

**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

GN Docket No. 12-268

Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions

**GOOGLE INC. REPLY TO OPPOSITIONS TO PETITIONS FOR
RECONSIDERATION**

Google's petition requests reconsideration of the *Part 15 Order's* requirement that databases "push" wireless microphone reservation information to unlicensed devices, because the Commission based this rule on a technical misapprehension and because substituting a "fast-polling-channel" requirement would better serve the public interest. Shure, Sennheiser, the National Association of Broadcasters ("NAB"), and Microsoft agree with Google that the Commission's database push rule is both procedurally and technically unsound. But Shure, Sennheiser, and NAB then attempt to persuade the Commission to impose a burdensome 20-minute re-check interval across every TVWS channel—an approach that the Commission has

already rejected as overbroad.¹ These parties, moreover, offer no legitimate reason to reject Google’s balanced and workable proposal to impose a “fast-polling” requirement on only two channels in a given location.

Google’s petition also requested that the Commission reconsider and clarify the role of Channel 37 test deployments by limiting the timing and scope of the testing period to avoid unnecessary delay. GE Healthcare (“GEHC”) and WMTS Coalition oppose this commonsense request based on professed concerns about interference from TVWS devices and the implausible claim that delay and uncertainty somehow will not harm TVWS innovation and investment. The FCC’s rules and waiver processes, however, already overprotect WMTS operations, and the lack of clarity in the Commission’s description of its test deployments creates an unnecessary risk that innovators will view the FCC’s Channel 37 as too uncertain to warrant investment. Because Channel 37 is critical to providing the three channels needed to support an unlicensed ecosystem in the 600 MHz band, this would severely undermine the FCC’s goals.²

Accordingly, the Commission should grant Google’s petition, replace the “push” requirement with a “fast-polling-channel” rule, and clarify its goals for Channel 37 test

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, and 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*, Report and Order, 30 FCC Rcd. 9551 ¶ 277 (2015) (“Part 15 Order”).

² *See, e.g.*, Comments of Google Inc. at 6-7, 26-27, MB Docket No. 15-146, GN Docket No. 12-268 (filed Sept. 30, 2015) (“Sept. Google Comments”); *see also Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Report and Order, 29 FCC Rcd. 6567 ¶ 8 (2014) (explaining the Commission’s intention to “make a significant amount of spectrum available for unlicensed use, a large portion of it on a nationwide basis” because “[u]nlicensed devices complement licensed services, serve a wide range of consumer needs, and contribute tens of billions of dollars to our economy annually.”).

deployments, accompanied by a target date for nationwide TVWS deployments in these frequencies.

I. The Commission Should Replace Its Database “Push” Requirement with a Fast-Polling-Channel Rule.

In its petition for reconsideration, Google explained that the Commission’s new database push requirement, which requires the database to proactively send channel availability to white space devices, was not properly raised in the Notice of Proposed Rulemaking, does not have adequate record support, and is technically infeasible.³ No party disagreed, and several parties agree with reconsidering the database push requirement.⁴ The record is now entirely clear and one-sided: the database push rule is unworkable and must be replaced. The only remaining question is what should replace it.

Wireless microphone interests contend that the FCC should replace the rule with the very proposal the Commission just rejected: high-frequency database polling on *all* channels.⁵ They simply disregard the Commission’s own sound reasoning in rejecting this proposal. As the Commission rightly concluded, frequent database polling on every channel would be “overly-broad in satisfying the objective of the original proposal,”⁶ and would disproportionately, and

³ Petition for Reconsideration of Google Inc. at 1-8 (“Google Petition”). Unless otherwise noted, all citations herein to petitions for reconsideration are to petitions filed on Dec. 23, 2015 in ET Docket No. 14-165 and GN Docket No. 12-268.

⁴ See Response and Opposition to Petitions for Reconsideration of Microsoft Corporation at 13-19 (“Microsoft Response”); Opposition to Petitions for Reconsideration of the National Association of Broadcasters at 8-9 (“NAB Opposition”); Comments of Shure Incorporated at 6; Opposition and Response of Sennheiser Electronic Corporation at 8 (filed Jan. 27, 2016) (“Sennheiser Opposition”). Unless otherwise noted, all citations herein to oppositions or responses to petitions for reconsideration are to oppositions and responses filed on February 29, 2016 in ET Docket No. 14-165 and GN Docket No. 12-268.

