

Department of Defense (DoD) Achieving Federal/Commercial Spectrum Sharing VCAT 2014



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Purpose

Provide use cases to identify requirements for a trusted measures and metrics environment in the development of electromagnetic spectrum sharing solutions

DoD Perspective on Spectrum Sharing

- DoD depends on the electromagnetic spectrum (EMS) for operational effectiveness due to increased use of data and automation on the battlefield.
- Simply reallocating DoD to new frequency bands is an incomplete solution
- Sharing is an essential part of maximizing EMS access for all users including DoD
- Development of efficient, flexible, adaptable and agile spectrum sharing technologies will improve DoD's operational effectiveness
- Spectrum sharing technologies require robust implementations that are validated through trusted tests in a realistic environment.
- Spectrum sharing must include protections for DoD operations and classified information

National Advanced Spectrum and Communications Test Network (NASCTN)

DoD Requirements for NASCTN with the Center for Advanced Communications:

- Enable a trusted capability for federal, academic, and industry spectrum users to facilitate spectrum sharing studies; optimize access to engineering capabilities; and engage federal, academic, and industry spectrum users in active collaboration;
 - Need impartiality
 - Mutual agreement
 - Sound engineering
- Protect information whether proprietary, classified, and sensitive, pursuant to applicable agreements, regulations, and statutes while facilitating maximum dissemination of controlled information;
- Provide a source for EMS test data, analyses, and reports that can be made available to federal, academic, and industry spectrum users to assist in testing, technology assessments, and other research; and
- Facilitate coordination, rapid access, and engagement of stakeholder engineering capabilities.

Use Case Analysis

- Three use cases have been selected to provide a “thought exercise” for your discussion on identification of requirements for trusted testing that represent current real issues
- The use cases represent a range of potential efforts that NASCTN and CAC may become engaged in
- Each use case provides a background, issues/risks, key tasks and solution requirements

3.5 GHz Sharing Use Case Analysis

Description

- The band is being studied for “shared use” as part of the National Broadband Plan
- The band is allocated to Radiolocation and Aeronautical Radio-navigation and is used by mission critical Navy radars, with some Army/Marine Corps systems
- DoD must maintain full access to this band
- Simplicity of 3.5 GHz band use makes it a logical resource to share

Key Tasks

- Sharing estimations and calculations must be validated with accurate measurements
- Sharing information to resolve issues must protect proprietary and classified
- Increased coordination (both internal to DoD and externally to commercial enterprises) on planned 3.5 GHz testing

Issue/Risk

- These radars are part of the defense plan for the continental US
- Initial proposed sharing methodology is complex with several challenges
- Operational security issues are significant
- Organizational distrust is impacting cooperation
- Systems are highly classified
- Commercial systems to share the band have yet to be designed

Solution Requirements

- Protected environment to work with classified and proprietary information
- Validate proposed propagation models
- Ensure accurate measures and agreed metrics
- Provide commercial systems metrics to ensure incumbents are protected

Spectrum Sharing Determination Use Case Analysis

Description

- Increased demand on the electromagnetic spectrum requires more users to have access to more spectrum
- DoD must not lose spectrum in order to maintain its operational effectiveness
- Sharing of the resource between current and future users is complex
- Trust and accurate measurements and metrics is essential to working out sharing agreements

Key Tasks

- Trusted engineering up front first
 - Agreed measures
 - Agreed metrics
- Protect classified and proprietary information
- Cooperative cross federal agency and commercial enterprise spectrum sharing test approach
- Recommend technology improvement to promote sharing
- Provide scientifically based information and data to the spectrum regulatory bodies

Issue/Risk

- Lack of transparency and organizational distrust impedes progress
- Independent non-cooperative testing cost DoD both resources and impact
- Key commercial equipment and future DoD systems are not developed at the time of the sharing agreements are being sought
- Decision makers are not being provided the best scientific based information to support the regulatory processes

Solution Requirements

- Unbiased and trusted test environment
- Optimized test scenarios by leveraging the optimum available facility for measures
- Advise when agreed metrics are not met
- Coordination with Federal regulatory processes

“Model City” Use Case Analysis

Description

- Model City is a concept developed by PCAST* for a federal and commercial test capability
- Model City will provide a capability for testing and evaluating new spectrum dependent technologies in a metropolitan environment based on software controlled waveforms and environment
- Initial focus will be on advanced capabilities for LTE; however, any spectrum dependent technology could be tested

Key Tasks

- Each Model City environment must be defined
- Model City must maintain scientific rigor
- Objectivity and trust must be proven out with agreed metrics and measures prior to influencing political or regulatory structures.
- Cost must be supported by commercial activities

Issue/Risk

- Model City promotes a ‘wild-wild-west’ approach to proving technology capabilities
- Promotes uninformed decision making due to unproven test environment
- No one city can provide a model for all city operating environments
- Role in regulatory advise is not defined

Solution Requirements

- Ensure regulatory recommendations are backed by accurate and repeatable measures and metrics
- Properly define the operating environment of each city that is modeled

*PCAST = President's Council of Advisors on Science and Technology

Summary

- Sharing of the electromagnetic spectrum promotes a strong economy and operational effectiveness for DoD
- Use case “thought exercise” shows the value of using trusted testing (impartial scientifically based information)
- NASCTN and CAC provide a unique approach to the trusted testing while addressing DoD operational concerns

A faded background image showing several soldiers in a field, some standing and some in the back of a vehicle, suggesting a military or operational context.

**Trusted Engineering Up Front First to Optimize Sharing
Solutions for the Future**