

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

In the Matter of

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

MB Docket No. 15-146

Expanding the Economic and Innovation
Opportunities of Spectrum Through Incentive
Auctions

GN Docket No. 12-268

REPLY COMMENTS OF GOOGLE INC.

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I. INTRODUCTION AND SUMMARY.

The record confirms that preserving a vacant channel for shared use by unlicensed broadband devices and wireless microphones in each market, and a second channel in markets where the duplex gap is subject to impairment, will support the development of robust wireless broadband operations in the 600 MHz and television bands. This action, moreover, will impose only a small burden on broadcast licensees, which is more than justified by the benefits it will create for millions of consumers and the U.S. economy. Finally, the Federal Communications Commission's ("FCC" or "Commission") broad statutory authority over spectrum policy empowers it to preserve these vacant channels for unlicensed wireless uses, and the Spectrum Act does not constrain that authority.

Some broadcaster associations nevertheless maintain that the FCC should not preserve even one vacant channel per market, regardless of whether shutting out unlicensed uses would destroy the value of the broadcast and 600 MHz bands as a home for unlicensed consumer devices. They assert—without support—that preserving just a single channel would displace a large number of low-power television ("LPTV") and TV translator stations. Yet actual analysis indicates that most LPTV and translator stations serve communities with very low population density, where vacant television spectrum is likely to remain abundant after the auction. In these low-density areas, LPTV and translator stations will not be displaced or otherwise prevented from adopting changes to their stations as a result of the Commission's proposals. Sufficient vacant channels will remain to accommodate both their operations and the operations of white space devices and wireless microphones.

In adopting its proposed rules, the Commission should modify the methodology by which broadcasters demonstrate the availability of vacant channels to better reflect real-world conditions. As recommended by the Consumer Electronics Association ("CEA"), the FCC

should (1) require broadcasters to use the population centroid of each 2 x 2 km grid square rather than the center point to determine vacant channel availability, and (2) require broadcasters to include all grid squares that a broadcaster's proposed modifications would impact, regardless of whether such grid squares also overlap a station's existing contour.

II. IMPLEMENTING THE VACANT CHANNELS PROPOSAL WILL NOT SIGNIFICANTLY AFFECT BROADCASTING.

The FCC correctly explained in the Notice of Proposed Rulemaking (“NPRM”) that its vacant channel rules “will not significantly burden broadcast applicants in terms of either the continued availability of channels in all areas or the administrative burdens of compliance.”¹ But still, the National Association of Broadcasters (“NAB”) and the LPTV Spectrum Rights Coalition (“LPTV Coalition”) insist that preserving vacant channels for use by unlicensed devices and wireless microphones would result in substantial broadcaster displacement nationwide. They exaggerate. As explained below, the number of broadcasters potentially impacted by the vacant channels proposal is far lower than either NAB or the LPTV Coalition suggests.

¹ *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, 6716 ¶ 11 (2015) (“Vacant Channel NPRM”).

The LPTV Coalition claims that up to 1,320 (or 22 percent² of) LPTV and TV translator stations could be displaced as a result of the vacant channels proposal.³ It provides no analysis or description of how it arrived at this number.⁴ NAB, on the other hand, suggests that in an 84 MHz spectrum recovery scenario, 347 (or 6 percent⁵ of) LPTV and TV translator stations are likely to go off-air if the Commission preserves a single vacant channel for unlicensed use, and in a 120 MHz recovery scenario, 433 (or 7 percent⁶ of) stations would be displaced if the FCC were to preserve a single vacant channel.⁷ Like the LPTV Coalition, NAB fails to explain how it arrived at its conclusion.

Contrary to these unsupported (and conflicting) assertions, analysis of the potential impact of the FCC's proposals shows that the number of affected LPTV and TV translator stations is likely to be smaller than even NAB claims. This is primarily because most LPTV and TV translator stations serve rural and other areas where vacant spectrum will remain abundant after the auction. Preserving one or two vacant channels in markets where enough post-auction spectrum will remain to accommodate LPTV, translator, and unlicensed users will not prevent LPTV and TV translators from making proposed channel moves or other station modifications.

² TV Query Broadcast Station Search, FED. COMMC'NS COMM'N, <https://www.fcc.gov/encyclopedia/tv-query-broadcast-station-search> (last visited Oct. 28, 2015) (follow "TV Query" hyperlink; then search Service: Low Power TV and TV translators, Record Types: Licensed Stations – total is 1,767; new search Service: Digital Low Power Television, Record Types: Licensed Stations – total is 4,239; showing a total of 6,006 LPTV and TV translator stations) ("TV Query").

³ Comments of the LPTV Spectrum Rights Coalition, LLC at 13 ("LPTV Coalition Comments"). Unless otherwise noted, all comment citations herein are to comments filed on September 30, 2015 in MB Docket No. 15-146 and GN Docket No. 12-268.

⁴ *Id.* at 13.

⁵ TV Query.

⁶ *Id.*

⁷ Comments of the National Association of Broadcasters at 11-13 ("NAB Comments").

Figure 1 below shows the distribution of LPTV and TV translator stations by the population density within their service contours. The underlying contour data comes from the FCC's publicly available TV service contour files,⁸ and the census tract data from www.census.gov.⁹ The population within a station's service contour is calculated as the sum of the populations of the census tracts within a station's service contour. For tracts that are only partially within the contour, an area-weighted population is used—in other words, the total population of that tract is multiplied by the percentage of that tract actually contained within the contour. Population density was determined by dividing the total population within a station's contour by the land area within the contour.

