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

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| In the Matter of | ) | |
| | ) | |
| Expanding the Economic and Innovation | ) | Docket No. 12-268 |
| Opportunities of Spectrum Through | ) | |
| Incentive Auctions | ) | |

# CONSOLIDATED REPLIES OF THE OPEN TECHNOLOGY INSTITUTE AND PUBLIC KNOWLEDGE TO OPPOSITIONS TO PETITIONS FOR RECONSIDERATION

The Open Technology Institute at the New America Foundation ("OTI") and Public Knowledge ("PK") support the Commission's balanced and sequenced approach toward the Congressional goal of ensuring unlicensed access to 600 MHz spectrum nationwide, while ensuring unlicensed operations do not cause harmful interference to licensed LTE services. OTI and PK file these comments in reply to oppositions to petitions for reconsideration filed in this proceeding by Qualcomm, GE Healthcare ("GEHC"), the WMTS Coalition ("WMTS"), Sennheiser Electronic Corp. ("Sennheiser") and the Radio Television Digital News Association ("RTDNA").

OTI and PK concur entirely with the arguments raised by WISPA and Google/Microsoft in their respective Opposition to Petitions for Reconsideration.[1] OTI and PK agree that each of the petitions filed by the parties noted above are both procedurally and substantively defective, particularly since the Commission now has opened an active proceeding to make a final

[1] *See* Opposition of Google Inc. and Microsoft Corporation to Petitions for Reconsideration, GN Docket No. 12-268 (filed Nov. 12, 2014) ("Google/Microsoft Opposition"); Wireless Internet Service Providers Association, Opposition to Petitions for Reconsideration, GN Docket No. 12-268 (filed Nov. 12, 2014) ("WISPA Opposition").

determination on the technical rules that can permit unlicensed operations in the 600 MHz duplex gap, guard bands and Channel 37.[2]

## I. Qualcomm's Petition is Premature and Factually Baseless

In entirely predictable fashion, Qualcomm continues its decade-long effort to kill off the public's unlicensed access to fallow TV band spectrum with yet another filing based on erroneous and unsupported procedural and technical assertions. Although Qualcomm's campaign to cripple the emerging market for 802.11af Wi-Fi connectivity may succeed in damaging its competitors and furthering its own narrow corporate interests, Qualcomm's filing is (as almost always) antithetical to the broader public interest. In their respective filings in opposition to Qualcomm's petition, WISPA and Google/Microsoft are entirely correct that Qualcomm's claims are both premature and factually mistaken.

First, OTI and PK agree that Qualcomm "improperly seeks reconsideration of a decision the Commission has yet to make."[3] Qualcomm is wrong twice over when it claims the Commission "announced a technical decision to allow unlicensed operations in the 600 MHz duplex gap and guard bands without providing any analysis of the extensive technical evidence in the record of this proceeding."[4] The Commission's Incentive Auction *Report & Order* made no final determination with respect to unlicensed operations in the 600 MHz duplex gap and guard bands. The contingent nature of the Commission's statement that "we are confident that unlicensed devices can operate in the duplex gap under existing TV White Space rules without

[2] *See 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,* Notice of Proposed Rulemaking, FCC 14-144 (2014) ("TVWS Part 15 NPRM").
[3] Google/Microsoft Opposition at 5.
[4] Petition for Reconsideration of Qualcomm, Inc., GN Docket No. 12-268 (filed Sept. 15, 2014) ("Qualcomm Petition"), at 4.

causing [harmful] interference" is completely clear in context.[5] In the immediately preceding sentence, the *Report & Order* states: "Consistent with the Spectrum Act, ***unlicensed use of the guard bands will be subject to the Commission's ultimate determination that such use will not cause harmful interference to licensed services***."[6]

As Google and Microsoft further observe, the Commission explicitly indicated that "a further record is necessary to establish the technical standards to govern [unlicensed] use"[7] of TVWS devices. Indeed, the Qualcomm Petition acknowledges that the FCC "will be initiating a rulemaking to revise its unlicensed [TVWS] rules to define technical rules for unlicensed operations,"[8] a now-active NPRM that the Commission adopted two weeks after Qualcomm filed its petition.[9] Both the *Report & Order* and the *TVWS Part 15 NPRM* make it clear that no final decision has been made on the operating parameters or rules governing unlicensed use of the duplex gap and guard bands. Qualcomm's complaints are therefore premature since reconsideration is reserved exclusively for "final actions."[10] Qualcomm will have every opportunity to demonstrate the infeasibility of unlicensed operations in the duplex gap and guard bands by filing comments and reply comments in the *TVWS Part 15 NPRM*.

