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

In the Matters of	
Use of Spectrum Bands Above 24 GHz For Mobile Radio Services	GN Docket No. 14-177
Establishing a More Flexible Framework to Facilitate Satellite Operations in the 27.5-28.35 GHz and 37.5-40 GHz Bands	IB Docket No. 15-256
Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create Service Rules for the 42-43.5 GHz Band	RM-11664
Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services	WT Docket No. 10-112
Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations	IB Docket No. 97-95

COMMENTS OF THE NATIONAL CABLE & TELECOMMUNICATIONS ASSOCIATION

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I. INTRODUCTION AND SUMMARY.

Consumer demand for licensed and unlicensed mobile broadband continues to grow at an astonishing rate. The Commission's proposal in the spectrum frontiers notice of proposed

rulemaking to designate new frequencies for unlicensed use is therefore of critical importance.[1] This proceeding plays a central role in the Commission's larger effort to identify new unlicensed spectrum from low- to high-frequency bands, in order to support investment and innovation across a range of different use cases and operating environments. Access to the spectrum being considered in the Commission's separate 5 GHz proceeding remains of primary importance to the future of unlicensed technologies. But comments in response to the spectrum frontiers notice of inquiry[2] demonstrate that the wireless industry also considers unlicensed access to the previously underutilized millimeter wave spectrum bands to be an important part of advancing the Commission's mobile broadband goals.

The National Cable & Telecommunications Association (NCTA) therefore welcomes the Commission's forward-thinking efforts in proposing licensing and service rules for four millimeter wave spectrum bands. Although technology that will enable mobile use of these bands is still under development, now is the time to create a regulatory framework and establish technical rules that will not only guide industry research, but will also maximize efficient use of these bands.

In order to promote such efficiency, to ensure that the rules adopted incentivize and do not discourage equipment development and network deployment, and to identify sufficient additional spectrum resources to meet growing demand, NCTA recommends that the Commission:

1. Adopt its proposal to authorize Part 15 unlicensed use of the 64-71 GHz band, subject to an updated version of the technical rules that currently apply in the 57-64 GHz band. Specifically, the Commission should eliminate the publicly accessible coordination

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[1] *See Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, GN Docket No. 14-177 *et al.*, Notice of Proposed Rulemaking, 30 FCC Rcd 11878 (2015) (*NPRM*).

[2] *See Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, GN Docket No. 14-177 *et al.*, Notice of Inquiry, 29 FCC Rcd 13020 (2014) (*NOI*).

channel at 57.00-57.05 GHz, increase by 10 dB the average and peak power limits for low-power operations, remove the peak transmitter conducted power limit, and remove the prohibition on unlicensed operation on board aircraft;

2. Authorize opportunistic unlicensed use of the 28, 37, and 39 GHz bands where and when licensed users are not operating, subject to coordination with a database to provide licensees with protection from harmful interference. This approach is superior to a use-or-share regime, which would not provide enough certainty to support investment in unlicensed equipment or networks;

3. Not adopt a hybrid local area/wide area licensing scheme for the 37 GHz band. A hybrid licensing scheme that grants indoor spectrum rights by rule to property owners would lead to over-complicated (and less efficient) indoor/outdoor network deployments and impose substantial transaction costs on licensees and network operators; and

4. Expeditiously issue a further notice of proposed rulemaking regarding additional millimeter wave bands, including those first identified in the *NOI*.

By taking each of these steps, the Commission can continue to make progress on its goal to keep pace with consumer demand for unlicensed spectrum, support the innovation needed to produce the next generation of wireless technologies, and create a foundation for network investment.

II. THE COMMISSION SHOULD AUTHORIZE UNLICENSED USE UNDER PART 15 IN THE 64-71 GHZ BAND SUBJECT TO UPDATED TECHNICAL RULES THAT APPLY ACROSS 57-71 GHZ.

The Commission should adopt its proposal to authorize unlicensed use in the 64-71 GHz range, and should adopt revisions to the current section 15.255 technical rules for operation at 57-64 GHz and apply those revised technical rules across the 57-71 GHz range. Doing so will make the band more attractive for unlicensed deployments, particularly if the revised technical rules apply throughout the entire 57-71 GHz range.

