

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of:)
)
Unlicensed White Space Device Operations in the) ET Docket No. 20-36
Television Bands)
)

**REPLY COMMENTS OF
THE NATIONAL ASSOCIATION OF BROADCASTERS**

I. INTRODUCTION AND SUMMARY

The National Association of Broadcasters (NAB)¹ hereby replies to comments submitted in response to the Commission’s Further Notice of Proposed Rulemaking (FNPRM) concerning unlicensed operations in the broadcast television bands.² Commenters supporting the adoption of this proposal significantly overstate the potential benefits of the change while understating the potential risks to licensed services. NAB has supported reasonable changes to television white spaces (TVWS) rules, including the significant changes the Commission recently made following extensive negotiations between Microsoft and NAB. We urge the Commission not to adopt additional changes that threaten television reception, particularly considering this unlicensed technology has produced few tangible results in the thirteen years since the Commission first authorized TVWS operations.

¹ The National Association of Broadcasters (NAB) is the 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 *Unlicensed White Space Device Operations in the Television Bands*, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 12603 (2020) (FNPRM).

II. THE RECORD DOES NOT SUPPORT USE OF A TERRAIN-BASED MODEL

A. PROPONENTS OF A TERRAIN-BASED MODEL TO DETERMINE CHANNEL AVAILABILITY FUNDAMENTALLY MISUNDERSTAND THE PURPOSE AND LIMITATIONS OF SUCH MODELS

The FNPRM expressly instructs commenters to address NAB's stated concern that use of a terrain-based "point-to-point" model to determine TVWS channel availability would be inappropriate because neither the FCC nor any stakeholder knows the location of all individual television receivers.³ Absent accurate and reliable information about the location of receivers, terrain-based modeling is as likely to introduce errors as it is to enhance the accuracy of results. No commenter addressed this issue.

Instead, commenters supporting the use of a terrain-based model in this proceeding assume away one of the central questions of this proceeding: whether a terrain-based model such as Longley-Rice will actually provide materially more accurate results regarding channel availability for unlicensed operations. For example, Microsoft claims that the "current method for calculating white space channel ability overprotects DTV receivers and as a consequence, reduces the amount of spectrum that is available for fixed WSD operations" without seriously engaging with the question of whether Longley-Rice would provide more accurate results.⁴

As NAB has previously noted, Longley-Rice and similar point-to-point propagation models provide the illusion of accuracy because they provide precise results. But precision and accuracy are not the same thing. For example, a measurement of 1.03 feet is more precise than a measurement of 1 foot. But if one is measuring, for example, water depth in a

³ FNPRM at ¶ 86.

⁴ Comments of Microsoft Corporation at 2, ET Docket No. 20-36 (March 29, 2021).

river with a shifting bed and varying water levels, artificial increases in precision are unlikely to lead to broadly accurate or reliable predictions.

Most point-to-point propagation models are two-dimensional. That is, they consider only the direct path along a line between the transmitter and the receiver. Real transmitters and receivers operate in a three-dimensional world where transmitted signals may, for example, bounce off of nearby buildings and reach the receiver through an indirect path. That is one reason why a person in a car driving along K Street in Washington, DC can receive an FM signal from a transmitting antenna that is blocked by the surrounding buildings. The walls of those buildings may act as specular surfaces, reflecting some of the energy from the FM station toward cars in the street.

Longley-Rice has other limitations as well. For example, it represents complex terrain features, such as jagged mountain ranges, as a single uniform terrain feature.⁵ Such simplifications are useful because they allow for reasonable signal level estimates over large areas with practical computational resources. However, these limitations also serve to limit the accuracy of prediction in specific cases.

As an illustration, Figure 1 shows an obstructed TV receiver location where Longley-Rice would not predict service along the transmitter-to-receiver direct path. However, the viewer may in fact receive service because the TV station's signal is reflected off distant terrain back toward the receiver location. If the TVWS database used Longley-Rice in this case to allow TVWS devices to operate in the area near the receiver, those devices would create harmful interference.

⁵ "Radio Propagation for Vehicular Communications," IEEE Trans. Veh. Tech., Vol VT-26, No. 4 (Nov. 1977).