Second, even if the Commission's well-founded "confidence" that unlicensed TVWS devices can operate in the 600 MHz guard bands without undue risk of harmful interference to post-auction licensed operations constitutes a "final action" subject to reconsideration, the Qualcomm Petition fails on the merits. Qualcomm is simply mistaken when it asserts there

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[5] *See Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Report and Order, FCC 14-50, 29 FCC Rcd. 6567 (2014), at ¶ 273 ("*Report and Order*").
[6] *Ibid* (emphasis added).
[7] *Id.*
[8] Qualcomm Petition at 1.
[9] *See* TVWS Part 15 NPRM, *supra* note 2.
[10] 47 C.F.R. §1.429(a). *See* Google/Microsoft Opposition at 4 and notes 10-12 [citations omitted], observing that although the Commission has "*tentatively* conclude[d] that devices operating at a level of 40 mW and having a bandwidth of six megahertz will be viable in this spectrum" [*Report and Order* at ¶ 273], a "tentative conclusion" is not a "final action."

"presently is no technically sound justification in the record for allowing unlicensed operations and wireless microphones in the duplex gap and guard bands," and that the Commission simply ignored Qualcomm's contrary filings and assertions.[11] As the Google/Microsoft Opposition documents in detail, in the *Report & Order* the Commission specifically discussed the competing technical claims of Qualcomm, Broadcomm and other parties, identified the contested technical issues, and explained that "appropriate assumptions for the technical analyses will be considered in the forthcoming 600 MHz and TVWS Part 15 proceeding."[12]

It is clear from the docket's extensive record of competing technical claims, as well as from the *Report & Order*, that Qualcomm's *real* complaint is not that the Commission "ignored" the company's technical arguments, but that the Commission rightly found them to be unconvincing. For example, during the months immediately preceding the *Report & Order*, Broadcomm demonstrated repeatedly that Qualcomm's technical claims were premised on mobile device filters with in-band blocking performance that is vastly inferior to the performance delivered by filters widely available on the market today, let alone in future years.[13] And as Google and Microsoft observed, the *Report & Order* specifically noted that "many of Qualcomm's analyses assume that unlicensed devices will operate at power levels higher than those currently permitted under the TVWS rules."[14]

Moreover, contrary to Qualcomm's claim that "there presently is no technically sound justification in the record for allowing unlicensed operations and wireless microphones in the

[11] Qualcomm Petition at 3.
[12] *Report and Order* at ¶ 272-73; Google/Microsoft Opposition at 5-6.
[13] *See, e.g.*, Letter from S. Roberts Carter, Counsel, Broadcom Corp., to Marlene H. Dortch, Secretary, Fed. Commc'ns Comm'n, at 1-2, GN Docket No. 12-268 (filed Apr. 23, 2014).
[14] Google/Microsoft Opposition at 6, citing *Report and Order* at ¶ 272, and noting that "[t]his criticism is equally applicable to the technical reports filed by the Consumer Electronics Association." *Id*. at 6, note 19. *See Ex Parte* Letter from Julie M. Kearney, Vice President, Regulatory Affairs, Consumer Electronics Association, *et al.*, GN Docket No. 12-268, at 30, 33, 43 (filed Dec. 16, 2013) (assuming that unlicensed devices will transmit at a maximum radiated power of 4 Watts).

duplex gap and guard bands," Broadcomm also put extensive and affirmative technical findings and *ex parte* presentations on the record that demonstrate unlicensed devices can operate in the duplex gap and guard bands at 40 mW without serious risk of harmful interference to licensed LTE services.[15] While Qualcomm may be correct concerning the ability of wireless microphones to operate at a higher power level in the duplex gap or guard bands without undue risk of harmful interference to licensed LTE services, there is clearly ample support for the feasibility of the outcome Congress intended, which is unlicensed TVWS devices, controlled by a database, operating at low power in the 600 MHz guard bands.[16] And if Qualcomm is correct that the evidence currently in the record is not "technically sound," it will have another chance to demonstrate that fact in the pending *TVWS Part 15 NPRM.*

## II. The GEHC and WMTS Petitions are Premature and Misstate the Report & Order

Like Qualcomm, GE Healthcare and the WMTS Coalition (together the "WMTS interests") seek reconsideration of a decision that is not yet final and justify their claims with arguments that misstate the *Report & Order* and even contradict their own position on the viability of at least some shared use of the band. OTI and PK generally agree with the Google/Microsoft Opposition concerning the fatal procedural and substantive defects of the GEHC and WMTS petitions for reconsideration.

