Oregon Department of Transportation

State Radio Project

State Radio Project

Legislative Report
December 2012

Oregon Department of Transportation
State Radio Project
Legislative Report, December 2012

I – Project Update

The Oregon Department of Transportation's Major Project Branch continues to advance the State Radio Project and to plan for future stages. Partnership obligations and narrowbanding are on track, while planning and engineering for microwave and the trunked radio system are progressing. To address the increase in cost estimates due to challenges encountered over the past 17 months, the project management team has developed a range of cost options, from completing the original scope to completing the project within the existing budget.

Progress

- The schedule for completing the remaining non-grant partnership obligations has been negotiated with Klamath County and the Southwest Seven. The completion of work on the last five sites will occur next summer to avoid potential weather complications. This revised timing meets the schedule needs of the radio project and its partners for installing and testing the microwave and radio equipment.

- All phases of narrowbanding continue on schedule to support completion by Nov. 1, 2013, the extended deadline granted by the Federal Communications Commission's acceptance of the project's waiver request. Narrowband repeaters have been installed at all existing sites, and infill repeaters are being installed at additional sites as site improvements are completed. The office remote installation plan is complete. Substantial cost savings will be realized by repurposing single-band mobile radios from Oregon State Police vehicles as office remote receivers in eastern Oregon. Multi-band radios will still be purchased for high-traffic areas in western Oregon. Mobile and portable radio deployment has continued successfully on the revised schedule. ODOT deployment will be complete by the end of the year, and OSP deployment will begin in December and continue through May 2013. The transition from wideband to narrowband is planned to begin in June 2013 and progress through geographic sub-areas of the state, concluding before the waiver deadline.

- The project continues a detailed, segment-by-segment design of the microwave system. A baseline design for the new statewide microwave system is complete.
    - The project is developing a plan with the vendor to redeploy 30-plus hops of microwave equipment purchased by the previous OWIN program and has held successful planning discussions with suppliers to purchase and install approximately 50-plus hops to support installation over the next two years.

- The radio project has approved and accepted a preliminary baseline design for a statewide trunked radio system and a detailed design for test bed, also known as Increment Zero, of up to eight sites in the Salem area.
    - Equipment for the test bed has been ordered.
        - Factory acceptance testing of the equipment is complete.
    - Site improvements for test bed sites are under way.

- "User readiness" initiatives preparing end users for the operation of the new system have been developed and implemented for OSP and the ODOT Maintenance Section.

- A State Radio System enterprise planning team is progressing well in developing the enterprise operations plan and interagency agreements.

Issues and Challenges
The issues and challenges the project has encountered are not inconsistent with those that large projects typically encounter. There will be continued adjustments, with the assurance that radio users will have a reliable radio system. The modernized system will be more robust and will provide users with more capability and overall functionality than the system it is replacing.

Budget
The radio project's current cost estimates forecast a potential $20 million budget overrun. To address this, the project has developed several cost options. These options are outlined in a separate report.

Communication Plans
A project strategy for communications with partners and users is complete. The plan identifies communication opportunities at project milestones and stakeholder liaisons (subject matter experts) to keep communications lines open and contact information updated.

A narrowband cutover communications plan framework is complete; the living document will evolve over the next nine months.

Cooperator Systems
Because other Oregon public safety communicators and cooperators are in various stages of narrowband compliance, coordination with them as the project transitions to narrowband operation is of the utmost importance. Every time a cooperator performs its own cutover, the ODOT/OSP Wireless Section must reprogram State Radio Project radios to communicate with that cooperator. To ensure a seamless transition of the radio project to narrowband operation, the project will provide cooperators with the plan and schedule in order that they can reprogram their radios to communicate with ODOT and OSP on the new narrowband frequencies.

Integrated Schedule
In July 2012 the project's independent quality assurance consultant, Public Knowledge, presented the project with a high risk finding for not having an integrated schedule and system architecture for the microwave and trunked systems in place. The project concurred with Public Knowledge's assessment. Due to the project's early emphasis on narrowbanding and grant-related partnerships work, management elected to delay planning and design of the microwave and trunked system components. The project is now addressing that need.

The integrated schedule with more than 8,000 activities is now being used by the project team to manage work. Schedule reports are being developed and refined to help monitor and manage overall project progress.

Site acquisitions and lease agreements are among the most challenging and time-consuming elements of the project. Any issues associated with these tasks have the potential to impact the schedule.

II – Project Status

Narrowbanding
With the Federal Communications Commission granting the project's waiver request extending the narrowband deadline to Nov. 1, 2013, the project is moving forward with its revised narrowband radio deployment schedule. The last of the mobile and portable deployments with OSP are scheduled in April 2013. The last of the ODOT and OSP office remotes are scheduled to be complete in May 2013, and narrowband cutover is scheduled to start in June 2013.

Sensitive to the operational areas of ODOT and OSP, the project will convert each operational area in its entirety to create a more consistent experience for the radio users. With the new FCC narrowbanding deadline, the project expects to complete cutover to narrowband in August or September 2013. The project is on a workable schedule now and is meeting anticipated delivery dates.

Repeater Installation
Existing repeater installations were completed prior to Aug. 31, 2012, as originally planned. Infill sites are needed to fill gaps in radio coverage that will occur with the transition from wideband to narrowband. The project has identified where infill sites will be necessary and how they will be delivered. Infill sites are proceeding according to the revised schedule and should be in place by June 2013. The budget issue and outcome relative to the site improvement budget could lead to a delay in delivery of infill site improvements.

Mobile, Portable and Office Remote Radio Deployment
In January 2012 the project experienced technical issues with the new Harris Unity radios; those issues resulted in suspension of the radio deployment. Management had previously identified new technology as a risk to the radio deployment.

- Harris' fix was ready in March 2012. It was rigorously tested for three months, and radio deployment resumed in June. As of the end of October, 1,792 mobiles have been installed and 1,438 handheld radios have been delivered on the revised deployment schedule.

- The installations continue on track with the revised schedule. ODOT installations will be complete in December 2012. OSP installations will be complete in May 2013.

Office Remotes
Office remote deployment is estimated to take three months and will be complete by May 2013. Approximately 143 office remote radios and 274 remote handsets are anticipated to be installed by state staff, providing a potential cost savings for the project.

Microwave and Trunked Systems

Integration Schedule and System Architecture
- A draft of the system requirements is in place, and staff is using an integrated schedule for the full trunked and microwave systems.

- The project is making significant progress in developing the overall system architecture.

- In the past 15 months, parts of the microwave system were deployed to meet partnership obligations.
    - The project accomplished this with the best information available, and project management believes the system is designed with adequate capacity for its projected use.

Trunked Radio System

Due to the sensitivity of this technology, the project is developing a trunked radio system test bed. The test bed comprises up to eight sites around Salem with two switch locations (Salem and Bend). ODOT has approved a Harris design of the test bed, and the project is moving ahead with building equipment for the test bed. The test bed equipment has undergone factory acceptance testing and is scheduled for delivery in early December.

Before the project can operate the trunked radio test bed or system, switches must be in place to control where the signals go. The project had arranged with the Oregon Department of Corrections to use their switches. However, a detailed evaluation revealed that upgrading the DOC switches would cost more that purchasing new equipment, so the project elected not to use them. Harris will deliver new switches to be installed in Salem and Bend in December 2012.

Harris will provide the land mobile radio trunked radio system. ODOT will be responsible for site improvements, microwave, consoles, control centers and the network that the trunked system will run on.

Procurement efforts for the network management systems and dispatch consoles are under way. Requests for Proposals are currently being developed with target advertisement in January 2013.

The project will meet its objective of having the test bed equipment in place by the end of 2012. It will then test the equipment to ensure it works as anticipated, and then conduct a six- to nine-month training period for the technicians.

The project has completed a preliminary system design; the cost option that is selected will determine the path forward for finalizing the system design:

- The design may no longer resemble a complete horseshoe up the Willamette Valley and down through Bend; the selected cost option will determine the final configuration.

