Oregon Department of Transportation

State Radio Project

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Legislative Report
January 2014

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I – Project Update

The Oregon Department of Transportation's Major Projects Branch continues to advance the State Radio Project. ODOT and the Oregon State Police are operating in the federally mandated narrowband frequencies. Work on the remaining partnership obligations and the microwave system continues. Final design for the remaining trunked radio system is progressing in preparation for acceptance and continuation of deployment in spring 2014. Dispatch consoles and the network management system are in procurement.

Progress

- ODOT and OSP began operation in full narrowband mode on Aug. 16, 2013, more than two months ahead of the extended Federal Communications Commission deadline of Nov. 1, 2013. Performance of the new system is being monitored, and no loss of radio coverage has been detected. Final mountaintop antenna and office remote installations will continue through 2014, and infill site construction will continue through summer 2015, further enhancing radio coverage.

- Microwave equipment has been installed at 18 sites since last fall. Installations will continue through 2014, with some sites extending in 2015.

- The trunked radio system test bed has been expanded to include both trunked radio system controllers (switches) in Salem and Bend plus eight nearby sites. Per the revised testing strategy and schedule, the switches will be tested twice prior to installation, slated to being in April, and again after installation.

  Final design of the remaining system will conclude this spring. Deployment of the rest of the trunked radio system equipment will continue through 2014. We now anticipate some trunked radio system sites will be completed in 2015.

- Site work and microwave installation for the Southwest Seven consortium of counties is nearing completion. Remaining partnership work in Klamath County is planned for the summer, once the snow melts at the sites. This timing meets the schedule needs of the radio project and its partners for installing and testing the microwave and radio equipment.

- Procurement of the network management system is nearing completion. A vendor has been selected and contract negotiations are underway.

- Procurement of the dispatch consoles is underway. Proposals have been submitted and selection is underway.

- User readiness initiatives preparing end users for the operation of the new system are being developed in conjunction with OSP and the ODOT Maintenance Section.

- A State Radio System enterprise transition framework continues to be developed that outlines the future governance of the State Radio System and transitional activities.

Issues and Challenges
The issues and challenges the project has encountered are consistent with those of large projects, especially those with more than 150 individual and somewhat independent, yet interdependent, projects within it. 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.

Integrated Schedule
The project schedule is substantially complete. The site delivery schedule is nonconventional, comprised of a high-level milestone schedule managed centrally with more detailed trackers managed by task leaders. The technology schedule is more traditional, with microwave, trunked radio system, consoles and the network represented in one centrally managed schedule. The schedule is complete except for network management system and console details, which will be incorporated when the selected vendors for these systems provide their detailed schedules.

System Integration
The system integration requirements and architecture are complete with acknowledgment that choices remain for final integration and associated configuration of the conventional land mobile radio, trunked radio system and consoles. A draft system integration plan is expected by March. Harris Corp. has provided an expert resource in this technology. AECOM is leading a multi-discipline task force to develop final recommendations by early 2014 for implementation as equipment is installed through 2014. Startup and testing of the integrated system continues into 2015.

Frequency Coordination
Preliminary analyses identified as many as 21 of Oregon's 700 MHz frequencies may conflict with Washington's. Only one state can use a frequency that is in conflict. Coordination meetings are underway to agree on the disposition of the conflicting frequencies, which must be resolved before the final trunked radio system design can be completed.

II – Project Status

Narrowbanding
The ODOT and OSP radio system is now fully functional in narrowband mode. No coverage loss has been detected or reported. The project will continue to upgrade antennas and office remotes and complete infill site construction through 2014. Some infill site construction and the associated repeaters are expected to extend into 2015 to complete all activities associated with narrowbanding.

Microwave and Trunked Systems

Planning Documents
System requirements and system architecture have been completed and accepted. A system integration plan is underway with a draft due by March. Once the draft integration plan is accepted, the final trunked radio system design and console design can be completed.

Installation

Approximately 20 percent of the digital microwave in the State Radio System has been replaced. Much of this was accomplished under the previous OWIN program. Microwave installations are continuing through 2014 as site improvements are completed, with some extending into 2015.