The WMTS interests erroneously claim that the Commission has made a final decision to allow unlicensed operations on Channel 37 in a manner that is likely to cause harmful

[15] *See, e.g., Ex Parte* Letter from Paul Margie, Counsel, Broadcom Corp., GN Docket No. 12-268 (filed Jan. 30, 2014); *Ex Parte* Letter from Jennifer. K. Bush, Assoc. Gen. Counsel, Broadcom Corp., GN Docket No. 12-268 (filed Mar. 4, 2014); *Ex Parte* Letter from Jennifer. K. Bush, Assoc. Gen. Counsel, Broadcom Corp., GN Docket No. 12-268 (filed April 23, 2014); *Ex Parte* Letter from Paul Margie, Counsel, Broadcom Corp., GN Docket No. 12-268 (filed July, 22, 2014).

[16] *Middle Class Tax Relief and Job Creation Act of 2012*, 126 Stat. 156, § 6407(b) at 231-32 (2012) ("Spectrum Act").

interference to WMTS operations and which is not supported by the record.[17] This is wrong twice over:

First, the Commission has not taken final action with respect to authorizing any particular type of unlicensed operations on Channel 37. The *Report & Order* concluded that unlicensed devices will be authorized to operate on Channel 37 "***subject to the development of the appropriate technical parameters*** for such operations as part of our 600 MHz and TVWS Part 15 proceeding in order to protect the WMTS and RAS from harmful interference."[18] As Google and Microsoft correctly observe, the *TVWS Part 15 NPRM* devotes several pages to the issue of developing technical parameters that will safeguard WMTS and RAS from harmful interference and seeks comment on appropriate power limits, separation distances, and other technical requirements.[19] Moreover, in addition to making the authorization of unlicensed access contingent on technical rules to be developed in a further notice (the now released and pending *TVWS Part 15 NPRM*), the *Report & Order* premised this tentative authorization on developing technical rules "to protect the WMTS and RAS from harmful interference."[20]

Second, the WMTS interests erroneously claim that the *Report & Order* authorizes unlicensed operations that are likely to result in harmful interference for WMTS operations. The *Report & Order* specifically indicates that the Commission will permit unlicensed operations *only* under operating parameters that are yet to be determined and "in locations that are sufficiently removed from WMTS users and radio-astronomy-service sites to protect those incumbent users from harmful interference."[21]

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[17] Petition for Reconsideration of the WMTS Coalition, GN Docket No. 12-268 (filed Sept. 15, 2014) ("WMTS Petition"), at 9-11, 14; Petition for Reconsideration of GE Healthcare, GN Docket No. 12-268 (filed Sept. 15, 2014) ("GEHC Petition"), at 9.
[18] *Report and Order* at ¶ 274 (emphasis added).
[19] *See* Google/Microsoft Opposition at 10, citing TVWS Part 15 NPRM at ¶¶ 97-128.
[20] *Report and Order* at ¶ 274.
[21] *Ibid.*

Despite the Commission's clear statements that it will ensure rules that avoid undue risk of harmful interference, the central premise of the GEHC and WMTS Petitions appears to be that the Commission should have decided that *any* unlicensed access to Channel 37, no matter how low power and how remote from a WMTS incumbent, is likely to cause harmful interference and must therefore be prohibited. However, as Google and Microsoft point out, in addition to being factually unfounded, this new position contradicts GE Healthcare's position prior to the *Report & Order* that unlicensed devices can coexist with incumbent operations provided that unlicensed devices maintain adequate separation distance.[22] OTI and PK agree that "[t]his contradiction alone warrants dismissal of the petition."[23]

Moreover, although the pending *TVWS Part 15 NPRM* will determine the exclusion zones, separation distances, power levels, database coordination and other technical parameters necessary to protect WMTS incumbents from harmful interference, it is obviously true that at least very low-power TVWS devices can operate without imposing any risk to distant and indoor WMTS systems. Given that reality, and the compelling public interest in ensuring nationwide access to a sufficient amount of unlicensed TVWS spectrum, the *Report & Order* clearly articulated a correct and defensible position that the Commission should proceed on the assumption that the technologies can coexist to a significant degree and make more effective overall use of Channel 37. The Commission stated:

> Subject to the adoption of appropriate technical rules, authorizing the use of channel 37 for unlicensed operations will make additional spectrum available for unlicensed devices on a nationwide basis, thereby advancing our goal of promoting innovation in new unlicensed devices. This will make an additional six megahertz of spectrum available for unlicensed devices in areas of the country that are not in close proximity to hospitals or other medical facilities that use WMTS equipment, or to RAS sites.[24]

[22] *See* Comments of GE Healthcare, GN Docket No. 12-268 (filed Jan. 25, 2013), at 32; Google/Microsoft Opposition at 10.
[23] Google/Microsoft Opposition at 11 [citations omitted].
[24] *Report and Order* at ¶ 276.