⁵ NAB Opposition at 10-11.

⁶ Part 15 Order ¶ 277.

unnecessarily, increase costs for consumers and limit the utility of TVWS devices.⁷ The microphone interests fail to offer any new reason to adopt their proposal despite these costs.

To avoid the problems associated with the “push” and high-frequency concepts, the Commission should adopt a straightforward rule that identifies two channels as “fast-polling” channels.⁸ The simplest manner of establishing this rule would be to require fast polling on the two lowest available UHF channels in a given location. The rule should require the TVWS devices operating on these channels to contact the database every 20 minutes while retaining the previous daily re-check requirement for all other channels.⁹

NAB suggests that the Commission would not be able to identify the fast-polling channels in any given market until after the Incentive Auction and accompanying transition period are complete.¹⁰ This is incorrect. As Google explained in its petition, the fast-polling-channel proposal would not require the Commission to identify specific channels. Rather, it would require only a general rule by which TVWS and wireless microphone operators can identify these channels for themselves. For example, if the Commission requires fast polling on the two lowest UHF channels in any given place at any given time, as Google has suggested, databases and devices could be programmed at any time to identify these channels (subject, of course, to a reasonable phase-in period for compliant TVWS hardware). This algorithm-based

⁷ See *id.*; Comments of Google Inc. at 47-51 (“Google Comments”). Unless otherwise noted, all citations to comments herein are to comments filed on Feb. 4, 2015 in ET Docket No. 14-165 and GN Docket No. 12-268.

⁸ See Google Comments at 47-51; Google Petition at 8-11; Microsoft Response at 17-19.

⁹ 47 C.F.R. § 15.711(d)(4).

¹⁰ NAB Opposition at 9.

approach is how the two reserved channels (the first available channels above and below Channel 37) are chosen today.¹¹

NAB and Sennheiser suggest that two fast-polling channels may not be enough to accommodate the number of wireless microphones necessary to respond to a breaking news event and simultaneously serve other needs such as sporting events and live performances.¹² But the Commission historically has made only two clear channels available on short notice to wireless microphones—the two channels reserved full-time for wireless microphones. In addition, licensed wireless microphone users will have access to a dedicated 4 MHz channel in the duplex gap and the ability to reserve additional channels in advance of predictable events like games and concerts.¹³ Thus, Google’s proposal would leave wireless microphone operators no worse off than before—a very favorable outcome for them in an era of increasingly intensive use of lower-frequency spectrum.

Finally, NAB argues that increasing the frequency of TVWS database queries will not substantially affect white-space database operations or reduce battery life.¹⁴ Google, itself an experienced white-space database operator, has already demonstrated why NAB is mistaken.¹⁵ Contrary to NAB’s suggestions, the issue is not the size of today’s white-space database, the complexity of database requests, or the amount of information being transmitted in each request. It is the *frequency* of requests. This is particularly true when taking into account future growth in the TVWS ecosystem. As discussed in the Google petition, increasing the number of requests

¹¹ See 47 C.F.R. § 15.707(a)(2).

¹² See NAB Opposition at 8-9; Sennheiser Opposition at 8-9.

¹³ See Part 15 Order ¶¶ 153, 273.

¹⁴ NAB Opposition at 10-11.

¹⁵ See Google Comments, Declaration of Andy Lee ¶¶ 12-15.

72-fold will yield a corresponding 72-fold increase in the bandwidth consumed by database queries and responses, and the computational resources required to respond to these requests.¹⁶ This concern will be particularly pressing as TVWS devices become more widely deployed after the Incentive Auction.

NAB further suggests that frequent database requests will not adversely affect TVWS battery life. But its analysis overlooks that these frequent requests will require devices to power on their radios *even when they are not otherwise in use*. While a small amount of additional traffic might not drastically affect battery life while the device is already transmitting data, requiring the device to activate its radio when it could otherwise remain in a low-power mode will have a significant effect.¹⁷ The Commission correctly concluded that increasing the frequency of the polling interval on all channels would harm consumers.¹⁸

II. The Commission Should Set a Target Date for Nationwide TVWS Deployments in Channel 37 and Clarify Its Goals in Establishing an Initial Test Period.

