

**Before the
NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION
Washington, DC 20230**

In the Matter of)	
)	
Developing a Sustainable Spectrum Strategy)	Docket No. 181130999-8999-01
For America's Future)	
)	

Comments of the National Association of Broadcasters

I. Introduction

The National Association of Broadcasters (NAB)¹ hereby submits comments in response to the Notice and Request for Comments (RFC) issued by the National Telecommunications and Information Administration (NTIA) in the above-captioned proceeding.²

NTIA requests comments regarding the development of a comprehensive, long-term national spectrum strategy as required by the Spectrum Presidential Memorandum (Spectrum PM).³ NAB applauds the effort to develop a national spectrum strategy and generally supports efforts to increase access to spectrum and the efficiency of spectrum use. Our comments reflect our experience with novel approaches to expanded spectrum use, including shared use of spectrum. As NTIA moves forward, it should bear in mind the need to balance opportunities for increased efficiency with the vital importance of protecting

¹ The National Association of Broadcasters is a nonprofit trade association that advocates on behalf of free local radio and television stations and broadcast networks before Congress, the Federal Communications Commission and other federal agencies, and the courts.

² *Department of Commerce National Telecommunications and Information Administration, Notice and Request for Comments, Docket No. 181130999-8999-01, 83 FR 65640 (Dec. 21, 2018).*

³ *Developing a Sustainable Spectrum Strategy for America's Future, 83 FR 54513 (Oct 24, 2018).*

existing uses of spectrum on which the public relies. NAB looks forward to working with NTIA and other stakeholders in the development of a national spectrum strategy.

II. Spectrum Sharing Remains Challenging and Uncertain

Broadcasters undoubtedly recognize the importance of good spectrum stewardship. Indeed, broadcasters took an unprecedented step in 2013 and began negotiations with the Department of Defense to share spectrum broadcasters currently use at 2025-2110 MHz. The resulting agreement enabled DoD's move out of the 1755-1780 MHz band so that the Federal Communications Commission could pair it with spectrum in the 2155-2180 MHz band to create the AWS-3 band. The subsequent auction of nationwide, paired spectrum that complemented carriers' existing spectrum portfolios yielded \$45 billion, the most lucrative spectrum auction in the nation's history.

Since the conclusion of the AWS-3 auction, broadcasters have been working closely with DoD spectrum users to develop a successful sharing regime. NAB's experience in this project is informative for future spectrum sharing efforts. In particular, successful sharing should allow for independent analysis of all operations by all involved spectrum users. In this case, shared use between DoD and broadcaster systems is challenging because it requires the exchange of information involving sensitive (in some cases classified) DOD uses as well as broadcast uses that change dynamically in real-time (e.g., electronic news gathering equipment on moving vehicles). Such challenges can frustrate the transparency that would support independent analysis by either party.

Based on this experience, NAB suggests that widespread successful spectrum sharing involving sensitive information is likely to require a third party, trusted by all involved spectrum users, to act as a frequency coordinator. To be effective, all spectrum users involved in a sharing arrangement will need to have real-time communication with the

trusted third party to provide up-to-the minute information on operating conditions and to facilitate interference reporting. Further, the third party in most cases would need to have an enforcement capability to alter the sharing parties' operating conditions to mitigate or avoid interference, and to shut down interference sources if necessary.

These capabilities will require reliable communications among all devices and the development of sophisticated policy algorithms that define priorities of access when conflicts arise. To the best of NAB's knowledge, however, there are no systems currently commercially deployed that have successfully demonstrated these capabilities. Further, the conversion or replacement of legacy telecommunications systems with systems that include these capabilities will be a very costly and time-consuming effort. In keeping with longstanding government policy, existing spectrum users should not be forced to bear the cost of accommodating new systems and users. Rather, all costs associated with sharing should be the responsibility of new users. Finally, new users must not constrain the evolving uses of existing spectrum users by preventing the deployment of new technologies or restricting the modification of transmit and receive nodes or the establishment of new nodes.

NAB's experience to date in working with DoD in the 2025-2110 MHz band suggests that spectrum sharing presents complex challenges that have not yet been fully resolved. Broadcasters' experience with other sharing arrangements, including Television White Spaces (TVWS) operations,⁴ are significantly more troubling. To date, TVWS has been a failure despite being sold to the public and to regulators as "WiFi on steroids."⁵ In practice,

⁴ See 47 CFR Subpart H.

