

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

June 2, 2020

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I. INTRODUCTION AND SUMMARY

The National Association of Broadcasters (NAB)¹ hereby replies to comments submitted in response to the Commission’s Notice of Proposed Rulemaking on potential changes to the Commission’s rules governing TV white spaces (TVWS) devices.²

NAB continues to urge the Commission to limit this proceeding to the narrow set of proposals set forth in the NPRM and not consider extraneous requests that would dramatically expand those proposals or effectively rewrite fundamental aspects of Part 15 of the Commission’s rules. It is undisputed in the record of this proceeding – and, as a matter of law, it is indisputable – that unlicensed services must not cause harmful interference to licensed users. Based on that common understanding, NAB and Microsoft worked together over many months to negotiate a targeted set of beneficial adjustments to the Commission’s

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*, Notice of Proposed Rulemaking, ET Docket No. 20-36, FCC 20-17 (March 2, 2020) (NPRM).

existing rules that would enable improvements for TVWS service while protecting television reception from harmful interference.

Unfortunately, some commenters seek to expand the scope of this proceeding into areas that have already been fully debated and where there have been no new developments that would warrant changes. These commenters focus their attention on arguments that alternative propagation models, power increases and reduced coordination requirements would expand service or create economic benefits. But before examining the potential economic benefits of reducing restrictions on unlicensed use, the Commission must first ensure that any changes it adopts in this proceeding will not increase the risk of harmful interference to existing users. Based on the record of this proceeding, the Commission should not entertain these extraneous proposals because it cannot conclude they will not increase the potential for harmful interference. NAB addresses specific proposals in more detail below.

II. CONTOUR PROTECTION IS THE ONLY REASONABLE WAY TO ADEQUATELY PROTECT CONSUMER TV RECEIVERS, WHICH OPERATE AS “HIDDEN NODES”

The Public Interest Spectrum Coalition (PISC) and WISPA urge the Commission to adopt a new model for protecting broadcast television service, asserting that television service is currently overprotected based on free-space propagation models and worst-case assumptions concerning television receiver performance.³ These claims are inaccurate.

First, the contours used to establish the protected service area of television stations are *not* based on free-space propagation. Rather they are calculated from the empirically

³ Comments of WISPA at 4, ET Docket No. 20-36 (May 4, 2020); Comments of the Public Interest Spectrum Coalition at 3, 11, ET Docket No. 20-36 (May 4, 2020).

derived R-6602 propagation curves as codified in the Commission's rules,⁴ which in turn are based on the average terrain surrounding a specific transmitter site. There is no better propagation model that will similarly serve to protect passive television receivers at indeterminate locations.

The use of a deterministic propagation model, such as Longley-Rice, requires that the locations of both transmitters and receivers are known with precision. Such models may be useful in more accurately protecting receivers at known locations, such as CBRS devices and fixed microwave links, but are of no use in the protection of hidden nodes, including TV receivers. Broadcast television receiver locations are not reflected in any database and cannot be passively detected. In short, the Commission should not consider adopting alternative propagation models.

Second, television receiver protection requirements for TVWS devices are not overly conservative or based on worst-case assumptions. In fact, the TVWS protection requirements are already relaxed in comparison to the FCC's other broadcast protection rules.⁵ The TVWS protection requirements are based on the voluntary recommended practice of ATSC A/74,⁶ which assumes considerably better receiver performance than other FCC rules. For example, the FCC's requirement for protection of a DTV station from another DTV station operating on an upper-adjacent channel is a D/U ratio of -26 dB, while the ATSC receiver recommended practice is -33 dB. Thus, the protection afforded television receivers from TVWS interference is

⁴ FCC Report R-6602, "Development of VHF and UHF Propagation Curves for TV and FM Broadcasting" (Sep. 7, 1966), available at: <https://www.fcc.gov/document/report-no-r-6602-tv-and-fm-propagation-curves>

⁵ 47 CFR §73.623(c).

⁶ ATSC, "A/74, Receiver Performance Guidelines" (April 7, 2010), available at: <https://www.atsc.org/atsc-documents/a74-receiver-performance-guidelines/>.

already 7 dB less than the protection afforded television receivers from other broadcast stations under the FCC's allotment rules. There is no data in the record of this or any other FCC proceeding that suggests that consumer television receivers perform better than either of these specifications. There is thus no justification for further relaxation of the protection requirements.

WISPA also asserts that the Commission need not wait for more experience with ATSC 3.0 before making changes, baldly asserting that ATSC 3.0 is "more robust against interference."⁷ Once again, this is a totally unsupported claim. In fact, the operating specifications of ATSC 3.0 are still under development and will likely vary from station to station. Further, no tests of consumer ATSC 3.0 receiver performance support that claim because no consumer ATSC 3.0 receivers are in use. There is no basis for claiming that ATSC 3.0 will be more robust against TVWS interference either on a theoretical or empirical basis. The Commission should not change its protection methodology with respect to television receivers until a far more substantial technical record based on real world experience with ATSC 3.0 deployments is available.

