

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of

Amendment of Part 15 of the Commission's Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap, and Channel 37, and

ET Docket No. 14-165

Amendment of Part 74 of the Commission's Rules for Low Power Auxiliary Stations in the Repurposed 600 MHz Band and 600 MHz Duplex Gap

Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions

GN Docket No. 12-268

**PETITION FOR RECONSIDERATION AND
CLARIFICATION OF MICROSOFT CORPORATION**

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December 23, 2015

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I. INTRODUCTION AND SUMMARY

Microsoft Corporation submits this petition for reconsideration and clarification of the Commission's Order adopting new rules for Part 15 white-space devices operating in the 600 MHz and broadcast television bands.¹ The Order takes several important steps towards producing an environment that will permit investment in unlicensed technologies in these bands while protecting licensed operations. However, Commission decisions related to rules governing channel 37 run counter to this goal, raising significant new uncertainty and unnecessarily undermining the viability of white-space operations, especially in urban areas.

Chipmakers, device manufacturers, and other innovators are watching this proceeding carefully to determine whether the regulatory framework for white-space devices will support a vibrant unlicensed ecosystem. The FCC's decisions will determine whether the overall operating environment for white-space devices will support investment, and white-space devices will only enjoy widespread adoption if consumers can rely on them to work reliably in three or more channels, including in major markets.

Because white-space spectrum is already quite constrained in urban areas, predictable access to channel 37 is essential to achieve this goal. The Commission's Order introduces significant uncertainty about access to channel 37, however, regarding (1) a plan to conduct trial deployments in channel 37 prior to nationwide access to the channel, (2) a waiver process for adjusting Wireless Medical Telemetry Service ("WMTS") exclusion zones, (3) the process and timing of WMTS operators' facility perimeter registrations, and (4) rules for protecting multiple WMTS sites as a single facility. Microsoft urges the Commission to clarify important details

¹ *Amendment of Part 15 of the Commission's Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap, and Channel 37*, Report and Order, 30 FCC Rcd. 9551 (2015) ("Part 15 Order").

relating to each of these points to promote certainty surrounding spectrum access that will be essential for the television bands to be a viable option for unlicensed operations.

Additionally, Microsoft urges the Commission to harmonize the conducted and radiated power limits for low-power fixed devices with personal/portable devices, and generally clarify its rules for low-power fixed devices operating at 40 mW. Unlike high-power fixed devices which are intended for outdoor use only, 40 mW fixed devices are expected to be used both indoors and outdoors. While Microsoft supports the Commission's actions to allow low-power fixed use, we note that the Commission's current rules fail, without explanation or record support, to extend similar treatment to 40 mW personal/portable devices and 40 mW fixed devices in several respects. The resulting rules raise new and unnecessary barriers that reduce the utility of what the Commission is trying to achieve by permitting low-power fixed use.

II. THE COMMISSION SHOULD CLARIFY SEVERAL ASPECTS OF ITS RULES FOR CHANNEL 37 OPERATIONS

As the Commission has acknowledged, the rules it has adopted for TVWS operations in channel 37 are quite conservative.² Microsoft understands the desire to proceed cautiously with co-channel operations on channel 37, and believes that several of the new channel 37 rules for TVWS devices, while over-protective, could nonetheless permit innovation and investment in a channel that is currently unacceptably underutilized. But the Part 15 Order also introduces, for the first time and without notice, several procedural restrictions that could preclude the reasonable use of channel 37. Because these measures were not discussed in the Part 15 NPRM, interested parties have not had a reasonable opportunity to comment on them. As a result, these unexpected rules fail to address several important issues, creating substantial uncertainty for

² See Part 15 Order ¶ 208.

potential investors in TVWS technologies about whether channel 37 will ultimately be usable at all, especially in urban areas where reliable spectrum access will be essential to support a viable ecosystem for TVWS technologies.

A. The Commission Should Make Explicit the Purpose and Limits of its Channel 37 “Trial Period”

Most significantly, the Commission, without prior notice, announced that it will “limit initial deployment of white space devices using channel 37 to one or two areas.”³ At the same time, however, the Commission promulgated a comprehensive set of Part 15 technical rules that enable Part 15 operations on channel 37.⁴ This discrepancy has created considerable confusion about both the purpose of the channel 37 trial period and the rules that will apply during and after the trial.

