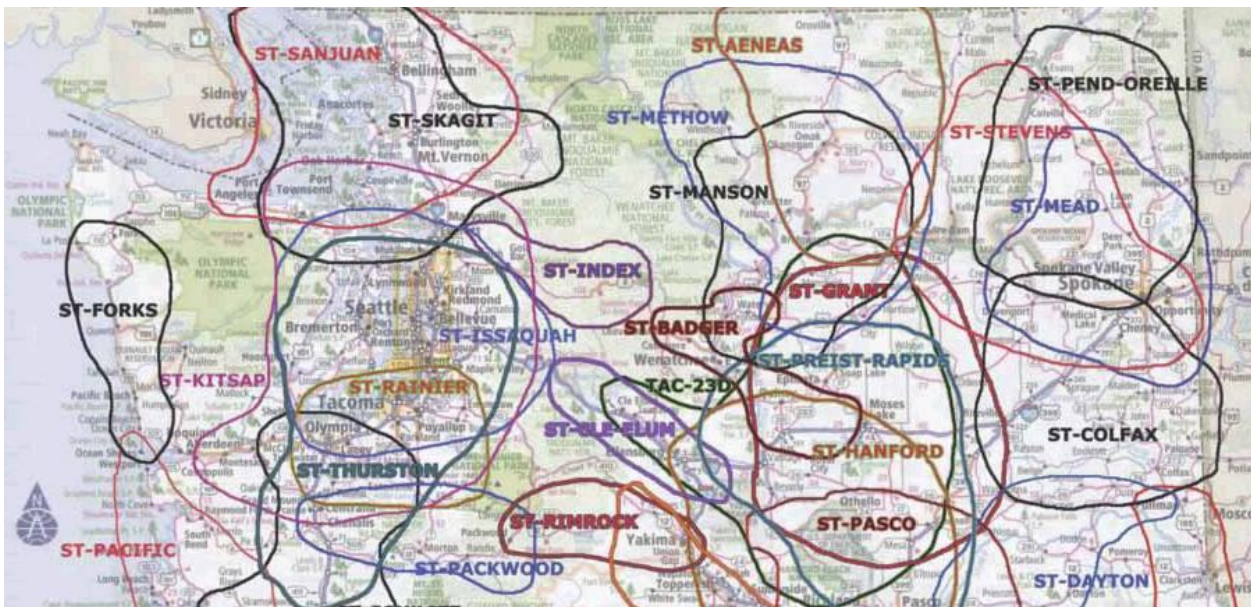


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RoIP Extends Coverage in Washington State

The Washington State Department of Fish & Wildlife improves statewide dispatch communications using radio over IP (RoIP) technology.

By Jack Kontney



Statewide Coverage Map

Images courtesy Phase 4 Design

The state's wide-area radio repeater network has 22 repeater control stations across the state, and WDFW controls the towers at its headquarters.

The Washington State Department of Fish & Wildlife (WDFW) faces a monumental challenge. The department must provide smooth, reliable

communications between its headquarters in Olympia, its statewide local and regional offices, and more than 150 field officers patrolling some of the most rugged, isolated geography in the United States. With a modest budget to meet those enormous needs, the department turned to Kenmore, Washington-based Phase 4 Design, which specializes in advanced radio communications solutions.



WILDCOMM Dispatch in Olympia

“The department had a dispatch system in place, but the consoles were not working well for their needs,” says Dave Grant, founder and CEO of Phase 4. “They brought us in about three years ago to survey the system and see if it could be saved. We found that, with a few well-chosen pieces of software and hardware, we could create a significant upgrade within a fairly modest budget.”

The Department of Natural Resources (DNR) owns and operates a statewide two-way radio system for fire emergency and administrative needs, including the state channel repeater system, which WDFW has accessed since 1990 through mutual agency agreements. The DNR system is licensed and operated in accordance with FCC rules and regulations in the forestry conservation radio service, and a robust infrastructure covers the majority of Washington. The system has a number of subscribers who are permitted access through formal contracts and memoranda of agreement. This resilient and well-maintained radio repeater network forms a solid foundation for the radio over IP (RoIP) system deployed by WDFW.