III. THE COMMISSION SHOULD NOT INCREASE THE ALLOWABLE TRANSMITTER POWER FOR TVWS DEVICES

Adaptrum asks the Commission to authorize increased conducted (transmitter output) power for TVWS devices.⁸ This proposal is unwarranted and would create a serious risk of harmful interference through either abuse or inadvertence.

The current conducted power limit of one watt implies that an antenna gain of about 12 dBi will be needed to achieve the maximum authorized EIRP of 16 watts. There are many

⁷ WISPA Comments at 6.

⁸ Comments of Adaptrum Inc. at 2, ET Docket No. 20-36 (April 30, 2020).

commercially available antennas with gains exceeding 12 dBi. Permitting greater conducted power levels will inevitably lead to inadvertent or intentional overpower operation and increased potential for interference. For example, the Kathrein PR-TV, a common antenna that has been available for decades, has a typical gain of over 18 dBi.⁹ Such an antenna, if connected to a one-watt TVWS transmitter, would radiate 63 watts – about 4 times the 16-watt EIRP maximum being proposed. If a two-watt TVWS transmitter were used instead, the radiated power would exceed 125 watts – almost eight times the maximum. This and other antennas are available for sale to the public without restriction.

Of course, the Commission should not always design rules assuming widespread non-compliance. In this case, however, the spotty history of “professional installation” of TVWS devices does not suggest that the TVWS installer’s primary interest is ensuring compliance with FCC rules. Increasing the conducted power limit in this case risks encouraging grossly overpower operation in violation of the Commission’s rules.

IV. THE COMMISSION SHOULD ALLOW GEOFENCED TVWS OPERATION BUT NOT WITHOUT RESTRICTION

PISC supports the NPRM’s proposal to allow geofenced TVWS operations, but adds a single sentence asking the Commission to make clear that “list of available channels can differ across the geofence.”¹⁰ PISC provides no explanation for how this proposal would work and identifies no potential benefits of the proposal. The Commission should therefore reject this suggestion.

⁹ See specifications for “PR-TV Series Parareflector Antenna,” available at: <https://www.kathrein-bca.com/files/pr-tv.pdf>.

¹⁰ PISC Comments at 18.

The purpose of allowing relatively high-power mobile TVWS operations within a predefined, geofenced area is to increase the flexibility of communications systems using TVWS while decreasing their complexity and maintaining protection of incumbent licensed services. Maintaining a consistent list of available channels constant across the geofenced area is a critical part of this approach. Allowing channel availability to vary, as suggested by PISC, would substantially increase complexity by creating new sub-zones within which devices would need to refresh channel availability every 60 seconds and new 1.6 kilometer buffer zones (1.6 kilometers is the distance a vehicle traveling 60 miles per hour covers in 60 seconds). The Commission should not allow the channel list to vary within a geofenced area.

Similarly, within a geofenced area, the mobile TVWS operation must maintain constant power. In a geofenced area characterized by varying terrain, the HAAT may vary as a vehicle goes up or down hills, resulting in a requirement for the TVWS device to adjust power depending upon its precise location within the geofenced area. Compliance with this requirement will be challenging because most GPS receivers have relatively poor performance in the Z-plane and the determination of HAAT from a rapidly moving platform would require significant real-time processing. Further, requiring continuous height and power monitoring seems contrary to the goal of maintaining constant operating conditions within the geofenced area. Consequently, NAB recommends that operation within geofenced areas be limited to the minimum EIRP that would be permitted at any location within the geofenced area.

NAB has no objection to defining devices engaged in high-power geofenced operations as a special class of fixed device rather than a Mode II device as some commenters

suggest.¹¹ Importantly, however, geofenced mobile operation is intended for school buses, precision agriculture and similar applications. Accordingly, NAB strongly supports the NPRM’s proposal to prohibit operation on board aircraft or satellites to limit the range at which interference could occur. For the same reason geofenced operations should not be permitted atop cranes, bucket trucks, or drones – all of which could substantially increase the potential for interference. To give effect to this restriction, we suggest the Commission limit the height above ground for devices installed on mobile platforms to no more than six meters.

