
COMMERCE SPECTRUM MANAGEMENT ADVISORY COMMITTEE (CSMAC)

Spectrum Efficiency Subcommittee:

Audrey Allison
Michael Calabrese
Mark Crosby
Thomas Dombrowsky
Carolyn Kahn
Paul Kolodzy
Giulia McHenry (NTIA Liaison)

Mark McHenry
Janice Obuchowski
Charla Rath
Richard Reaser
Steve Sharkey
Bryan Tramont (co-chair)
Jennifer Warren (co-chair)

REPORT
November 2017

Table of Contents

I. NTIA Question	3
II. Background	3
III. Observations	3
IV. Recommendations to NTIA	4
Appendix A: Interview Questionnaire.....	6
Appendix B: Agency Interviews.....	8

I. NTIA Question

The CSMAC Spectrum Efficiency Subcommittee addressed the following question for NTIA:

What additional regulatory, procedural, legislative, or policy actions could be implemented to improve spectrum efficiency without harming effectiveness, including enhanced funding options for the federal agencies?

II. Background

To address this question, CSMAC conducted outreach to multiple federal agencies, including both agencies that manage/regulate federal spectrum as well as agencies that implement regulatory, procedural, legislative, and policy actions. Inputs from the management/regulatory agency interviews were used to inform questions and dialogue with federal agencies on implementation challenges and opportunities. This approach provides a round discussion of all elements. The interview questions are shown in the appendix. CSMAC member input and discussions, in conjunction with the interview responses, helped identify and shape recommendations for NTIA.

III. Observations

The Subcommittee made the following observations:

1. Measurement of spectrum efficiency differs by usage. CSMAC reiterates its recommendation from 2008 that “it is not possible to establish a uniform metric for spectrum use efficiency that encompasses the wide range of services and uses for which spectrum is needed.”¹ Therefore, effective incentives cannot be premised on a singular measure of spectrum efficiency. CSMAC’s view is not consistent with OMB A-11 guidance on the economic value of spectrum in Section 31.12(b), even with updated population density models, because it postulates that spectrum efficiency is tied to population density. This OMB A-11 guidance is only applicable to specific applications of fixed and mobile wireless broadband, and not broadly applicable to agency spectrum uses. Moreover, OMB has not sought to apply the guidance where it may be applicable. Therefore, OMB A-11 Section 31.12(b) has not resulted in any implementable guidance to the agencies on how to apply spectrum efficiency metrics. Spectrum efficiency is not just about how much federal agency spectrum can be vacated for commercial use; it is also about expanding uses and accommodating more users. Spectrum efficiency is a multifaceted issue, and these complexities must be recognized and reflected into policy reform to be effective.
2. Technology advancements have and will continue to improve spectrum usage. For example, radar technology improvements that are components of enhanced efficiency in the use of spectrum include an increase in spectrum situational awareness by connecting with spectrum environment sensor networks to either provide decision aids for radar operators or automation on radar spectrum settings to avoid interference with other emitters/receivers; command and control through advanced radar apertures and signal processing with either multiple frequency

¹ “Definitions of Efficiency in Spectrum Use,” CSMAC Working Group 1, 1 October 2008, https://www.ntia.doc.gov/files/ntia/publications/spectral_efficiency_final.pdf.

bands or broader bandwidth capability, software defined radars that enable agile (dwell-to-dwell) control of spectrum characteristics, and spectrum policy based control features for radar operators; and maneuver by use of passive and/or bi-static radar architectures. Radars for particular missions have increased their bandwidth requirements to support their ability to frequency hop to avoid intentional jamming, thus improving the effectiveness of their mission.

3. The legacy spectrum management regime, first designed over 100 years ago, inherently constrains today's use of spectrum. Systems are tied to earlier allocations and assignments, and it is very expensive, time-consuming, and disruptive to substantially overhaul this structure. This is a macro- (federal and non-federal) level problem that should be addressed collaboratively by federal and non-federal agencies, regulators, policy-makers, and academia with a constructive tone/attitude to help all parties work together productively toward increased spectrum efficiency. All dimensions of the problem space should be leveraged, including the frequency band, geographic location, directionality, and time.

IV. Recommendations to NTIA

CSMAC recommends continuation of this Subcommittee's efforts, as more time is needed to gain additional details from the agencies. The Subcommittee wants to ensure a well-rounded discussion of all elements prior to issuing formal recommendations to NTIA. More agency interviews are needed to better understand challenges and opportunities of implementing regulatory, procedural, legislative, and policy actions. The Subcommittee has pending interview requests with FAA, NOAA, and NASA, which are expected to be scheduled for post-Thanksgiving, and is also expecting written input from the DOD. There could be potential outreach to other agencies as well.