As Figure 1 illustrates, the vast majority of LPTV and TV translator stations serve rural areas with a population density of between 0 and 200 people per square km. By way of comparison, the population densities of Los Angeles, California, and Harrisburg, Pennsylvania—two markets that the FCC has identified as potentially impacted by its proposal to place a broadcaster in the duplex gap¹⁰—are an order of magnitude higher at 3,153 and 2,345 people per square km, respectively.¹¹

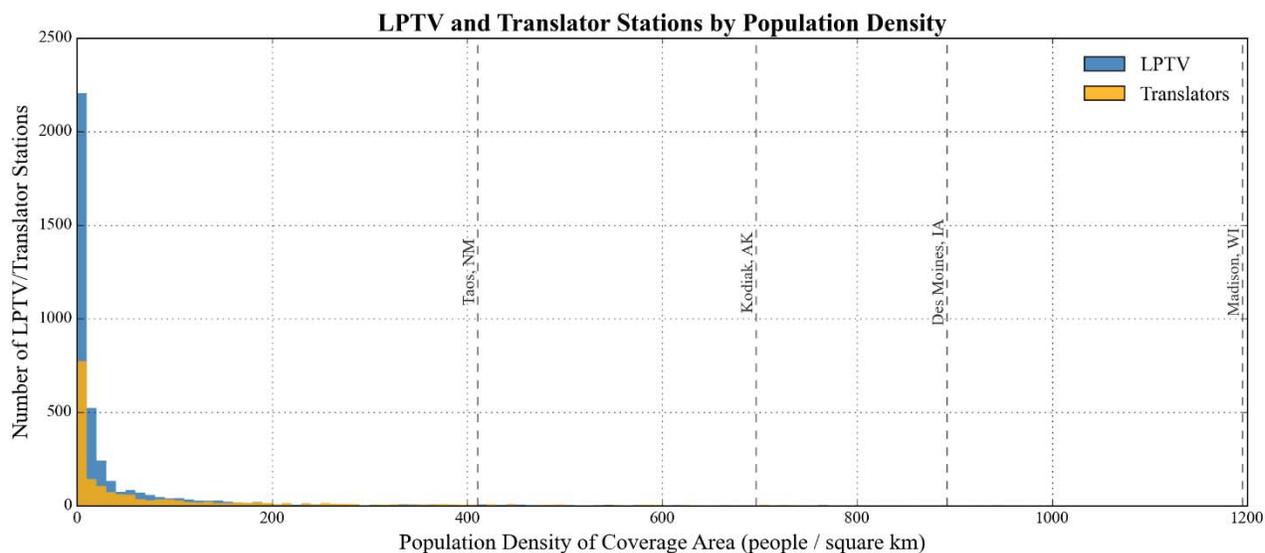
⁸ FCC Encyclopedia, *TV Service Contour Data Points*, FED. COMM'NS COMM'N, <https://www.fcc.gov/encyclopedia/tv-service-contour-data-points> (last visited Oct. 20, 2015).

⁹ Data, *Data Tools and Apps*, U.S. CENSUS BUREAU, <http://www.census.gov/data/data-tools.html> (last visited Oct. 20, 2015).

¹⁰ Letter from Gary M. Epstein, Chair, Incentive Auction Task Force, to Marlene H. Dortch, Secretary, FCC at Attachment p.3, GN Docket No. 12-268, WT Docket No. 12-269, AU Docket No. 14-252 (filed July 10, 2015).

¹¹ See *Los Angeles, CA Demographics Data*, TOWN CHARTS, <http://www.towncharts.com/California/Demographics/Los-Angeles-city-CA-Demographics-data.html> (last visited Oct. 28, 2015); *Harrisburg, PA Demographics Data*, TOWN CHARTS, <http://www.towncharts.com/Pennsylvania/Demographics/Harrisburg-city-PA-Demographics-data.html> (last visited Oct. 28, 2015).

Figure 1

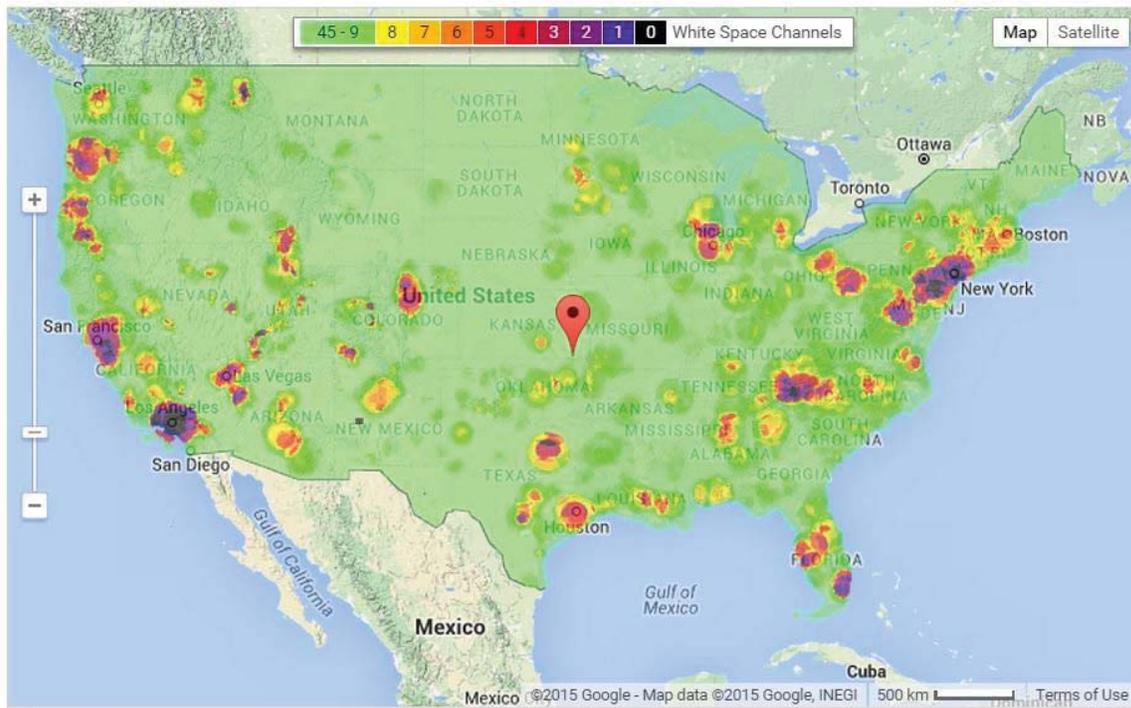


This analysis correlates with TV translators’ own description of their service base. In comments submitted to Congress, the National Translator Association explained that TV translators “deliver . . . television programming from distant major stations to *small rural communities*.”¹²