V. THE PROTECTION DISTANCES FOR T-BAND LAND-MOBILE RADIO PROTECTION SHOULD BE INCREASED

The National Public Safety Telecommunications Council (NPSTC) observes that the proposed small increases in separation distances between TVWS devices and land-mobile radio (LMR) sites may account only for the increase in EIRP from 10 watts to 16 watts, but may not account for the increase in HAAT from 250 to 500 meters.¹² NAB agrees with NPSTC that larger separation distances are likely needed to protect LMR sites. NAB suggests that the appropriate separations can be calculated using FCC curves by establishing equivalent protection of LMR receivers at the proposed increased power and height of TVWS devices. For example, the present Section 15.712(d)(1) distances from areas specified in Section 90.303 are:

TVWS EIRP	Co-Channel Distance	Adjacent-Channel Distance
≤ 4 watts	134 km	131 km
> 4 watts	136 km	131.5 km

¹¹ Letter from Pierre-Jean Muller to Marlene H. Dortch at 2, ET Docket No. 20-36 (May 1, 2020) (RED Technologies Letter).

¹² Comments of the National Public Safety Telecommunications Council at 5-6, ET Docket No. 20-36 (May 4, 2020).

Using the FCC F(50,10) curves, which are commonly applied to the prediction of interfering signals, the above co-channel protections are equivalent to field strengths of -0.6 dBµV/m and 3 dBµV/m in a bandwidth of 6 MHz, while the adjacent-channel protections are equivalent to -0.1 and 3.9 dBµV/m F(50,10) in 6 MHz. Equivalent field strength values could also be calculated in 12.5 kHz or some other bandwidth more typical of land-mobile operation, but the resulting distances do not appear to vary significantly.

Using these equivalent field strengths, increasing the TVWS power to 16 watts and the HAAT to 500 meters gives distances of:

TVWS EIRP	Co-Channel Distance	Adjacent-Channel Distance
≤ 4 watts	158 km	155.4 km
> 4 watts and ≤ 10 watts	169.8 km	166 km
> 10 watts	171.1 km	166.2 km

Similarly, the existing 15.712(d)(2) distances from waived LMR receive sites are:

TVWS EIRP	Co-Channel Distance	Adjacent-Channel Distance
≤ 4 watts	54 km	51 km
> 4 watts	56 km	51.5 km

Increasing the TVWS power to 16 watts and the HAAT to 500 meters gives equivalent distances of:

TVWS EIRP	Co-Channel Distance	Adjacent-Channel Distance
≤ 4 watts	69.8 km	65.6 km
> 4 watts and ≤ 10 watts	76.3 km	70.5 km
> 10 watts	78.2 km	71.3 km

NAB recommends that the Commission adopt the equivalent protection distances tabulated above in lieu of the values given in Tables 6 and 7 of the NPRM. In the alternative,

NAB would support different distance calculations based on analysis by NPSTC or the land mobile community.

VI. THE COMMISSION SHOULD ADOPT MICROSOFT'S PROPOSED COORDINATION REQUIREMENT FOR TVWS OPERATIONS WHERE THE HAAT EXCEEDS 250 METERS

NAB continues to support the prior coordination approach that Microsoft sought for those TVWS operations that are most likely to cause widespread interference – operations where the HAAT would exceed 250 meters.¹³ NAB continues to believe that the alternative notification process suggested in the NPRM will lead to interference that will be difficult to identify. Nonetheless, NAB agrees with NPSTC that if the Commission does decide to require a notification process in place of the coordination procedures Microsoft proposed, the amount of advance notice must be substantially greater than 48 hours.¹⁴ NPSTC has suggested at least ten days advance notice and NAB agrees that ten days is the minimum period needed to reasonably ensure that licensees are aware of the potential for interference.

RED Technologies asserts that there is no need for a special coordination procedure between TVWS devices and licensed facilities, claiming that the information included in the TVWS database is sufficient to diagnose “most interference events.”¹⁵ NAB strongly disagrees. The limited information available publicly through TVWS databases is insufficient to identify the source of TVWS interference and difficult for even technical staff at television stations to use and interpret. It is also completely unclear why any TVWS proponent would endorse such a risky procedure, which could easily lead to TVWS facilities being constructed

¹³ Microsoft Corporation Petition for Rulemaking at 14, ET Docket Nos. 14-165, 20-36 (filed May 3, 2019).

¹⁴ NPSTC Comments at 8.

¹⁵ Letter from Pierre-Jean Muller to Marlene H. Dortch at 2, ET Docket No. 20-36 (May 1, 2020) (RED Technologies Letter).

at significant expense that must ultimately cease operation or be dismantled because they result in interference.

More fundamentally, the Commission should not impose on licensees the obligation to proactively check databases for potential unlicensed interference sources. Rather, for TVWS deployments that will exceed 250 meters HAAT and carry a particularly high potential for causing widespread interference, the onus should be on the TVWS operator to coordinate with potentially affected broadcast stations.

Finally, RED Technologies requests that the Commission make the “proposed rules optional for [white spaces database administrators] to support until there is market demand.”¹⁶ This is a patently unreasonable request. NAB has no objection to a very limited phase-in period to allow database administrators and device manufacturers to implement the new rules. However, the Commission cannot responsibly allow an indefinite time, based on amorphous “market demand” during which existing TVWS devices may be relocated to sites greater than 250 meters HAAT or to allow geofenced operations without some mechanism for controlling their interference potential. TVWS database administrators simply must update their database capabilities to comply with the Commission’s rules. If database administrators find this too expensive or inconvenient, they should not be database administrators.

