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

In the Matter of Amendment of Part 15 of the Commission's Rules for Unlicensed White Space Devices	ET Docket No. 16-56 RM-11745

REPLY COMMENTS OF MICROSOFT CORPORATION

The record overwhelmingly establishes that eliminating the professional installation option for fixed-device geolocation would limit the utility of white-space devices ("WSDs"),[1] stifle innovation,[2] frustrate consumers,[3] and increase costs.[4] It would do all this in an attempt to solve a problem that has never been observed: potential interference from fixed WSDs to licensed services due to incorrect geolocation data. There is no evidence of any such interference despite the fact that hundreds of fixed WSDs have been in operation for several years.[5]

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1 Comments of Microsoft Corporation at 3-4, 9, ET Docket No. 16-56 and RM-11745 (filed May 6, 2016) ("Microsoft Comments"); Comments of Wi-Fi Alliance at 3-4, 5, ET Docket No. 16-56 and RM-11745 (filed May 6, 2016) ("WFA Comments"); Comments of the Wireless Internet Service Providers Association at 2-3, ET Docket No. 16-56 and RM-11745 (filed May 6, 2016) ("WISPA Comments").

2 Microsoft Comments at 2.

3 Comments of Google Inc. at 7, ET Docket No. 16-56 and RM-11745 (filed May 6, 2016) ("Google Comments"); Microsoft Comments at 8-9.

4 Microsoft Comments at 2, 7-8; Comments of Spectrum Bridge, Inc. at 4, ET Docket No. 16-56 and RM-11745 (filed May 6, 2016); Letter from Israel Koffman, CEO, Runcom Communications Ltd., to Marlene H. Dortch, Secretary, FCC, ET Docket No. 16-56 (filed Apr. 4, 2016) ("Runcom Letter").

5 Microsoft Comments 2, 4-7; WISPA Comments at 2-3.

Importantly, this rule would cause these harms with no offsetting benefits, because automatic geolocation is likely incapable of addressing the imagined interference that broadcasters assert could occur due to existing limitations of existing automatic geolocation technologies.[6] Accordingly, the Commission should not mandate automatic geolocation.

The Commission should also reject suggestions by the National Association of Broadcasters ("NAB") and GE Healthcare ("GEHC") to hobble fixed white-spaces deployments through unnecessary and burdensome new location reporting requirements, validation procedures that are unworkable for mass market low-power consumer devices, and redundant new security requirements that would increase WSD development costs by several orders of magnitude. NAB's and GEHC's proposals would impose substantial new burdens on consumers while offering minor, if any, benefits.

If, despite the demonstrated lack of harmful interference, the Commission nonetheless decides to alter its geolocation rules for fixed devices, it should do so by adopting the far simpler, more effective, and less burdensome approach discussed in Microsoft's comments: strengthening the professional installation rules to further improve installer training and accountability.[7]

I. Automatic Geolocation is not a Workable Alternative to Professional Installation for Fixed Devices

As Microsoft and others have explained, the risk of interference from WSDs to licensees due to incorrect geolocation data is, at best, hypothetical.[8] Moreover, as numerous commenters

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[6] Google Comments at 6; Runcom Letter; WISPA Comments at 3-5.

[7] Microsoft Comments at 3, 10-12. *See also* WISPA Comments at 6-7.

[8] Microsoft Comments 2, 4-7; WISPA Comments at 2-3.

have observed, the Commission's automatic geolocation proposal would not be effective in addressing even this imagined risk.[9]

For example, unlike personal/portable devices, fixed devices (especially higher power devices) often use external antennas mounted on masts. Antenna height affects signal propagation and channel availability. But existing automatic geolocation technologies such as GPS provide no means for determining antenna height. Therefore, even if the Commission were to mandate automatic geolocation, there would be no reasonable alternative to requiring professional installers to enter antenna height information manually.

Automatic geolocation systems would be built into the WSD radio unit itself, not the external antenna, which may be 100 feet higher than the radio.[10] And there is no technology available today that would allow the radio to automatically detect and take into account the distance between itself and the external antenna. Building the GPS antenna into the receiver itself is also not a viable solution. Doing so would require the antenna (as opposed to the radio unit it serves) to have its own source of power, and some means of communicating its location to the connected radio, presenting entirely new engineering and standards challenges. And in any event, GPS does not provide sufficiently accurate height information to be useful at the scales relevant for WSD geolocation.

Thus, if the Commission were to require all fixed devices to incorporate automatic geolocation capabilities, consumers would need to pay for *both* the increased cost of implementing automatic geolocation as well as the services of a professional installer. And these increased costs would produce little additional benefit because the system would still need to rely

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[9] Google Comments at 6; Runcom Letter; WISPA Comments at 3-5.

