

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

In the Matter 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 CTIA®

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COMMENTS OF CTIA®

I. INTRODUCTION AND SUMMARY.

CTIA® respectfully submits these comments in response to the Commission’s Notice of Proposed Rulemaking (“*NPRM*”) seeking comment on proposed service rules that would

authorize mobile operations in various spectrum bands above 24 GHz.¹ While the U.S. wireless industry leads the world in deployment and adoption of 4G LTE,² for the U.S. to remain the world leader in mobile broadband, additional spectrum must be made available to continue the trend of innovation and growth that is the industry’s hallmark. The *NPRM* is an important step toward ensuring that the U.S. is a leader in 5G technologies, as additional spectrum above 24 GHz can be used to enhance high-capacity and high-speed services, increase quality of service for consumers, and enable new technologies and services including the Internet of Things. CTIA agrees with the Commission that it can best promote innovation and investment in these spectrum bands by “enabl[ing] flexibility in the uses and technologies that might be deployed in these bands” while also “promot[ing] coexistence between . . . different uses and technologies.”³ While CTIA agrees with many of the Commission’s proposals, it also suggests changes that it believes would best promote the Commission’s goals of innovation, investment, efficiency, and coexistence. The Commission can best promote the success of millimeter wave spectrum bands by taking the following actions:

- In conjunction with exploring spectrum bands above 24 GHz for 5G and other mobile services, the Commission also should focus on clearing spectrum in additional bands (low-, medium- and additional high-frequency spectrum) that will complement existing low-band spectrum allocated to mobile broadband. Additional low and medium frequency bands will be required for coverage (and capacity) of next generation technology to enable innovation and future use cases.
- CTIA agrees with the criteria defined by the Commission for selecting spectrum bands for initial consideration, but urges the Commission not to automatically or permanently dismiss any band that fails to meet one or more of these criteria. In the future, bands with less than 500 megahertz of contiguous spectrum or bands

¹ *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Notice of Proposed Rulemaking, 30 FCC Rcd 11878 (2015) (“*NPRM*”).

² See Comments of CTIA – The Wireless Association®, WT Docket No. 15-125 (filed June 29, 2015) (“CTIA 18th Competition Report Comments”).

³ *Id.* ¶ 2.

that are not uniformly internationally harmonized, for example, may nonetheless prove to be ideally suited for 5G services.

- The Commission should make bands above 24 GHz available predominantly on a licensed, exclusive use basis and should build upon the successful rules governing mobile services in Part 27 of the Commission’s rules. The 28, 37, and 39 GHz bands all should be licensed using this model. While spectrum above 24 GHz should *primarily* be licensed, CTIA does support both licensed *and* unlicensed use in the millimeter wave spectrum.
- Because the primary promise of millimeter wave band spectrum is the potential for very high speed data throughput which requires extensive, contiguous spectrum blocks, the Commission should revisit its initial band plan proposals to provide for more contiguous spectrum blocks and limit the variances in licensing and technical rules associated with this spectrum.
- Licensees of millimeter wave spectrum should be provided significant license terms, be granted certainty by a renewal expectancy, and not have license rights purchased in an auction undermined by a “use it or share it” model.
- Licensees of millimeter wave spectrum also should be subject to reasonable performance requirements – namely, a substantial service requirement with safe harbors specified by the Commission. The proposed performance requirements are not viable and are ill-suited for the millimeter wave bands.
- The Commission should adopt flexible technical rules and provide clarity to licensees. Specifically, the Commission should allow licensees flexibility with respect to frequency duplexing and adopt technical rules that do not inadvertently inhibit technological development.
- The Commission’s rules should continue to protect primary wireless, satellite, and Federal incumbents from harmful interference caused by new millimeter wave services, but the Commission should not bestow upon secondary services any new rights that would undermine the development of the millimeter wave spectrum for mobile broadband.
- The Commission’s questions regarding security protocols for millimeter wave spectrum, while important, are best considered in a separate forum where the Commission can consider these matters more holistically.

Millimeter wave spectrum will play a critical role in the U.S. wireless industry’s migration to 5G and, by adopting these proposals, CTIA believes the Commission will promote a vibrant mobile ecosystem that will help to improve service for U.S. wireless consumers, facilitate

the Internet of Things, and promote the United States' leadership in mobile technologies and service to consumers for years to come.