In the *NPRM*, the Commission proposes to "allow unlicensed operations in the 64-71 GHz frequency band pursuant to the same technical rules as in the 57-64 GHz frequency band

under section 15.255 of [the Commission's] rules, with slight modifications."[3] Commenters to the Commission's *NOI* in this proceeding enthusiastically support authorizing unlicensed use in the 64-71 GHz band.[4] For example, the Wi-Fi Alliance observes that extending unlicensed operations into the 64-71 GHz band "would double the number of possible channels available to WiGig technologies in the U.S. . . . enhanc[ing] the capability of WiGig technologies to support denser deployments and multiple co-located user segments with increased data rate capacity."[5] Qualcomm believes that the band will be "useful for ultra-high-speed unlicensed uses, such as streaming Ultra HD audiovisual content across a large room."[6] InterDigital envisions that authorizing Part 15 operations in 64-71 GHz "will foster innovative solutions leading to efficient use of spectrum," including wireless backhaul.[7] SiBeam states that authorizing unlicensed in 64-71 GHz "will significantly accelerate growth of existing and new applications in this band . . . . [including] multi-gigabit, large scale, dynamically switche[d] wireless network[s] equivalent to current fiber metro networks."[8] These comments indicate widespread interest in innovating in

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3 *NPRM*, 30 FCC Rcd at 11965 ¶ 300.

4 Comments of IEEE 802 at 3; Comments of Wi-Fi Alliance at 4-6 (Wi-Fi Alliance Comments); Comments of SiBeam, Inc. at 3 (SiBeam Comments); Comments of Qualcomm Incorporated at ii, 17-18 (Qualcomm Comments); Comments of Straight Path Communications, Inc. at iii, 26-27; Comments of InterDigital, Inc. at 3, 18-20, GN Docket No. 14-177 (filed Jan. 12, 2015) (InterDigital Comments); Reply Comments of NYU Wireless at 33, GN Docket No. 14-177 (filed Feb. 18, 2015); Reply Comments of Open Technology Institute at New America and Public Knowledge at 7-8 (New America & PK Comments), GN Docket No. 14-177 (filed Feb. 18, 2015). Unless otherwise noted, all comment citations herein are to comments filed on January 15, 2015 in GN Docket No. 14-177.

5 Wi-Fi Alliance Comments at 4-5; *see also* New America & PK Comments at 8.

6 Qualcomm Comments at 17-18.

7 InterDigital Comments at 3.

8 SiBeam Comments at 3.

these frequencies. Given these comments, and because a contiguous band of unlicensed spectrum from 57-71 GHz would promote the expansion of existing unlicensed operations and the development of new and innovative unlicensed applications, the Commission should adopt its proposal to authorize unlicensed use of the 64-71 GHz band.

Designating additional unlicensed spectrum also has the potential to contribute billions of dollars to the U.S. economy. A 2014 study by Raul Katz concluded that in 2013, unlicensed spectrum bands in the United States generated an economic surplus of $222 billion and contributed $6.7 billion to Gross Domestic Product (GDP).[9] In a subsequent study, Katz concluded that by 2017, the value of unlicensed spectrum to the U.S. economy could more than double, generating $547 billion in economic surplus and contributing $49.78 billion to GDP annually—*but only if the Commission makes available sufficient additional unlicensed spectrum to support increasing demand*.[10] To help maintain the value-generating potential of unlicensed operations, the Commission should therefore adopt its proposal to expand the existing 57-64 GHz band by authorizing unlicensed access in the 64-71 GHz band.

In order to maximize the utility of this band, the Commission should also make the following changes to the technical rules that will govern the 57-71 GHz band. First, NCTA supports the Commission's proposal to remove the existing restrictions on 50 megahertz of spectrum in the 57.00-57.05 GHz band that "set aside" this spectrum for a publicly accessible

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9 Raul Katz, *Assessment of the Economic Value of Unlicensed Spectrum in the United States*, at 8-9, 11-13 (Feb. 2014), http://www.wififorward.org/wp-content/uploads/2014/01/Value-of-Unlicensed-Spectrum-to-the-US-Economy-Full-Report.pdf.

10 Raul Katz, *Assessment of the Future Economic Value of Unlicensed Spectrum in the United States*, at 4 (Aug. 2014), http://www.wififorward.org/wp-content/uploads/2014/01/Katz-Future-Value-Unlicensed-Spectrum-final-version-1.pdf.

coordination channel.[11] As the Commission has recognized, this 50 megahertz could better be used for data transmission than for interference management coordination techniques.[12] This is particularly true given that, while this set aside was first adopted nearly two decades ago, the Commission has not received a single request for experimental use of the band to develop such techniques.[13] Because industry experience suggests that voluntary standard setting constitutes a superior method for interference management than setting aside a separate channel for coordination, NCTA agrees that the Commission should remove the set aside in the 57-57.05 GHz band.