Trunked Radio System

The trunked radio system test bed has been reconfigured to include eight repeater sites around Salem and two switch locations (Salem and Bend). Harris is upgrading the primary switch in Salem to its final configuration and will install the secondary switch in Bend once the site is ready. After two rounds of pre-installation testing, the installed switches and nearby sites will undergo additional testing in late spring and early summer. The test bed will be used to:

- Test the systems in the configuration used by the project.
- Train Wireless Communications Section staff on operating and managing a trunked system.
- Beta test operations with end users.
- Refine intra-operation of the trunked and conventional radio systems that comprise the State Radio System.

Trunked repeaters have been received at the Harris warehouse for 35 sites. The remaining repeaters will be delivered after frequency coordination with Washington is completed. Upon acceptance of the final trunked radio system design, orders for ancillary equipment will be finalized and deployment will begin. Installation, startup and testing at trunked repeater sites began in the fall of 2013 and will continue through December 2014, with some sites possibly extending into 2015. Full system testing and acceptance of the trunked radio system will continue into 2015.

Proposals have been received from console vendors. The vendor selection process will include system demonstrations and user operation testing. Console vendor selection is now anticipated by summer 2014, with delivery and startup into the fall and possibly spring of 2015.

The network management system vendor has been selected and contract negotiations are underway. Detailed design review will occur this spring, with implementation continuing through the end of the project as the trunked radio and microwave systems are completed.

Partnerships

In July 2011 the radio project made a commitment to satisfy its partnership and grant obligations. The project met all of its grant obligations, commitments and deadlines by the end of July 2012.

Delivery of the remaining non-grant obligations was negotiated with partners to meet their needs and better fit the project schedule. Installations to meet the Southwest Seven partnership obligations are underway and are now anticipated to be completed by the end of January. The Klamath County partnership obligations are anticipated to be completed by December 2014.

All partnership obligations are scheduled to be completed by the end of December 2014. The delays in finalizing leases and agreements have been communicated to all affected partners, who have accepted the need for flexibility on these challenging sites. The revised schedule will continue to meet the needs of our partners and the state.

Interoperability
The State Interoperability Executive Council developed and submitted a legislative concept to further clarify governance for interoperability and broadband in Oregon. A bill was introduced in the 2013 legislative session and assigned to the Senate Veterans and Emergency Preparedness Committee that would move the SIEC out of ODOT to the Oregon Department of Administrative Services, expand the council's scope to address cellular broadband technology in response to federal legislation and establish the position of Statewide Interoperability Coordinator. Senate Bill 665 was not passed by the 2013 Legislature and is anticipated to be revisited in the future.

III – Governance and Consolidation

This is a summary on the progress made to establish the long-term state Land Mobile Radio 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) continue to operate under the SRUG interagency agreement, using the agencies' established authorities to establish the SRUG as the "governance" of the state's multi-agency LMR communication systems.

The SRUG, through the ODOT Wireless Communications Section, is collaborating with the State Interoperability Executive Council Technical Committee to better understand the technology that will be used to accommodate future interoperability between P25 radio systems. Discussions have been positive, and radio vendors including Harris and Motorola have been active participants in contributing information and timelines for technology upgrades that will help foster greater interoperability between P25 non-proprietary radio systems.

The SRUG worked with the SIEC to respond to legislative questions and prepare final drafts of amendments for Senate Bill 665, which would have established the roles and responsibilities of the SIEC and moved it under DAS. The bill was not passed by the 2013 Legislature but is anticipated to be revisited in the future.

Budget and Cost Model Allocation
The SRUG is currently operating under the 2013-2015 Cost Model Allocation Agreement that will use subscriber equipment as the basis for allocating the State Radio System operations and maintenance budget across the representing agencies through the build-out of the State Radio Project. The cost model workgroup will continue to collaborate on:

- Developing the 2015-2017 budget.
- Defining future measurements to allocate costs based on equitable level of services received and provided.
- Developing the State Radio System Operations Manual and long-term service level agreement.