II. CTIA SUPPORTS COMMISSION EFFORTS TO ALLOCATE ADDITIONAL SPECTRUM FOR MOBILE BROADBAND SERVICES.

CTIA commends the Commission for exploring new and innovative ways to bring additional spectrum to the market and believes that this proceeding will play an important role in both enabling 5G services and addressing future spectrum challenges. As wireless services grow more advanced and lower-frequency spectrum grows increasingly scarce, it will be necessary for the Commission to explore the use of higher-frequency bands for mobile services. Indeed, bands above 24 GHz may be particularly well-suited for the provision of 5G services. However, while CTIA commends the Commission's efforts in this proceeding, it also urges the Commission to continue examining mid- and low-band spectrum that can be reallocated for mobile broadband and to ensure a robust spectrum pipeline at all frequencies.

The Commission is, of course, well aware of the explosive growth in mobile broadband use and the need for additional spectrum to accommodate this ever-increasing usage.⁴ This robust growth shows no signs of slowing. Worldwide, mobile data traffic was 65 percent higher

⁴ See generally CTIA 18th Competition Report Comments; see also Letter from Scott Bergmann, Vice President, Regulatory Affairs, CTIA, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 15-125 (dated Aug. 11, 2015) (noting that mobile data traffic for North America increased more than 11-fold from 2010, that mobile data traffic is conservatively expected to grow six-fold by 2019, and that the spectrum deficit is expected to grow to 366 MHz by 2019); *Mobile Broadband Spectrum: A Vital Resource for the U.S. Economy*, THE BRATTLE GROUP, at 23 (May 11, 2015) ("Brattle Group May 2015 White Paper") (finding that the economic value of the spectrum that is available to the mobile wireless industry is almost \$500 billion); Thomas Sawanobori and Dr. Robert Roche, *Mobile Data Demand: Growth Forecasts Met: Significant Growth Projects Continue to Drive the Need for More Spectrum*, CTIA – THE WIRELESS ASSOCIATION[®] (June 22, 2015) (finding that Americans use more than 11.1 billion MB of data every day); Coleman Bazelon and Giulia McHenry, *Substantial Licensed Spectrum Deficit (2015-2019): Updating the FCC's Mobile Data Demand Projections*, THE BRATTLE GROUP, at 6-7 (June 23, 2015) (finding that, to meet America's growing demand for mobile broadband, the wireless industry will need more than 350 megahertz of new licensed spectrum by 2019) .

in Q3 2015 than it was in Q3 2014.⁵ Ericsson projects that by 2021, mobile broadband subscriptions will reach 7.7 billion globally.⁶ It is also expected that significant 5G deployments will take place during this time, and that in North America 95 percent of all subscriptions will be LTE or 5G by 2021.⁷ As the U.S. mobile ecosystem increasingly incorporates the Internet of Things, there will be an even greater need for additional network resources to accommodate new devices and their associated traffic.⁸ And, as the Commission has acknowledged, it is essential that spectrum allocation and deployment keep pace with this demand.⁹ With these spectrum challenges on the horizon, the Commission should continue to take a leadership role in identifying ways to clear spectrum – of all frequencies – to support wireless broadband data and, eventually, 5G.

In this proceeding, the Commission has focused on frequency bands above 24 GHz, which it believes may be suitable for advanced mobile services such as 5G. While these frequencies “have historically been considered unsuitable for mobile applications,” technological advances have the capability to “unlock[] the potential of using [millimeter wave] bands for mobile uses in a way that meets the need for flexible access to spectrum to improve bandwidth in constrained geographies.”¹⁰ As parties in this proceeding have highlighted, developments in

⁵ Ericsson, *Ericsson Mobility Report: On the Pulse of the Networked Society* at 3 (Nov. 2015) (“Ericsson Mobility Report”) (noting that this growth was “largely driven by increased video consumption on mobile devices” and that “[a]part from mobile phones, there will also be a multitude of other connected devices communicating”).

⁶ *Id.* at 6.

⁷ *Id.* at 9.

⁸ *Id.* at 3 (“Out of a total forecast of 28 billion connected devices – more than 15 billion will be Machine-to-Machine (M2M) and consumer electronic devices by 2021.”).

⁹ See, e.g., *Amendment of the Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, 30 FCC Rcd 3959, ¶¶ 9-14 (2015).