- The project will proceed with its anticipated implementation schedule to deliver the site improvements that will support the trunked system.

- The project will begin installing the trunked system equipment through summer 2013.

- There will be a test period through winter 2013, with a target of having an operational trunked radio system in 2014.

The baseline design to replace the statewide microwave system is complete. Components of the microwave system design may change in order to support the trunked system design option that is selected.

The microwave deployment process is as follows:

- Deliver the site improvements.
- Install the microwave.
- Install the network equipment.
- Test the microwave and network equipment.
- Switch on the new microwave in that area.

Microwave will be installed in stages throughout the state per the integrated schedule.

Partnerships
In July 2011 the radio project made a commitment to satisfy its partnership and grant obligations. To deliver those commitments, the project developed a schedule that could be delivered on time, negotiated with local partners and the Oregon Office of Emergency Management, and was given flexibility on several challenging deadlines.

The project's grant-related partnership obligations needed to be completed by May 2012. The project met all of the grant obligations, commitments and deadlines; work on non-grant-funded partnership sites continues according to plan.

Interoperability
The State Interoperability Executive Council and its Partnerships Subcommittee have been working on drafting a legislative concept to further clarify governance for interoperability. It is the desire of some council members to move the SIEC out of ODOT and to expand the council's scope to address cellular broadband technology in response to federal legislation.

III – Governance and Consolidation

This is a summary on the progress made to establish the long-term state LMR governance of the State Radio User Group and the delivery of the radio project transition to the consolidated ODOT and OSP State Radio System.

Governance
The five partnering agencies (Oregon departments of Corrections, Forestry and Transportation; Oregon State Police; and Oregon Office of Emergency Management) have drafted an agreement framework and are collaboratively finalizing the master interagency agreement, using the agencies' established authorities to charter the SRUG as the "governance" of the multi-state LMR communication systems.

The SRUG will assume the responsibility of governing and directing state LMR policy, federal and state legislation, state standards, resolution processes, budget and future technology review to assure administrative and operational efficiencies, operability, interoperability and sustainability.

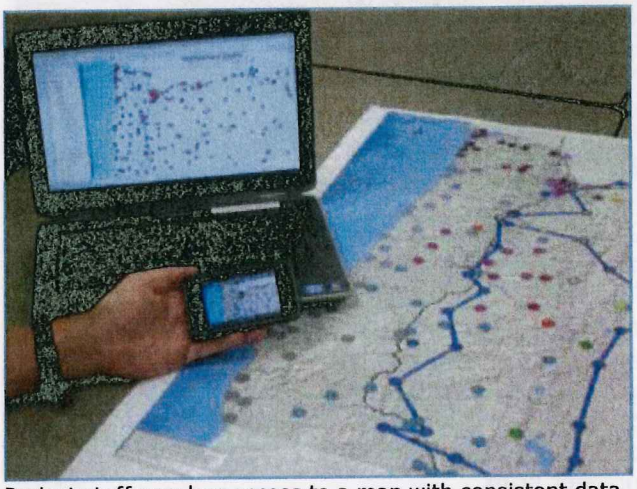
Budget and Cost Model Allocation
The SRUG has adopted subscriber equipment as the allocation model for the 2013-2015 budget and has directed the Cost Model Workgroup to draft the details into an intermediate IAA, begin drafting the 2015-2017 proposed budget, and begin defining the measurement details to allocate future cost based on actual level of services.

Transition to State Radio System Consolidation
The transition and consolidation alignment between ODOT and OSP and partnerships between the other agencies continues to make progress, the success of which is apparent in the signing of the IAA between ODOT and OSP that solidifies service-level expectations, asset transfers and other key components for ODOT and OSP during the build-out of the radio project. This IAA allows for executing site contracts more effectively and efficiently, saving time and costs.

PROJECT SUCCESS

INTERACTIVE PROJECT MAP PROVIDES RELIABLE DATA AND FLEXIBLE FORMATS

When the radio project's Site Review Committee first met in early 2011, each discipline and vendor was operating with working maps they had created independently. As a result, each had a slightly different "vision" of the project, which led to misunderstanding and confusion. Not only did the maps not contain the same information such as uniform site names, but the geographic positions (latitude and longitude) didn't always match up. The project team needed consistent and accurate information to accomplish their work.



Project staff now has access to a map with consistent data, available in formats that meet their needs.

Radio Project Manager Dick Upton established a single-source project map that all of the disciplines could use as their "road map" to the sites and the work to be done. That effort was undertaken by a small group who worked in the background to collect and verify data that could be displayed in one place: the State Radio Project map.

Over the course of the past year, Executive Assistant Tiffany Sturges worked with Principal Project Manager Clyde Raymer and Lled Smith, a GIS analyst with HDR Engineering Inc., to produce an essential work tool that allows everyone to operate from the same set of information, vastly improving team communications and planning.

The project disciplines went from having dozens of maps to one consistent map. The common points of reference provide a lot more confidence: Each site has a set name and exists in a constant location with fixed properties and features.

Data are vetted and consolidated into one source, with stringent quality control. Site information comes from the project team, its vendors and even from Oregon Bridge Delivery Partners; the joint venture's previous work on ODOT's OTIA III State Bridge Delivery Program yielded dividends beyond that program. Once data are approved by the Site Review Committee, they are added to the master site list and the map and are considered official, published data. The map is updated as needed, about once per month, and posted on a shared site that team members and partners can access.

The resulting "interactive geo-PDF" is a digital map with layers that show various components of the project. Users can turn elements on or off in the layers. For each layered view, information boxes show details such as timelines, expense account information, assigned deployment zone, geographic coordinates, radio project work to be done, appropriate work breakdown structure, changes made and completion status. Further, the map is searchable, saving time and effort in research, planning and discussions.

A strong project focus is to reduce the number of project site visits and optimize the amount of work that gets done during visits.

"Now we're more focused, which allows the design folks to let bids in areas efficiently," Raymer said. "We would not have been able to do this without consolidating all of the maps into one master with all of the information on it."

Having accuracy and correct data saves money and time. The project team can speak the same language and communicate with confidence to regulators and partners about project progress. The map is an accurate and reliable tool for those who are responsible for planning and

designing project components, especially since not all staff can physically visit a site.

The map also addresses several concerns recently expressed by quality assurance consultant Public Knowledge about internal communications and the project's lack of an integrated schedule. Additional benefits include:

- The same reliable, uniform data can be used to create different maps or reports, for example to show all radio project sites that might affect tribal lands or what sites touch lands of other agencies.
- Project staff can identify sites with lengthy permitting requirements so that acquisition can begin earlier for these sites.
- The map will be useful in the future, when the project is handed over for maintenance and operation of the system, and also for Oregon's prospective participation in a national public safety radio network.
- For project staff and partners, the maps are downloadable onto smart phones; staff in the field can see where they are on the PDF.
- With a clearer view of locations and site relationships, the project has an enhanced ability to use local contractors and put money into the community.

"The map and its data are accurate, constant and consistent," Raymer said. "As we become more organized, we build understanding of and support for the project among our partners and team members. And we realize the radio project is temporary, so we're building things like this map and the downloadable application for the future. The legacy we provide will save those who maintain and operate the radio system time and money, and allow them more information and control."

Executive Assistant Tiffany Sturges worked with Principal Project Manager Clyde Raymer (standing) and Lled Smith, a GIS analyst with HDR Engineering, to maintain the data for the interactive radio project map.

A static image of the project map is available under the Resources banner at www.oregon.gov/ODOT/HWY/StateRadioProject/. For security purposes, the interactive features and project component data can be accessed only by project staff.

PROJECT SUCCESS

OSP, RADIO PROJECT ALIGN AND PREPARE THROUGH 'READINESS' INITIATIVE

Most who are familiar with the State Radio Project recognize that it got a rough start. The project was transferred from the Oregon State Police to the Oregon Department of Transportation in 2010, and in 2011 was downsized from the $585 million OWIN program to the $210 million State Radio Project — yet ODOT still needed to meet looming federal narrowbanding and grant deadlines as well as address the needs of a failing statewide public safety communications system.