The Commission spent more than two years accumulating a substantial record that supports the white-space rules it has now created for channel 37. It could not be the Commission’s intent to adopt these detailed technical rules, and, in the very same order, announce that it will revisit these same rules before they even go into effect after the channel 37 trial period has concluded. Indeed, doing so would not only scrap years of work by the Commission and industry to develop adequate operating rules for channel 37, but would create stifling uncertainty surrounding channel 37 operations for years to come. Uncertainty surrounding channel 37, in turn, will likely forestall investment in white-space technologies in general, because access to channel 37 is essential to making three channels available for

³ Part 15 Order ¶ 221.

⁴ *See, e.g.*, 47 C.F.R. §§ 15.707(a)(6), 709(a)(3), 712(h)(2)(3), & 712(j)(1).

unlicensed devices in many urban areas so as to produce sufficient spectrum to support TVWS operations.⁵

Moreover, and unlike with initial white-space trial deployments in 2011, the Commission now has extensive experience and confidence in the ability of white-space databases to protect incumbent licensees. This derives both from the 2011 trials themselves and subsequent operations. This experience renders the FCC's announcement of additional trials unnecessary. In fact, white-space operations in channel 37 present significantly diminished challenges compared to the initial white-space deployments. When the concept of white-space devices was new, and the white-space databases untested, the Commission was on firm ground in proposing test deployments in Wilmington, North Carolina. However, now white-space devices have been in operation for some time and an extensive record has been developed on the potential for interference—including the ability to avoid WMTS licensees as defined in the existing white-spaces rules. Consequently, there is little need for a new round of test deployments, on top of the many other limitations the Commission has imposed on white-space devices operating in channel

⁵ See *Amendment of Parts 15, 73 and 74 of the Commission's Rules to Provide for the Preservation of One Vacant Channel in the UHF Television Band For Use By White Space Devices and Wireless Microphones*, Notice of Proposed Rulemaking, FCC 15-68, 30 FCC Rcd. 6711 ¶ 10 n.26 (2015). See also Comments of Microsoft Corporation at 2-6, ET Docket No. 15-146 and GN Docket No. 12-268 (filed Sept. 30, 2015); Reply Comments of IEEE 802, ET Docket No. 12-268 (filed Mar. 12, 2013). See also Letter from Paul Margie, Counsel for Google Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 and ET Docket No. 14-165 (filed June 2, 2015); Reply Comments of Microsoft Corporation at 3, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 25, 2015); Comments of Google Inc. at 51, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015); Comments of Microsoft Corporation at 2, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015); Letter from Paul Margie, Counsel for Broadcom Corporation, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Sept. 25, 2014); Letter from Paul Margie, Counsel for Google Inc. and Microsoft Corporation, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Sept. 19, 2014); Letter from S. Roberts Carter, Counsel for Broadcom Corporation, to Marlene H. Dortch, Secretary, FCC, at 1, GN Docket No. 12-268 (filed Apr. 23, 2014).

37. Furthermore, GE Healthcare and WMTS advocates made their technical concerns known to the Commission through the rulemaking process. The Commission reviewed the technical issues raised, agreed with some and dismissed others because they lacked technical merit. There is no reason to relitigate these issues in the context of the initial deployments. The Commission should therefore reconsider imposing these new initial deployments, or clarify how they will operate in a way that will not re-open the very rules it just adopted.

Additionally, if the Commission determines to proceed with the initial deployment approach, it should clarify that while the Food and Drug Administration (“FDA”) will participate in these deployments to provide advice on issues within its jurisdiction, it will not play a role in analyzing radio interference issues.⁶ The FDA, while a critical part of our nation’s healthcare regulatory system, is not an expert agency on RF interference, TVWS databases, or white-space devices. The FDA can therefore play a valuable role in ensuring that WMTS facilities are suitably informed and prepared for any nearby testing, verifying that WMTS systems are properly installed and integrated into facility operations, and evaluating baseline performance of WMTS systems. Once the FCC explains how the FDA will participate within its jurisdictional mandate, it should ensure that the FDA plays this role with respect to each part of the WMTS issues in this proceeding, rather than arbitrarily singling out white-space issues. This would mean ensuring the FDA plays a similar role in tests related to the impact of adjacent channel LTE operations and co-channel wireless microphone operations. Finally, the FDA could play an important role if the FCC’s tests show that WMTS devices have been engineered to be unnecessarily vulnerable to radio interference. In this case the FDA could determine whether

⁶ See Part 15 Order ¶ 221.