NCTA also recommends that the Commission increase by 10 dB the current average and peak effective isotropic radiated power (EIRP) limits for low-power use specified in section 15.255(b)(1)(i) of its rules (for a total average power limit of 50 dBm and a peak power limit of 53 dBm),[14] and remove the peak transmitter conducted power limit in section 15.255(e).[15] Increasing the EIRP limits will help to ensure that indoor and outdoor low power operations can coexist with higher-power outdoor operations authorized under section 15.255(b)(1)(ii). Companies will likely use the 64-71 GHz band—as they use the 57-64 GHz band today—for outdoor, high-power, directional point-to-point backhaul links, as well as short range indoor technologies like WiGig and WirelessHD, and short range outdoor networks. The Commission can best promote the complementary development of all types of unlicensed technologies and their successful coexistence by adopting sufficiently high transmission power limits for low-

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11 *NPRM*, 30 FCC Rcd at 11969 ¶ 312.

12 *Id.*

13 *Id.*

14 *See* 47 C.F.R. § 15.255(b)(1)(i).

15 *See id*. § 15.255(e).

power devices. This would enable such devices to receive each other's transmissions clearly even in the presence of co-channel high-power transmissions. A 10 dB increase in the EIRP limits for low-power use in the 57-71 GHz range would be sufficient to promote better coexistence among various types of unlicensed technologies.

The Commission should also remove the peak transmitter conducted power limit.[16] Removing the peak conducted power limit would have several benefits for equipment manufacturers and unlicensed network operators. First, a higher conducted power limit could help to overcome the limited propagation of 60 GHz spectrum, potentially enabling a wider range of applications and use cases that require more than just in-room coverage. Given that most 60 GHz devices will have multiple antenna arrays, higher conducted power would be particularly helpful to enable higher performance. Second, removing the peak conducted power limit would enable device manufacturers to reduce the gain of a device's antenna. The current rules for 57-64 GHz operations constrain the conducted power into the antenna to 500 mW,[17] which means that a device's antenna must have a gain of 23 dB to meet the conducted power requirement (assuming that the Commission adopts the 10 dB average power limit increase proposed above). Removing the peak conducted power limit would allow manufacturers to reduce the size, cost, and complexity of antennas by reducing antenna gain.

Furthermore, as the Commission notes, companies will use 802.11ad tri-band chipsets—which allow devices to operate in the 2.4, 5, and 60 GHz bands—in products like laptops and mobile devices that consumers frequently bring aboard aircraft.[18] Given ongoing industry and

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16 *See id.*

17 *Id.*

18 *NPRM*, 30 FCC Rcd at 11966 ¶ 304; Michael Brown, *TP-Link's Talon AD7200 is a true tri-band router, operating on the 2.4-, 5.0-, and 60 GHz bands*, TECHHIVE (Jan. 6, 2016),

government collaboration to study the impact of airborne unlicensed devices on radio astronomy operations,[19] NCTA agrees that the Commission should revisit whether to maintain the section 15.255 prohibition on 57-64 GHz unlicensed operations on board aircraft. Provided that radio astronomy operations can be protected from harmful interference, the Commission should remove the prohibition throughout the 57-71 GHz range.

Finally, the Commission should, as it proposed in the *NPRM*,[20] adopt the same technical rules (subject to the revisions proposed above) for use throughout the 57-71 GHz range. A 14-gigahertz-wide designation, subject to uniform technical rules, will allow a broader range of unlicensed technologies and use cases to develop, including new uses that may require very wide channels for high-bandwidth applications. Moreover, the economies of scale made possible by a wide spectrum band of 14 gigahertz subject to the same set of technical rules will provide the commercial incentives for the unlicensed industry to continue to develop equipment and deploy innovative services in the band.[21] Note that Section 15.255 of the Commission's rules regarding operations in the 57-64 GHz band does not specify a channel plan for unlicensed operations.[22]

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http://www.techhive.com/article/3019938/home-networking/tp-links-talon-ad7200-is-a-true-tri-band-router-operating-on-the-24-50-and-60ghz-bands.html.

19 *NPRM*, 30 FCC Rcd at 11966 ¶ 306.

20 *Id.* at 11965 ¶ 300.