From left, ODOT Assistant Radio Project Manager Joe Messman, OSP Executive Assistant Stephanie Sciarrotta and OSP Major Craig Durbin have worked to ensure that troopers are ready to receive and use their new radios.

Typically, a project of this magnitude and impact would begin with developing a business case, identifying stakeholder needs, and getting approvals and agreements, then move on to contracting and project delivery on an orderly schedule. In the planning stages, determinations would be made about what the project would look like, how it would operate, how it would be governed and who would be responsible for what. Things like communications, finances, ongoing operations and maintenance would be identified and fleshed out.

Many of those things were missing or needed further development when the project was assigned to ODOT, according to Oregon State Police Major Craig Durbin, OSP's representative to the radio project.

"What OSP had was a state contract with Harris Corp. to provide our radios and services," said Durbin. "When the project went over to ODOT, there was a realization by both agencies that all the planning and the maturing of the business needed to be done at the same time the project had to continue to move forward, due to federal and funding deadlines."

The challenge was made even more difficult because the project not only had to integrate what had already been done with what needed to be done, but it had to significantly downsize while it was building and delivering the new radio system.

"It's been an incredible challenge, a huge lot of work, and the biggest challenge has been communication," Durbin said.

It was essential to have people — stakeholders, users and the Legislature as well as the other public safety responders of the state — understand the genesis of the project and its changing status. The project team needed to identify all the project planning parts that were missing and put them into place — the disciplines, respective skill sets and various project management elements — at the same time the project was being built.

"In order to do that, we very much had to have strong project management and expertise in place to help us," Durbin said. OSP reached out to the radio project and Tom Lauer, ODOT's Major Projects Branch manager. Assistant Radio Project Manager Joe Messman was assigned as lead for the "OSP Readiness" initiative, with support from OSP Executive Assistant Stephanie Sciarrotta.

"OSP's radios are their lifelines," said Messman. "That was a big eye-opener and a message I've been able to bring back to the radio project team. Early on, it seemed like this was just another project ODOT needed to deliver. It helps to provide a wider perspective to folks

who are used to playing a specific role in a construction project: Our radio staff now realizes that they are helping to protect and save lives. It brings more of an emotional element and intensifies the results."

For OSP, the planning and communicating elements were a place to stretch abilities and learn.

"Besides receiving the radios and getting them into officers' hands, we needed to look at our entire business and make sure we had a plan to integrate everything from how we were going to communicate, how to schedule the rollout, to what our needs would be with channel allocation, to trunking, to consoles and all those moving parts," Durbin said.

Through the Readiness initiative, OSP and radio project staff worked together to identify and prepare the different parts of the business organization the project would affect: business integration, communications, finance, radio deployment, training, operations, agreements and contracts. OSP established sponsors in each area and instituted formal project management. Sponsors were tasked with defining needs, priorities, barriers and resources for their discreet areas.

> "Overall, the Readiness initiative has been very successful in assuring that we're able to encompass all of our business needs and make sure that we have a strong plan for the integration. It has really opened up dialogue and communication."
>
> — OSP Major Craig Durbin

The Readiness team then looked at the radio project staff and identified corresponding functions: the people with whom the OSP sponsors needed to communicate on the project side for a successful rollout. Connecting people in corresponding functions was an enormous asset and aid to communications and easing integration.

"OSP as a whole is an outstanding partner and has been great to work with on this project. Once we identified the counter-dependencies, the connections began," Messman said. "We wanted to identify barriers and knock them down for the success of the project."

"That has helped to bring together the department to meet our common goals," Durbin said. "What has made this very successful is that we've had Joe, a person who not only had the skill set of formal project management but also was embedded within the radio project. He was able to take OSP's needs, desires and 'pain points' to the project team and work within the project to assure that those needs were met, and align the project to work with OSP."

For his part, Messman said he has enjoyed advocating for each organization, and that it has helped to push each along in certain areas. For example, ODOT's trouble-ticket process for reporting radio issues was not tight.

"ODOT/OSP Wireless Section has always been great at addressing issues, but the scope is much bigger now," Messman said. "We're going from OSP being a sole owner to being a customer. It's important to be transparent, to show the documentation of how their problems are being handled and processed, the steps along the way. We have tools and monitoring in place to track how we are doing in meeting their needs. That accountability is essential."

Both agencies continue to refine the process and to adjust on both sides of the fence. Together they have discovered areas of deficiency, be it in expertise, skill sets, personnel assigned or just things they had not thought of. Similar efforts have been initiated internally with the ODOT Maintenance Office to ensure crews are equally prepared for the changes that the radio project is ushering in.

"Overall, the Readiness initiative has been very successful in assuring that we're able to encompass all of our business needs and make sure that we have a strong plan for the integration," Durbin said. "It has really opened up dialogue and communication.

"It's only because there's been openness on both sides to continue to try to move this project forward that it's been able to work. Honestly, we're not all the way there yet. There's a lot of work to be done, but people are willing to continue to make that effort."

State Radio Project Goals and Objectives – Status Update

Project Objective	Progress Assessment	Impacts of Status	Mitigations Taken or Planned
Overall – Focused on repairs and modernization, the State Radio Project is replacing aging public safety communications systems statewide, upgrading the existing radio systems for the Oregon Department of Transportation and the Oregon State Police to create an integrated statewide network.	Although progress is slower than anticipated, an integrated ODOT and OSP system is progressing with forecast completion by March 31, 2015. Long-term operations and maintenance service level agreement discussions are under way. A dependence on funded FTE will need to be addressed when the project is in O&M phase.	Delays in individual components have impacted the schedule and costs.	Received Federal Communications Commission narrowbanding waiver that extends completion of that portion of efforts to Nov. 1, 2013. Initial foundational O&M service level agreement has been reached; longer term agreement discussions continue. Policy option package submitted to cover O&M.
Consolidation – Consolidate the ODOT and OSP wireless communications systems into a single unit and allow for shared efficiencies and integration between the four existing state systems.	Efforts to consolidate the ODOT and OSP systems into a single system is ongoing and is anticipated to be reached through a combination of intergovernmental and service level agreements and property transfers. Efficiencies from a reduced number of sites from combining OSP and ODOT equipment are occurring, with further reductions to occur. Oregon Department of Corrections, Oregon Department of Forestry and the Oregon Office of Emergency Management are also engaged in the project discussions.	Cost sharing models for service and participation, while taking longer due to service level and future revenue concerns, have arisen.	Initial foundational O&M service level agreement executed Oct. 30, 2012. Long-term cost sharing and agreement discussions continue.

State Radio Project Goals and Objectives – Status Update

Project Objective	Progress Assessment	Impacts of Status	Mitigations Taken or Planned
Infrastructure – Repair or replace critical components of Oregon's deteriorating state radio network and extend the useful life of the existing ODOT and OSP wireless communications systems.	Due to the long-term nature of deferred maintenance that has occurred to the systems and the upgrades needed, costs have been running higher than anticipated. Narrowbanding has required additional time due to technology challenges.	Fewer repairs and shorter life cycle replacements may be selected on a case-by-case basis. This will lead to a greater cost assumption once the system moves to O&M for continuing repairs and upgrades.	Prioritization of repairs and replacement of components is occurring to reduce costs, which are higher than originally anticipated.
Narrowbanding – Comply with the approved Federal Communications Commission waiver deadline to transition state radios from wideband to narrowband transmission and position for future narrowbanding requirements.	Installation and training has resumed: 3,230 mobiles and portables have been installed/issued of the 5,116 estimated total through October 2012. Mountaintop repeaters – The first phase of work at existing sites has completed installation. Infill sites remain; 138 of the 160 estimated sites have repeaters installed through October 2012.	Delay due to spring suspension of mobile installations caused schedule slippage.	Received FCC waiver that extends narrowbanding completion efforts to Nov. 1, 2013.
Interoperability – Provide limited, local interoperability for public safety agencies and lay the foundation for expanded and improved interoperability in the future. • The project will build a trunked, two-way radio system. • The radio project has limited budget for	Still in the process of developing the issue with the SIEC, with action anticipated after moving to digital narrowband.	Interoperability efforts do not impact the core project schedule.	Continuing discussions with the SIEC.