Finally, OTI and PK concur with Google and Microsoft that a number of other claims by WMTS interests are not supported by the record or by a fair reading of the *Report & Order*. For example, the WMTS interests claim the Commission failed to consider the safety-of-life aspects of WMTS,[25] a consideration the Commission addressed in paragraph 275 of the *Report & Order*. Similarly, the WMTS Coalition contends that the Commission did not address the possibility that the geolocation data upon which the database will rely might not be complete or accurate,[26] a consideration the Commission addressed specifically in paragraphs 275 and 277 and in footnote 832 of the *Report & Order*.

In short, neither the GE Healthcare nor WMTS Coalition petition for reconsideration is procedurally or substantively tenable. Like Qualcomm, the WMTS interests will have a full and fair opportunity to present technical arguments and evidence in the pending *TVWS Part 15 NPRM* that will ultimately decide the final action concerning coexistence with unlicensed devices on Channel 37.

## III. The Sennheiser and RTDNA Petitions Seek to Relitigate the Question of Exclusive Channels for Wireless Microphones, Which is also Inefficient and Unnecessary

In their respective petitions for reconsideration, Sennheiser and RTDNA effectively ask the Commission to relitigate an issue expressly decided and justified in the *Report & Order* based on an ample record: To wit, whether the post-auction band plan will include two 6 MHz channels reserved exclusively for wireless microphone operators. Although the two microphone interests file conflicting proposals, both boil down to asking the Commission to revisit the

[25] *See, e.g.*, WMTS Petition at 9-11, 14; GE Healthcare Petition at 9.
[26] WMTS Petition at 13-14.

industry's arguments for exclusively-reserved microphone channels in UHF spectrum, a decision that the Commission has fully considered and cannot relitigate in a petition for reconsideration.[27]

For its part, the Sennheiser Petition asks the Commission to compensate for the loss of the two current exclusive microphone channels by denying unlicensed TVWS devices shared access to Channel 37 and to what Sennheiser calls the "naturally occurring" vacant TV channel to be designated in each market, while giving "wireless microphones" (apparently including unlicensed microphones) exclusive access (subject to protecting WMTS and RAS on channel 37).[28] Alternatively, Sennheiser asks the Commission "to reserve two separated 6 MHz channels on the TV side of the boundary for wireless microphone use,"[29] which is precisely what the Commission considered and rejected in the *Report & Order*.[30]

RTDNA, which represents primarily licensed electronic news gathering operations, takes a very different approach that completely contradicts the Sennheiser Petition.[31] RTDNA "seeks reconsideration of the determination to permit unlicensed use of the duplex gap," proposing that "the FCC should allow wireless microphones and other low power auxiliary station (LPAS) users to operate in the duplex gap on an exclusive basis, and in the guard bands under the current TV White Space rules, . . .."[32] RTDNA suggests that limiting unlicensed devices to shared

[27] 47 C.F.R. § 1.429(l)(3) ("Petitions for reconsideration of a Commission action that plainly do not warrant consideration by the Commission . . . include . . . petitions that [r]ely on arguments that have been fully considered and rejected by the Commission within the same proceeding.").
[28] *See* Petition for Reconsideration of Sennheiser Electronic Corporation, GN Docket No. 12-268 (filed Sept. 15, 2014) ("Sennheiser Petition"), at 9-10.
[29] *Id.* at 10.
[30] Sennheiser also throws in, as another alternative, that the Commission "keep for wireless microphones an unauctioned 5 MHz pair on the wireless broadband side, adjacent to the guard bands." *Id.* Sennheiser fails to explain why this would not violate the Spectrum Act.
[31] As the WISPA Opposition notes, Sennheiser explains that the duplex gap and guard bands are inadequate for microphone fidelity and cites studies showing that in Europe "the duplex gap ha[s] demonstrated interference to wireless microphones." Sennheiser Petition at 6. Sennheiser further contradicts RTDNA by also explaining why it's extremely important for high-fidelity microphone operators, such as electronic news gathering, to have two clean UHF channels with substantial frequency separation. *Id.* at 7.
[32] Petition for Reconsideration of the Radio Television Digital News Association, GN Docket No. 12-268 (filed Sept. 15, 2014) ("RTDNA Petition"), at 1-2.