21 *See Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354, Report and Order and Second Further Notice of Proposed Rulemaking, 30 FCC Rcd 3959, 4073-74 ¶ 393 (2015) (*3.5 GHz Order*); *Amendment of the Commission's Rules with Regard to Commercial Operations in the 1695-1710 MHz, 1755-1780 MHz, and 2155-2180 MHz Bands*, GN Docket No. 13-185, Report and Order, 29 FCC Rcd 4610, 4630 ¶ 41 (2014) ("Licensing the 2155-2180 MHz band under technical rules similar to those for the adjacent AWS-1 and AWS-4 spectrum efficiently manages the spectrum, will improve economies of scale for mobile device equipment manufacturing, and is consistent with global standards activity in this frequency range.").

22 *See generally* 47 C.F.R. § 15.255.

Similarly, the Commission should not impose a channel plan in the 64-71 GHz band unless it is consistent with the IEEE 802.11ad standard and applies throughout the 57-71 GHz band, allowing 802.11ad devices to make the most efficient use of this 14 gigahertz of contiguous spectrum.

III. THE COMMISSION SHOULD AUTHORIZE UNLICENSED USERS TO OPERATE IN THE 28, 37, AND 39 GHZ BANDS WHERE AND WHEN LICENSED USERS ARE NOT OPERATING.

The Commission proposes a use-or-share approach in the 28, 37, and 39 GHz bands pursuant to which unlicensed users would be permitted to share on a non-interfering basis the portions of a license area that remain unused by a licensee five years after a license is issued.[23] The Commission envisions that such a use-or-share requirement would "discourage warehousing and other improper behavior[s] that result in spectrum not being used,"[24] and requests comment on an appropriate framework to facilitate sharing.[25] NCTA recommends an alternative path toward achieving the Commission's laudable goals, because the current proposal would not provide enough certainty regarding spectrum availability to support unlicensed network operators' development of equipment or networks in these bands. NCTA instead encourages the Commission to consider authorizing opportunistic shared use throughout the 28, 37, and 39 GHz bands where and when licensees are not operating, or at reduced power levels sufficient to protect licensees from harmful interference.

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[23] *NPRM*, 30 FCC Rcd at 11941 ¶ 216.

[24] *Id.* at 11941 ¶ 215.

[25] *Id.* at 11941 ¶ 217.

A. The Use-or-Share Approach Would Stifle Investment in Unlicensed Equipment and Networks.

NCTA supports the adoption of sharing requirements for the 28, 37, and 39 GHz bands. But the approach proposed by the Commission would leave access to adequate spectrum resources so uncertain that unlicensed equipment and network investors would avoid these bands, undermining the Commission's goals of preventing warehousing and maximizing efficient use.

The Commission proposes that after a five-year build-out deadline, "a licensee would be free to expand its operations (with the requirement that other users retract service from the expanded area)."[26] Therefore, even if a substantial amount of spectrum became available for unlicensed use immediately after the five-year build-out period, any or all of that spectrum could become unavailable to unlicensed operators at any time as licensees expand their networks. In other words, if unlicensed equipment makers decided to develop devices for the band, that equipment could be rendered useless to that party at any time as licensees continue to build out their networks.

Furthermore, under the Commission's proposed approach, it would be at least five years after the Commission issues the first license in a band before unlicensed users would know whether any spectrum would be available for their use.[27] Until this five-year build-out deadline passes, unlicensed users would have no way of knowing whether a licensee intends to deploy throughout its geographic license area—precluding any unlicensed use—or intends to use only a small portion of the spectrum licensed to it. Potential unlicensed users would therefore be very

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[26] *Id.* at 11941 ¶ 216.

[27] *Id.* ("We propose that portions of a license area that remain unused after 5 years after the initial license is issued, or, for incumbent licensees, five years after the effective date of the new rules, be made available for shared use by other users.").

unlikely to invest in the development of equipment capable of operating in these bands until at least five years after the Commission has issued a substantial number of licenses in the band.

B. The Commission Should Use a Spectrum Access System/Database Approach to Discourage Warehousing and Promote Efficiency-Maximizing Sharing.

To maximize efficient spectrum use and provide sufficient incentives for the unlicensed industry to invest in 28, 37, and 39 GHz equipment and networks, the Commission should instead authorize unlicensed users to operate wherever and whenever licensees are not operating, including in areas where licensees have not yet begun to deploy. This approach will still provide meaningful incentives for licensees to build out their networks, while at the same time promoting efficient spectrum use.