[10] 47 C.F.R. § 15.709(g)(1).

on professional installers to properly measure and report each device's antenna height. In any case, NAB's distrust of professional installers is not based in any record evidence, and all NAB's theoretical concerns about the reliability of professional installers have proven unfounded. The truth is that installers and their employers have powerful incentives to enter information accurately.[11]

II. Professional Installation is the Best Geolocation Option Available

If the Commission nonetheless determines that it will take additional measures to ensure the accuracy of geolocation information for fixed WSDs, the most effective and least burdensome option would be to enhance the professional installation program, not to eliminate it.

As Microsoft explained in its opening comments,[12] the Commission could further increase confidence about installers' reliability by requiring them to register for FCC Registration Numbers ("FRN"s), and by requiring installers to enter their FRNs when submitting fixed-device registration information. This would add to the already robust incentives for installers to maintain high standards of reliability. It would simultaneously make it easier for the Commission to take action in the unlikely event that an installer does enter incorrect data. FRN registration would enable the Commission to quickly contact the installer in the event of a report of harmful interference, and would provide a separate basis for disciplinary action if circumstances warranted.

In a similar vein, the Wireless Internet Service Providers Association ("WISPA") has observed that work is already underway to develop a certification program for professional

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[11] Microsoft Comments at 5-7.

[12] Microsoft Comments at 3, 10-12.

installers.[13] Such a program could be an effective alternative or complement to Microsoft's proposal, further increasing geolocation reliability without increasing the burdens on consumers. Both proposals would also avoid the numerous technological problems likely to plague the automatic geolocation proposal favored by NAB.[14]

III. Proposals by NAB and GEHC Would Do Little to Protect Licensees, but Would Seriously Limit the Utility of Fixed WSDs

Microsoft takes seriously the need to ensure that white-spaces databases are as reliable as possible. This is why Microsoft supports common-sense measures to increase reliability, even when these measures may impose reasonable burdens on white-space operators or manufacturers.[15] Unfortunately, however, opponents of unlicensed technologies appear to view this proceeding primarily as an opportunity to make WSDs more expensive or harder for consumers to use, regardless of whether the proposal would have a material impact on database accuracy.

NAB, for example, suggests that fixed WSDs should be required to contact the database every day to verify that it has not somehow moved—even though fixed devices rely on external power sources and cannot be moved without being powered off and back on again, which itself would require the device to reacquire its location and re-register with the database.[16] Similarly, NAB has proposed to require consumers to take their indoor low-power devices outside to re-

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[13] *See* WISPA Comments at 6-7.

[14] *See supra* notes 1-6.

[15] *See supra* Part II; Microsoft Comments at 3, 10-12.

[16] 47 C.F.R. § 15.711(c)(1).

check their locations *every thirty days*, and then re-install their devices within thirty minutes.[17] This procedure would be absurdly burdensome and unnecessary.[18]

NAB also contends that fixed WSDs "should automatically determine antenna height,"[19] but makes no attempt to explain how WSDs could reliably do so. NAB instead proposes a crude system of "default" values that would likely result in databases' treating many ground-level WSDs as though they were mounted on masts at least 10 meters in the air.[20] NAB likewise opposes the use of wireless connections between WSDs and external geolocation devices, allegedly because a wireless connection would permit unlimited range between the two devices.[21] But this is precisely backwards: a wired connection is effectively limitless in range, while a wireless connection will typically be extremely limited.

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[17] Comments of the National Association of Broadcasters at 8, ET Docket No. 16-56 and RM-11745 (filed May 6, 2016) ("NAB Comments").

[18] *See* Microsoft Comments at 8.

[19] NAB Comments at 4.

[20] NAB also contends that antenna height has little bearing on channel availability. As NAB itself explained in responding to a proposal to *increase* height limits, "[A]ny increase in antenna heights would necessarily involve corresponding increases in distance separation limits to protect licensed operations. However, calculating adequate protection distances can be complex. Protection distances need to take to into account both the height of the TVWS transmitting antenna and the height of the TV receiving antenna. Further, increased antenna heights increase the potential for interference to cable headend receivers, broadcast auxiliary and land mobile receiving facilities. . . ." Opposition to Petitions for Reconsideration of the National Association of Broadcasters at 4-5, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 29, 2016). If NAB now concedes that antenna height has little effect on the interference potential of fixed devices, and therefore results in little to no change in available channels, the Commission should take this into account in considering WISPA's petition to increase fixed-device height limits in the proceeding to amend the Commission's technical rules. Petition for Partial Reconsideration of the Wireless Internet Service Providers Association, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Dec. 23, 2015).