access to Channel 37 should be sufficient to achieve a more "balanced approach" between unlicensed services and wireless microphones.[33]

Notably, RTDNA does not address the fact that its petition asks the Commission to reverse its adherence to Congressional intent, clearly expressed in the Spectrum Act, to allocate the 600 MHz guard bands for unlicensed TVWS operations without causing harmful interference to licensed LTE operations post-auction.[34] As the Commission stated in the *Report & Order*, "Section 6407(c) was a compromise intended by the conferees to 'create a nationwide band of spectrum that can be used for innovative unlicensed applications.'"[35]

With respect to the merits of both the Sennheiser and RTDNA petitions, OTI and PK concur fully with the WISPA Opposition, which argues that the Commission did in fact adopt a balanced approach that takes a series of actions that largely offset any loss of exclusive TV spectrum for microphone interests.[36] For example, as Sennheiser acknowledges,[37] the Commission amended Section 74.802(b) to permit wireless microphones to operate as close as four kilometers from the protected contour of co-channel TV stations, a change that OTI and PK supported. The Commission also opened a proceeding and is seeking comment on how to accommodate the long-term needs of wireless microphone users in other bands.[38]

In addition, since it will not be possible for the Commission to repack TV stations in a market on every single channel, to avoid interference and due to the broadcast viewership protections in the Spectrum Act, there will continue to be a number of locally-vacant channels in every market nationwide where Part 74 microphones can be permitted to make reservations for

[33] *Id.* at 2.
[34] *See* Spectrum Act, § 6407(c).
[35] *Report & Order* at ¶ 271, note 815, citing 158 Cong. Rec. H915 (daily ed. Feb. 17, 2012) (remarks of Rep. Waxman).
[36] *See* WISPA Petition at 8.
[37] Sennheiser Petition at 7; *see Report & Order* at ¶¶ 304-07.
[38] *See Promoting Spectrum Access for Wireless Microphone Operations*, GN Docket No. 14-166 (rel. Sept. 30, 2014).

safe use of their low-power microphones. A number of these channels will be unencumbered by unlicensed TVWS devices, thereby adding to the number of "clean" channels available for microphones that Sennheiser claims are needed by very high-fidelity users. As OTI and PK have detailed in previous filings in this docket, Part 74 microphones have historically operated co-channel to broadcast stations in neighboring media markets that are *not* available for use by unlicensed devices.[39] For example, PISC documented in its initial comments in this proceeding that at the Rockefeller Center in New York City (home to TV production facilities for NBC Universal), the Shure Inc. microphone user look-up database shows that in addition to channels 22 and 42, which are reserved exclusively for microphones, there are ten (10) non-TVWS channels available with no broadcaster operating within 70 miles (the FCC separation distance); plus an additional six channels with no broadcaster operating within 50 miles; and yet another four channels with no broadcaster operating within ten miles.[40] In contrast, the TV Bands Databases show only one vacant channel available for unlicensed use.

## IV. CONCLUSION

The Commission should summarily dismiss the unfounded and fatally flawed petitions for reconsideration discussed above. OTI and PK strongly support the Commission's decision to proceed carefully, and in stages, to determine how best to ensure that unlicensed devices coexist safely with licensed services on both unused 600 MHz spectrum and in the remaining TV Band white spaces. We appreciate the enormous complexity of the Commission's effort to both conduct a successful incentive auction and, most importantly, to optimize the utility of current TV band spectrum for a variety of different incumbent and entrant use cases and technologies.

[39] *See, e.g., Ex Parte* Letter from Michael Calabrese, GN Docket 12-268 (filed May 6, 2014), at 3.
[40] *See* http://www.shure.com/americas/support/tools/wireless-frequency-finder; Comments of the Public Interest Spectrum Coalition, Docket No. 12-268, *et al.* (Jan. 25, 2013) at 32-37.

OTI, PK and the broader Public Interest Spectrum Coalition (PISC) support the Commission's decision in the *Report & Order* to make "a significant amount of spectrum available for unlicensed use, a large portion of it on a nationwide basis," including at least 20 to 34 MHz of unlicensed spectrum in every market nationwide.[41] Unlicensed use of the 600 MHz duplex gap, guard bands, along with shared access to Channel 37 and a dedicated microphone channel, are all essential to the realizing the compelling public interest in low-band unlicensed access nationwide.

Respectfully Submitted,

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November 24, 2014

[41] *Report & Order* at ¶ 264.