As shown in Figure 2, vacant channels are so abundant in the lightly populated areas most LPTV and TV translator stations serve that the auction will not materially impact spectrum availability for those users.

¹² National Translator Association Comment on the House Telecommunications Subcommittee Hearing of July 24, 2014, NAT’L TRANSLATOR ASS’N, at 1 (July 24, 2014), <http://www.nationaltranslatorassociation.org/upload/OtherPDFs/Posthearing20140724.pdf> (emphasis added).

Figure 2¹³



✓ Spectrum availability (as of October 16, 2015)

Broadcasters in fact have argued that preserving vacant channels is unnecessary because there will be more unlicensed spectrum available after the auction than before it.¹⁴ While vacant spectrum is likely to remain abundant in the rural areas of concern to LPTV and translator interests, the auction and repack will reduce the number of vacant channels in most spectrum-constrained urban markets. The vacant channels proposal is primarily aimed at ensuring sufficient unlicensed spectrum in those areas.¹⁵ And of course, if NAB is correct that available

¹³ Spectrum Database, GOOGLE INC., <https://www.google.com/get/spectrumdatabase/channel/> (last visited Oct. 16, 2015).

¹⁴ NAB Comments at 2, 5-6.

¹⁵ Cf. *Expanding the Economic and Innovation Opportunities of Spectrum through Incentive Auctions*, Report and Order, FCC 14-50, 29 FCC Rcd. 6567, 6683 ¶ 265 (2014) (“We expect that there will still be a substantial amount of spectrum available for use by these [unlicensed] devices in the post-auction television bands, particularly in areas outside of the central urban areas of the largest DMAs.” (emphasis added)) (“Incentive Auction Order”).

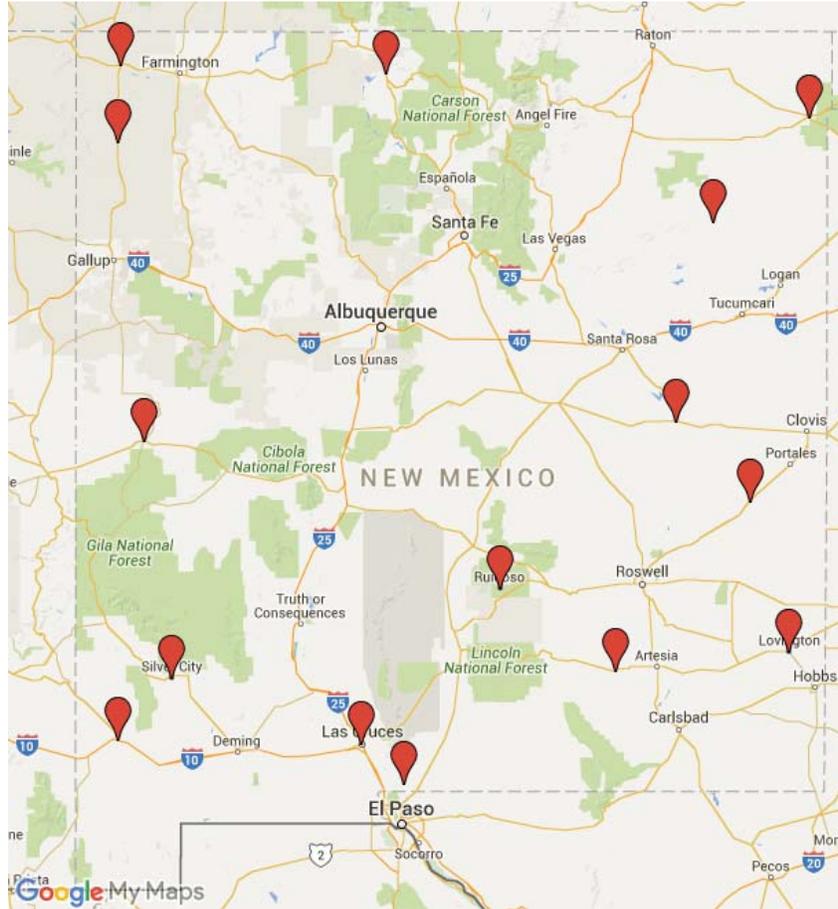
spectrum will be abundant after the auction, then the Commission's vacant channels proposal will have no impact on broadcasters' ability to move channels and make modifications to their contours. NAB's point about available spectrum, then, does not support its opposition to the vacant channel rules.

Taken together, Figures 1 and 2 illustrate that nearly all LPTV and TV translator stations serve areas where vacant spectrum is likely to be abundant even after the auction. Such stations are therefore not at risk of displacement if the FCC preserves one, and in a limited number of markets, two, vacant channels for shared unlicensed broadband and wireless microphone use. These data also demonstrate that NAB and the LPTV Coalition have vastly overstated the number of LPTV and TV translator stations likely to be displaced as a result of vacant channel preservation.