State Radio Project Goals and Objectives – Status Update

Project Objective	Progress Assessment	Impacts of Status	Mitigations Taken or Planned
interoperability equipment and is working through the State Interoperability Executive Council and the State Radio User Group to foster interoperability between state and local systems.			
Partnerships – ODOT will fulfill partnership obligations and commitments of the OWIN program and is working to meet deadlines for federal Public Safety Interoperability Communications grants. • Partnership agreements reduce cost by sharing operations, maintenance and equipment. • The budget allows the state to complete its share of projects already started by local partners.	All obligations where there were federal grant deadlines have been met. In a few instances, a Plan B was approved by the federal funding agency to allow the obligations to be completed after the grant deadline. Some obligations have been removed and others have been added as the state and partners have worked collaboratively to respond to site challenges while working to meet partner needs.	Federal grant obligations have been met. Of the original budget of $10.4 million, $6.2 million is spent to date. The remaining funds are fully budgeted to complete remaining work that will complete the obligations to partners.	Agreements that allow Klamath County partners to fulfill federal funding obligations have been executed and will allow work to progress as external delays are resolved. Agreements that allow Southwest Seven partners to fulfill federal funding obligations while continuing to meet their deadlines are with the local partners for acceptance. Temporary arrangements have been completed in northwest and north central Oregon that provide connectivity for the partners while the state continues to work toward meeting obligations that ensure long-term functionality of the system.

State Radio Project Goals and Objectives – Status Update

Budget – Funding for the radio project does not involve any new money in the current biennium. The project is proceeding with funds reduced from those previously authorized. For the 2011-2013 biennium, the project target is $108.5 million. When added to OWIN funds spent and future anticipated funding, the budget totals $209.9 million from inception. The work to address Oregon's critical microwave needs will be split over two biennia, 2011-2013 and 2013-2015, to conserve funding.	Current budget: $209.9 million Forecast estimate through Oct. 31, 2012: $223.2 million Expended through July 31, 2012: $37.5 million	Budget overrun projected.	Providing four cost options for consideration. See separate report for full discussion.

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FirstNet
In February, President Obama signed Public Law 112-96, the Middle Class Tax Relief and Job Creation Act of 2012. Title VI of the law, entitled Public Safety Communications and Electromagnetic Spectrum Auctions, includes provisions to:

- Fund and govern the National Public Safety Broadband Network (NPSBN).
- Reallocate the 700 MHz D-Block spectrum to public safety.
- Authorize the Federal Communications Commission to conduct incentive auctions to raise $7 billion for building and managing the new network.
- Establish within the Department of Commerce's National Telecommunications and Information Administration (NTIA) the First Responder Network Authority (FirstNet) to oversee network planning, construction and operation.

FirstNet must consult with state, local and tribal jurisdictions through a single state-designated officer or governmental body regarding the distribution and expenditures of funds to carry out its responsibilities. In Oregon, the Oregon Department of Transportation is acting as the interim public safety broadband office to interact with FirstNet. Efforts to date are focused on developing a working business plan and identifying metrics from current public safety broadband usage. Metrics on public safety broadband use show:

- How users intend to use the broadband network.
- The most desired applications.
- The biggest gaps between desired and implemented applications.
- The biggest barrier to implementing or using wireless data.

Next Steps
The act provides $135 million nationwide to support planning and implementation efforts to prepare for NPSBN implementation. States are required to apply to NTIA for grants. State, regional, tribal and local jurisdictions will identify, plan and implement the most efficient and effective way for their jurisdiction to use and integrate the infrastructure, equipment and other architecture associated with local implementation of the network.

Unless waived by the NTIA, the grants will require a 20 percent match from the state and are contingent upon the office or single designated point of contact being assigned by the governor's office. The anticipated grant amount for Oregon is $2 million to $3 million.

ODOT is preparing information in coordination with public safety stakeholders, the State Interoperability Executive Council, the Oregon Department of Administrative Services Chief Information Officer and the Oregon Broadband Advisory Committee to ensure the governor is in position to work with FirstNet. FirstNet will present the governor with a detailed implementation plan for use by public safety officials in Oregon; the time estimate for presenting the plan is 2015. This plan will indicate the number of communications sites used, location of the system, cost of the system and recurring cost required by users of the NPSBN. Key national and Oregon project dates are attached.

The technical architecture design for the FirstNet Nationwide Network (FNN) was presented at the initial FirstNet meeting in September. The FNN design will use commercial cellular infrastructure to support mobile data requirements for public safety.

As a result of this presentation, FirstNet sent a notice of inquiry asking for comments on the architecture design. ODOT submitted comments on behalf of the state of Oregon and participated in collaborative efforts as joint commenters with the Early Builders Advisory Council, comprised of former waiver jurisdictions, and a western states representation of Idaho, Montana, Nevada, Oregon, South Dakota, Utah and Wyoming. The NTIA will post remarks on the comments, and Oregon will use this feedback to help prepare the state's implementation grant.

NTIA representatives at a national conference last month said that the state implementation grant will have two phases. Phase I will focus on stakeholder engagement development, and Phase II will be directed at state, local and private infrastructure resources available for use by FirstNet. The next FirstNet board meeting is in December.

Status of A-Block License
As a result of the creation of FirstNet, Oregon's spectrum lease for 700 MHz (A-Block) licensing authority expired in September 2012. This spectrum has been assigned to FirstNet by the FCC for use with the D-Block spectrum to build out the NPSBN. In the future, Oregon will work with FirstNet for the use of 700 MHz frequency spectrum for public safety communications.

Land Mobile Radio and Broadband
Wireless broadband does not currently meet the requirements for emergency response voice communications. Land mobile radio (LMR) does, and is projected to be used by public safety officials in Oregon and nationally for many years to come.

FirstNet will begin coordinating its plan with states in 2015. Projections for completion of the first phase of the NPSBN is 2017 or beyond. LMR systems and the State Radio Project efforts are critical elements for public safety officials. Public safety broadband is designed to complement current LMR voice services, not replace them.

Broadband is a national effort by the federal government to improve public safety communications, not an Oregon-based initiative. The State Radio Project is working to get the best business deal for Oregon — for all state public safety officials, not just state agencies.

Other agencies within Oregon and the region are moving forward with LMR system upgrades:

- City of Portland — $45 million radio replacement project.
- City of Salem — $15 million radio replacement project.
- Deschutes County — anticipates replacing current radio system in 2013.
- City of Seattle — contract proposal later this year for more than $200 million to replace current radio system.

These efforts primarily support traditional LMR systems for public safety officials. It should be noted that 4G services available today from commercial services do not provide 4G voice; the voice portion used with 4G phones is actually 3G. The 4G portion only works with fast data on smart phones, and the same consideration applies to the public safety broadband setup.