In the *Part 15 Order*, the Commission protected TVWS operations in Channel 37 by establishing both highly conservative operating rules and a belt-and-suspenders waiver system.¹⁹ Although these rules robustly safeguard WMTS services, the Commission (in a last-minute addition) still stated its intention to limit test deployments in Channel 37 to just one or two markets before authorizing nationwide use. As Google's petition explained, that decision will create uncertainty that will reduce investment in unlicensed services.²⁰ The FCC should clarify

¹⁶ *Id.* ¶ 13.

¹⁷ *Id.* ¶ 14.

¹⁸ Part 15 Order ¶ 273.

¹⁹ *See, e.g., id.* ¶¶ 198, 211-15, 217, 220-21.

²⁰ Google Petition at 12.

the purpose of this testing and set a nationwide roll-out target date to ensure that its hastily adopted test-deployment concept does not undermine the goals of the *Part 15 Order*.

WMTS proponents oppose Google's request, rehashing their interminable calls for delay. First, GEHC and WMTS Coalition claim that moving forward with no clear timeline for TVWS operations in Channel 37 somehow would not negatively impact innovation or investment.²¹ This is self-evidently incorrect. TVWS chipmakers, electronics manufacturers, software developers, and other parts of the unlicensed ecosystem must be confident that at least minimally adequate spectrum will be available to support consumer devices. As the record makes abundantly clear, the Commission's rules must make available at least three channels per market to support the FCC's goals.²² Given spectrum constraints, particularly in dense urban markets, Channel 37 will be the essential third channel. In fact, if the Commission does not act to preserve a vacant channel in the particular markets where one otherwise would not be available for TVWS, Channel 37 may be the *only* channel available for unlicensed operations in critical markets such as Los Angeles.²³ Undermining the availability of Channel 37 therefore threatens to derail the Commission's efforts to bring the benefits of unlicensed low-band TV spectrum to American consumers.

GEHC additionally asserts that the FCC should delay all TVWS operations if trials reveal the need to adjust separation distances and procedures in certain markets. The Commission has

²¹ Opposition of GE Healthcare at 9; Opposition to Petitions for Reconsideration of the WMTS Coalition at 5-8 ("WMTS Coalition Opposition").

²² See Sept. Google Comments at 5 and n.14 (citing comments); Comments of Open Technology Institute and Public Knowledge at 2, MB Docket No. 15-146, GN Docket No. 12-268 (filed Sept. 30, 2015); Comments of Microsoft at 3, MB Docket No. 15-146, GN Docket No. 12-268 (filed Sept. 30, 2015) ("Microsoft Comments").

²³ See, e.g., Microsoft Comments at 5.

already adopted separation distances that “are conservative and will protect WMTS systems from harmful interference.”²⁴ The Commission has also recognized that individual characteristics of each WMTS site, including terrain and building features, may warrant adjustments in particular cases.²⁵ To accommodate those varying circumstances, the Commission created a waiver process designed to make adjustments where WMTS services are under-protected or overprotected.²⁶ GEHC has offered no reason why interference problems identified during the validation trials cannot be handled under these procedures.

Similarly, there is no adequate rationale for waiting until after the TVWS databases rulemaking concludes before allowing nationwide Channel 37 use. The Office of Engineering and Technology has already worked with the White Space Database Administrators Group to improve database entries and filter out common errors.²⁷ With these improvements in place, the Commission has determined that white-space database operations need not be suspended while the separate rulemaking proceeds.²⁸ This is unsurprising, given the absence of any actual interference associated with this issue. The Commission likewise should not further delay white space uses in Channel 37 while this issue is being resolved.

Nor should the Commission add unnecessary complexity to the WMTS testing process. The Commission already accounted for reasonably anticipated vulnerabilities by building in extremely conservative assumptions designed to give WMTS systems added protection from

²⁴ Part 15 Order ¶ 205.

²⁵ *Id.* ¶ 217.

²⁶ *Id.*

²⁷ *Amendment of Part 15 of the Commission’s Rules for Unlicensed White Space Devices*, Notice of Proposed Rulemaking and Order, FCC 16-23, ¶ 14 (rel. Feb. 26, 2016).