⁵ Anne Broache, "Google outlines proposal for 'Wi-Fi on steroids'" (April 28, 2008) ("Google on Monday said it has a plan to have American consumers from Manhattan to rural North Dakota surfing the Web on handheld gadgets at gigabits-per-second speeds by the 2009

TVWS has proven to be an empty promise, with only a few hundred devices deployed nationwide. In part, this is likely because the policies underlying the database system were flawed and there was no mechanism for enforcement, which undermined any potential for a commercial market to develop. NAB's examination of the TVWS database over the course of years has repeatedly revealed flawed and incomplete data that demonstrate that the database in its current form cannot serve as an effective mechanism to prevent harmful interference. Marketing slogans, rather than sound spectrum policy, led the nation down a dead end.

The authorization of waveform-sensing based Unlicensed National Information Infrastructure (U-NII) devices in spectrum shared with radar systems has proved similarly frustrating. The FAA has reported hundreds of interference incidents to Terminal Doppler Weather Radar systems that were traced to improperly configured U-NII devices. Broadcasters have deployed weather radar systems in that same spectrum and have similarly experienced widespread interference from U-NII devices. Such interference continues to plague weather radar systems, creating a potential public safety hazard.

While the Citizens Broadband Radio Service (CBRS) presents an opportunity to test an updated sharing mechanism with more capability, it is far too early to declare success and attempt to apply this system in other contexts. The Spectrum Access System used in CBRS is designed in part to protect a few dozen Navy radar systems operating in U.S. coastal waters. It is unclear whether this approach can be scaled from protecting a few ship-borne radars to potentially thousands or millions of legacy spectrum users, many of which are passive receivers.

holiday season.”) available at: <http://www.cnet.com/news/google-outlines-proposal-for-wi-fi-on-steroids/>.

The failed TVWS experiment demonstrates that database-driven spectrum access systems are still in their infancy and cannot be relied on for near-term deployments or network configurations. Coupled with the widespread and ongoing problems with U-NII sharing in radar bands based on waveform-sensing, there are not yet proven solutions for widespread spectrum – particularly in dynamic situations.

III. Responses to Specific Questions in the RFC

The RFC sets forth seven specific questions on which it requests comment. NAB provides answers to each of these seven questions below.

1. In what ways could the predictability of spectrum access for all users be improved?

NAB supports novel approaches to improve spectrum access, but such access should fully protect existing operations on which consumers rely today. Broadcasters typically operate continuously, or nearly so, providing news, emergency information and entertainment to viewers and listeners across the country. Continued, assured access to these services is essential. A national spectrum policy must ensure that shared access to spectrum does not affect broadcast services.

As a general matter, NAB suggests that sharing with systems that operate at fixed, known locations may be more plausible than sharing with systems that are in motion or operating at temporary locations. Any expanded spectrum sharing efforts should therefore begin with straightforward situations subject to rigorous and reliable analysis and avoid overly complex approaches that are unpredictable or unenforceable, particularly those involving statistical inferences concerning the likelihood of use.

2. To what extent would the introduction of automation facilitate assessments of spectrum use and expedite the coordination of shared access, especially among Federal and non-Federal spectrum stakeholders?

Automated access systems have thus far proven unreliable or subject to manipulation that defeats their interference mitigation properties. As discussed above, the TVWS database-driven approach has failed in large part because it allowed end-users to input incorrect or even fraudulent information concerning the location of the device and the identity of the user. An automated mechanism must not rely upon manual data entry unless those data are subject to rigorous third-party verification. To be effective and reliable, devices under the control of an automated spectrum-sharing system must automatically and verifiably report their true location (including height), the true identity of the operator and provide a mechanism for shut-down if communication with the automated system fails for any reason.

3. What is the practical extent of applying standards, incentives, and enforcement mechanisms to promote efficient and effective spectrum use?