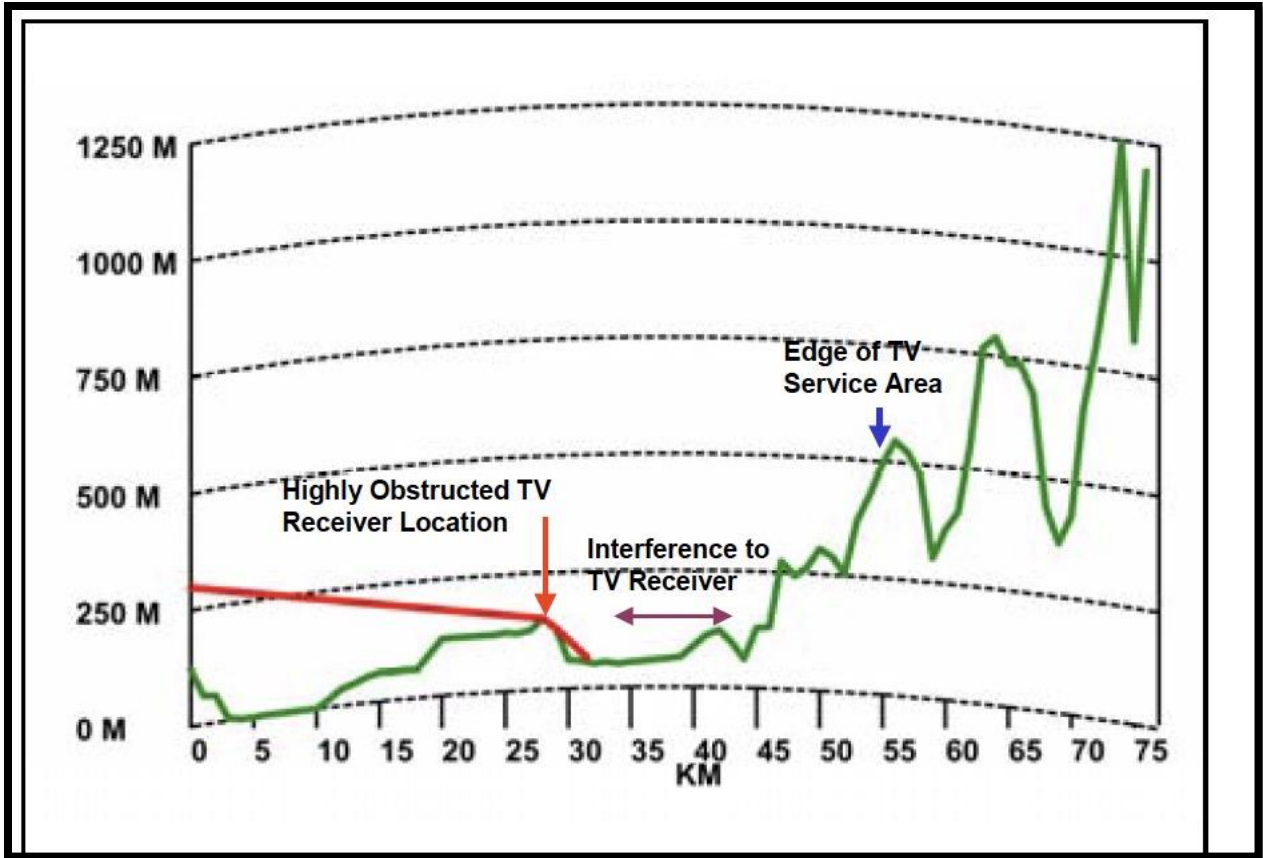


Figure 1.

In short, Longley-Rice is useful for making reasonable and reliable predictions of coverage over very large geographic areas. It was never intended, however, to predict coverage from broadcast stations at specific locations, and thus is potentially misleading. What proponents are in essence asking the FCC to do is adopt a terrain-based model for predicting channel availability solely because such a model may have the result of predicting a greater number of available channels under some circumstances. Microsoft reveals its' true intentions by expressly asking the Commission to make the use of Longley-Rice *optional*; Microsoft plainly wants to preserve the ability to use whichever methodology predicts a greater number of available channels for unlicensed use. The Commission should not indulge this request.

B. PROPOSED MODIFICATIONS TO THE PROPOSAL DO NOT ELIMINATE THE RISK OF HARMFUL INTERFERENCE TO FULL POWER AND OTHER STATIONS

In their initial comments, Microsoft and the Dynamic Spectrum Alliance (DSA) suggest that the Commission allow the use of terrain-based modeling such as Longley-Rice only outside of the 41 dBu F(50,90) contour (the noise-limited service contour or NLSC) for full-service broadcasters on UHF channels.⁶ Considering the use of Longley-Rice only outside a station's NLSC does nothing to alter the fundamental limitations of that model.