Transition to State Radio System Consolidation
The transition to a shared radio system between ODOT and OSP and consolidation of radio services with partnering agencies continue to progress. ODOT and OSP are focused on

developing a long-term service level agreement that will be developed in concert with the State Radio System Operations Manual. The agencies will continue to operate through the life of the radio project under the agreement signed by ODOT and OSP in January 2013. The goal is to have the long-term service level agreement in place prior to the 2015-2017 biennium; work products associated with the agreement are progressing.

ODOT and OSP continue to collaborate on many processes and procedures that are being implemented into the State Radio System Operations Manual and will benefit the overall operations of the State Radio System and set expectations that will be made part of the long-term agreement. An overall strong partnership between the two agencies has be an integral part of developing agreements and associated work products for the consolidation and operations of the State Radio System.

PROJECT SUCCESS

'EXPECT THE UNEXPECTED' PROVES TRUE FOR NEW MCCULLY MOUNTAIN SITE

Building a new site to improve radio communications is nothing new for the State Radio Project team. With many sites constructed over the past year all over the state, the procedure is somewhat routine: install receiver equipment on a tower, construct a shelter to house the generator and other necessary radio equipment, and test the equipment for proper signal coverage. But while basic steps guide the team, each new site brings its own unique challenges.

ODOT mechanic Jim Cooper maneuvers the crane lifting the generator into the shelter, while mechanic Jay Burkert helps guide it into place.

McCully Mountain, about 40 miles east of Salem off Oregon 22 near Lyons, is no exception. The new intermediate site for microwave is situated between the existing Halls Ridge and Wipper sites, which have experienced intermittent low signal strength due to the distance between them. Crews are now constructing McCully Mountain and adding equipment to an existing tower to improve the signal.

Microwave radio signal strength can be affected by interference from topography, trees and even fog. Ritch Hanneman, microwave systems specialist in the Oregon Department of Transportation's Wireless Communications Section, explained that this problem can usually be remedied by adding an additional receiver antenna below the main microwave antenna to each tower that communicates with each other.

"Some new sites will have space diversity in order to get a consistent signal," Hanneman said, and McCully Mountain is one of those sites.

To house the new site's radio equipment, project staff located and purchased a previously used shelter from North Carolina that met the size requirements needed at McCully. After making its way by truck to Oregon, the shelter was stored at the radio project's warehouse in Salem until site preparation was complete.


ODOT crew members guide the repurposed shelter into place on the new concrete foundation at McCully Mountain.

Typically, generators are installed in the shelters before arriving at a site location. But when the shelter arrived at the warehouse, the crane that lifted it off the transport truck placed it very close to another building. Because the opening was too narrow to install the generator at the warehouse before the move, Dennis Mansfield, State Radio Project asset analyst, negotiated with the crane company to work in coordination with ODOT generator mechanics on the day of the shelter move.

"They were willing to wait the two hours it would take the ODOT mechanics to install the generator in the shelter once the shelter was lifted onto the transport trailer," said Mansfield.

According to Jack Williams, State Radio Project asset manager, this arrangement saved the project several thousand dollars.

> "Every new site that is constructed has different elements that need to be considered in the planning stage. But no matter how much you plan, you have to expect the unexpected."
>
> — Jack Williams, State Radio Project asset manager

Early on the morning of Oct. 10, ODOT crew members, contractor Patriot Towers and Wireless Communications Section staff arrived at the Salem warehouse to execute the plan. The large crane hoisted the shelter onto the flatbed trailer and waited while ODOT generator mechanics used a smaller crane to lift the generator into the shelter, then bolted it into place. Once the installation was complete, the same large crane followed the truck from Salem to McCully Mountain to lift the shelter onto its permanent concrete foundation.