WMTS devices that do not follow modern RF engineering practices are appropriate for patient care.

Importantly, if the Commission determines that it will conduct these test deployments to determine whether changes to the rules are necessary, it should enable white-space devices to access channel 37 pursuant to the operating rules it has just issued. If the tests determine that changes are necessary, as the Commission has recognized, protection criteria can be modified in particular circumstances based on new information.⁷

The Commission should also make several other clarifications regarding channel 37 testing. First, the Commission should clarify that the purpose of its trial period is to specifically evaluate the actual interference risk between white-space operations and WMTS in dense urban environments, with a view to liberalizing the channel 37 rules to reflect the realities of these operating environments. This interpretation of the FCC's decision to conduct trial deployments is consistent with its finding that the rules it just adopted are conservative, and would provide certainty to innovators and investors that they can begin work on new devices under the new rules.

Doing so will also give the Commission the opportunity to address an important inconsistency in its new channel 37 rules: namely, that the rules are tailored toward hypothetical WMTS site deployments in rural and suburban areas, even though white-space devices will depend on this spectrum most heavily in urban cores. Recognizing this fact, the Commission has even recommended that white-space operators extend additional protection to rural WMTS operators by using channel 37 only when no other channel is available.⁸ This is because, unlike

⁷ Part 15 Order ¶ 220.

⁸ Part 15 Order ¶ 219.

dense urban areas, “rural areas, where there are already plenty of channels available for white space devices, will continue to have channels available after the incentive auction.”⁹ But despite its pronouncement that white-space operators should use channel 37 only in urban areas where fewest channels will be available, the Commission’s rules assume that white-space devices will always operate in a suburban or rural propagation environment. This is the case even though the Commission also established an expedited waiver process for WMTS operators to expand protection zones in the unlikely event that the operating rules were to under-protect particular WMTS systems.¹⁰ For this reason, even potential outlier cases such as white-space deployments using channel 37 in rural areas and located near hospitals would receive sufficient protection. The Commission should therefore use the newly announced channel 37 trial period to adapt its rules to better reflect the practical reality of white-space operations.

Second, the Commission has justified its channel 37 test period based on the desire to assess purported interference risk posed by white-space devices to WMTS operations.¹¹ But the test period does not account for claimed interference risks to WMTS by broadcasters, wireless microphones, or licensed mobile wireless operations, without any explanation and without any discussion in the record of the relative interference risks of these similarly-situated services.¹²

To the extent the Commission’s rationale for the channel 37 test period is to assess unforeseen interference risks to WMTS from neighboring services, the Commission must take a

⁹ *Id.*

¹⁰ *See* Part 15 Order ¶ 217.

¹¹ *See* Part 15 Order ¶ 221.

¹² *See, e.g.*, Petition for Reconsideration of GE Healthcare, at 5-6, GN Docket No. 12-268 (filed July 28, 2015); Letter from Ari Q. Fitzgerald, Counsel to GE Healthcare, Hogan Lovells US LLP, to Marlene H. Dortch, Secretary, FCC, at 1, GN Docket No. 12-268 (filed June 12, 2015); *See, e.g.*, Comments of GE Healthcare at 17-30, WT Docket No. 12-268 (filed Jan. 25, 2013).

similar approach to allowing adjacent-channel wireless and broadcast operations, including establishment of an initial test period. To require TVWS devices to prove themselves through a trial period while permitting broadcasters and licensed wireless operators transmitting at much higher powers to deploy without these trials—and without explaining the differential treatment—is plainly arbitrary.¹³

Finally, the Commission should clarify the different roles of the stakeholders involved in the testing process. The Commission explains that white-space interests can cooperate bilaterally to begin testing before WMTS site registration is complete.¹⁴ But the FCC does not explain the role of WMTS interests in subsequent testing. WMTS interests will likely have little incentive to facilitate timely testing. Therefore, the Commission should make clear that, as its Order suggests,¹⁵ initial test planning will be conducted between white-space interests and OET—while WMTS interests will, of course, be encouraged to participate in this process as well, the Commission should clarify that post-registration testing will not depend on the consent of WMTS operators in a chosen test location. To do otherwise would be to invite delay.