Authorizing shared use throughout these bands from the outset would allow the unlicensed industry to begin the equipment design and certification process immediately and enable unlicensed operations even before a band is auctioned or a licensee begins deployment. Under the Commission's proposed approach, the unlicensed industry would have little incentive to develop equipment for the bands until at least five years after most of the band is licensed. A general opportunistic unlicensed access rule, in contrast, would promote efficient spectrum sharing by allowing unlicensed users to operate in bands where licensees have not yet deployed and provide incentives for the unlicensed industry to move forward expeditiously with equipment development, testing, and certification.

Moreover, although this approach would still require unlicensed users to cease operating (or significantly reduce power) where and when a licensee operates, a broader shared-use approach need not entirely displace unlicensed users as licensees expand their networks. Instead, unlicensed users could continue to operate at times when a licensee does not operate (or reduce power to a level that will not cause harmful interference to the licensee), even if a licensee's

network expands to fully occupy the relevant geographic area. Finally, such an approach would still provide licensees with adequate build-out incentives. Licensed users would remain able to exclude unlicensed users through the type of extensive geographic network deployments and intensive spectrum use that the Commission expects, and would only share if their deployments leave spectrum to lie fallow.

NCTA envisions that the widespread opportunistic access approach described above would be implemented using a database system.[28] Much like unlicensed devices in the TV bands (and future General Authorized Access devices in the 3.5 GHz band), unlicensed devices in these millimeter wave bands would communicate with a database to determine where and when they could operate without causing harmful interference to licensees. Licensees would register their information in the database and keep it up-to-date as their network deployments change. Spectrum access database technology is already available in the TV bands[29] and is under development for the 3.5 GHz band,[30] and NCTA believes it could be easily adapted to foster efficient shared use of the 28, 37, and 39 GHz bands.

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[28] *See id.* at 11941 ¶ 217 (requesting comment on whether a Spectrum Access System database could be used to facilitate shared use of the 28, 37, and 39 GHz bands).

[29] *See, e.g., Office of Engineering and Technology Announces the Approval of LStelcom AG's TV Bands Database System for Operation*, ET Docket No. 04-186, Public Notice, 29 FCC Rcd 11687 (OET 2014); *Office of Engineering and Technology Announces the Approval of Google Inc.'s TV Bands Database System for Operation*, ET Docket No. 04-186, Public Notice, 29 FCC Rcd 10586 (OET 2014); *Office of Engineering and Technology Announces the Approval of Spectrum Bridge, Inc.'s TV Bands Database System for Operation*, ET Docket No. 04-186, Public Notice, 26 FCC Rcd 16924 (OET 2011).

[30] *See Wireless Telecommunications Bureau and Office of Engineering and Technology Establish Procedure and Deadline for Filing Spectrum Access System (SAS) Administrator(s) and Environmental Sensing Capability (ESC) Operator(s) Applications*, GN Docket No. 15-319, Public Notice, DA 15-1426 (WTB, rel. Dec. 16, 2015).

Spectrum Access System or database design is becoming very sophisticated. To make the most of this technology and maximize efficient use of the 28, 37, and 39 GHz bands, the Commission should not only allow unlicensed users to operate on channels where and when licensees are not operating, but should also explore whether opportunistic unlicensed users could operate co-channel with licensees at reduced power levels rather than vacate the band entirely. The database could enforce such power limits to prevent harmful interference to licensees, just as it would enforce channel move requirements once it receives information regarding a licensee's operations. Allowing unlicensed opportunistic use to continue at reduced power even when a licensee occupies a channel would make the most of sophisticated database technology and ensure the most efficient use of the millimeter wave bands.

IV. THE COMMISSION SHOULD NOT IMPLEMENT A HYBRID INDOOR/OUTDOOR LICENSING FRAMEWORK FOR THE 37 GHZ BAND.

The Commission proposes to adopt a hybrid local area/wide area (or indoor/outdoor) licensing model for the 37 GHz band.[31] Specifically, the Commission "seek[s] comment on a hybrid licensing scheme that would convey licensed 'local area' operating rights to premises occupants by rule, and separately, geographic area licenses for wide area use."[32] The Commission ultimately rejected such an approach in the 3.5 GHz proceeding[33] and should do so

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31 *NPRM*, 30 FCC Rcd at 11909-10 ¶ 100.

