



Subcommittee 3
Electromagnetic Compatibility Improvements
Dec. 19, 2023

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Electromagnetic Compatibility Improvements Subcommittee Tasking by NTIA

- Background: As the spectral environment continues to become more congested and spectrum sharing becomes more common, the potential for adjacent channel interference scenarios remains a limiting factor in expanding access to spectrum. In particular, government radar bands increasingly are being identified for sharing with commercial or other government systems.
- Question: To increase the efficient use of the spectrum resource:
 - How can radar and other systems better co-exist in co-channel and non-co-channel relationships?
 - How should statistical risk-based analysis techniques in spectrum modeling analyses be used to characterize operational impact to federal systems?
 - What improvements in propagation modeling would increase the accuracy?
 - What role should NTIA play in ensuring the independent and timely analysis of these potential interference scenarios?
 - Other improvements suggested by CSMAC.
- A series of clarifications were asked of NTIA to solidify the questions and the task for the subcommittee.
 - Based on this, the subcommittee focused on how to improve compatibility analyses between aeronautical radar and commercial wireless systems in the 5-16 GHz frequency range.
 - Subcommittee is not conducting any analysis, but instead has recommendations on potential methodologies and types of inputs required for an appropriate statistical analysis.

Status of Efforts

- Subcommittee has met at least monthly.
- A series of interviews have also occurred to get other perspectives with draft questions provided prior to the interviews.
 - NTIA/IIC Overview
 - NASA
 - FAA
 - Garmin
 - Collins
- A draft report was agreed to by the subcommittee and provided to the full CSMAC in mid-October for comments.
 - Final report is provided today based on all feedback received.

Overview of Draft Report

- Radar Discussion
 - Report provides information on aeronautical radar systems in the 5-16 GHz frequency range.
 - Summary of responses and discussions with FAA, NASA, Garmin, and Collins.
- Commercial Wireless Coexistence Modeling
 - Overview of parameters that could be used to model commercial wireless systems.
 - Mutually acceptable values should be used unless the commercial providers submit more granular data.
- Coexistence Analysis
 - Describes parameters that should be considered as part of coexistence analysis.
 - Provides types of inputs needed for statistical analyses.
 - Discusses the use of statistical analysis by federal agencies and how it could be applied to coexistence modeling in the 5-16 GHz frequency range.
 - Describes the importance of propagation modeling and potential improvements.
 - Suggests potential approaches for coexistence analysis.
 - As commercial and federal systems will evolve over time, suggests that any modeling be an iterative process to allow all affected stakeholders an opportunity to update technical parameters.

Overview of Draft Report (cont.)

- Role of NTIA
 - Ensure full representation of agency views, concerns, and analyses to present one coordinated view to the FCC.
 - Process needed to facilitate federal agency/private sector collaboration on analysis method.
- Enforcement
 - Compliance with spectrum coexistence arrangements.
 - There must be mechanisms to identify and mitigate interference, even with compliance.

Draft Recommendations

- In accordance with the direction received from NTIA, the following recommendations are provided to suggest improvements in electromagnetic coexistence compatibility studies between non-federal terrestrial and federal aeronautical operations in any portions of the 5-16 GHz frequency range. The recommendations are not meant to be used with any other services in this frequency range, or in any other bands.
- **RECOMMENDATION 1: Coexistence Collaboration Process.** The CSMAC recommends that NTIA, in coordination with the FCC, set as a routine step early in the spectrum decision making process a mechanism for direct industry (providers and manufacturers) and government user collaboration for the development and coordination of tools and techniques for any portions of the 5-16 GHz frequency range.
- **RECOMMENDATION 2: Statistical Models/Analysis.** The CSMAC recommends that NTIA, in collaboration with the FCC and federal and non-federal user/stakeholder communities, develop guidelines for the use of statistical models/analysis for coexistence studies for any portions of the 5-16 GHz frequency range, make those guidelines available to the public, and apply those guidelines to analyses performed as the first stage of coexistence studies. Such modeling and analysis should account for different agencies/commercial industries having very different metrics for defining the risk of interference.
- **RECOMMENDATION 3: Data Transparency.** The CSMAC recommends that NTIA develop a process to allow for the filing and public availability of non-sensitive data needed to model the radiofrequency environment for the 5-16 GHz frequency range.

Draft Recommendations

- **RECOMMENDATION 4: Coexistence Analysis Updates.** The CSMAC recommends that NTIA, in coordination with the FCC and federal and non-federal user communities, establish a process or processes for updating existing coexistence arrangements in any portions of the 5-16 GHz frequency range as federal and non-federal operations, systems and technologies continue to evolve.
- **RECOMMENDATION 5: Risk Measures.** The CSMAC recommends that NTIA translate interference in the radiofrequency realm into risk measures. A risk measure could be defined as the tolerance for interference that a particular system could manage. Risk measures could be used to model the statistical likelihood of harmful interference and based on the government-determined tolerance for risk (including degradation and/or disruption) for the spectrum user under study within the 5-16 GHz frequency range. Risk also includes the ability or lack thereof to adopt innovative, next generation capabilities in either commercial or federal missions under coexistence arrangements.
- **RECOMMENDATION 6: Propagation Model Improvements.** The CSMAC recommends that NTIA engage in measurements of the RF environment to improve and inform propagation modeling to enable coexistence analysis between aeronautical radar and commercial wireless services in the 5-16 GHz frequency range.
- **RECOMMENDATION 7: Propagation Model Working Group.** The CSMAC recommends that NTIA should establish a working group that includes NTIA, FCC, and any interested federal agencies and industry stakeholders to tune and validate propagation modeling discussed in Recommendation 6 for the 5-16 GHz frequency range using the measured data NTIA has collected.

Draft Recommendations (cont.)

- **RECOMMENDATION 8: Inclusive Analysis.** The CSMAC recommends that NTIA ensure full representation of agency views, concerns, and analyses to present one coordinated view that avoids federal agencies needing to supplement publicly the record of their views through direct filings to the FCC and where feasible, facilitate direct discussions between non-federal and federal entities to work out fully vetted and agreed technical analysis methods and sharing or coordination arrangements that are based on those analysis methods.
- **RECOMMENDATION 9: Interference Mitigation.** The CSMAC recommends that NTIA work with the FCC and the federal/non-federal user and OEM communities to identify resources or mechanisms to locate and accurately and expeditiously mitigate harmful interference that may be experienced in coexistence environments within any portion of the 5-16 GHz frequency range (For example, resources and mechanisms could be provided through user community funding).
- **RECOMMENDATION 10: Enforcement of Coexistence Arrangements.** The CSMAC recommends that NTIA, together with the FCC, develop and identify enforcement activities and mechanisms necessary to ensure compliance with spectrum coexistence arrangements in any portion of the 5-16 GHz frequency range.
- **RECOMMENDATION 11: Compliance Penalties.** The CSMAC recommends that NTIA should work with the FCC to establish penalties for failing to comply with the coexistence agreement requirements.

Questions?