¹⁰ *NPRM* ¶ 5.

antenna technology and the densification of mobile broadband networks have been instrumental in facilitating the movement toward the use of higher frequency bands for advanced mobile services. For example, beamforming technologies permit an increase in capacity on millimeter wave spectrum, while the use of phased antenna arrays permits communications to be sent and received more efficiently and effectively.¹¹ And semiconductor technology improvements make deployment in these bands much more feasible than before.¹² Trends in mobile network deployment also improve the prospects of bands above 24 GHz for providing mobile services. While these bands are likely to provide less coverage than a traditional microcell (and certainly unable to achieve coverage of a macrocell), they work well for providing capacity via small cells and backhaul, particularly in densely populated areas. In the *NPRM*, the Commission accurately observed that “short transmission paths and high propagation losses can facilitate spectrum re-use in microcellular deployments by limiting the amount of interference between adjacent cells.”¹³ With these characteristics, bands above 24 GHz are well suited to serve as supplementary channels for delivering ultra-high data rates and expand capacity in densely populated areas.

While CTIA takes this opportunity to highlight the technological advances that make deployment of millimeter wave technologies above 24 GHz possible, it also notes that there remain significant challenges in putting these frequencies to use. As the Commission observed in the *NPRM*, “given the nascent state of technology” in higher frequency spectrum “it will take

¹¹ Comments of Samsung Electronics America, Inc. and Samsung Research America, GN Docket No. 14-177, RM-11664, at 23-24 (filed Jan. 15, 2015) (“Samsung NOI Comments”).

¹² *Id.* at 24-25.

¹³ *NPRM* ¶ 5

substantially longer to deploy these systems than in lower frequency bands.”¹⁴ Further, frequency bands above 24 GHz may not provide a stand-alone solution, as coverage will be fundamentally limited. Instead, bands above 24 GHz should be examined for their potential to complement lower-frequency channels by delivering ultra-high data rates, providing backhaul support, and expanding capacity in densely populated areas.

The Commission’s examination of bands above 24 GHz therefore should be but one component of a holistic examination of high-, mid- and low-frequency spectrum for mobile services. There remains a growing need for spectrum below 3 GHz to support more traditional mobile broadband applications. This proceeding should not be viewed as a “substitute” for “efforts to make lower frequency spectrum available for mobile services.”¹⁵ Indeed, spectrum below 3 GHz will remain necessary to provide consumers with network coverage, and medium-band spectrum (3 to 24 GHz) will be needed to supplement capacity and coverage for 5G services. For consumers to have a seamless 5G mobile experience, networks will need access to frequency bands above *and* below 24 GHz, those below 6 GHz and, in particular, bands below 3 GHz because they have better propagation characteristics and, for the foreseeable future, will be more advantageous for macro network coverage and capacity. Accordingly, the Commission should bear in mind that the complementary use of millimeter wave spectrum will not be a sufficient replacement for spectrum below 6 GHz. CTIA encourages the Commission to continue its ongoing examination of spectrum bands below 24 GHz as potential homes for mobile services.

¹⁴ *Id.* ¶ 212.

¹⁵ *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Notice of Inquiry, 29 FCC Rcd 13020, 13021, ¶ 2 (2014) (“*NOI*”).

III. THE INITIAL CRITERIA OUTLINED BY THE COMMISSION FOR ABOVE 24 GHz SPECTRUM ARE A GOOD STARTING POINT.

In selecting candidate spectrum bands above 24 GHz for examination, the Commission has identified four criteria which, while appropriate for use in the near term, should not serve as a limit on the Commission's ability to consider other bands.¹⁶ CTIA is optimistic about the potential for bands above 24 GHz to serve as a home to next-generation mobile services. As mobile technology is better able to exploit the characteristics of higher-frequency spectrum, all players in the mobile ecosystem should examine the potential of spectrum bands previously not considered for these uses. The criteria identified by the Commission will play an important role in identifying initial candidate bands, but they should not foreclose use of other spectrum bands in the future.

In the *NPRM*, the Commission defined four criteria for selecting spectrum bands above 24 GHz for mobile broadband service. Specifically, the Commission indicated that it would focus on bands (1) with at least 500 megahertz of contiguous spectrum, (2) that are being considered internationally for millimeter wave mobile service, (3) that are compatible with existing incumbent license assignments and uses, and (4) that can accommodate a flexible regulatory framework that accommodates as wide a variety of services as possible.¹⁷ For the reasons explained below, CTIA agrees that all of these are important criteria for the Commission to consider as it identifies candidate bands.