Based on initial interviews and discussions, the Subcommittee is considering the following draft recommendations for further analysis and deliberations after completing the additional federal agency interviews:

- Addressing spectrum efficiency, including effectiveness and interoperability, at the macro-level. This includes a one-government concept to bring agencies together collectively to more efficiently use systems and dollars and also to partner with industry.
- A roadmap – including technologies, standards, metrics, tools/software, implementation, schedule, and cost elements – to drive toward greater spectrum efficiency, relative to the individual mission needs.
- Policy recommendations/changes should accompany sufficient resources/staffing to properly address (i.e., if there's a requirement, agencies need resources and staff).
- Further expansion of the Spectrum Relocation Fund (SRF), such as to cover operations and maintenance (O&M) costs for improved, more spectrally-efficient solutions. However, the SRF is limited to only those situations when there is a case for auctions (which is how the SRF is replenished).
- For other cases, devise mechanisms for federal government to share spectrum, without giving up assignments. As a follow-on effort, NTIA should consider focusing another CSMAC

CSMAC Spectrum Efficiency Report

Working Group on economic mechanisms that could be employed to increase spectrum efficiency via sharing options, such as a federal mechanism to monetize assets on a non-permanent basis (e.g., a secondary markets model)

Appendix A: Interview Questionnaire

Additional Policies to Improve Spectrum Efficiency Subcommittee

Questions for the OMB and the Federal Agencies

A. Questions for OMB:

1. How successful has OMB been in encouraging the agencies to be spectrum efficient and consider the economic value of spectrum?
 - a. What obstacles or complications exist?
 - b. How could OMB improve this?
2. How did OMB arrive at the economic value of the spectrum methodology contained OMB Circular A-11 Section 31.12(b)? What underlying principles were considered? What behavior is OMB trying to encourage on the part of the agencies?
3. Have any federal agencies submitted alternative economic value methodologies for OMB review and approval? If so, what alternative methodologies were used?
4. How do the agencies report their compliance with OMB Circular A-11 Section 31.12? How does OMB enforce compliance?
5. What issues has OMB encountered in implementing OMB Circular A-11, Section 31.13, Spectrum Relocation Fund (SRF)?
6. What additional procedures or policies could be implemented to improve OMB's ability to incentivize greater spectrum efficiency?

B. Questions for NASA, DoD, FAA, NOAA, DHS and DoJ:

1. How does your agency define spectrum efficiency?
2. What are the biggest impediments to your agency to improving spectrum efficiency?
3. In Requests for Proposals (RFP) do you routinely identify spectrum efficiency as a relevant factor?
4. Does your agency use the methodology contained in OMB Circular A-11 Section 31.12(b) to determine the economic value of the spectrum being used in your agency's procurements?
 - a. If so, how?
 - b. If not, why not?
 - c. What impediments does your agency encounter with respect to implementing the spectrum efficiency requirements of OMB Circular A-11?
 - d. If there is a need for improving the effectiveness of OMB Circular A-11, what recommendations do you have to drive more spectrum efficient decisions?
5. If your agency uses an alternate methodology to the one in OMB Circular A-11, Section 31.12(b) how does it determine whether the system procured was most efficient?
 - a. Have you submitted the alternate method to OMB for approval?

- b. How do you track the investment difference between the chosen solution and the more spectrum efficient system?
 - c. Where does spectrum efficiency fall in terms of importance when making source selection decisions?
6. How do you address the possibility of using an existing or alternative Federal system and its already assigned spectrum, instead of procuring a new system? What mission or other barriers are there to considering other department's or federal agencies' systems?
7. How do you address consideration of using the capabilities of similar Federal users to avoid the need for new spectrum when procuring a new system?
8. How do you specify improvements in spectrum efficiency and effectiveness when replacing a system?
9. What process do you use, and how do you certify, that your agency considered commercial or non-spectrum dependent alternatives to meet your mission/operational requirements?
10. How does your agency promote the development and implementation of spectrum efficient technologies? What could be done to make R&D and integration of spectrum efficient technologies more pervasive?
11. Has your agency taken advantage of the Spectrum Relocation Fund (SRF) described in OMB Circular A-11, Section 31.13? Has that been successful?
12. What impediments has your agency encountered with the SRF?
13. What changes to OMB Circular A-11, Section 31.13, SRF, would be helpful to your agency's implementation of the SRF's objectives?
14. What solutions, procedures or policies could be implemented to improve spectrum efficiency?

Appendix B: Agency Interviews

This appendix lists the federal agency interviews conducted to-date.

Agency	Date	Name	Organization/Title
OMB	19 July 2017	Ben Page Steve Cahill	Branch Chief at Executive Office of the President/OMB
NTIA Institute for Telecommunications Sciences (ITS)	15 August 2017 & 1 November 2017	Keith Gremban	Director of NTIA ITS
DHS	31 October 2017	Warren Kendrick Dave Campbell Kelly Oliver Chris Wurst	Director of the Joint Wireless Program Office, Office of the CIO Section Chief, Immigration and Customs Enforcement (ICE) Technical Operations