BACKGROUND

National

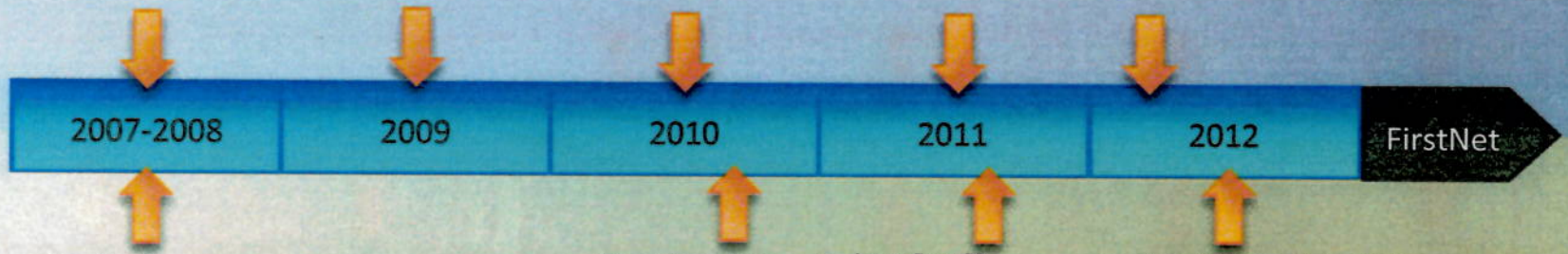
- The Public Safety Spectrum Trust (PSST) is formed to develop opportunity for PS broadband use nationwide

- The FCC meets with public safety leaders to strategize on how to implement a PSBN using FCC spectrum
- The FCC establishes the National Broadband Plan, for PS use of the Public Safety BB Spectrum (PSBB-Block)

- PSBB-Block waiver by FCC a Landmark decision for Public Safety – the 700MHz spectrum has market value of $2.7B

- National BB initiatives focused on securing additional 10MHz of 700MHz spectrum for Public Safety use
- D-Block spectrum is also valued at $2.7B

- **Feb 22** - D-Block Legislation signed creating NPSBN under NTIA through FirstNet governance



OREGON

- Broadband is seen as a solution to mitigate future mobile data concerns raised by stakeholders and industry
- Broadband would support user requirements unsatisfied by OWIN mobile data system capabilities

- Officials from ODOT, OSP, Corrections, & Forestry along with SIEC applied for waiver to use PSBB Block to build LTE Broadband system
- Unsuccessful BTOP $150M grant application

- **June** - Four OR representatives attended waiver jurisdiction meeting at the White House
- **Dec** - ODOT Office of Innovative Partnerships Program (OIPP) issues RFI-EI to industry to develop PSBN public-private partnerships

- **May** - RFI-EI complete; ODOT and stakeholders suspend broadband pilot project to align OR efforts with FirstNet
- **May** – OEC completes PS broadband survey to identify future Oregon wireless BB needs
- **May** - ODOT begins PSBB Business Plan development

Public Safety Broadband Network
2014 – 2015 and beyond

National

- **2H** – FirstNet completes development process for Supplier RFP
- **1Q** – FirstNet informs States of deployment plan and funding
- **1 Q** – Initial funds from spectrum auctions available
- Spectrum Auctions complete

OREGON

90 Days After FirstNet Plan/Funding Release – Determine decision to Opt In or Opt Out

If Opt Out - Develop alternate plan for FCC approval within 180 days

Revised State Radio Project

Business Plan Summary

The revised State Radio Project will rebuild the existing Oregon Department of Transportation and Oregon State Police radio systems to create an integrated statewide network. The project will partner with local public safety agencies, allowing for integration between state and local systems as envisioned in the original Statewide Interoperability Executive Council (SIEC) plan. The revised project is significantly scaled back in scope and cost from its predecessor, the old Oregon Wireless Interoperability Network. In line with the Governor's budget, ODOT is moving forward with a new mandate that will:

- Repair the critical components of Oregon's deteriorating state radio network.
- Provide the core foundation for a statewide, modern, reliable, state-of-the-art, Federal Communications Commission-compliant public safety radio system.
- Require no new money this biennium and will use existing financing from capital construction bonds already authorized.

Engineering and physical assets from the old OWIN program will not go to waste. ODOT will use this work and equipment to accomplish the goals of the revised State Radio Project.

The project's 2011-2013 biennial budget of $121.4 million consists of existing funds. The budget provides for repayment of an $8 million short-term loan from Oregon State Treasury in 2007 used to help get the project up and running in advance of bond proceeds. The $121.4 million budget does not include an additional $43 million to complete the microwave system upgrade scheduled for the next biennium.

The revised State Radio Project will upgrade the microwave network; comply with federal narrowbanding requirements; build a trunked, two-way radio system; and lay the foundation for limited interoperability.

Narrowbanding – *$49.2 million, 2011-2013 biennium*

- The FCC requires a shift from wideband to narrowband transmission by Jan. 1, 2013.
- The budget expense pays for a narrowband-compliant, digital, two-way radio system for ODOT and OSP, including necessary repairs to buildings and associated components to make the system function reliably.
- Local agencies may choose to buy new radios and add extra options to their systems. Local partners will not be obligated to purchase equipment they do not require.

Microwave upgrade – *$43 million, 2011-2013 biennium; $43 million, 2013-2015 biennium*

- Oregon's microwave radio system, which connects central dispatch to remote areas of the state, is obsolete and failing at an increasing rate. Catastrophic failures are likely, and replacement parts are increasingly unavailable.
- The budget expense will upgrade and modernize the state microwave system. The work to address Oregon's critical microwave needs will be split over two biennia, 2011-2013 and 2013-2015, to conserve funding.
- Upgrades to the microwave transport system are necessary; addressing the narrowband requirement will not provide the updates required for the system to maintain successful operation.

Trunked radio system – *$8.5 million, 2011-2013 biennium*

- Two-way trunked radios manage congested airwaves, preserve Oregon's use of the 700 MHz band, prevent signal interference and provide opportunities for future system-of-systems coordination with local government public safety radio systems.
- A trunked radio system allows simultaneous conversations without waiting for an open channel.
- The budget pays for equipment to establish two-way trunked radio in the Willamette Valley and from the Columbia River south to Deschutes County.
- Conventional coverage will be provided statewide via narrowbanding by Jan. 1, 2013.
- As the radio system is expanded in the future, greater interoperability can be achieved across the state.

Limited interoperability – *$2.3 million, 2011-2013 biennium*

- An interoperable system allows public safety providers from many jurisdictions to connect with one another immediately.
- This system will provide limited, local, tactical interoperability among agencies using frequencies set aside by the federal government specifically for this purpose.
- The budget pays for a small but important boost in interoperability for public safety agencies and lays the groundwork for future expansion.
- Interoperability is accomplished through tower-top repeaters.

Partnerships – *$10.4 million, 2011-2013 biennium*

- Partnership agreements reduce costs by sharing operations, maintenance and equipment.
- Oregon will meet all obligations to local agencies that have expended money contingent on state participation.
- The budget allows the state to complete its share of projects already started by local partners.

Governance

- The project will follow strict ODOT protocols for expenditures, contracts and staffing decisions.
- ODOT will oversee all project operations after completion.
- The Oregon Interagency Wireless Communications Advisory Council, chaired by ODOT, will oversee state policies and deliver a complete strategy to the Legislature by February 2012.

Oversight

- The project will issue monthly progress reports for internal and external stakeholders.
- The project will report monthly to the Oregon Transportation Commission and the Superintendent of the Oregon State Police.
- The project will report quarterly to the Legislative Radio Project Work Group.
- A performance audit will be conducted by ODOT or the Oregon Audits Division.
- A full project report will be provided during the February 2012 legislative session.
- The SIEC will provide policy recommendations, advice and leadership related to interoperability.

Future technology

- The technology in the radio systems offers local control; open, non-proprietary architecture; and equipment that can be upgraded to meet the needs of local users. The radio system will not be limited to a single vendor for any equipment or upgrade.
- The equipment is flexible, up-to-date and should meet Oregon's needs for the foreseeable future.
- No new technology yet challenges the pre-eminence of the land mobile two-way radio, which is still used by virtually all public safety organizations worldwide.

