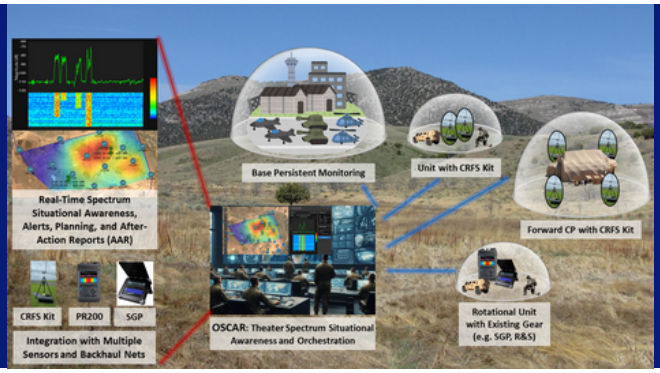
national spectrum consortium®

National Spectrum Consortium:
Delivering Innovation



The OSCAR platform developed by Peraton Labs delivers a dynamic spectrum management system for wireless operations on military training ranges.

Objective
Create a dynamic spectrum management tool for training ranges to allocate spectrum faster and more effectively in a congested environment, reduce signal interference, visualize the spectrum for range operators and participants, and improve mission effectiveness.

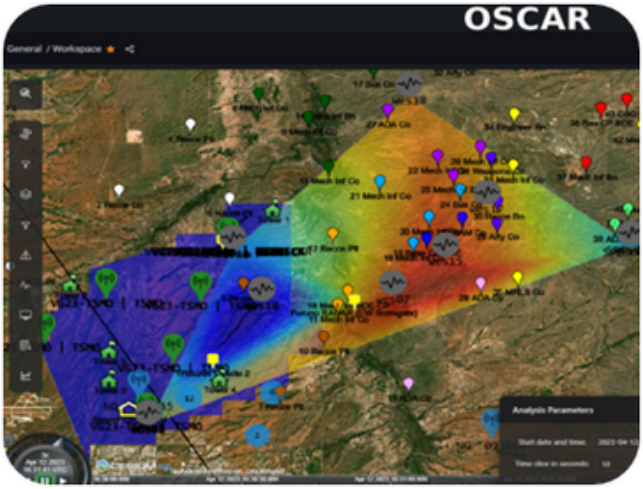
Investment – $18 million

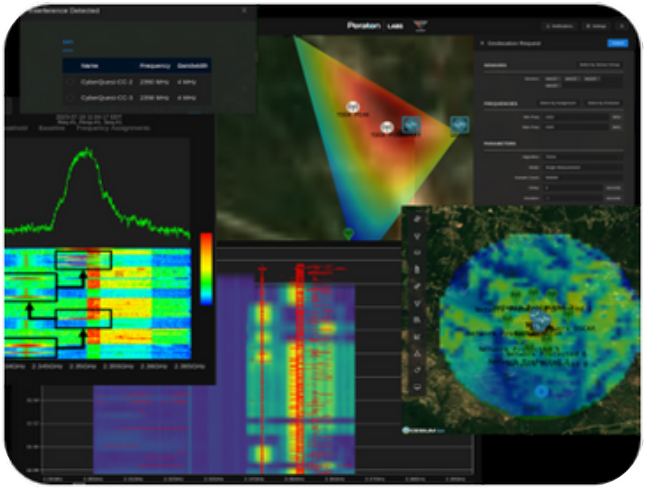
Outcome
The OSCAR platform was demonstrated successfully in nearly a dozen DoD field exercises and installed permanently at Fort Huachuca. It has reduced the time spent locating spectrum interference in training operations from hours or days to under ten minutes.

With the completion of the project, the DoD solicited and awarded follow-on work to develop additional software capabilities for the platform and to integrate it with a more distributed RF sensor environment. More than a dozen entities have also requested and received access to evaluate the solution across a broad range of use cases.

Keys to Success
Working with the spectrum management community during the development process proved critical to developing a solution that operators would eagerly use for multiple end use cases. The modular and extensible architecture of the platform is a key element for translating the solution to other environments.

More to the Story
While the focus of the initial project was on efficient spectrum management in a constrained DoD range environment, there is considerable interest in applying the technology to tactical use cases and to scenarios involving spectrum sharing between federal and commercial operators.





CHALLENGE

Dedicated spectrum is in short supply at military installations, making it increasingly urgent to develop and deploy dynamic spectrum management technologies. In a congested wireless environment, the wait times for spectrum allocations are long, signal interference becomes a potential threat to mission effectiveness, and spectrum managers are overburdened without the visibility and tools needed to improve outcomes.