As an initial matter, there is not a magical barrier at the edge of the NLSC that protects viewers inside that contour from interfering signals originating outside the contour. The contour simply reflects a calculation of a signal level that occurs at 50 percent of locations, 90 percent of the time. Although more granular than the contour calculated using these F-Curves, Longley-Rice predictions of coverage have the same statistical limitations. In practice, signal levels will vary significantly over both time and location. For example, at UHF frequencies, the difference in location variability between the 50th percentile and the 90th percentile is on the order of 15 dB. Thus, a small change in location of a TV receiver may result a large change in signal level, even though the level predicted by Longley-Rice does not change at all.

Further, this proposal would lay the groundwork for harmful interference to non-consumer receivers. For example, TV White Space devices are required to protect rural TV Translators, which *receive* programming from primary TV broadcast stations but may be located outside the NLSC of the primary station. Such protection is afforded by restricting TVWS devices from locating within a “keyhole” protection zone around the TV Translator.

⁶ Microsoft Comments at 8; Comments of the Dynamic Spectrum Alliance at 5-6, ET Docket No. 20-36 (March 29, 2021).

Interference to a TV Translator would simultaneously and unavoidably disrupt hundreds or thousands of rural viewers.

Even more troublingly, DSA seems to not recognize the underpinnings of the existing TVWS rules. For example, DSA suggests that “cross-polarization loss” might be incorporated to allow for more flexible TVWS operations.⁷ In fact, cross-polarization loss is already incorporated into the TVWS rules. Particularly at large distances, linearly polarized broadcast signals become “depolarized,” reaching the TV receiver with random polarization. Further, many or most TV broadcast stations transmit with (or are switching to) elliptical or circular polarization. Cross-polarized operation of a linearly polarized TVWS signal with an elliptically or randomly polarized TV broadcast signal is not possible. As a result, DSA’s assumptions concerning polarization of TV broadcast signals are almost certainly invalid.

Similarly, DSA’s proposal to apply climatic zone corrections to “tune” the Longley-Rice model would create confusion. TV Broadcast stations have coverage that is defined in OET Bulletin No. 69 to be in a continental-temperate environment. During the development of the planning factors for the digital television service, the use of other climatic zones was considered and rejected by the FCC.⁸ To reopen that issue 23 years later could redefine coverage for many or most TV stations in the country, creating significant uncertainty solely for the sake of perceived marginal gains in TVWS channel availability.

⁷ DSA Comments at 6.

⁸ *Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service*, Memorandum Opinion and Order on Reconsideration of the Sixth Report and Order, 13 FCC Rcd 7418 (1998).

III. EXPERIENCE WITH TVWS TECHNOLOGY TO DATE DOES NOT WARRANT A RISKY NEW PROCEDURE FOR DETERMINING CHANNEL AVAILABILITY

In addition to assuming away the central question of whether a terrain-based model will produce more accurate results, commenters favoring such a model also assume that further loosening of TVWS rules, even at the risk of increased interference, is worthwhile because TVWS technology has the potential to play a meaningful role in increasing access to broadband service. There is little evidence this is true.

The self-described “Public Interest” Spectrum Coalition (PISC), for example, states that “pilot programs in Boulder, Colorado, rural Virginia, and Nebraska that employ TV White Spaces for service deployment have been expanded both in the context of the COVID-19 pandemic and broadly to connect students and families in their local communities.”⁹ In reality, according to the TVWS database, there are *no* TVWS devices operating in Boulder Colorado, there is a *single* device in Harrisonburg, Virginia, *another device* in Blacksburg, Virginia, and there are *no* TVWS devices operating in the state of Nebraska. The only evidence the PISC offers for its claim is a citation to a report authored by the same individuals who drafted the PISC comments.¹⁰ That report, in turn, cites a petition for a waiver of the FCC’s E-rate rules seeking support for a *theoretical* white spaces deployment.¹¹ That is, the evidence cited for these supposedly “expanded” white spaces deployments is a petition on which the

⁹ Comments of the Public Interest Spectrum Coalition at 6, ET Docket No. 20-36 (March 29, 2021).

¹⁰ Michael Claabrese and Amir Nasr, “The Online Learning Equity Gap: Innovative Solutions to Connect All Students at Home,” New America’s Open Technology Institute Report (Nov. 17, 2020), available at: <https://www.newamerica.org/oti/reports/online-learning-equity-gap/>.