32 *Id.*

33 *See Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354, Notice of Proposed Rulemaking and Order, 27 FCC Rcd 15594, 15619 ¶ 73, 15622-23 ¶ 85 (2012) (inquiring whether Priority Access protections should "convey as an 'air right'" with use of a piece of real property and inquiring whether the Commission should adopt a "hybrid model in which geographic area licenses would be issued for public property or outdoor areas, while a license-by-rule approach would be employed in private property or indoor areas"); *see also 3.5 GHz Order*, 30 FCC Rcd at 4012-13 ¶¶ 164-69 (declining to adopt a proposal for special indoor spectrum

here as well. Instead, the Commission should authorize unlicensed use of the entire 37 GHz band using a database to provide interference protection to licensees. However, if the Commission ultimately adopts a hybrid approach that grants spectrum rights by rule to property owners, it should ensure that rights holders can easily provide access to this spectrum to experienced wireless networking providers.

A. The Commission Should Not Adopt a Hybrid Local Area/Wide Area Licensing Model for the 37 GHz Band or Grant Local Area Rights to Property Owners by Rule.

A licensing model that grants wide area licensing rights to geographic areas by auction and local area rights to property owners by rule would impair flexibility in network deployments, impose substantial transaction costs on network operators, and provide inadequate certainty regarding interference protection. Such an approach would ultimately depress investment in the band. First, entities experienced in wireless network deployments will want the flexibility to deploy seamless indoor/outdoor networks, much as cable Wi-Fi network operators have done in the 2.4 GHz and 5 GHz bands. Under the proposed licensing framework, however, network operators wishing to create an indoor/outdoor network in a particular area would need to engage in a costly process to obtain separate authorizations from property owners (for indoor operating rights) and the Commission (for outdoor geographic area licenses).

Second, most property owners who would obtain indoor operating rights by rule under the hybrid scheme described above have no special expertise in owning and operating wireless networks. Therefore, most such property owners would likely outsource the installation and maintenance of a wireless network to an experienced network provider. This would necessitate a

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access rights for property owners or "contained access facilities," and authorizing secondary General Authorized Access use by rule both indoors and outdoors).

series of contractual negotiations with large numbers of property owners in the area where a network operator seeks to deploy. Providing indoor spectrum rights to property owners by rule therefore would impose an unnecessary set of transaction costs on both the proposed spectrum rights holder and 37 GHz network operators. Although, as the Commission points out, network operators already must contract with property owners for electrical power, siting permission, and other non-spectrum inputs necessary to provide service,[34] adding spectrum rights to the bundle of permissions that network operators must obtain from property owners would unnecessarily complicate network deployments and increase costs for network operators.

This is particularly true for properties owned by more than one individual or entity. For instance, many multi-dwelling units in urban areas are owned by a group of individuals, residents, or investors. In these cases, a network operator might need to secure permission from some or all of these persons in order to obtain access to the indoor spectrum rights associated with that property.[35] Many such cooperatively owned properties would not have an established administrative mechanism in place to address a request for spectrum rights, further complicating the matter.[36] Attempting to obtain spectrum rights with respect to multiple such properties would compound the problems and costs.

Finally, the Commission notes that "radio signals in [the 37 GHz] band propagate over short distances (due to atmospheric absorption) and signals are heavily attenuated by exterior walls and windows," and therefore believes that "it could be possible to separate local-area

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[34] *See NPRM*, 30 FCC Rcd at 11910 ¶ 101; *see also 3.5 GHz Order*, 30 FCC Rcd at 4009-10 ¶ 156.

[35] *See* Comments of Google, Inc. at 5, GN Docket No. 12-354 (filed Feb. 20, 2013).

[36] *Id.*

deployments from each other and also from wide-area deployments by simply leveraging the physical properties of the spectrum."[37] However, it is not clear that dividing the band between indoor and outdoor users would provide sufficient certainty regarding radiofrequency coexistence and interference protection to encourage indoor or outdoor deployments, particularly given the recent technological developments the Commission has cited and the additional technological advancements it hopes to promote.[38] For instance, the Commission has not made clear how it would handle outdoor spaces belonging to property owners with indoor operating rights in an adjacent building. Property owners and outdoor licensees would need significantly more clarity regarding coexistence in such areas, for example, in a large parking lot that forms part of the property near a congested shopping area or in an outdoor courtyard surrounded by the property owner's building.

B. The Commission Should Adopt a Geographic Area Licensing Approach for the 37 GHz Band and Authorize Opportunistic Unlicensed Use of the Entire Band.