B. The Commission Should Resolve Ambiguities in the WMTS Perimeter Modification Waiver Process

In addition to requiring trial deployments of TVWS devices in channel 37, the Commission outlines a waiver process by which operators may petition to modify the protected

¹³ See, e.g., *McElroy Elecs. Corp. v. F.C.C.*, 990 F.2d 1351, 1365 (D.C. Cir. 1993) (“remind[ing] the Commission of the importance of treating similarly situated parties alike or providing an adequate justification for disparate treatment”); *Petroleum Commc'ns, Inc. v. F.C.C.*, 22 F.3d 1164, 1172 (D.C. Cir. 1994) (discussing the applicability of this principle in the rulemaking context).

¹⁴ Part 15 Order ¶ 221 n.560.

¹⁵ Part 15 Order ¶ 221.

perimeter of a particular WMTS site.¹⁶ However, the Commission’s description of this process, like its explanation of the trial period, omits important details. These omissions could chill investment in white-space devices and invite a flood of waiver petitions from parties seeking to relitigate the Commission’s channel 37 rules one facility at a time.

As the Commission has explained, its waiver process will be available in instances where the rules “either over or under protect[] WTMS systems”; in other words, to both WMTS and white-space-device operators.¹⁷ However, the order only describes how waiver requests will be handled when they are submitted by a WMTS operator to address suspected interference from a white-space device.¹⁸ The Commission should identify the waiver standard and relief available for white-space operators—just as it has done with WMTS operators. Likewise, the Commission should commit to “expeditiously resolving”¹⁹ waiver requests from all parties—not just WMTS operators.

Moreover, even the waiver process the Commission has briefly described in paragraph 217 for WMTS operators is unclear.²⁰ The best reading of the Commission’s procedure appears to be that a WMTS operator must:

1. Determine that the performance of the WMTS system has been impaired by harmful interference from a white-space device;

¹⁶ Part 15 Order ¶ 217.

¹⁷ *Id.* (“if parties believe a distance other than that provided in the rules either over or under protects WMTS systems, they may file waiver requests with the Commission to modify the distance for a particular facility or group of similarly situated facilities”).

¹⁸ *See id.* n.554 (describing the filing process “[for] the WMTS community” but not for white-space operators).

¹⁹ Part 15 Order ¶ 217.

²⁰ *See id.*

2. Work with the white-space community in “good faith” to resolve the harmful interference;²¹ and
3. If these efforts fail, a WMTS operator may then file a waiver petition, seeking to expand its protected perimeter. This petition must include:
 - a. A description of the harmful interference;
 - b. A description of the good-faith efforts the WMTS operator has made to engage with the white-space community; and
 - c. A “substantiated showing” that harmful interference from white-space devices is degrading WMTS system performance.
4. The Commission will review the petition and, if it appears to meet these requirements, the Commission will temporarily triple the applicable separation distance for the facility at issue.²²
5. The Commission will then “expeditiously resolv[e]” the waiver request, presumably by determining, after notice and comment, a more appropriate protected perimeter for the site.²³

To minimize uncertainty, the Commission should confirm that this description accurately captures the process that it intends to observe, or clarify the respects in which it does not.

The Commission should also take this opportunity to resolve several important questions about the waiver process, uncertainty surrounding which will chill investment in white-space technologies. First, the Commission should make clear what is required for the “substantiated showing” of interference that would justify tripling a WMTS protection zone. Such showings should include the following components:

Existence of Harmful Interference. Most critically, the Commission should explain how a WMTS operator would demonstrate the existence of harmful interference. Significantly, WMTS

²¹ See Part 15 Order ¶ 217 n.554.

²² See *id.* (“A request for an expanded protection zone of three times or less the separation distances provided by the rules will be considered presumptively reasonable.”).

