of January 12, 1951, P.L. 81-920 (50 U.S.C. 2252).

[*(11)*] **(10)** "Emergency services system" means that system composed of all agencies and organizations involved in the coordinated delivery of emergency services.

[*(12)*] **(11)** "Injury" means any personal injury sustained by an emergency service worker by accident, disease or infection arising out of and in the course of emergency services or death resulting proximately from the performance of emergency services.

[*(13)*] **(12)** "Local government" means any governmental entity authorized by the laws of this state.

[*(14)*] **(13)** "Major disaster" means any event defined as a "major disaster" [*by the Act of May 22, 1974, P.L. 93-288*] **under 42 U.S.C. 5122(2).**

[*(15) "Office" means the Office of Emergency Management of the Department of State Police.*]

[*(16)*] **(14)** "Oregon emergency management plan" means the state emergency preparedness operations and management plan. The Office of Emergency Management is responsible for coordinating emergency planning with government agencies and private organizations, preparing the plan for the Governor's signature, and maintaining and updating the plan as necessary.

[*(17)*] **(15)** "Search and rescue" means the acts of searching for, rescuing or recovering, by means of ground or marine activity, any person who is lost, injured or killed while out of doors.

However, "search and rescue" does not include air activity in conflict with the activities carried out by the Oregon Department of Aviation.

[*(18)*] **(16)** "Sheriff" means the chief law enforcement officer of a county.

SECTION 10. ORS 401.270 is amended to read:

401.270. The Director of the Office of Emergency Management shall be responsible for coordinating and facilitating emergency planning, preparedness, response and recovery activities with the state and local emergency services agencies and organizations, and shall, with the approval of the Superintendent of State Police or as directed by the Governor:

(1) Make rules that are necessary and proper for the administration and implementation of ORS 401.015 to 401.105, 401.260 to 401.325, 401.355 to 401.580 and 401.706;

(2) Coordinate the activities of all public and private organizations specifically related to providing emergency services within this state;

(3) Maintain a cooperative liaison with emergency management agencies and organizations of local governments, other states and the federal government;

(4) Have such additional authority, duties and responsibilities authorized by ORS 401.015 to 401.105, 401.260 to 401.325 and 401.355 to 401.580 or as may be directed by the Governor;

(5) Administer grants relating to emergency program management and emergency services for the state;

(6) Provide for and staff a State Emergency Operations Center to aid the Governor and the Office of Emergency Management in the performance of duties under ORS 401.015 to 401.105, 401.260 to 401.325, 401.355 to 401.580 and 401.706;

(7) Serve as the Governor's authorized representative for coordination of certain response activities and managing the recovery process;

(8) Establish training and professional standards for local emergency program management personnel;

(9) Establish task forces and advisory groups to assist the office in achieving mandated responsibilities; [*and*]

(10) Enforce compliance requirements of federal and state agencies for receiving funds and conducting designated emergency functions[.]**; and**

(11) Coordinate the activities of state and local governments to enable state and local governments to work together during domestic incidents as provided in the National Incident Management System established by the Homeland Security Presidential Directive 5 of February 28, 2003.

SECTION 11. ORS 401.305 is amended to read:

401.305. **(1)** Each county of this state shall, and each city may, establish an emergency management agency which shall be directly responsible to the executive officer or governing body of the county or city.

(2) The executive officer or governing body of each county and any city which participates shall appoint an emergency program manager who shall have responsibility for the organization, administration and operation of such agency, subject to the direction and control of the county or city.

(3) The local governing bodies of counties and cities that have both city and county emergency management programs shall jointly establish policies which provide direction and identify and define the purpose and roles of the individual emergency management programs, specify the responsibilities of the emergency program managers and staff and establish lines of communication, succession and authority of elected officials for an effective and efficient response to emergency conditions.

(4) Each emergency management agency shall perform emergency program management functions within the territorial limits of the county or city and may perform such functions outside the territorial limits as required under any mutual aid or cooperative assistance agreement or as authorized by the county or city.