Even more concretely, NAB suggests that in an 84 MHz recovery scenario, 20 LPTV and translator stations in New Mexico will be displaced as a result of the FCC's vacant channels proposal.¹⁶ In order to evaluate this claim, Google selected 15 towns and cities in New Mexico based on their geographic dispersion (ensuring that they all fell outside of both Santa Fe and Albuquerque, the markets most likely to be served by full-power stations). Figure 3 identifies these communities, which represent rural areas likely to be served by LPTV and TV translators.

¹⁶ NAB Comments at 16.

Figure 3



As shown in Figure 4 below, Google’s spectrum database reflects that between 18 and 28 vacant channels are available in each of these areas of New Mexico, while publicly available contour data show that no more than 7 LPTV and translator stations currently serve each of these localities. In all of these areas, if each LPTV or translator station was moved to a channel that is vacant today, between 15 and 28 vacant channels would still remain available for use by unlicensed devices.

Figure 4

Town	Population	Vacant Channels Available	LPTV/Translator Stations
Chaparral	15,260	21	1
Clayton	2,875	28	0
Elida	199	27	0
Fort Sumner	1,026	23	1
Hope	107	26	1
Las Cruces	100,698	18	3
Lordsburg	2,711	26	2
Los Ojos	121	20	5
Lovington	11,994	23	2
Mosquero	92	27	0
Newcomb	335	25	2
Quemado	229	28	0
Ruidoso	8,152	21	6
Shiprock	8,207	23	4
Silver City	10,151	24	7

Accordingly, an ample amount of spectrum will remain available in areas like rural New Mexico to accommodate LPTV and TV translator stations, while still leaving a vacant channel available for use by unlicensed devices and wireless microphones. The vacant channels rules would have no impact in these markets, where LPTV and TV translator stations generally operate.

To be sure, in dense urban areas where less spectrum is available and the need for wireless bandwidth is greatest, some LPTV and TV translator stations will be affected by the repack. This is true with or without the vacant channels proposal. But both NAB and the LPTV

Coalition have significantly overstated the number of LPTV and TV translator stations that are at risk of displacement if the FCC adopts the vacant channels proposal, which is the relevant figure here.

Importantly, the overriding goal of the incentive auction is to ensure that the nation's spectrum resources are used more efficiently and intensively for the benefit of the public overall. To achieve this goal, the FCC has made difficult decisions that burden every industry sector active in the broadcast and 600 MHz bands. Wireless carriers will pay billions of dollars for new licenses. Full-power broadcasters that do not participate in the auction will need to relocate. Manufacturers and service providers that rely on unlicensed technologies will have access to fewer channels than before the auction in metropolitan markets and will be governed by strict power, out-of-band-emissions, and other technical rules. LPTV and translator stations will lose access to channels in unusual circumstances—but these changes are far smaller than portrayed by the LPTV Coalition and NAB, and are justified in the context of the FCC's efforts to achieve the greatest overall public benefit consistent with the law.

III. THE LAW AND THE RECORD SUPPORT THE FCC'S AUTHORITY TO PRESERVE VACANT CHANNELS.

As Google demonstrated in its opening comments,¹⁷ both the Communications Act and the Spectrum Act support the FCC's proposal to require all classes of broadcasters to make vacant channel showings when applying for new facilities or modifications.

¹⁷ Comments of Google Inc. at 7-12 ("Google Comments").

A. The Communications Act Provides the Commission Authority to Adopt Its Vacant Channels Proposal.

The Communications Act grants the Commission broad authority to make spectrum management decisions that serve the public interest, as court decisions confirm.¹⁸ While the FCC's actions must be reasonable and supported by the record,¹⁹ adopting the vacant channels proposal easily clears this bar.

The proposal is reasonable because it will (1) preserve sufficient spectrum to allow the development of an unlicensed ecosystem in the 600 MHz and television bands and (2) impose only a limited burden on other parties that is more than justified by the benefits to consumers. As the FCC has recognized, “there will be fewer unused television channels in the repacked television bands” for unlicensed use.²⁰ In fact, “[d]epending on the amount of spectrum recovered in the incentive auction, there may be no television channels remaining above channel 37 in some or all parts of the country.”²¹ Given additional uncertainty regarding the availability of guard band spectrum (discussed further in Part IV below), and the fact that exclusion zones will limit the availability of Channel 37 for unlicensed use in some locations (particularly in urban areas where spectrum is scarce),²² the preservation of up to two vacant channels is even more important to ensure sufficient unlicensed channels nationwide. Ensuring sufficient

¹⁸ 47 U.S.C. § 303(c)-(d), (r), (y); *Nat'l Ass'n of Regulatory Util. Comm'rs v. FCC*, 525 F.2d 630, 636 (D.C. Cir. 1976); *see also Cellco P'ship v. FCC*, 700 F.3d 534, 541-42 (D.C. Cir. 2012); *Telocator Network of Am. v. FCC*, 691 F.2d 525, 538 (D.C. Cir. 1982).

¹⁹ *Chevron, U.S.A., Inc. v. Nat. Res. Def. Council, Inc.*, 467 U.S. 837, 843 (1984); *Nat'l Cable & Telecommunications Ass'n v. Brand X Internet Servs.*, 545 U.S. 967, 997, 1001 (2005); *AT&T Wireless Servs., Inc. v. FCC*, 365 F.3d 1095, 1099 (D.C. Cir. 2004); *see also* 5 U.S.C. § 706.

²⁰ Incentive Auction Order at 6683-84 ¶ 269; *see also* Vacant Channel NPRM at 6716 ¶ 10.

²¹ Incentive Auction Order at 6684 ¶ 269 n. 807.

²² *See* Comments of Microsoft Corporation at 4-5 (“Microsoft Comments”).

unlicensed spectrum, particularly in major markets where the need is greatest, will provide investors and manufacturers the certainty they need to justify the development of a full range of equipment for the delivery of wireless broadband to consumers, and will support commitments to other innovative unlicensed technologies.