²³ See Part 15 Order ¶ 217.

systems regularly experience both false alerts today, due to system malfunctions.²⁴ Thus, less-than-perfect WMTS performance is not a reliable indication that a WMTS system is receiving harmful interference. The Commission should therefore require WMTS providers to include evidence beyond mere unreliability of the WMTS system as part of a “substantiated showing.”

Harmful Interference Caused by TWVS Devices. WMTS interests have argued that their systems are generally not hardened against adjacent-channel interference and, therefore, may be vulnerable to interference from broadcasters, mobile wireless operators, or other sources.²⁵ If this is the case, it would not be reasonable to automatically triple the protection radius of a WMTS site versus white-space devices and trigger a burdensome waiver process if the origin of putatively harmful interference is unknown. The Commission should therefore make clear that a “substantiated showing” requires concrete evidence that the WMTS site is experiencing harmful interference *from a white-space device*.

²⁴ See Welch Allyn, *Telemetry Monitoring on the Medical/Surgical Floor* (2014), <https://www.welchallyn.com/content/dam/welchallyn/documents/upload-docs/Product-Literature/Brochure/MC11587%20Telemetry%20MedSurg.pdf>; Lisa Kirkland, *Cardiac Telemetry Monitoring*, ACP Hospitalist, July 2010, <http://acphospitalist.acponline.org/archives/2010/07/tech.htm>; James M. Blum, MD; Kevin K. Tremper, PhD, MD, *Alarms in the intensive care unit: Too much of a good thing is dangerous: Is it time to add some intelligence to alarms?*, 38, Crit Care Med, 702 (2010); Sylvia Siebig, MD; Silvia Kuhls, PhD; Michael Imhoff, MD, PhD; Ursula Gather, PhD; Jurgen Scholmerich, MD, PhD; Christian E. Wrede, MD, PhD, *Intensive Care Unit Alarms – How Many Do We Need?*, 38, Crit Care Med, 451 (2010); GE Healthcare, *ApexPro FH – Enterprise-wide Telemetry* (2009), http://www3.gehealthcare.com.au/~media/documents/us-global/products/patient-monitoring/brochures/apex-pro-fh-telemetry-system/gehealthcare-brochure_apexpro-fh-telemetry-system.pdf?Parent=%7BA7FF21F9-813A-45A1-8BC7-A89F6D12C03D%7D; Marshaleen N. Henriques-Forsythe, MD; Chinedu C. Ivonye, MD; Uma Jamched, MD; Lois Kemilembe K. Kamuguisa, MD; Kelechukwu A. Olejeme, MD, MPH; Anekwe E. Onwuanyi, MD, *Is telemetry overused? Is it as helpful as thought?*, 76, Cleveland Clinic Journal of Medicine, 368, 371 (2009).

²⁵ See, e.g., Comments of GE Healthcare at 21-25, WT Docket No. 12-268 (filed Jan. 25, 2013).

Efforts to Mitigate. The tests submitted by GE Healthcare and WMTS Coalition in this proceeding demonstrated that white-space operations interfered with WMTS operations only when WMTS transmitters operated at low-power levels or the WMTS system was otherwise designed in a way that made the WMTS devices particularly susceptible to interference.²⁶ Therefore, a “substantiated showing” should also include a showing that the operator has taken reasonable steps to mitigate interference. While the Commission need not ask operators to redesign their WMTS systems to avoid interference from white-space devices, it should require WMTS operators to (1) confirm that they have followed reasonable best practices to mitigate interference, including increasing transmit power levels if possible and moving receivers away from unshielded windows; or (2) demonstrate why these basic mitigation techniques would be infeasible for the specific WMTS deployment at issue. Similarly, the Commission should clarify what steps WMTS operators must take to satisfy the Commission’s requirement that it has worked with the white-space community “in good faith” to resolve any interference.²⁷

Finally, the Commission should clarify the circumstances under which a waiver will trigger the immediate, short-term relief described in paragraph 217. The language of the Commission’s Order suggests that this relief will be conditioned on 1) the threshold showing that a WMTS operator has cooperated in good faith with the unlicensed community, and 2) the “substantiated showing” described above. The Commission should clarify, however, that it will make an expedited threshold evaluation of these showings *before* granting temporary relief. If

²⁶ See Reply Comments of Google Inc. at 14-15, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 25, 2015); Comments of GE Healthcare at Appendix A at 11, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015).