[21] NAB Comments at 7-8.

Finally, NAB contends that mandatory automatic geolocation would decrease costs relative to professional installation, potentially allowing consumers to self-install fixed devices.[22] But, as discussed above, many fixed devices are mounted on tall masts, making professional installation necessary regardless of the Commission's geolocation rules. The suggestion that consumers could self-install such devices is ill-considered at best. In addition, the Commission's fixed-device rules already allow the option of automatic geolocation.[23] The very fact that there are numerous professionally installed fixed devices deployed today is itself strong evidence that, in many cases, professional installation is either necessary for technical or safety reasons, or less costly than implementing geolocation. Put another way, if it really is true that there is no need for professional installation, then there is also no need for this rulemaking, because users and device manufacturers would never elect the professional installation option. The Commission should reject all of these suggestions, which NAB appears to have proposed merely to hobble unlicensed consumers rather than to address any legitimate interference concern.

GEHC, meanwhile, does not even pretend that its comments are intended to address the topics the Commission raises in this rulemaking. Instead, GEHC merely repeats arguments it previously made in the Commission's separate Part 15 proceeding that the Commission should impose additional obligations related to software for WSDs and white-spaces databases.[24] The

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[22] *Id*. at 4.

[23] 47 C.F.R. § 15.711(c)(1).

[24] *See* Comments of GE Healthcare at 3, ET Docket No. 16-56 and RM-11745 (filed May 6, 2016) ("GEHC Comments"). *See also* Petition for Reconsideration of GE Healthcare at 36-42, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Dec. 23, 2015).

Commission has already considered and rejected these arguments.[25] And the manner in which fixed WSDs establish their locations is completely unrelated to the integrity of WSD software. Moreover, the fact that white-spaces databases contain a small number of entries for test devices, which were registered at various locations to verify their database functionality, in no way supports GEHC's over-the-top claims that databases contain "rampant false device registrations,"[26] that "many existing devices are inherently insecure"[27] or that "the FCC's current certification process is manifestly ineffective."[28] Rather, as GEHC itself acknowledges, the Commission's rules already impose security and reliability requirements on WSDs.[29]

To be clear, Microsoft has no objection to the Commission's robust enforcement of the Commission's rules related to WSD security and reliability. But there is no evidence in the record of this or any other proceeding to support GEHC's sweeping demands. Indeed, the fact that hundreds of WSDs have operated for years without a single report of harmful interference due to database errors establishes precisely the opposite.

On the other hand, improper registration of WMTS site perimeters *may* present serious challenges. Therefore, while Microsoft does not recommend that the Commission undertake a separate review of WMTS data, to the extent the Commission assesses the "robustness" of the white-spaces database system, its review must also include every relevant licensee, including WMTS operations. In particular, the Commission needs to ensure that WMTS operators provide

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[25] *Amendment of Part 15 of the Commission's Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands & Duplex Gap, & Channel 37*, 30 FCC Rcd. 9551, ¶ 194 n.490 (2015).

[26] GEHC Comments at 12.

[27] *Id.*

[28] *Id.*

[29] *See Id.* at 8 n.18.

accurate and timely information on the perimeters of the facilities for which they seek protection. Similarly, the Commission must ensure that over-the-air broadcasters provide accurate and timely information of their broadcast antenna locations and operational parameters if these change as a result of the Incentive Auction and subsequent repacking.

IV. Conclusion

No party in this proceeding disputes that information in white-spaces databases must be accurate. But any additional obligations the Commission adopts must be proportionate to the risk of harmful interference, the requirement's ability to address that risk, and the burdens that new rules would impose on WSD users. The evidence in this proceeding makes clear that the risk of harmful interference, as the rules stand today, is vanishingly small. Not a single instance has yet been reported. On the other hand, an automatic geolocation mandate would impose significant burdens with little corresponding benefit. NAB and GEHC's proposals fail this test even more dramatically. While individual manufacturers should be allowed to pursue these approaches, the Commission should not impose such burdensome requirements by rule.

The Commission should continue to rely on the proven skill, integrity, and market-based incentives of professional installers and maintain the professional installation option for fixed WSDs. The professional installation program succeeded in preventing harmful interference in this band, and there is no reason to believe it will become less reliable in the future. But if the Commission nonetheless determines to take additional action on database reliability, then it should augment the professional installation program rather than finding that professional installers cannot be trusted. It could augment the program by supporting efforts to develop professional certification programs and, perhaps, requiring professional installers to register for FRNs. Unlike the automatic geolocation mandate, these measures would further enhance the

reliability of white-space geolocation data without imposing disproportionate burdens on consumers.

Respectfully submitted,

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