(5) [*Such*] **The** emergency management functions shall include, as a minimum[,]**:**

(a) Coordination of the planning activities necessary to prepare and maintain a current emergency operations plan, management and maintenance of emergency operating facilities from which elected and appointed officials can direct emergency and disaster response activities[*, and*];

(b) Establishment of an incident command structure for management of a coordinated response by all local emergency service agencies; **and**

(c) Coordination with the Office of Emergency Management to integrate effective practices in emergency preparedness and response as provided in the National Incident Management System established by the Homeland Security Presidential Directive 5 of February 28, 2003.

SECTION 12. ORS 401.515 is amended to read:

401.515. (1) During the existence of an emergency, the state and any local government, any agent thereof or emergency service worker engaged in any emergency services activity, while complying with or attempting to comply with ORS 401.015 to 401.105, 401.260 to 401.325 and 401.355 to 401.580 or any rule [*promulgated*] **adopted** under those sections, [*shall*] **is** not, except in cases of willful misconduct, gross negligence or bad faith, [*be*] liable for the death or injury of any person, or damage or loss of property, as a result of that activity.

(2) There shall be no liability on the part of a person who owns or maintains any building or premises which has been designated by any emergency management agency or emergency service agency or any public body or officer of this state or the United States as a fallout shelter or a shelter from destructive operations or attacks by enemies of the United States for the death of or injury to any individual or damage to or loss of property while in or upon the building or premises as a result of the condition of the building or premises or as a result of any act or omission, except willful misconduct, gross negligence or bad faith of such person or the servants, agents or employees of the person when the dead or injured individual entered or went on or into the building or premises for the purpose of seeking refuge therein during or in anticipation of destructive operations or attacks by enemies of the United States or during tests ordered by lawful authority.

(3) The provisions of ORS 401.015 to 401.105, 401.260 to 401.325 and 401.355 to 401.580 [*shall*] **do** not affect the right of any person to receive benefits or compensation to which the person would otherwise be entitled under ORS 401.015 to 401.105, 401.260 to 401.325 and 401.355 to 401.580, under ORS chapter 656, under any pension or retirement law or under any act of Congress.

(4) Emergency service workers, in carrying out, complying with or attempting to comply with any order or rule issued under ORS 401.015 to 401.105, 401.260 to 401.325 and 401.355 to 401.580 or any local ordinance, or performing any of their authorized functions or duties or training for the performance of their authorized functions or duties, shall have the same degree of responsibility for their actions and enjoy the same immunities as officers and employees of the state and its local governments performing similar work.

(5) [*Nothing in*] This section [*shall*] **does not** excuse any governmental agency from liability for intentional confiscation or intentional destruction of private property.

(6) [*There shall be no liability incurred by any*] **A** person who complies with [*an*] **a lawful** order of the Governor under ORS 401.015 to 401.105, 401.260 to 401.325 and 401.355 to 401.580 **incurs no liability** for damages resulting from compliance.

(7)(a) An officer, employee or agent of the federal government or another state, or an agency or political subdivision of another state, who is accepted by the Office of Emergency Management to act as an emergency service worker is an agent of this state for the purposes of this section and ORS 30.260 to 30.300.

(b) An officer, employee or agent of the federal government or another state, or an agency or political subdivision of another state, who is accepted by a local government emergency management agency to act as an emergency service worker is an agent of the local government emergency management agency for the purposes of this section and ORS 30.260 to 30.300.

SECTION 13. ORS 453.317 is amended to read:

453.317. (1) The State Fire Marshal shall develop a hazardous substance survey and distribute the survey to employers in this state. The survey shall request the following information from such employers:

(a) The identity and hazard classification of the hazardous substance as listed on a material safety data sheet;

(b) The approximate amount and location of the hazardous substance;

(c) The name and telephone number of personnel qualified to give technical, onsite information about hazardous substances; and

(d) Any procedures established by the employer for the control of hazardous substances in the event of an emergency.