²⁷ See Part 15 Order ¶ 217 n.554 (“[W]e expect that any such filing will describe the good-faith steps taken to engage the unlicensed community and reach a consensus as to an appropriate and tailored approach to sharing.”).

WMTS operators can obtain temporary relief with no substantiated showing, waivers could become operators' first step in troubleshooting their own network issues rather than a targeted response to concrete interference concerns, potentially inundating the Commission with meritless requests. Although the Commission would eventually deny these petitions and reverse the temporary relief, WMTS interests' ability to file such petitions, and radically increase exclusion zones at any moment—regardless of the petitions' merit—will significantly hamper deployment of white-space devices, especially in urban areas.

C. The Commission Should Provide Additional Detail Regarding WMTS Perimeter Registration

Microsoft agrees with the Commission that the use of facility perimeters, instead of a single point, is a logical and straightforward way of improving spectrum utilization and efficiency in channel 37.²⁸ However, the Commission has failed to provide important details of how this registration process will unfold.

Most importantly, the Commission should set a date, or explicitly delegate authority to OET to set a date, by which WMTS site perimeters must be registered. For WMTS sites that do not comply with this deadline, databases can use existing coordinates listed in the American Society for Healthcare Engineering (“ASHE”) database to establish a temporary protection perimeter until the facility perimeter is properly registered.²⁹ This would provide far greater protection for channel 37 WMTS deployments than commencing white-space operations with no protection zone at all for noncompliant sites, while continuing to create an incentive for operators to register their sites with white-space databases.

²⁸ See Part 15 Order ¶ 216.

²⁹ See Part 15 Order ¶ 245.

When WMTS operators supply their facility perimeters, the Commission’s rules should also require them to attest that the data they have entered is correct. It is already an actionable violation of FCC rules for WMTS operators to intentionally misrepresent their facility perimeters whether or not the Commission requires an attestation that the submission is correct.³⁰ But requiring this attestation will provide useful information to WMTS operators who may not be familiar with these rules and will help to improve the substantive accuracy of perimeter registrations. To aid WMTS operators in verifying the accuracy of their information, the attestation should include a visual depiction of the perimeter to be submitted over a map or aerial photograph of the relevant area. Such a depiction likely can be generated and displayed by a white-space database itself, and would impose no additional burden on WMTS operators—this would simply provide operators with the information they need to confirm that their submission is accurate.

D. The Commission Should Identify Acceptable Separation Distances for WMTS “Campuses”

Microsoft supports the Commission’s decision to simplify WMTS site registration by allowing operators to submit the outer perimeter of closely-spaced WMTS sites.³¹ However, the Commission should clarify the distance that is required for facilities to qualify as part of a WMTS campus, and therefore eligible for joint registration. If the Commission does not specify a minimum distance, or specifies too large a distance, this could have the inadvertent effect of again diminishing the spectrum available for white-space devices with no significant countervailing benefit.

³⁰ See 18 U.S.C. § 1001 (imposing penalties for “knowingly and willfully” making “materially false” statements “in any matter within the jurisdiction of the executive, legislative, or judicial branch of the Government of the United States”).

³¹ Part 15 Order ¶ 246.

Importantly, *any* grouping threshold will result in the loss of some spectrum to white-space devices. The only offsetting benefit to this cost will merely be to reduce the time it takes WMTS operators to draw the perimeters of their facilities—savings that will likely amount to no more than one or two minutes per facility, at most. Moreover, the already limited marginal benefits of larger separation thresholds diminish rapidly as the threshold grows. Meanwhile, the amount of fallow spectrum increases with the separation threshold, threatening to undo the gains in spectral efficiency from calculating white-space separation distances from facility perimeters instead of single points.

Accordingly, the balance of these benefits and harms strongly counsels in favor of minimizing the separation threshold for facilities to qualify as part of a WMTS campus. Microsoft suggests a threshold of no more than 0.76 km—twice the smallest applicable separation distance for any white-space device operating in channel 37. This will allow WMTS administrators to group the large majority of adjacent hospital buildings, while minimizing the amount of valuable spectrum that would otherwise not be put to productive use.