As discussed in further detail in Part III.B above, NCTA favors an approach to 37 GHz licensing that would authorize opportunistic unlicensed operations throughout the band. This licensing scheme would promote flexibility in network deployments and reduce the transaction costs necessary to deploy millimeter wave networks.

As noted above, segmenting the band by indoor and outdoor uses would make it complicated to deploy hybrid indoor/outdoor networks. Rules that enable opportunistic unlicensed access throughout the band, in contrast, would grant both geographic area licensees and unlicensed users the flexibility to deploy integrated indoor/outdoor networks if they so

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[37] *NPRM*, 30 FCC Rcd at 11910 ¶ 101, 11910-11 ¶ 104.

[38] *See id.* at 11882-85 ¶¶ 5-12.

choose, without requiring network operators to obtain multiple permissions from multiple sources, and without restricting property owners' ability to deploy their own equipment.

Granting spectrum rights by rule to property owners places spectrum rights in the hands of those who lack experience with wireless network deployments and imposes transaction costs on property owners and network operators who seek to put the spectrum to use for a wider group of consumers. However, authorizing unlicensed use throughout the band would allow anyone with certified equipment—property owners, network operators, and individuals—to set up an unlicensed network without first obtaining spectrum rights from the Commission or from a property owner, minimizing transaction costs and barriers to entry. The success of the 2.4 GHz and 5 GHz bands is clear proof of the effectiveness of this system.

C. If the Commission Does Adopt a Hybrid Licensing Approach, it Should Ensure that Rights Holders Can Easily Provide Rights to this Spectrum to Experienced Wireless Networking Providers.

In the *NPRM*, the Commission proposes to authorize spectrum leasing in the 37 GHz band pursuant to the Commission's existing spectrum leasing rules.[39] If the Commission ultimately decides that a hybrid local area/wide area licensing system would best promote the public interest, NCTA asks that the Commission set forth clear rules regarding secondary markets for 37 GHz spectrum that will make it easy for property owners to lease the spectrum rights licensed to them by rule. Specifically, NCTA recommends that the Commission authorize long term de facto transfer leasing agreements such as those contemplated under section 1.9030

[39] *Id.* at 11946 ¶ 238 ("We propose that the spectrum leasing policies and rules established in those proceedings be applied to the new Part 30 radio service governing Upper Microwave Flexible Use Services, including all 28 GHz, 39 GHz, and 37 GHz terrestrial licensees."); 47 C.F.R. § 1.9001 et seq.

of its existing rules for all 37 GHz licensees.[40] However, the Commission should either dispense with the existing requirement that the lease parties obtain Commission consent for such leasing arrangements, or should process 37 GHz de facto transfer leasing applications pursuant to its existing immediate approval procedures.[41] The Commission should also develop and make available on its website a standard form contract for such spectrum leases that, when completed by a 37 GHz licensee and prospective lessee, would meet all of the requirements of section 1.9040 of the Commission's rules.[42]

V. THE COMMISSION SHOULD EXPEDITIOUSLY ISSUE A FURTHER NOTICE OF PROPOSED RULEMAKING TO EXPLORE AUTHORIZING MOBILE OPERATIONS IN ADDITIONAL MILLIMETER WAVE BANDS.

In the *NPRM* the Commission also discusses a series of other bands for which it does not presently propose service rules for mobile use, including the 24 GHz, 29/31 GHz, 32 GHz, 42 GHz, 71-76 GHz/81-86 GHz bands, as well as bands above 86 GHz.[43] NCTA urges the Commission to move forward expeditiously by issuing a further notice of proposed rulemaking exploring technical rules for mobile services in these bands.

Cisco's 2015 Visual Networking Index predicts that mobile data traffic will grow seven-fold from 2014 to 2019 (a compound annual growth rate of 47 percent) and that there will be 1,066 million mobile-connected devices, or approximately 3.2 devices per capita, in the United

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40 *See* 47 C.F.R. § 1.9030.

41 *Id.* § 1.9030(a), (e) (authorizing long-term de facto transfer leasing arrangements "subject to prior Commission consent" and providing application procedures for such arrangements); *id*. § 1.9030(e)(2).

42 *Id.* § 1.9040 (setting forth contractual requirements applicable to spectrum leasing arrangements).

43 *See NPRM*, 30 FCC Rcd at 11900-07 ¶¶ 60-91.