¹¹ Joint Petition for Clarification or, in the Alternative, Waiver of Microsoft Corporation, Mid-Atlantic Broadband Communities Corporation, Charlotte County Public Schools, Halifax County Public Schools, GCR Company, and Kinex Telecom, WC Docket No. 13-184 (June 7, 2016).

FCC has not acted and which has apparently yielded no actual deployment or benefit. Setting aside the irony of a nearly \$2,000,000,000,000 company being a signatory to a petition seeking government funding to support a limited pilot project, this petition proves nothing about the potential or actual merits of TVWS technology. In other words, none of these claims regarding expanded TVWS deployments are true.

This is nothing new. In 2009, Microsoft, Dell, and Spectrum Bridge heralded the launch of the first ever public white spaces broadband network in Claudville, Virginia.¹² Twelve years later, there are no TVWS devices registered in Claudville, Virginia. In 2017, Mid-Atlantic Broadband Communities Corp. and Microsoft announced the launch of a new project promising to “deliver broadband internet access at home to thousands of students in Southern Virginia, at no cost to their families.”¹³ Again, as described above, there are only two TVWS devices registered in Southern Virginia – whatever broadband access is being provided in that area is not being provided via white spaces.

More generally, there are only 307 TVWS devices registered to operate in the United States more than 12 years after the FCC initially authorized unlicensed operations in the television bands. This represents hundreds fewer devices than NAB found four years ago.¹⁴

¹² Julie Bort, “Microsoft, Dell, Spectrum Bridge launch first public white spaces network,” NetworkWorld (Oct. 21, 2009) available at: <https://www.networkworld.com/article/2232171/microsoft-dell-spectrum-bridge-launch-first-public-white-spaces-network.html>.

¹³ “Mid-Atlantic Broadband Communities and Microsoft launch new Homework Network to bring thousands of students online in rural Virginia,” Microsoft New Center (May 23, 2017) available at: <https://news.microsoft.com/2017/05/23/mid-atlantic-broadband-communities-and-microsoft-launch-new-homework-network-to-bring-thousands-of-students-online-in-rural-virginia/>.

¹⁴ Letter from Patrick McFadden to Marlene H. Dortch at 1, GN Docket No. 12-268, ET Docket No. 14-165, MB Docket No. 15-146 (July 10, 2017).

Despite multiple attempts to reform or loosen the TVWS rules to encourage greater deployment, the inescapable reality is that TVWS technology is moving backwards in the United States, not forwards. The Commission should not keep bending over backwards for a technology that's only consistency has been a failure to produce results.

It remains unclear whether TVWS will actually be used for rural broadband deployments at scale. It remains even more unclear whether rural broadband is even a serious goal of the technology's chief proponent or if, in the words of one sophisticated observer, Microsoft is "hustling us with white spaces," to further its urban Internet of Things aspirations.¹⁵

Nonetheless, as the Commission is well aware, NAB supported numerous revisions to the Commission's TVWS rules because it believed those revisions would not necessarily increase the potential for harmful interference to licensed services. This proposal is different. It creates a significantly increased interference risk to a licensed service actually serving real-world customers today to benefit an unlicensed service that remains almost entirely hypothetical and has a lengthy track record of broken promises. We urge the Commission not to take further action in this proceeding – particularly with no evidence that continuing to double down on white spaces will produce any tangible public interest benefits.

IV. CONCLUSION

NAB has repeatedly stressed in this proceeding that terrain-based modelling is not intended to, and cannot, provide accurate information about service with respect to individual receivers. No commenter made any effort to address this issue in initial comments,

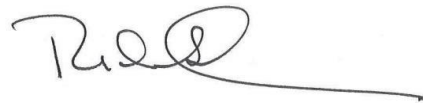
¹⁵ See Susan Crawford, "Microsoft is Hustling Us With 'White Spaces'" WIRED (July 26, 2017) available at: <https://www.wired.com/story/microsoft-is-hustling-us-with-white-spaces/>.

notwithstanding the express request of the FNPRM. Use of such modeling would likely increase the risks of harmful interference to television viewers with no substantial benefits in predictive accuracy. More fundamentally, having now made several rule changes to benefit a service that has yielded no material public interest benefits to date, the Commission should not take further action absent substantial real-world deployments demonstrating that white spaces technology can form the basis of a meaningful service. We continue to urge the Commission to retain its existing rules for determining the availability of TVWS channels, at least until all stakeholders have a clearer picture of the impacts of the recent changes to the TVWS rules.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read "Rick Kaplan", with a long horizontal line extending to the right from the end of the signature.

Rick Kaplan
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Alison Neplokh
Robert Weller

April 26, 2021