Financial Summary

Cost Summary
(in millions)

OLD OWIN PROJECT		
Old OWIN Project		
Spending through 6-30-2011	$	45.00
Remaining Old OWIN Obligations		
Treasury Loan	$	8.00
Partnerships	$	10.40
Subtotal	**$**	**18.40**
Total Old OWIN Project	**$**	**63.40**

REVISED STATE RADIO PROJECT		
2011-2013 Biennium		
Narrowbanding	$	49.20
Microwave Modernization	$	43.00
Trunking	$	8.50
Interoperability	$	2.30
Subtotal	**$**	**103.00**
2013-2015 Biennium		
Microwave Modernization	$	43.00
Total Revised State Radio Project	**$**	**146.00**

BIENNIAL COST BREAKDOWN		
2011-2013 Biennium Expenditures		
Old OWIN Project Obligations		
Treasury Loan	$	8.00
Partnerships	$	10.40
Subtotal	**$**	**18.40**
Revised State Radio Project	$	103.00
Total 2011-13 Biennium Budget	**$**	**121.40**
2013-2015 Biennium		
Microwave Modernization	$	43.00
Total 2013-15 Biennium Budget	**$**	**43.00**

TOTAL COST SUMMARY		
Old OWIN Project		
Old OWIN Spent	$	45.00
Remaining Old OWIN Obligations	$	18.40
Subtotal	**$**	**63.40**
Revised State Radio Project		
2011-2013 Biennium	$	103.00
2013-2015 Biennium	$	43.00
Subtotal	**$**	**146.00**
Total Program	**$**	**209.40**

Financial Summary

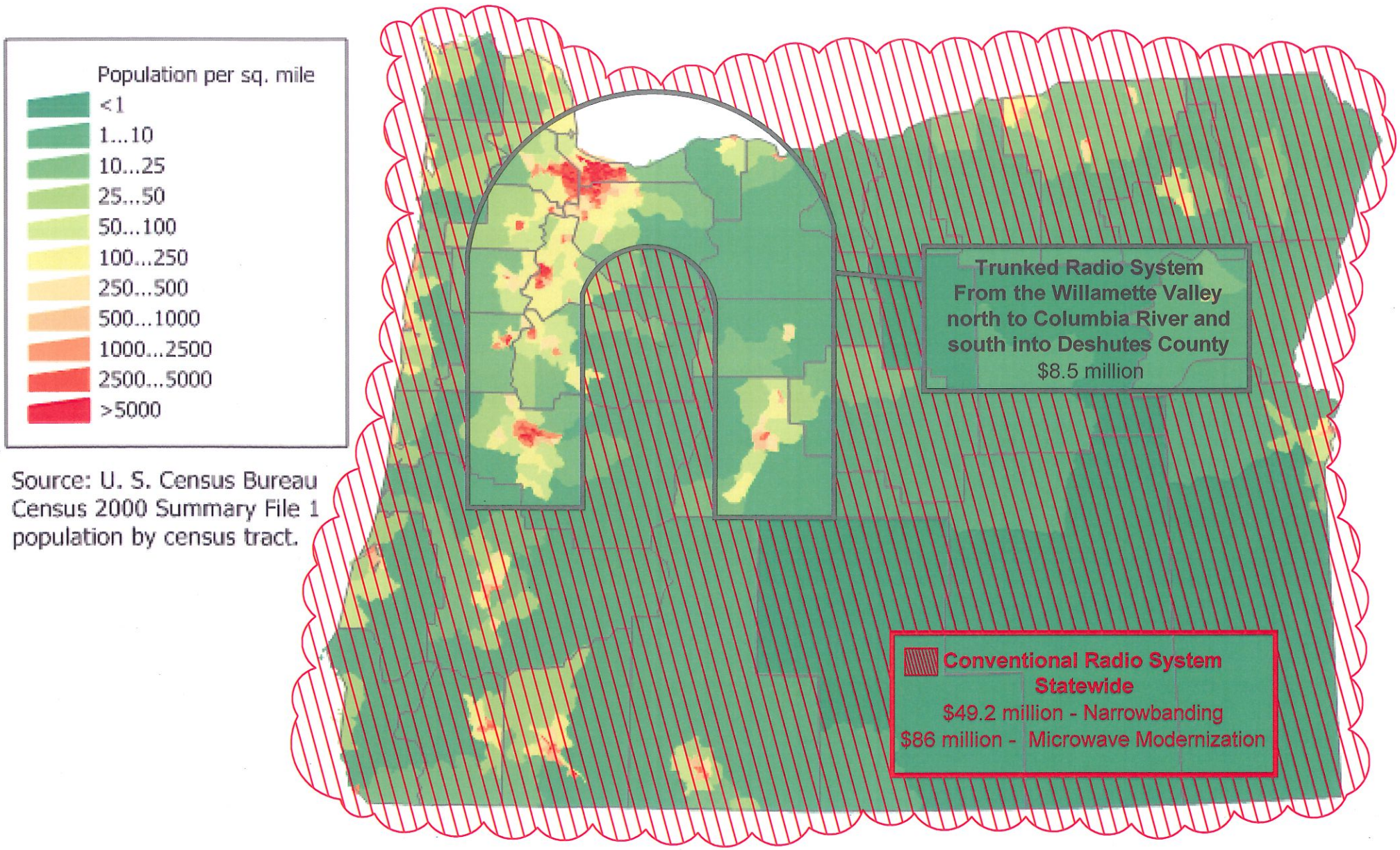
Funding Summary
(in millions)

FUNDING SUMMARY	Funding	Source	Available Start	Spending	Available End
Through 2009-2011 Biennium					
Capital Construction Bonds	$ 75.49	General Fund			
General Obligation Bonds	$ 19.26	General Fund			
Subtotal	**$ 94.74**		**$ 94.74**	**$ 45.00**	**$ 49.74**
2011-2013 Biennium	$ 74.50	Highway Fund	$ 124.24	$ 121.40	$ 2.84
2013-2015 Biennium	$ 40.16	*	$ 43.00	$ 43.00	$ -
Grand Total	**$ 209.40**			**$ 209.40**	**$ -**

** General Fund $9.956 and Highway Fund $30.2 to establish a 50/50 split.*

ESTIMATED BOND PAYMENTS	Funding	Source	2011-2013 Payment	2013-2015 Payment	
Issued Through 2009-2011					
Capital Construction Bonds	$ 75.49	General Fund	$ 11.88	$ 10.59	
General Obligation Bonds	$ 19.26	General Fund	$ 4.85	$ 4.85	**
Subtotal	**$ 94.74**		**$ 16.73**	**$ 15.44**	
Issued in 2011-2013					
Highway Revenue Bonds	$ 74.50	Highway Fund	$ 12.15	$ 15.30	**
Subtotal	**$ 74.50**		**$ 12.15**	**$ 15.30**	
Issued in 2013-2015					
General Obligation Bonds	$ 9.96	General Fund	$ 1.48	$ 1.48	**
Highway Revenue Bonds	$ 30.20	Highway Fund	$ 4.48	$ 4.48	**
Subtotal	**$ 40.16**		**$ 5.96**	**$ 5.96**	
Total General Fund	**$ 104.70**		**$ 18.20**	**$ 16.92**	
Total Highway Fund	**$ 104.70**		**$ 16.63**	**$ 19.78**	
Grand Total	**$ 209.40**		**$ 34.83**	**$ 36.70**	

*** Bond payments are estimates.*


Population per sq. mile
<1
1...10
10...25
25...50
50...100
100...250
250...500
500...1000
1000...2500
2500...5000
>5000
Source: U. S. Census Bureau
Census 2000 Summary File 1
population by census tract.
Trunked Radio System
From the Willamette Valley
north to Columbia River and
south into Deshutes County
$8.5 million
Conventional Radio System
Statewide
$49.2 million - Narrowbanding
$86 million - Microwave Modernization