VII. THE COMMISSION SHOULD NOT ADJUST ITS RULES FOR FIRST-ADJACENT CHANNEL OPERATIONS

NAB continues to urge the Commission not to consider higher power operations on first-adjacent channels to broadcasters at this time. Nothing submitted in initial comments in this proceeding warrants a different approach.

¹⁶ Comments of RED Technologies, May 1, 2020, page 1 and 5.

Microsoft submitted testing results that it claims support its request for higher power on first-adjacent channels.¹⁷ While we appreciate the effort Microsoft has made to submit testing results on the issue of first-adjacent channel operation, nothing in these results warrants an examination of this issue at this time. Critically, Microsoft conducted testing using only new receivers (2018-2019 models.) This provides no useable information whatsoever with respect to older receivers, which almost certainly make up the bulk of the installed consumer base and may be more susceptible to potential interference from TVWS operations on first-adjacent channels. Similarly, the sole ATSC 3.0 receiver that Microsoft tested is a dongle that costs nearly \$1,000 and is marketed as a “professional grade” receiver. The consumer ATSC 3.0 receiver market is plainly in a nascent stage, and without a wider base of tested receivers the Commission cannot draw any conclusions about the susceptibility of future 3.0 receivers to interference. If Microsoft is correct that very recent model DTV receivers and future ATSC 3.0 receivers offer more robust interference protection, that may, in the future, warrant reexamination of this issue. As it stands, however, there are very obviously a large number of receivers in the market that predate 2018, and more ATSC 3.0 receivers will be available in the marketplace in the coming months and years. Microsoft’s testing provides no information at all with respect to either older DTV receivers or future ATSC 3.0 receivers.

Even if Microsoft’s testing was probative, the testing suggests that at least one of the DTV receivers tested could be susceptible harmful interference from higher power first-adjacent channel operations. One of the receivers tested performed only 0.8 dB better than the recommended practice in ATSC A/74 of -33 dB, which serves as the basis for the existing

¹⁷ Comments of Microsoft Corporation, Appendix A and B, ET Docket No. 20-36 (May 4, 2020).

40 mW power limitation on first-adjacent channels.¹⁸ In other words, Microsoft's testing *confirms* the basis for the existing limitations.

In any event, Microsoft's obligation in this proceeding is not to suggest that at some indeterminate point in the future it may be possible to reexamine the rules for first-adjacent channel operation. Rather, Microsoft must demonstrate that higher power first-adjacent channel TVWS operations will not cause interference to television receivers regardless of vintage. Microsoft has not met that burden.

Similarly, PISC points to a small-scale test on television reception in Africa that was published in 2015.¹⁹ These tests used a different television transmission system than is used in the U.S., as well as larger (8 MHz) bandwidth television channels than are used in the U.S. PISC does not even attempt to reconcile these differences. There is no reason to believe that the results of those tests would be in any way applicable to the U.S. market.

VIII. THE COMMISSION SHOULD NOT ADJUST ITS RULES BASED ON DIRECTIONAL ANTENNAS

PISC asks the Commission to adjust TVWS protections based on the use of directional antennas by TVWS devices. While NAB recognizes that the use of directional antennas can reduce the potential for interference in some directions, there is absolutely no way of determining whether a directional antenna has been installed properly without hiring a licensed land-surveyor. If one of the thus far theoretical advantages of TVWS technology is low cost, the hiring of a land-surveyor to certify the proper installation of a directional antenna seems unlikely.

¹⁸ Microsoft Comments at 33, Appendix A at 12.

¹⁹ Comments of PISC, page 19.

Further, WISPA's suggestion that the Commission, and broadcasters, rely on "professional installation" to confirm proper deployment of directional antennas is deeply unserious. Professional installation remains an undefined and unreliable concept, as elusive as the Loch Ness Monster or Sasquatch. Indeed, the decidedly checkered history of professional installation in the TVWS context includes the entry of hundreds of incorrect if not outright fraudulent entries in the TVWS database. Based on this decidedly checkered history, NAB does not share WISPA's confidence that professional installation will be sufficient to avoid causing harmful interference. We urge the Commission not to make changes to the existing rules at this time.

IX. CONCLUSION

We continue to urge the Commission to move forward expeditiously with the proposals set forth in the NPRM that are uncontroversial and technically supported. The Commission has before it a narrow set of proposals that can be quickly adopted without materially increasing the risk of harmful interference to licensed services. Expanding the proceeding to consider novel, unsupported proposals will only mire the proceeding in uncertainty and delay.

Respectfully submitted,

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