Any sharing regime must recognize and deal with the “hidden node” problem. “Hidden nodes” arise, for example, when passive receivers cannot be detected or protected by other spectrum users. All one-way transmission systems, including broadcasting, are particularly subject to interference because the locations and characteristics of the receivers are typically not known – no one knows where all television sets or radio receivers are located, and it would be impractical and unreasonable to try to collect this information. The only way to protect these receivers is by excluding access within the entire geographic area served by the broadcaster. Unless some automated means for receivers to communicate their location and status to a central authority develops, or low-level sensing approaches become a demonstrably reliable technology to prevent interference, standards for spectrum-

sharing must respect the geographic boundaries of service of existing users in such situations.

4. How might investment in Research, Development, Test and Evaluation (RDT&E) improve spectrum-utilization methods, and spectrum-sharing tools and techniques?

The TVWS rules allow for interference protection based on a database system, discussed above, or spectrum “sensing.”⁶ The sensing approach has never been employed commercially because none of the sensing systems manufacturers submitted for testing were able to comply with the requirements of the TVWS rules, or they reported so many false positives that the capability was useless. Sensing systems must be able to reliably identify a variety of emission types at levels low enough to avoid the hidden node problem. Research that improves upon recognition of cyclostationary signal characteristics (signals that vary cyclically with time) or other features to more effectively and reliably identify incumbent spectrum users could allow for additional access to spectrum while avoiding some of the pitfalls of database systems.

5. What are the risks, if any, to the global competitiveness of U.S. industries associated with spectrum management and policy actions?

The ITU does not recognize spectrum uses other than those contained in its Table of Frequency Allocations. NAB suggests that the U.S. take a lead role in conducting research and contributing to ITU-R questions and policies that can facilitate spectrum sharing, while ensuring incumbent and allocated uses are fully protected. The U.S. should avoid seeking spectrum allocations by footnote and instead achieve regional or global harmonization of spectrum sharing, which can help create economies of scale necessary to drive down equipment costs.

⁶ 47 CFR §15.717.

6. How could a spectrum management paradigm be structured such that it satisfies the needs of commercial interests while preserving the spectrum access necessary to satisfy the mission requirements and operations of Federal entities?

To embrace sharing with federal government users, commercial interests must be satisfied that their operations will be protected. Yet many government spectrum uses are considered sensitive, with operational details, and sometimes technical details, restricted. Thus, as a practical matter, federal users may be unable to share with commercial users the technical information necessary for an independent assessment of interference. As discussed above, spectrum sharing that relies on the exchange of sensitive information is likely to require a trusted third-party to serve as a coordinator.

Further, it is essential to involve both government and commercial users in the development of the policies necessary to ensure interference-free operation. Commercial users cannot accept a “trust us, we’ll protect you” approach from federal users.

7. What are the likely future needs of spectrum users, both terrestrially and for space-based applications, within the next 15 years? In particular, are present allocations of spectrum sufficient to provide next generation services like Fifth Generation (5G) cellular services and emerging space-based applications?

NAB respectfully submits that no party is in a position to offer a responsible answer to this question, especially while 5G services remain largely speculative. The past several years have seen major spectrum policy decisions turn on hyperbolic claims of an impending “spectrum crunch” or a “spectrum crisis,” that proved overblown. NAB urges that a national spectrum strategy be based on facts, not marketing campaigns.

While NAB agrees that demands for wireless data are increasing, more spectrum is not the only solution to accommodate those increasing needs. Carriers can expand capacity through increased infrastructure investment and commercial research and development. Further, there is presently considerable spectrum lying dormant because it was purchased

by speculators with no clear plan for deployment. We respectfully urge NTIA not to accept marketing slogans around 5G or other services as a substitute for sound engineering analysis and consideration of the public policy interests at stake in protecting existing uses of spectrum.

IV. Conclusion

NAB supports the development of a long-term national spectrum strategy based on sound spectrum policy and engineering considerations. Such a policy should demand rigorous technical support for its conclusions, rather than relying on unproven assumptions that solutions will appear over time. We look forward to working constructively with NTIA and other stakeholders in this process and providing any further information that may be helpful.

Respectfully submitted,

**NATIONAL ASSOCIATION OF
BROADCASTERS**
1771 N Street, NW
Washington, DC 20036
(202) 429-5430



Rick Kaplan
Patrick McFadden
Robert Weller

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