STATE RADIO PROJECT
Partnership Communications and Site Status

Site Name	Partner Agency and Contact	Recent Discussion Topics		Current Site Status	Total ODOT Obligation ($)	Estimated Work by Partner Agency ($)
Chemical Stockpile Emergency Preparedness Program (CSEPP) Communications Network ***Counties: Morrow, Umatilla, Benton (Washington State) and Klickitat (Washington State)***						
Boardman	Umatilla/Morrow Radio and Data District (UMRADD) Mike Roxbury, Chair, UMRADD and Umatilla City Fire Chief Shawn Halsey, Director, UMRADD Ray Denny, Confederated Tribes of the Umatilla Indian Reservation (CTUIR) Chris Brown, Oregon Emergency Management Rodney Boast, FEMA Jerry Ekker, CRITFE Steve Brown, Klickitat County Tom Warnock, FEMA Headquarters LTC Kris Perkins, Army Chemical Depot Commander Bill Howard, Umatilla County Casey Beard, Morrow County Marc Rogelstad, City of Boardman Fire Chief Kathy Lieuallen, Umatilla County 9-1-1 Dan Coulombe, City of Hermiston Fire Chief Ken Matlack, Morrow County Sheriff	Update of project status; discussion of chemical stockpile disposal and close-out issues, including transfer of communication equipment and sites; and partner responsibilities on newly developed sites		ODOT has completed construction. Currently installing county microwave equipment. ODOT to install state microwave equipment.	$ 5,000	$ 6,600,000
Jordan Butte				ODOT has completed construction. Currently installing county microwave equipment. ODOT to install state microwave equipment.	$ 189,000	
Cabbage Hill				No further ODOT action required.	$ 5,000	
Coombs Canyon				No further ODOT action required.	$ 5,000	
Mount Weston				ODOT to construct FEMA site by Sept. 1, 2011.	$ 986,926	
Pendleton East				ODOT to install county microwave equipment.	$ 340,817	
Pendleton Justice Center				Construction complete.	$ 5,000	
Sillusi (Benton Co, WA)				ODOT to install county microwave equipment.	$ 244,700	
Golgotha Butte (Klickitat Co, WA)				No further ODOT action required.	$ 5,000	
Juniper (Klickitat Co, WA)				ODOT to install shelter and generator on existing site.	$ 229,749	
Roosevelt (Klickitat Co, WA)				No further ODOT action required.	$ 106,830	
				CSEPP Communications Network Subtotal	**$ 2,123,022**	**$ 6,600,000**
Lincoln County Sheriff Communications Network						
Cape Perpetua	Lt. Curtis Landers, Lincoln County Sheriff's Office	ODOT and county lease agreement.		ODOT to build site, including tower, shelter and generator, with $400,000 county grant funds.	$ 648,737	$ 1,200,000
Euchre Mountain		ODOT will install new tower.		ODOT to construct tower. County has paid for microwave; installation not complete.	$ 651,126	
Table Mountain		Co-location on existing tower.		County PSIC pays for backbone microwave.	$ 78,976	
				Lincoln County Sheriff Communications Network Subtotal	**$ 1,378,839**	**$ 1,200,000**
Northwest Coast Network ***Counties: Clatsop, Tillamook and Pacific (Washington State)***						
Astoria PD/FD	Jeff Rusiecki, City of Astoria Police Brad Johnston, City of Astoria Police Gene Strong, Clatsop County Paul Williams, Clatsop County Sherriff's Office Dale Karmath, Seaside Fire Chief Lynn Smith, Seaside 9-1-1 Cleve Rooper, Cannon Beach Fire Chief Doug Kettner, Tillamook 9-1-1 District	Spur site to link to backbone.	Local PSIC grant funds paid for three microwave links, and ODOT to cover infrastructure, construction and improvements, including three on-ramp connections to backbone from Seaside 9-1-1, Camp Rilea and Astoria 9-1-1.	ODOT to provide and install microwave or provide reimbursement to county if necessary.	$ 105,000	$ 2,000,000
Camp Rilea		Spur site to link to backbone will be paid by Clatsop County. ODOT provides $88,000 match for U.S. Homeland Security grant to improve site.		ODOT to pay match of $83,000 and $5,000 administrative expense.	$ 88,000	
Nicolai				County to pay for microwave.	$ 835,199	
Seaside 9-1-1		Spur site to link to backbone.		ODOT to provide and install microwave or provide reimbursement if necessary.	$ 105,000	
Tillamook Head				County to pay for backbone microwave.	$ 249,435	
Wickiup				County paid for site construction and microwave. ODOT paid $92,000 match.	$ 37,384	
Megler (Pacific Co, WA)	Hancock Insurance (Private Property Owner)	ODOT and property owner will re-start lease agreement once program funding guidance is provided.		ODOT to construct site, including tower and shelter. County to pay for microwave.	$ 623,419	
				Northwest Coast Network Subtotal	**$ 2,043,437**	**$ 2,000,000**

STATE RADIO PROJECT
Partnership Communications and Site Status

Site Name	Partner Agency and Contact	Recent Discussion Topics	Current Site Status	Total ODOT Obligation ($)	Estimated Work by Partner Agency ($)
Northwest Path Network ***Counties: Yamhill, Multnomah and Cowlitz (Washington State)***					
Chehalem	Kathy George, Yamhill Co Commissioner Murray Paola, Yamhill County	Periodic project updates.	ODOT to install tower, shelter, generator and generator shelter.	$ 875,504	$ 800,000
Council Crest	Karl Larson, City of Portland	Program status and Council Crest co-location agreement.	No construction required.	$ 386,272	
Green Mountain (Cowlitz Co, WA)	Steve Watson, Columbia County 9-1-1	ODOT discussed easement agreement language with private property owner.	ODOT to construct site and install equipment. *NOTE: County built Clatskanie and ODOT to build Green; each party to use both sites.*	$ 787,867	
			Northwest Path Network Subtotal	**$ 2,049,643**	**$ 800,000**
Southwest Seven Communications Network ***Counties: Coos & Lane***					
Bennett Butte	Ray Ganner, SW7	Construction complete. No further action required.		$ 15,760	$ 1,200,000
Dead Mountain	Louis Gomez, City of Oakridge	Provide status of PSIC grants	Oakridge PSIC pays $147,000 of site cost.	$ 597,642	
Walker Point	Jeff Johnson, Fire Chiefs Association Kristi Wilde, Lane Communications District	Provide J. Johnson with zoning and building permit status. Provide K. Wilde with schedule update.	ODOT to build site with county grant dollars, $100,000.	$ 480,421	
			Southwest Seven Communications Network Subtotal	**$ 1,093,823**	**$ 1,200,000**
Klamath County Communications Network					
Swan Lake Point	Rod Dailey, Klamath County Sheriff's Office Stan Strickland, Klamath County Public Works John Spradley, Klamath County Fire District John Ketchum, Keno Fire District	ODOT has verbally committed to providing two dual-feed microwave dishes to KCSO for connection to Applegate. These dishes are required for KCSO to meet its PSIC obligations.	ODOT to provide and install microwave County to provide antennas and radios upon completion of microwave installation.	$ 369,113	$ 2,500,000
Applegate		ODOT has verbally committed to providing four dual-feed microwave dishes to KCSO for connection to Swan Lake and to Walker. These dishes are required for KCSO to meet its PSIC obligations. KCSO requires a location to mount antenna for KCSO dishes.	ODOT to provide tower and microwave County utilizing existing commercial tower for temporary solution; waiting for ODOT to complete permanent tower.	$ 886,468	
Odell Butte		ODOT has verbally committed to provide an antenna support structure (small 30'-40' monopole) at the Angel Mountain facility for KCSO, a microwave dish required for the path to Walker Mountain. This dish is required for KCSO to meet its PSIC obligations.	ODOT to provide monopole tower. County to provide antenna for path to Walker; waiting for ODOT to complete tower.	$ 167,677	
Walker Mountain		ODOT has verbally committed to providing shelter and tower space for KCSO to meet its PSIC obligations. ODOT has verbally committed to provide two dual-feed microwave dishes for the route to Applegate.	ODOT to provide tower and shelter. County to install antennas; waiting for ODOT to complete tower.	$ 320,558	
			Klamath County Communications Network Subtotal	**$ 1,743,816**	**$ 2,500,000**
			GRAND TOTAL	**$ 10,432,580**	**$ 14,300,000**

Oregon Department of Transportation
State Radio Project

Reliability Enhancements to the ODOT/OSP Radio System

The State Radio Project has funding to significantly increase the reliability of the state's existing VHF conventional system and to install a new trunked radio system in the major population areas of the state.

Improvements to power sources
Loss of commercial power is the primary cause of extended public safety radio outages, due largely to the wind storms, snow storms and deep freezes that occur in Oregon. Funding for the conventional VHF radio system includes new repeater radios at each mountaintop site and new batteries at 102 of the 176 sites to provide a minimum of 48 hours of battery backup. Funding also provides for about 100 new propane generators, and about 70 existing generators can be reused to augment the batteries for an additional 14 days. This minimum standard allows these remote radio sites to operate for at least two weeks in the absence of commercial power.