On the other side of the equation, as demonstrated above in Part II, the preclusive impact on broadcast operations will be much smaller than broadcasters suggest. Furthermore, the Commission's proposed methodology for vacant channel showings requires only minimal effort from broadcasters, who would check a database once for vacant channel availability, assessing merely the limited number of 2 x 2 grid squares actually affected by their proposed channel move or other station modification.²³ As CEA observes, "the burdens on [broadcasters] are low compared to the importance of ensuring that consumers continue to benefit from unlicensed and wireless microphone use of one or more vacant UHF channels."²⁴

B. The Record Supports the Vacant Channels Proposal and the FCC's Authority to Adopt It.

A wide variety of commenters in this proceeding—from mobile carriers and wireless microphone manufacturers, to public interest advocacy organizations and technology companies—support and justify the FCC's proposal in their comments in response to the NPRM.²⁵ Microsoft states that "the Commission's proposal to protect vacant channels in each

²³ Comments of the Consumer Electronics Association at 4, 12 ("CEA Comments"); Google Comments at 19; Microsoft Comments at 15; Comments of T-Mobile USA, Inc. at 4 ("T-Mobile Comments").

²⁴ CEA Comments at 12.

²⁵ Comments of Competitive Carriers Association at 8 ("CCA Comments"); CEA Comments at 1-2; Microsoft Comments at 6; Comments of Open Technology Institute at New America and Public Knowledge at 1 ("OTI and PK Comments"); Comments of Sennheiser Electronic Corporation at 1; Comments of Shure Incorporated at i, 2-3 ("Shure Comments"); T-Mobile

market is the only way to achieve the Commission’s goal of creating a successful unlicensed ecosystem in the 600 MHz band for both fixed and personal/portable white space devices.”²⁶ CEA notes that preserving sufficient vacant spectrum “will enable manufacturers and service providers to meet exploding consumer demand for unlicensed wireless services,” and will “encourage the development of new and innovative services that require greater unlicensed bandwidth or take advantage of the unique propagation characteristics of the 600 MHz spectrum band.”²⁷ T-Mobile USA, Inc. (“T-Mobile”) also expresses support for the vacant channels proposal, which it states will “promote innovation in the 600 MHz band.”²⁸

Numerous commenters also recognize the FCC’s authority to preserve vacant channels for unlicensed use.²⁹ For example, CEA notes that “Title III of the Communications Act of 1934, ‘endow[s] the Commission with expansive powers,’” and that “the Spectrum Act preserves the Commission’s authority to adopt the vacant channel proposal.”³⁰ Microsoft agrees, noting the Commission’s “‘broad authority to manage spectrum . . . in the public interest,’” and stating that the vacant channels proposal is “fully consistent with [Title III’s] broad statutory mandate” and the Spectrum Act.³¹ The Competitive Carriers Association notes that “[t]he Commission has expansive power to adopt spectrum management policies, when necessary, to promote the public

Comments at 1-2; Comments of Wi-Fi Alliance at 1; Comments of the Wireless Internet Service Providers Association at 1-2 (“WISPA Comments”).

²⁶ Microsoft Comments at 4.

²⁷ CEA Comments at 2.

²⁸ T-Mobile Comments at 1.

²⁹ CCA Comments at 3-4; CEA Comments at 11-12; Microsoft Comments at 6-11; OTI and PK Comments at 7-8; Shure Comments at 10-11; T-Mobile Comments at 4-6; WISPA Comments at 4-5.

³⁰ CEA Comments at 11.

³¹ Microsoft Comments at 6-7 (quoting *Cellco P’ship*, 700 F.3d at 541).

interest,”³² while T-Mobile emphasizes the Commission’s “ample authority to preserve vacant television channels” under the Communications Act and the Spectrum Act.³³

C. The Spectrum Act Does Not Prevent the FCC from Preserving Vacant Channels.

Opponents’ contrary arguments do not withstand scrutiny. NAB’s principal contention is that “[n]othing in the Spectrum Act . . . authorizes the Commission to displace . . . LPTV and TV translator stations solely to provide additional spectrum for unlicensed operations.”³⁴ NAB relies primarily on Section 6403(b)(5) of the Spectrum Act, which provides that “[n]othing in this subsection shall be construed to alter the spectrum usage rights of low-power television stations,” arguing that while LPTV and TV translators could presently apply for authority to operate on an unused channel in the broadcast bands, they may no longer be able to do so if the FCC adopts its proposal.³⁵ Section 6403(b)(5), however, does not lessen the FCC’s pre-existing power under the Communications Act to make changes to LPTV and translator rules and rights. Instead, the provision states that *the Spectrum Act itself* does not change LPTV and translator rights.

In any event, far from being changed with the adoption of the vacant channels proposal, the spectrum usage rights of LPTV and TV translator licensees are today subject to the FCC’s right and duty to impose reasonable conditions on the grant of new broadcast licenses or license modifications when it finds that doing so is in the public interest.³⁶ The FCC’s exercise of this

³² CCA Comments at 3.

³³ T-Mobile Comments at 4-5.

³⁴ NAB Comments at 9-10.

³⁵ *Id.* at 9 (quoting Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, 126 Stat. 156, 227 § 6403(b)(5) (codified at 47 U.S.C. § 1452) (“Spectrum Act”)); *see also* Comments of DTV America Corporation at 2, MB Docket No. 15-146 and GN Docket No. 12-268 (filed Sept. 29, 2015).