All went smoothly onsite until a week later, when an accident occurred nearby that was anything but typical. A contractor performing maintenance on another tower at the site, unrelated to the ODOT shelter placement or tower, backed up his equipment too far and caught a guyed wire of a different tower. The guyed tower fell on top of another tower's guyed wires, and an anchor point that secures the wires at ground level was uprooted, causing the tower and wires to come down in a jumble of steel. Work at the site was suspended until the liabilities and the steel could be untangled.

An accident unrelated to the radio project caused one of the four towers at the McCully Mountain site to collapse; it fell on top of another tower's guyed wires, temporarily closing the site.

Fortunately, the tower that collapsed did not injure anyone or damage any ODOT property, and the incident caused no disruption to radio service. Once the damaged towers are fixed or replaced, crews can once again enter the property and finish installing the remaining equipment that goes inside the shelter.

"Every new site that is constructed has different elements that need to be considered in the planning stage," Williams said. "But no matter how much you plan, you have to expect the unexpected."

STATE RADIO PROJECT

Performance Predictions

A microwave hop is the service between two sites.

WBS 3.1 Microwave Replacement

Revised completion: 1/31/2015

Revised: 50 of 151 hops
Actual: 50 of 151 hops

Integration

Integrated design for all systems
System requirements competition: 5/1/2013
System architecture competition: 8/16/2013
Integration plan completion: 5/1/ 2014

WBS 3.3 Site Improvements

Revised completion: 8/31/2015

Revised: 44 of 156 sites
Actual: 32 of 156 sites

WBS 4.0 Trunked Radio System

Revised completion - Operations: 2015
Revised completion – Testing: 2016

Revised: 5 of 41 sites
Actual: 4 of 41 sites

Revised budget with increase of $20 million approved during 2013 legislative session.

Budget

Revised: $229.99 million
Expended: $139.05 million

Operational Preparedness

Updated operational plan and associated annual cost estimate under review.

Revised completion: 10/30/2013
ODOT/OSP agreement: 7/1/2015

WBS 6.0 Partnerships

Revised completion: 12/31/2014

Revised: 42 obligations at $10.5 million
Completed: 32 obligations
Expended: $8.0 million

Will be completed when recommendations are delivered by the SIEC and implemented after moving to digital narrowbanding. Anticipated completion: 12/31/2015

WBS 5.0 Interoperability

Original completion: 1/1/2014
Planned completion: 12/31/2015

WBS 2.0 Narrowbanding

Original completion: 1/1/2013
Revised completion: 11/1/2013

All radios and sites are in narrowband operation with upgrades ongoing
Revised completion: 4/30/2014
Revised: 44 of 135 offices
Actual: 42 of 135 offices
Revised: 51 of 157 radios
Actual: 5 of 157 radios

Waiver

FCC deadline waiver received Aug. 20, 2012, extending deadline to Nov. 1, 2013
Cutover Completed – operating under narrowband
Planned: 10 of 10 zones
Actual: 10 of 10 zones

Radio Deployment

Deployment Completed
Planned: 5,095 of 5,126 radios
Actual: 5,126 of 5,126 radios

Office Remotes

Planned: 160 of 160 sites installed
Actual: 154 of 170 sites installed
Infill sites remain to be installed

Mountaintop Repeaters

No Waiver Planning

- Goal will be met
- Goal changed (scope, schedule or budget)
- Goal may be met
- Goal will not be met

January 2014

Data through December 2013
Document reflects revised baseline for the project

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.	An integrated ODOT and OSP system is progressing with forecast completion targeted by Dec. 31, 2015. Long-term operations and maintenance service level agreement discussions are underway, with formal agreement anticipated in July 2015.	Delays in individual components have impacted the schedule and costs.	Federal Communications Commission narrowbanding waiver 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 has been approved and positions are in process of being hired.
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 are ongoing and are anticipated to be reached through a combination of operations manuals, intergovernmental agreements and service level agreements. A Policy Option Package that solidified the transfer of OSP and Oregon Office of Emergency Management staff to ODOT was approved during the 2013 legislative session and took effect July 1, 2013. The Oregon Department of Corrections, the Oregon	Long-term service level agreements and operations manuals continue to be a topic of conversation. These items are key to understanding service levels and will be of concern until they are fully developed.	Initial foundational O&M service level agreement between OSP and ODOT was executed Oct. 30, 2012, and will continue to be used through the duration of the radio project build-out. Long-term cost sharing and agreement discussions continue to progress and need to be concluded with resulting agreement(s) prior to the 2015-2017 biennium. A draft State Radio System Operations Manual is nearly complete and is being developed in collaboration with customers on processes and procedures. Continued customer participation will help to ensure