(2) In addition to the information to be provided under subsection (1) of this section, the State Fire Marshal may by rule establish additional requirements for obtaining hazardous substance information the State Fire Marshal considers necessary. All rules adopted under this subsection shall be adopted after public hearing in accordance with ORS chapter 183.

[*(3) Before the development of the initial hazardous substance survey, the State Fire Marshal shall consult with the Interagency Hazard Communication Council established under ORS 453.510 regarding:*]

[*(a) Interagency cooperation in the development of the hazardous substance survey; and*]

[*(b) Interagency access to data collected as the result of ORS 453.307 to 453.414 and 476.030.*]

[*(4)*] **(3)** Any employer receiving a hazardous substance survey shall complete the hazardous substance survey and return it to the State Fire Marshal not later than March 1 of each year or within 60 days after the date the State Fire Marshal mails the hazardous substance survey, whichever is later.

[*(5)*] **(4)** The State Fire Marshal shall update the hazardous substance survey once every 12 months.

[*(6)*] **(5)** An employer shall update and return the hazardous substance survey on or before March 1 of each year or within 60 days after the date the State Fire Marshal mails the survey, whichever is later, or an employer shall update the hazardous substance survey whenever any substantive information required to be provided changes, whichever situation occurs most often.

[*(7)*] **(6)** The Director of the Department of Consumer and Business Services shall participate in the development and updating of the hazardous substance survey and shall have access to the data included in the survey.

[*(8)*] **(7)** The State Fire Marshal may conduct an inspection to confirm the validity of a hazardous substance survey required by this section. The inspection shall be conducted according to the provisions of ORS 476.150.

SECTION 14. ORS 453.520 is amended to read:

453.520. **(1)** The Governor shall designate the [*Interagency Hazard Communication Council*] **office of the State Fire Marshal** as the state emergency response commission as required by the Emergency Planning and Community Right-to-Know Act of 1986 [*(P.L. 99-499)*] **(42 U.S.C. 11001 et seq.)**.

(2) The office shall:

(a) Provide, in a timely manner, advice to a state agency that is required to consult with the office about programs that involve hazardous materials or hazardous substances; and

(b) Undertake all duties of a state emergency response commission required by the Emergency Planning and Community Right-to-Know Act of 1986 (42 U.S.C. 11001 et seq.) including but not limited to:

(A) Designating emergency planning districts;

(B) Establishing local emergency planning committees within emergency planning districts and appoint members to the local emergency planning committees; and

(C) Providing comments on local emergency plans.

SECTION 15. ORS 453.825 is amended to read:

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453.825. (1) The Department of Transportation shall coordinate development of a single plan and procedure for the regulation of the transportation of hazardous material and waste and radioactive material and waste in Oregon.

(2) In developing the plan under subsection (1) of this section, the Department of Transportation shall cooperate with the [*Interagency Hazard Communication Council created under ORS 453.510*] **office of the State Fire Marshal**.

(3) As used in this section, "hazardous waste" has the meaning given that term in ORS 466.005.

SECTION 16. ORS 466.620 is amended to read:

466.620. In accordance with the applicable provisions of ORS chapter 183, the Environmental Quality Commission shall adopt an oil and hazardous material emergency response master plan consistent with the plan adopted by the [*Interagency Hazard Communications Council pursuant to the provisions of ORS 453.317 (1) to (6), 453.510,*] **Department of Transportation under ORS** 453.825 and 453.835, and after consultation with the [*Interagency Hazard Communications Council*] **office of the State Fire Marshal**, the Oregon State Police, the Oregon Fire Chiefs Association and any other appropriate agency or organization.

SECTION 17. ORS 453.307 is amended to read:

453.307. As used in ORS 453.307 to 453.414:

(1) "Community right to know regulatory program" or "local program" means any law, rule, ordinance, regulation or charter amendment established, enforced or enacted by a local government that requires an employer to collect or report information relating to the use, storage, release, possession or composition of hazardous substances and toxic substances if a primary intent of the law, rule, ordinance, regulation or charter amendment is the public distribution of the information.