²⁸ *Id.* ¶ 41.

interference.²⁹ By WMTS Coalition’s description, all interference testing would apparently have to take place using WMTS systems actively engaged in medical facilities at the time of the test.³⁰ Testing in active healthcare settings would likely lead to new delays and administrative complications. But the WMTS Coalition offers no reason why such testing would provide benefits justifying these new hurdles. Interference testing is routinely performed using simulations of the propagation conditions at a particular site. With so many protections for WMTS systems in place and representative WMTS equipment commonly available in the marketplace, there is no need to complicate the testing process by directly testing locations where patient care is ongoing.

Finally, the Commission should continue to require WMTS facility owners to register perimeters rather than requiring the unlicensed community to do so for facilities that they do not control.³¹ On this issue, WMTS Coalition reprises its argument that the unlicensed community should be responsible for registering the perimeters of hospitals and other facilities simply because unlicensed users will be new to the channel. As explained elsewhere, these arguments should be set aside as procedurally improper on reconsideration.³² They are also meritless. WMTS licensees are in the best position to provide database information *about their own facilities*. And, as Google has demonstrated, perimeter registration is not a difficult process. Using the instructions Google has provided, or comparable services, WMTS licensees can

²⁹ See, e.g., Opposition to Petitions for Reconsideration of Google Inc. at 6 (“Google Opposition”).

³⁰ WMTS Coalition Opposition at 7.

³¹ See *id.* at 11.

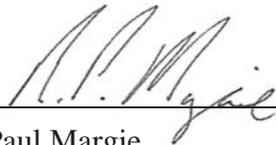
³² See Google Opposition at 11-13.

determine the perimeters of their facilities for free in a matter of minutes.³³ There is no need to involve the unlicensed community in this straightforward process.

III. Conclusion

The Commission has correctly found that its rule can provide consumers and communities the benefit of expanded unlicensed technologies while protecting Channel 37 incumbents. Google's petition seeks to advance this goal by addressing two narrow issues: fixing the unworkable "push" requirement and reducing the uncertainty surrounding Channel 37 test deployments. Opponents fail to offer meaningful reasons why the FCC should not grant Google's petition; they instead argue for additional delay, uncertainty, and complexity that will do little to protect licensed users, but will reduce investment in unlicensed services. The Commission should therefore grant Google's petition.

Respectfully submitted,



Paul Margie
S. Roberts Carter
Austin Bonner
HARRIS, WILTSHIRE & GRANNIS LLP
1919 M Street NW, 8th Floor
Washington, D.C. 20036
(202) 730-1300
Counsel for Google Inc.

Austin C. Schlick
Director, Communications Law
Aparna Sridhar
Counsel
GOOGLE INC.
25 Massachusetts Avenue NW, 9th Floor
Washington, D.C. 20001

March 10, 2016

³³ *Id.* at 10.

CERTIFICATE OF SERVICE

I, April Smith, do hereby certify that on this 10th day of March, 2016, I caused a copy of the foregoing Reply to Oppositions to Petitions for Reconsideration to be served by postage pre-paid mail on the following:

Ari Q. Fitzgerald
Tom Peters
Wesley Platt
Hogan Lovells US LLP
555 Thirteenth Street, NW
Washington, DC 20004
Counsel for GE Healthcare

Neal Seidl
Matthew Pekarske
GE Healthcare
8200 W. Tower Avenue
Milwaukee, WI 53223

Rick Kaplan
Patrick McFadden
National Association of Broadcasters
1771 N Street, NW
Washington, DC 20036

Laura Stefani
Fletcher, Heald & Hildreth, P.L.C.
1300 North 17th Street, 11th floor
Arlington, VA 22209
Counsel for Sennheiser Electronic Corporation

Joe Ciaudelli
Sennheiser USA
1 Enterprise Drive
Old Lyme, CT 06371

Lawrence J. Movshin
Timothy J. Cooney
Wilkinson Barker Knauer, LLP
1800 M Street, NW, Suite 800N
Washington, DC 20036
Counsel to WMTS Coalition

Dale Woodin
Executive Director
The American Society for Healthcare
Engineering of the American Hospital
Association
155 North Wacker Drive, Suite 400
Chicago, IL 60606

Catherine Wang
Timothy Bransford
Morgan, Lewis & Bockius LLP
2020 K Street, NW
Washington, DC 20006
Counsel to Shure Incorporated

/s/ April Smith