State Radio Project Goals and Objectives – Status Update

Project Objective	Progress Assessment	Impacts of Status	Mitigations Taken or Planned
	Department of Forestry and OEM are also engaged in the project as State Radio User Group partners.		a smooth transition into operation of the new system.
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.	The long-term nature of deferred maintenance and the resulting system upgrades needed have led to higher-than-anticipated costs. 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.	To complete the project as originally scoped, the 2013 Legislature approved a budget increase of $20 million. The prioritization of repairs and replacements and use of a change management process continues to occur to control costs.
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.	To date, 5,216 mobiles and portables have been installed and issued of the 5,095 estimated total. A few additional radios are expected to be installed and issued. Mountaintop repeater installations are complete at the 138 existing sites and at 16 of the 32 infill sites. Site preparation is underway to prepare the remaining infill radio installations. The project completed the transition to narrowband operations in August 2013, more than two months ahead of the FCC extension date of Nov. 1, 2013.	The radio project has completed the transition to narrowband operations. Sites currently operational provide coverage and meet expectations, with additional coverage to be provided by remaining infill sites. Office remote radios are also operating in narrowband mode, with upgrades to equipment and antennas progressing and expected to be complete in April 2014.	Received FCC waiver that extends narrowbanding completion efforts to Nov. 1, 2013.

State Radio Project Goals and Objectives – Status Update

Project Objective	Progress Assessment	Impacts of Status	Mitigations Taken or Planned
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 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.	Still in the process of developing the issue with the SIEC, with action anticipated after moving to digital narrowband. The SRUG, through the ODOT Wireless Communications Section, is collaborating with the SIEC Technical Committee to better understand the technology that will be used to accommodate future interoperability between P25 radio systems.	Interoperability efforts do not impact the core project schedule.	Continuing discussions with the SIEC.
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 with federal grant deadlines were 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 worked collaboratively to respond to site challenges while working to meet partner needs. Ten of the 42 obligations remain in progress; all partnership obligations will	Federal grant obligations have been met. Of the revised budget of $10.5 million, $8.0 million is spent to date. The remaining funds are fully budgeted to complete remaining work that will complete the obligations to partners. Additional time and effort have been required to finalize leases and agreements with partners for the remaining sites.	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 have been executed and will allow work to progress. Temporary arrangements have been completed in northwest and north central Oregon that

State Radio Project Goals and Objectives – Status Update

Project Objective	Progress Assessment	Impacts of Status	Mitigations Taken or Planned
	be fulfilled by Dec. 31, 2014.		provide connectivity for the partners while we continue to work toward meeting obligations that ensure long-term functionality of the system.
Budget – Funding for the radio project includes $20 million in additional money in the 2013-2015 biennium. However, the project is proceeding with funds reduced from those previously authorized. Inclusive of the $20 million approved in the 2013 legislative session, the project budget totals $229.9 million from inception. The work to address Oregon's critical microwave needs will occur over two biennia, 2011-2013 and 2013-2015. Additional work to finalize the trunked radio system may extend into the 2015-2017 biennium.	Current budget: $229.9 million Forecast estimate through Dec. 31, 2013: $142.6 million Expended through Dec. 31, 2013: $139 million (expenditures to date include OWIN funds spent)	Budget, even with the increase, is at a nominal level to achieve the planned scope, leaving little margin for contingency to cover unanticipated costs.	The project continues to closely control the scope, schedule and budget of each project element through the integrated change management process and to prioritize its work efforts to control project costs. The project has taken steps to establish both a contingency list and a cut list to be able to adjust to budget movements in either direction.