³⁶ Google Comments at 9-11.

authority to protect unlicensed broadband consumers therefore would not alter the spectrum usage rights of low-power television stations. Indeed, as Microsoft explains, the Commission’s existing rules are clear that an LPTV station does not enjoy any protection from future regulatory changes by the Commission, including the decision to require the vacant channel showing.³⁷ Section 6403(b)(5) of the Spectrum Act therefore poses no impediment to the FCC’s authority to adopt vacant channel preservation rules.

The Spectrum Act also does not address whether the Commission may require Class A and full-power broadcasters to make vacant channel showings after the conclusion of the 39-month transition period. The Spectrum Act’s protections for full-power and Class A broadcasters are time-limited. The FCC need not, in perpetuity, “make all reasonable efforts to preserve . . . the coverage area and population served of each [full-power and Class A] broadcast television licensee.”³⁸ Rather, this mandate was designed to ensure that during the “reassignments and reallocation” phase of the incentive auction, when the FCC *imposes* channel moves and other changes on broadcasters, the Commission will minimize the impact of such changes on broadcast television viewers.³⁹ After the repacking phase—and certainly after the conclusion of the transition period—broadcasters’ applications to modify their stations will be voluntary rather than forced and the Spectrum Act’s specific protections for Class A and full-power broadcasters will no longer apply. The Commission may therefore impose a vacant channel showing requirement on such broadcasters after the transition period with confidence that it will not run afoul of the Spectrum Act.

³⁷ Microsoft Comments at 12-13.

³⁸ Spectrum Act § 6403(b)(2)-(3); *see also id.* § 6001(6) (defining “broadcast television licensee” to include only full-power and Class A television stations).

³⁹ *See id.* § 6403(b)(2).

D. When Making Spectrum Designations, the FCC May Prioritize Unlicensed Access over Additional Broadcast Stations.

Several broadcasters argue that the Commission may not adopt a vacant channel showing because it lacks authority ever to prioritize unlicensed services over licensed broadcast services.⁴⁰ This argument misunderstands the distinction between, on the one hand, FCC decisions that make frequencies available for different services, and on the other hand, decisions concerning spectrum interference disputes.

Section 15.5 of the Commission's rules provides that the operation of Part 15 unlicensed devices "is subject to the conditions that no harmful interference is caused and that interference must be accepted that may be caused by the operation of an authorized radio station."⁴¹ This provision simply prohibits unlicensed devices from causing harmful interference to services the FCC has licensed and requires unlicensed devices to accept interference from Commission-authorized services.

This rule does not speak to the Commission's authority to make decisions regarding which services it will authorize in various frequency bands. Neither Rule 15.5, nor the Communications Act, nor the Spectrum Act, limits the Commission's authority to select an unlicensed model over a licensed model in 600 MHz spectrum that will not become part of the new mobile wireless band.⁴² Indeed, if the law required the Commission always to favor

⁴⁰ See Comments of Gray Television, Inc. at 3-6; Comments of Pearl TV at 3; Comments of Mako Communications, LLC at 3-5; NAB Comments at 3-4; Comments of the Public Broadcasting Service, Association of Public Television Stations, and Corporation for Public Broadcasting at 3; Comments of Sinclair Broadcast Group, Inc. at 4 ("Sinclair Comments"); Comments of Venture Technologies Group, LLC at 3-4.

⁴¹ 47 C.F.R. § 15.5.

⁴² Although the FCC must, under the Communications Act, auction spectrum for which multiple licensees have submitted mutually exclusive applications, a primary benefit of unlicensed operations is that they are not mutually exclusive. Section 309(j) of the

licensed services over unlicensed, there could be no spectrum designated for unlicensed use—including for broadcasters’ own wireless microphones or established technologies like Wi-Fi and Bluetooth in the 2.4 GHz and 5 GHz bands. Just as Section 15.5 did not prohibit the FCC from authorizing unlicensed operations in these bands, or from deciding in the initial television white spaces proceeding to allow unlicensed use of vacant channels rather than auction those channels, the FCC has authority here to require the proposed vacant channel showings in order to preserve sufficient vacant spectrum for unlicensed use.

IV. THE VACANT CHANNEL SHOWING IS NECESSARY TO ENSURE ACCESS TO THREE UNLICENSED CHANNELS PER MARKET.

Preserving in the FCC’s nationwide plan at least three unlicensed channels across the entirety of the 600 MHz and television bands is critical to enabling innovation and investment in unlicensed technology and services. The vacant channel showing, in turn, is essential to preserving at least three unlicensed channels. Nonetheless, the LPTV Coalition argues that the Commission does not need to protect vacant channels because it will have reserved enough duplex gap and guard band spectrum for unlicensed use in all spectrum recovery scenarios except for an outcome in which the Commission recovers exactly 84 MHz.⁴³ In all other scenarios, the LPTV Coalition appears to claim, the FCC has already guaranteed a sufficient amount of duplex gap and guard band spectrum to ensure the viability of unlicensed operations.⁴⁴ This assertion contradicts the LPTV Coalition’s own representation that, absent some change to current LPTV displacement rules, after the auction “no spectrum will be left for unlicensed use

Communications Act therefore poses no barrier to the Commission’s proposal to preserve vacant channels.

⁴³ See LPTV Coalition Comments at 12.