III. THE COMMISSION SHOULD ADJUST THE POWER LIMITS FOR 40 mW FIXED DEVICES

The Commission correctly observed that 40 mW E.I.R.P. fixed and personal/portable devices ought to be subject to the same regulatory treatment.³² Operating at the same power level, fixed and personal/portable devices present similar interference risks, given the limited maximum height of fixed devices, and their identical out-of-band emissions limits.³³ In fact, as the Commission has concluded, fixed devices likely present even *fewer* interference challenges than personal/portable devices: “because of the low power limit and antenna height restriction on

³² Part 15 Order ¶ 28-29.

³³ See Part 15 Order ¶ 28-31.

white space devices, harmful interference would occur only at short distances making identification of a fixed device that may be causing harmful interference fairly straightforward since those devices' locations must be registered in the database.”³⁴

However, despite this compelling explanation, the Commission's rules actually treat fixed and personal/portable devices *differently* even when operating at the same power level. Most significantly, the Commission's radiated power limits for fixed devices assume that all fixed devices will use an antenna with at least 6 dBi directional gain, which has the effect of reducing the maximum transmit power of a fixed device that does *not* use a directional antenna to well below the analogous power limits for a personal/portable device.³⁵

The Commission appears to have based this decision on an assumption that operators would use fixed devices only in deployments involving directional antennas. There was no record support, however, for this conclusion, especially as it applies to fixed devices operating at such low powers as 40 mW E.I.R.P.

The Commission can easily remedy this discrepancy, however, it should revise its rules to permit operation at 40 mW E.I.R.P, with 0 dBi antenna gain, for fixed devices operating indoors. In other words, it should simply conform its technical rules for these devices to those of personal/portable devices operating at the same power level. Clearly, an indoor-only fixed device presents even less interference risk than a personal/portable white-space device operating at the same power level. The Commission's rules should account for this fact.

Similarly, to facilitate the use of indoor fixed devices such as routers that use white-space frequencies, the Commission should clarify that such devices are fixed devices eligible to use the

³⁴ Part 15 Order ¶ 31.

³⁵ See 47 C.F.R. §§ 15.709(b)(1), (b)(2), (c)(1).

same frequencies that other fixed devices may use, and also clarify the applicability of its professional installation rule to these devices. Although a home access point plainly meets the definition of a “fixed device”—“[a] TVBD that transmits and/or receives radiocommunication signals at a specified fixed location”³⁶—the Commission should clarify that a consumer’s moving an access point from one area of the house to another—likely only a few meters—is a *de minimis* change in location that does not require professional re-installation of the device. It should also clarify that, due to the very small distances involved, and the extreme infrequency of such moves, the theoretical possibility that a home access point may be moved from one part of the house to another does not change the fact that, while it is in operation, a home access point “transmits and/or receives radiocommunication signals at a specified fixed location” and is therefore a fixed device under the Commission’s rules.³⁷ As OFCOM explained in addressing this issue, “it is unlikely that the movements of a home router within the home will be significant in the context of interference to licensed services.”³⁸

IV. CONCLUSION

Microsoft shares the Commission’s commitment to expanding consumers’ access to unlicensed technologies in the television bands while protecting WMTS facilities from harmful interference. Microsoft therefore urges the Commission to clarify the complex and, in many cases, ambiguous procedures laid out in the Order for unlicensed operation in channel 37. Without a clearer picture of this channel’s availability to users—particularly in urban markets—

³⁶ 47 C.F.R. § 15.703(c).

³⁷ *Id.*

³⁸ Ofcom, *Regulatory Requirements for White Space Devices in the UHF TV Band*, CEPT, 3 n.3 (2012), <http://www.cept.org/Documents/se-43/6161/>.

innovators may be deterred from developing mass market white-space technologies – undoing the Commission’s hard work to promote efficient spectrum use on an unlicensed basis in the television bands and 600 MHz band. Finally, the Commission should clarify and revise its rules for low-power fixed devices to remove needless, but potentially stifling restrictions on in-home white-space access points.

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