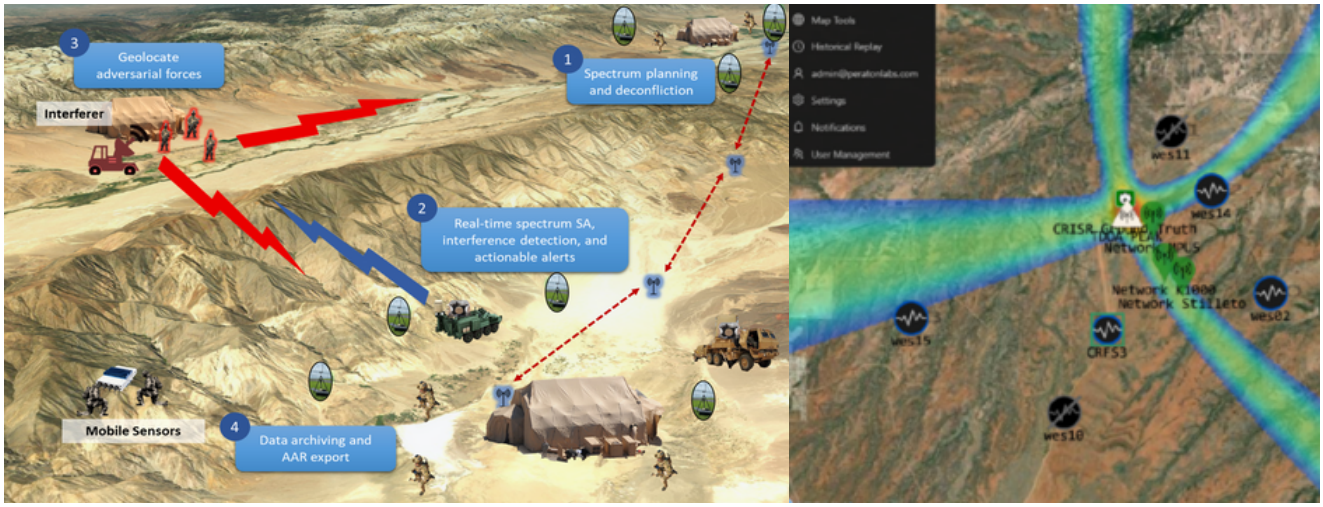
Traditional spectrum management methods no longer suffice. Spectrum operators at installations use non-standardized static spreadsheets and manual processes to manage frequency request and assignment workflows. They have limited ability to deconflict concurrent operations and are particularly ill-equipped to locate and mitigate interference in real time.

The challenge is two-fold. First is a lack of RF data available for assessing when and where conflict may occur. Second, the complexity of spectrum operations means installations need to automate tasks to improve efficiency and effectiveness. Spectrum operators require solutions that optimize their capabilities while also supporting the growing need for sophisticated spectrum planning, interference mitigation during missions, and after-action analysis.

To address the spectrum management problem on military training ranges, the Department of Defense (DoD) Office of the Undersecretary of Defense for Research and Engineering (OUSD(R&E)) released a Request for Prototype Proposals (RPPs) through the National Spectrum Consortium (NSC). The RPP was competed out to the NSC membership, and after a thorough review, the government awarded an $18 million contract to Peraton Labs to develop the Operational Spectrum Comprehension, Analytics, and Response (OSCAR) platform. Peraton subcontracted work to several companies for radio integration, front-end web development, waveform detection algorithms, and more. Partners included non-traditional defense contractors Spectrum Bullpen, AiRANACULUS, and Game7, as well as CACI, Collins Aerospace, and Cubic Corporation.

STRATEGY

Peraton's approach to the spectrum management challenge was to combine a flexible sensor network system with the design of a modular and extensible software architecture capable of analyzing wireless activity and automating frequency allocations. The team built the OSCAR software platform with containerized microservices. These microservices enable functions like sensor tasking or interference identification and can be added to the system or changed to meet specific operator needs. The OSCAR software also supports third-party sensor hardware, which enables the platform to integrate with existing range infrastructure and spectrum monitoring assets while providing a seamless experience to system users.



OSCAR was not designed from scratch. The software team leveraged mature capabilities developed previously within the DoD's Spectrum Access Research & Development Program (SARDP) and integrated those technologies into a single system with a frontend interface and new features for spectrum planning purposes. The team also hired a former Army spectrum manager for the project and worked directly with future users of OSCAR at Fort Huachuca and other entities during design and training. The goal was to create a solution that would not put an additional burden on spectrum managers but rather ease their ability to deconflict operations both in advance and in real time.

Features in OSCAR include validation of waveforms and spectrum activity, resolution of interference events, localization of emitters, streamlined request and assignment workflows, analysis of potential interference in concurrent missions, use of a spectrum resource pool to automate frequency assignments, real-time spectrum monitoring, audits and alerts, and automated modification of spectrum assignments. OSCAR further archives all spectrum measurements and planning information to provide visualization of historical data, calculate spectrum usage metrics, and automate report generation.

RESULT

The OSCAR platform has been demonstrated successfully in nearly a dozen DoD field exercises and is now deployed permanently at Fort Huachuca. **Among other results, OSCAR has reduced the time spent locating interference in training operations from hours or days to under ten minutes.**

The solution enhances spectrum decision support, reduces manual effort while ensuring approval authority remains with authorized personnel, and offers a streamlined portal for stakeholders with tiered permissions access, intuitive visualizations, and the ability to create customizable alerts.

Following the completion of the OSCAR project, OUSD(R&E) solicited and awarded follow-on work to develop both new software capabilities for the platform and a physical sensor edge system that can integrate with a parallel distributed range spectrum operations system. In addition:

- More than a dozen entities have requested and received access to evaluate the solution across a broad range of use cases
- There are explorations underway to determine how OSCAR could support inter-range sharing, tactical use cases, and spectrum sharing between federal and commercial operators
- OSCAR has demonstrated compatibility with more than half a dozen leading COTS RF sensors
- The platform has been deployed with a heterogeneous sensor network including airborne, maritime, and ground based sensors, enabling spectrum management and situational awareness in mobile scenarios with dynamically changing spectrum environments

The prototyping effort enabled by OUSD(R&E)’s partnership with the National Spectrum Consortium has not only been a success in its prototype deployment, it is now a catalyst driving further innovations in technology for spectrum sharing, situational awareness, network resiliency, and usage efficiency.