⁴⁴ See *id.*

when LPTV licensees re-engineer themselves into the available channels.”⁴⁵ Or, as the LPTV Coalition very recently put its view: “Too bad for the TV white space and unlicensed users,” because they will not have “spectrum left for what they need.”⁴⁶

The LPTV Coalition’s revised view that there will be abundant spectrum for unlicensed use is, moreover, incorrect. First, the LPTV Coalition’s calculations assume that unlicensed devices will have free rein to operate in every megahertz of duplex gap and guard band spectrum. This ignores channelization and the Part 15 Order. The FCC has recognized that 802.11af unlicensed devices will operate on 6 MHz channels and will have access to only one 6 MHz channel in the duplex gap, not all 11 MHz.⁴⁷ Moreover, unlicensed devices will not have access to any 3 MHz guard bands flanking Channel 37,⁴⁸ and will have access to only one 6 MHz channel in guard bands of 9 and 11 MHz.⁴⁹ In just 6 out of the 11 possible band plan scenarios would unlicensed devices have access to a 6 MHz channel in the guard band. Investors

⁴⁵ *The LPTV Spectrum Rights Coalition Applauds [sic] FCC Chairman Wheeler’s Decision to Delay the TV Spectrum Auctions Until All of the Issues and Auction Design Problems Are Fully Discussed, Tested, and Ready for Prime Time, Including the Unfair Treatment of LPTV Licensees*, Press Release, LPTV Spectrum Rights Coalition, http://media.wix.com/ugd/724207_984c6ebd9cb74c7abf9caefbf31e1dd4.pdf (last visited Oct. 28, 2015).

⁴⁶ *Breaking News: New Spectrum Auction Authority for 2023-2025, Part of Budget Deal in Congress to Avoid Government Shutdown*, Press Release, LPTV Spectrum Rights Coalition, <http://goo.gl/UzOHwp> (last visited Oct. 28, 2015).

⁴⁷ *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, FCC 15-99, 30 FCC Rcd. 9551, 9615 ¶ 153 (2015).

⁴⁸ *Id.* at 9613 ¶ 147.

⁴⁹ *Id.* at 9595 ¶ 145.

and inventors thus have no guarantee that *any* guard band spectrum will be available for unlicensed use after the auction.

Therefore, contrary to the LPTV Coalition’s assertions in this proceeding, unlicensed equipment makers can count on only one channel in the duplex gap (and then only in markets where the FCC does not place a broadcaster there) and, in places where there are not incumbent radio astronomy or protected wireless medical telemetry service operations, on Channel 37. In order to create a viable market for unlicensed 600 MHz/television band devices, the FCC must provide certainty that three channels will be available for unlicensed use as part of its nationwide plan. A reasonable way to provide such certainty is to preserve a vacant channel in every market, and preserve access to a second vacant channel in markets where the FCC places a broadcaster in the duplex gap.

V. THE VACANT CHANNELS PROPOSAL WILL SUPPORT INNOVATION, INVESTMENT, AND DEPLOYMENT OF UNLICENSED WIRELESS BROADBAND.

The Commission has consistently recognized the importance of making spectrum available for unlicensed use in the television bands—including, most recently, in this proceeding.⁵⁰ Turning a blind eye to those findings, NAB maintains that enabling the operation of low-power 40 mW personal/portable unlicensed devices “would provide no benefit” for

⁵⁰ See Vacant Channel NPRM at 6715-16 ¶10; Incentive Auction Order at 6682-83 ¶ 264; *Unlicensed Operation in the TV Broadcast Bands, Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, Second Report and Order and Memorandum Opinion and Order, FCC 08-060, 23 FCC Rcd. 16,807, 16,809 ¶ 2 (2008) (“2008 White Spaces Order”); *Unlicensed Operation in the TV Broadcast Bands, Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, First Report and Order and Further Notice of Proposed Rulemaking, FCC 06-156, 21 FCC Rcd. 12,266, 12,267 ¶ 1 (2006); *Unlicensed Operation in the TV Broadcast Bands, Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, Notice of Proposed Rulemaking, FCC 04-113, 19 FCC Rcd. 10,018, 10,019 ¶ 1 (2004).

wireless broadband Internet access.⁵¹ This assertion, echoed by Sinclair Broadcast Group,⁵² misunderstands the role of personal/portable devices in the delivery of wireless broadband.

In authorizing personal/portable unlicensed devices to operate in the television band, the FCC noted that, despite their low power, such devices can be used for a wide variety of important applications. For example, personal/portable devices can be used for “broadband wireless connectivity between a cable modem, DSL modem, or other internet connection and in-home computing devices; broadband wireless home entertainment applications, such as video/home theater use; business applications such as wireless inventory control and wireless cash registers; and personal applications such as wireless headphones.”⁵³ And this is just the beginning. The real power of unlicensed designations is that they create a foundation for new applications that the FCC cannot anticipate. If the Commission provides innovators with adequate spectrum resources and certainty about the rules that will govern these bands, a wide variety of devices using IEEE’s 802.11af or other standards will produce tremendous value, as they have in other unlicensed bands.

Furthermore, manufacturers are eager to innovate in these particular frequencies because sub-1 GHz spectrum has excellent spectrum propagation characteristics, and there is no other sub-1 GHz unlicensed band on the horizon. Operating at 600 MHz, even 40 mW transmissions will penetrate walls and other clutter better than many devices operating in other unlicensed frequencies, including at 2.4 and 5 GHz.⁵⁴

⁵¹ NAB Comments at 6-7.

⁵² Sinclair Comments at 6.

⁵³ 2008 White Spaces Order at 16,828 ¶ 52.

⁵⁴ *Cf.* Reply Comments of Dell Inc., Google Inc., the Hewlett-Packard Co., Intel Corp., Microsoft Corp., and Philips Electronics North America Corp. at 25, ET Docket Nos. 04-186 & 02-380 (filed Mar. 2, 2007) (noting that short range unlicensed applications operating in

Broadcaster attempts to declare unlicensed use of the TV bands a failure because it is not yet mature are just tired rhetoric.⁵⁵ As broadcasters well know, the development of new technologies takes time. For example, although the FCC first authorized unlicensed use in the 2.4 GHz band in 1985,⁵⁶ consumer use of Wi-Fi did not achieve widespread popularity until more than a decade later.⁵⁷ In the television bands, moreover, the development of unlicensed technologies has been slowed by regulatory uncertainty. The Commission now has a chance to end the decade-long period of regulatory flux that has undermined predictability in these frequencies by guaranteeing the availability of sufficient unlicensed spectrum after the incentive auction. The availability of three stable and usable channels nationwide—the same number that facilitated widespread availability of Wi-Fi in the 2.4 GHz band⁵⁸—will finally provide investors the certainty they need to justify the development of low-power personal/portable equipment for the band.

television spectrum “will be far more robust than they are at 2.4 or 5 GHz” due to favorable propagation characteristics).