Seismic upgrades
Project funds also include the repair or replacement of towers to ensure they meet local structural load and seismic requirements, and communications building repair or replacement to allow for an additional 20 years of service. The effect of an earthquake on a site depends on the severity, length and type of quake. Site improvements have increased reliability by adding seismic bracing to all 137 buildings that are being upgraded and to the 39 new buildings. The buildings are now compliant to Seismic Design Category D. Radio project funding has provided for the replacement of 52 towers and for the upgrade of 81 towers that were more vulnerable in an earthquake; the systems have been designed to the appropriate Telecommunication Industry Association's TIA-222 earthquake loading standard.

Partnerships
Many of the sites have been developed or upgraded in cooperation with federal and local partners. These sites have dramatically increased the reliability of the partners' radio systems as well as that of the state. In many cases, the partnerships have collaborated for the procurement, installation and maintenance of a shared system. These shared microwave radios have greatly enhanced reliability and survivability of both the state's and the partners' system.

Improved access roads
As part of the upgrades, several communication sites' access roads have been upgraded or repaired to allow for four-wheel-drive vehicle access for more months during the year. This allows technicians to more quickly get to the site when there is a failure, enabling repairs to be made in a timely manner and thereby increasing the reliability of the system.

Microwave redundancy
The microwave system, which connects the VHF radio traffic at mountaintop sites to the various dispatch centers throughout the state, is being upgraded to a digital system. To date, approximately 44 sites of about 113 have the new digital microwave equipment installed and operating. The new equipment is being installed with multiple levels of redundancy, and the microwave backbone (main corridor) of the system will have "loop redundancy." If a microwave

hop fails, it will not affect the other sites, and the signals will be rerouted. This redundancy will greatly minimize any service-affecting outages. On the spur hops (sites that are “tentacles” from the backbone) there is “hot standby” protection: If one radio fails, the second “hot” microwave radio will take on the traffic of the failed microwave radio within milliseconds. The project funding has greatly increased the reliability and survivability of the new microwave system.

Network connectivity
Through coordinated grant and partnership efforts, the state microwave network is the foundation piece allowing the state and several local and federal systems to connect to their 911 or operations centers, and most importantly to those outside of their county or local boundaries. This capability is essential in a disaster, when commercial phone systems fail; the state microwave system has a higher reliability factor and enables some communities without commercial services to get information out for emergency response. Examples of this network capability are prevalent in Oregon’s coastal and eastern regions. These areas are more susceptible to communications outages, and the state microwave network provides a critical-use service for the first responder community. For example, during a December 2007 storm, Clatsop County lost commercial landline and cellular telephone services and Internet service, while ODOT and OSP microwave and radio systems continued to operate.

Commercial service is defined as companies that provide communication services to the public over wire line, sea cable, and mobile (cellular) point-to-point microwave and /or satellite systems, including analog (voice) and digital (data). Landlines are hard-wired connectivity such as overhead and underground telephone lines. Cellular phone coverage is the range in which a tower performs and a cell phone is operable. When the coverage is exceeded, service is dropped or handed off to another tower.

Local communications
Most local and state resources are normally dispatched from one of four dispatch locations throughout the state. A failed microwave would mean that the line to the dispatch center is no longer available and the emergency response would have to be dispatched locally. In the event of a large earthquake sufficient to cause a misalignment of microwave dishes on a tower, the VHF radio system is anticipated to still operate locally, and the local dispatch of public safety responders could take place. This means that state emergency responders can still talk to one another locally and can also communicate with the cooperators (if their local system is still operating), while responding to citizen calls for help during the disaster.

New mobile radios
Using multiband mobile and portable radios, ODOT, Oregon State Police and select Oregon Department of Forestry and Oregon Department of Corrections subscribers now have the capability to communicate with all existing analog conventional and P-25 digital voice systems used by cities, counties, tribal entities and joint agencies throughout Oregon. The radios are capable of operating on all local/regional nonproprietary P-25 systems to which the state has been granted access. This allows state users to easily and seamlessly talk to local partners during incidents. This is important for normal interoperability in day-to-day public safety operations and is important as a backup to the state’s system in the event of a communications system failure. If there is a catastrophic failure of the state’s system, the users can simply switch to a cooperators system and continue to function, no matter what frequency band they are in (as defined and authorized in the Tactical Interoperable Communications Plan).

Because of the new radios, interoperability is now in the hands of the state’s first responders. These radios, with user knowledge and the proper information stored, can communicate across

each frequency spectrum used by first responders. This enhances interoperability capabilities in each region of the state by allowing OSP and ODOT officials to communicate directly to their local counterparts.

Monitoring sites remotely
Also funded is the project's Radio Management System, which allows remote monitoring and provides site information. Project technicians receive data centrally from sites that allow them to respond proactively to problems before service is affected. More than 100 points of information from each site are provided to the Network Operations Center to produce a status report of the radio system. For example, the report shows if the commercial power is out; if the generator is running; the current voltage and charge of the batteries; the security status of the site; the room temperature; the battery oil level, voltage and fuel level of the generator; and so on.

Emergency communications caches
Oregon received a grant for about $12 million that primarily went to counties to upgrade their radio systems. OWIN was allocated about $1 million from the grant to implement the Oregon Military Department's plan to support the strategic technology needs as identified by local public safety radio users. Project funding, used as matching funds to the grant, has supported the planning, acquisition, development and implementation of the Strategic Technology Reserves for the state. The objective is to maintain a reliable communications capability that permits re-establishment of local-to-county and county-to-state communications when conventional systems are disabled. The project has procured, assembled and distributed 12 STR caches of radio equipment. Caches are assembled in kits, each within a trailer that can quickly be located — by ground or air — near a disaster. STR caches are located at ODOT and OSP facilities across the state with 24-hour access. Each of these select facilities has a communications technician available to operate the cache, to provide training to county emergency managers and other authorized users, and to distribute and collect the cache equipment when it is deployed. Training on the STR for local, federal and state cooperators was accomplished in the summer of 2012.

Each cache contains three kits:

- **A public safety push-to-talk radio kit to re-establish first responder communications at the emergency site.** The kit contains 12 portable multi-band digital public safety radios with holsters and speaker microphones, a VHF repeater, a UHF repeater, programming software and cables, duplexer, seven-meter antenna mast, pole mount kit and power equipment.
- **An amateur (Ham) radio kit** to establish emergency voice and data communications between an emergency site and the county or state emergency coordination center, which is the responsibility of the Office of Emergency Management. The kit contains one VHF/UHF radio and transceiver, a laptop, a printer, an automatic antenna tuner, a node-controller, a 5kw generator, an antenna mast system, power pole connectors and appropriate cables.
- **A satellite data kit** to establish Internet communications between an emergency site and the county or state emergency management center. The kit contains a laptop, solar charger, DC power adapter and satellite radio.

Statewide Interoperability Coordinator
The Statewide Interoperability Coordinator is located within the State Radio Project. This position is an advocate for public safety communications statewide. The SWIC has taken the lead role and has worked with local and regional partners to complete the Tactical Interoperable

Communication Plans for each region throughout the state. This plan provides first responders with critical information about communications resources and assets within their region as well as capabilities available statewide. The SWIC regularly updates the Emergency Response Plan and the State Interoperable Communications Plan that address interoperability standards for all public safety in the state. Working with the State Interoperability Executive Council and through the federal Office of Emergency Communications, the SWIC office has been able to support training events and assistance for the public safety community valued at more than $500,000. This assistance is supported by federal grants.

In summary, the new public safety radio system provides a significantly higher level of public safety communications reliability than the previously existing system being replaced and lays a solid foundation for improved future interoperability.

Shelters

Old

New

Shelters

Old

New

Connection between shelter and tower

Old

New

Sites

Old

New

Towers

Old

New

Radio installations

Old — Oregon State Police radios

New — Oregon State Police radios

Radio installations

Old — ODOT Incident Response Vehicle

New — ODOT Incident Response Vehicle