(2) "Emergency service personnel" includes those entities providing emergency services as defined in ORS 401.025 [*(8) and (10)*].

(3) "Employer" means:

(a) Any person operating a facility that is included in one or more of the 21 standard industrial classification categories in Appendix B of the Natural Resources Defense Council v. Train Consent Decree of June 8, 1976 (8 E.R.C. 2120); or

(b) Any person operating a facility designated by the State Fire Marshal.

(4) "Fire district" means any agency having responsibility for providing fire protection services.

(5) "Hazardous substance" means:

(a) Any substance designated as hazardous by the Director of the Department of Consumer and Business Services or by the State Fire Marshal;

(b) Any substance for which a material safety data sheet is required by the Director of the Department of Consumer and Business Services under ORS 654.035 and which appears on the list of Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment by the American Conference of Governmental Industrial Hygienists; or

(c) Radioactive waste and material as defined in ORS 469.300 and radioactive substance as defined in ORS 453.005.

(6) "Health professional" means a physician as defined in ORS 677.010, registered nurse, industrial hygienist, toxicologist, epidemiologist or emergency medical technician.

(7) "Law enforcement agency" has the meaning given that term in ORS 181.010.

(8) "Local government" means a city, town, county, regional authority or other political subdivision of this state.

(9) "Person" includes individuals, corporations, associations, firms, partnerships, joint stock companies, public and municipal corporations, political subdivisions, the state and any agency thereof, and the federal government and any agency thereof.

(10) "Trade secret" has the meaning given that term in ORS 192.501 (2).

SECTION 18. ORS 654.196 is amended to read:

654.196. (1) The Director of the Department of Consumer and Business Services may by rule require employers to provide information to employees relating to the contents of piping systems. The rules shall include, but need not be limited to requirements for:

(a) Labeling piping systems to provide notice about hazardous chemicals contained in the system; and

(b) Labeling a piping system that uses asbestos as a pipe insulation material.

(2) Every employer shall post a sign in the location where notices to employees are normally posted to inform employees that they have a right under this section and ORS 453.317 [*(7)*] **(6)** to information from the employer regarding hazardous substances found in the place of employment.

(3) The sign required under subsection (2) of this section shall include, but need not be limited to, the following information and shall be substantially in the following form:

NOTICE TO EMPLOYEES

You have a right under state law to information about hazardous substances found in your place of employment. For this information, contact your employer.

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(4) Notwithstanding any other provision of this chapter or ORS 192.410 to 192.505, an employer may withhold the precise chemical name of a chemical only if the employer can substantiate that:

(a) The chemical name is a trade secret with commercial value that can be protected only by limiting disclosure; and

(b) The commercial value of the product cannot be preserved by withholding the processes, mixture percentages or other aspects of the production of the product instead of its chemical constituents.

(5) A trade secret designation claimed under subsection (4) of this section may be subject to yearly review.

(6) Notwithstanding any other provision of this chapter or ORS 192.410 to 192.505, if a treating physician or health professional concludes that the chemical identity of a hazardous chemical used in an employer's place of employment is necessary to prescribe necessary treatment for a patient, the employer may not require the physician or health professional to sign a confidentiality agreement as a condition to the release of the information by the employer, manufacturer or importer.

SECTION 19. ORS 453.510, 453.517 and 453.527 are repealed.

SECTION 20. Section 7 of this 2005 Act and the repeal of ORS 453.510, 453.517 and 453.527 by section 19 of this 2005 Act become operative on January 1, 2006.

SECTION 21. This 2005 Act being necessary for the immediate preservation of the public peace, health and safety, an emergency is declared to exist, and this 2005 Act takes effect on its passage.

Passed by House August 2, 2005

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Chief Clerk of House

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Speaker of House

Passed by Senate August 4, 2005

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President of Senate

Received by Governor:

........................M.,..., 2005

Approved:

........................M.,..., 2005

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Governor

Filed in Office of Secretary of State:

........................M.,..., 2005

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Secretary of State

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