The state’s wide-area radio repeater network has 22 repeater control stations across the state. WDFW controls the towers at its headquarters. A previous attempt to leverage RoIP technology using a piggyback arrangement on the state network was met with limited success, with base

sites dropping offline for no apparent reason and an inability to scan across multiple frequencies.

“Our officers and staff all work in remote areas where radio coverage cannot be guaranteed,” says Lt. Phil Johnson, who manages radio communications for the WDFW. “With danger from poachers, wildlife and the land itself, reliable communications is critical. In terms of both public safety and the welfare of the officers and scientists out in the field, the situation was unacceptable.”

After survey and site analysis, it was clear that the biggest problem with the radio system access was console software. The department’s core system of Telex radio controllers working with older legacy radios was fine, but the consoles held them back, especially with the inability to scan multiple frequencies. Phase 4 used a pilot base station as a demo with Telex C-Soft, an IP-based dispatch console, and the department was onboard.

Scanning is important because it allows monitoring of multiple frequencies. For instance, a field officer who is unable to key a primary repeater can still communicate on a different scanned repeater or local tactical channel, so the communications officer can hear and respond to the call. The console can also keep a running buffer recording of the most recent 10 minutes of audio, allowing the operator to listen to the transmission again and see what frequency it was transmitted on. This feature can be a life saver in cases where a field officer is in a dangerous situation.

Functionally, the console communicates with the base station’s radio, picking up information and giving it commands via the serial port connection on the IP-223 remote adapter panel. Unlike the previous consoles, which could be tuned to only one repeater’s frequency pairs and had to be rebooted daily, the new console generates the necessary radio commands to switch frequencies based on need. This allows a base station to work in scan mode, covering multiple repeater sites, so a single WDFW base station can effectively cover upwards of one-quarter of Washington State.

Phase 4 designed a standard radio system, consisting of a small cabinet containing the radio and associated controller and a console and associated hardware. The company then created a Telex-based network across the state, working with the WDFW to identify existing facilities with internet access within reach of one or more repeater towers. Locations with overlapping coverage from multiple repeaters function as control stations, while those with a single repeater in range are known as orphan sites. The result is coverage across the state with real time, full-duplex

communications among the main office in Olympia, its remote offices and field personnel.

The idea is to do scanning at both ends, so that an officer who travels many miles, driving out of range of one repeater and into range of another, can still communicate. — Dave Grant, Phase 4 Design

“The idea is to do scanning at both ends, so that an officer who travels many miles, driving out of range of one repeater and into range of another, can still communicate,” Grant says. “So, whether it’s a biologist doing field work, an officer chasing down poachers, or dealing with disasters like floods and wildfires, Fish & Wildlife now has reliable coverage that extends deep into some of the back country.”

“Working with Phase 4, we’ve been able to deploy a statewide RoIP system with full dispatching ability for under \$200,000,” Johnson says. “So, it’s the same impact of a conventional radio system, with all its million-dollar towers and infrastructure, at a fraction of the cost.”

The success of the project has opened the door for more improvements in the future. Phase 4 maintains the system, performing annual inspections and maintenance for each location. In addition, WDFW is refining the system and has the ability to monitor network efficiency and performance. Phase 4 is integrating session initiation protocol (SIP) VoIP phones to consoles in the department. Ultimately, the department hopes to add tactical mobile phone and radio communications for field operations outside the network’s coverage, enabling critical phone traffic to go along with communications in emergency situations including satellite data links.

“On one level, RoIP is not unlike my kids playing computer games online, talking on headsets,” Johnson says. “But the stakes are a lot higher in public safety, where a system failure can literally cost lives. The new dispatch solution has given us reliable communications and great coverage, and we did it at a lower cost, with less frustration, than anything else we’ve tried. We couldn’t ask for more.”

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