⁵⁵ See, e.g., Comments of the National Association of Broadcasters at 13, GN Docket No. 12-268 (filed Nov. 12, 2014, corrected Nov. 14, 2014); see also Petition for Reconsideration of Sennheiser Electronic Corporation at 8-9, GN Docket No. 12-268 (filed Sept. 15, 2014).

⁵⁶ See generally *Authorization of Spread Spectrum and Other Wideband Emissions not Presently Provided for in the FCC Rules and Regulations*, First Report and Order, 58 Rad. Reg. 2d (P & F) 251 (1985).

⁵⁷ *A Brief History of Wi-Fi*, THE ECONOMIST (June 10, 2004), <http://www.economist.com/node/2724397> (last visited Oct. 29, 2015).

⁵⁸ Google Comments at 6 (citing Reply Comments of IEEE 802 LAN/MAN Standards Committee at 2, GN Docket No. 12-268 (filed Mar. 12, 2013)).

VI. THE FCC SHOULD ADOPT CEA’S PROPOSALS FOR IMPROVING THE ACCURACY OF VACANT CHANNEL DEMONSTRATIONS.

CEA makes several useful proposals for improving the vacant channel showing methodology in order to better reflect operational realities and needs. The FCC should adopt these modest changes.

CEA first suggests that within each 2 x 2 km grid square, the channel vacancy should not be determined at the very middle of the square, but should be determined at the “population centroid” in each square—in other words, as is reasonable, where the majority of the population is concentrated.⁵⁹ This approach will better reflect the availability of vacant channels where it matters most, which is where people live or work. A method based on the population centroid will avoid creating “a false showing that the cell is vacant when in fact most or all of the population of the cell is unable to access the vacant channel.”⁶⁰ CEA also correctly points out that by adopting the same 2 x 2 km grid for vacant channel showings that it has adopted in its ISIX methodology, the FCC can minimize complications and make data on the population centroids for each grid square easily accessible to broadcasters.⁶¹

In addition, as CEA explains, excluding from the vacant channel showing those grid squares that overlap a station’s existing contour⁶² could incorrectly assess the real-world impact

⁵⁹ CEA Comments at 6-7; *see also* Vacant Channel NPRM at 6729 ¶ 48 (requesting comment on whether to use the center point of the cell, the center of the population, or some other point for determining the availability of vacant channels).

⁶⁰ CEA Comments at 6.

⁶¹ *Id.* at 7-8.

⁶² Vacant Channel NPRM at 6729 ¶ 45 (proposing that a vacant channel showing “be performed on the station’s proposed protected area after excluding all [2x2] cells that are within or overlap any portion of the station’s existing protected area.”).

of the broadcaster's proposed modification on the availability of vacant channels.⁶³ This approach would exclude grid squares that only barely overlap with a broadcast station's existing contour, but may be significantly covered by a broadcaster's proposed contour change. Because such grid squares barely overlap with an existing broadcast station, a white space channel may be functionally available in those grid squares before the contour change, but unavailable after the proposed contour change. Excluding grid squares that overlap a station's existing contour from the showing would not reflect this difference, thereby incorrectly assessing the impact of a broadcaster's proposed modification on vacant channel availability. To fix this problem, the FCC's rules should require broadcasters to include all grid squares within the proposed contour change, whether or not they overlap a broadcaster's existing contour.

VII. PRESERVING VACANT CHANNELS WILL NOT REDUCE THE SPECTRUM AVAILABLE FOR AUCTION.

The LPTV Coalition maintains that if the FCC adopts its vacant channels proposal, it could forgo up to \$18 billion in auction revenue due to the displacement of LPTV and TV translator stations.⁶⁴ This argument is based entirely on wishful thinking. The Spectrum Act does not permit LPTV and TV translator stations to participate in the reverse auction,⁶⁵ and the Commission rightly has no plans to do so.⁶⁶ LPTV and TV translator licensees therefore will not have the option to relinquish spectrum for the forward auction, and their spectrum will not generate any auction revenue. Thus, under the law, the displacement of a limited number of

⁶³ CEA Comments at 8-9.

⁶⁴ LPTV Coalition Comments at 15.

⁶⁵ Spectrum Act §§ 6001(6)(A)-(B), 6403(a)(1).

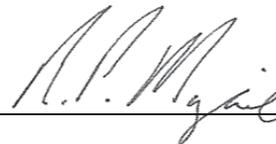
⁶⁶ Incentive Auction Order at 6715-17 ¶¶ 350-52 (excluding LPTV and TV translators from eligibility to participate in the reverse auction).

LPTV and TV translator stations in favor of unlicensed services will not cost taxpayers even one penny in auction revenue.

VIII. CONCLUSION.

The record supports the FCC's proposal to preserve one vacant channel in every market for shared unlicensed broadband and wireless microphone use, and to preserve a second vacant channel in markets where the FCC places a broadcaster in the duplex gap. The law and the record also establish the FCC's authority to adopt such vacant channel rules. Adoption of the vacant channel rules will provide the minimum amount of spectrum resources and certainty needed to support the development of a robust unlicensed ecosystem in 600 MHz and television band spectrum, while imposing only a small and justifiable burden on broadcasters. The Commission should adopt its proposal, with the slight modifications proposed by CEA and discussed herein.

Respectfully submitted,



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