States by 2019.[44] Cisco also predicts that by 2019, the percentage of IP traffic that travels over Wi-Fi (47 percent) will exceed the percentage of IP traffic that travels over a wired connection (44 percent).[45] Given this ever-increasing demand for wireless access, the Commission must constantly work to find additional spectrum resources for mobile use. NCTA understands that the additional bands discussed in the *NPRM* may pose "complex sharing issues."[46] Nevertheless, given the pressing demand for more mobile spectrum resources, it is never too soon to begin discussing service rules for additional bands above 24 GHz that will both protect incumbents and allow new, innovative mobile broadband operations to flourish.

Moreover, the Commission must continue to push the millimeter wave spectrum frontier forward if it wishes the United States to remain a leader in mobile broadband policy. Participating nations at the 2015 World Radiocommunication Conference (WRC) adopted a resolution inviting the International Telecommunication Union – Radiocommunication Sector to conduct sharing and compatibility studies to be delivered at the 2019 WRC relating to possible mobile use of the following bands: "24.25-27.5 GHz, 37-40.5 GHz, 42.5-43.5 GHz, 45.5-47 GHz, 47.2-50.2 GHz, 50.4-52.6 GHz, 66-76 GHz and 81-86 GHz, which have international allocations to the mobile service on a primary basis; and 31.8-33.4 GHz, 40.5-42.5 GHz and 47-47.2 GHz, which may require additional allocations to the mobile service on a primary basis."[47]

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44 Cisco, *Visual Networking Index 2015*, http://www.cisco.com/c/dam/assets/sol/sp/vni/forecast_highlights_mobile/index.html#~Country (follow links for United States, 2019 Forecast Highlights, and Network Connections).

45 *Id.* (follow links for United States, Device Growth Traffic Profiles, Offload Traffic).

46 *NPRM*, 30 FCC Rcd at 11900 ¶ 60.

47 World Radiocommunication Conference, Resolution COM6/20 (WRC-15), *Studies on frequency-related matters for International Mobile Telecommunications identification including possible additional allocations to the mobile services on a primary basis in portion(s) of the frequency range between 24.25 and 86 GHz for the future development of International Mobile Telecommunications for 2020 and beyond*, at 426 (2015).

While these studies progress internationally, the Commission should also explore domestically service rules and sharing mechanisms for bands identified both in paragraphs 60-91 of the *NPRM* and in the WRC resolution.

Finally, as the Commission moves forward with plans for mobile use in additional millimeter wave spectrum, it should keep in mind the need for a balanced spectrum policy that authorizes a mix of licensed and unlicensed access. Unlicensed spectrum access models can often do a better job than licensed models at facilitating efficient, shared use of bands already populated by incumbents, and offer far lower barriers to entry than other licensing approaches, encouraging innovation and competition.[48] It is no surprise, then, that Congress, the White House, and the Commission itself have all recognized the need for a more sharing-focused spectrum policy, including the importance of designating additional spectrum bands for unlicensed use.[49]

VI. CONCLUSION.

For the foregoing reasons, the Commission should: (1) authorize unlicensed use under Part 15 in the 64-71 GHz band, subject to the technical rule modifications discussed herein; (2)

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[48] Comments of the National Cable & Telecommunications Association at 3-4.

[49] *See Unlicensed Operation in the TV Broadcast Bands; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, ET Docket Nos. 04-186, 02-380, Second Memorandum Opinion and Order, 25 FCC Rcd 18661, 18662 ¶ 1 (2010); *Connecting America: The National Broadband Plan*, GN Docket No. 09-51, at XII, http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-296935A1.pdf (Omnibus Broadband Initiative, Mar. 16, 2010); *cf.* Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, 126 Stat. 156 at Sections 6406-07 (2012); Expanding America's Leadership in Wireless Innovation, 78 Fed. Reg. 37,431, 37,434 (June 14, 2013); President's Council of Advisors on Science and Technology, *Report to the President: Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth* at 2-3, 78 (2012), http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast_spectrum_report_final_july_20_2012.pdf.

authorize opportunistic unlicensed use of the 28, 37, and 39 GHz bands where and when licensed users are not operating, subject to coordination with a database to provide protection from harmful interference to licensees; (3) not adopt a hybrid local area/wide area licensing scheme for the 37 GHz band, which would complicate indoor/outdoor network deployments and impose substantial transaction costs on licensees; and (4) expeditiously issue a further notice of proposed rulemaking regarding additional millimeter wave bands.

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