¹⁶ While CTIA's comments focus on the 28 GHz, 39 GHz, 37 GHz, and 64-71 GHz bands consistent with the *NPRM*, the *NPRM* also discusses other spectrum including the 24 GHz, 29 GHz, 42 GHz, and 71-76 GHz and 81-86 GHz bands. CTIA's focus on the Upper Microwave Flexible Use Service bands in these comments should not be interpreted as a lack of interest by CTIA or its members in the other high-frequency spectrum bands mentioned in the *NPRM*. To the contrary, CTIA welcomes additional opportunities to discuss the potential for mobile wireless device deployment in these and other bands.

¹⁷ *NPRM* ¶¶ 20-23.

As the Commission observed in the *NPRM*, bands with at least 500 megahertz of contiguous spectrum are particularly well-suited for the provision of millimeter wave services. As Samsung explained, “5G will have extensive bandwidth requirements to provide the expected gains over 4G services.”¹⁸ Further, large contiguous blocks of spectrum will simplify RF transceiver design.¹⁹ While there is not universal agreement as to the minimum bandwidth necessary to support 5G, the 500 megahertz figure proposed by the Commission is a logical one and an appropriate starting point in evaluating candidate spectrum bands.

To the extent the Commission can allocate spectrum that is internationally harmonized, it will enable the wireless industry – and consumers – to reap significant benefits. International harmonization of millimeter wave spectrum bands “would drive down equipment costs, which would benefit consumers in the United States and abroad.”²⁰ International harmonization also will promote “global interconnection, roaming, and interoperability,”²¹ simplify antenna design, and minimize interference. CTIA shares the Commission’s goal of a “unified world market” for 5G services and supports the Commission’s pledge to work with international organizations to promote global harmonization of 5G spectrum bands.²²

CTIA agrees that mobile use in millimeter wave bands should be compatible with existing incumbent operations to the extent possible. Indeed, incumbents in many of the bands under consideration by the Commission may opt to use their existing licenses to provide

¹⁸ Samsung NOI Comments at 8.

¹⁹ Comments of Qualcomm Incorporated, GN Docket No. 14-177, RM-11664, at 12 (filed Jan. 15, 2015) (“Qualcomm NOI Comments”).

²⁰ Comments of Motorola Mobility LLC, GN Docket No. 14-177, RM-11664, at 2 (filed Jan. 15, 2015) (“Motorola Mobility NOI Comments”).

²¹ Samsung NOI Comments at 17-18.

²² *NPRM* ¶ 21.

millimeter wave services. Further, by promoting compatibility with incumbent operations, the Commission can encourage a more rapid and efficient deployment of spectrum for millimeter wave services and avoid complicated relocation and/or reallocation procedures. CTIA agrees with the Commission that incumbents are not “entitled to maintain the *status quo* indefinitely,”²³ but believes that incumbents can and should be accommodated in several of the bands under consideration, and that primary incumbents should receive protections consistent with their spectrum rights.

Finally, CTIA applauds the Commission’s commitment to a “flexible regulatory framework that accommodates as wide a variety of services as possible.”²⁴ To date, the incredible success of the U.S. wireless industry can be credited to the flexible regulatory framework espoused by the Commission as it develops licensing and service rules for different spectrum bands. CTIA believes that the millimeter wave bands are capable of supporting a variety of innovative services and that the Commission should select candidate bands with an eye toward ensuring flexibility and accommodating future technological developments.

The four criteria identified by the Commission are adequate as a first step toward identifying additional spectrum for mobile broadband services, but they should not serve to artificially limit consideration of candidate bands. Spectrum is a limited resource and the Commission will be required to make certain trade-offs in the future (if it is not already). The Commission should not foreclose use of spectrum bands with less than 500 megahertz of contiguous spectrum, for example, as these bands could nonetheless be developed for 5G services. The total bandwidth of a spectrum block should not serve as a barrier to its allocation for 5G, particularly in light of recent developments in carrier aggregation technology. CTIA

²³ *Id.* ¶ 22.

²⁴ *Id.* ¶ 23.

encourages the Commission to continue investigating those bands that do not have 500 megahertz of contiguous spectrum. Similarly, while CTIA has long supported international harmonization of mobile spectrum bands, it also recognizes that in certain limited instances, harmonization may not be possible. In such cases, if a candidate spectrum is well-suited for mobile services in all other respects, CTIA submits that international harmonization should not serve as a barrier to deployment of such bands, in particular with respect to the 28 GHz band. CTIA fully supports the Commission's efforts to not solely focus on international harmonization by continuing to prioritize the 28 GHz band for mobile services in the United States.²⁵

IV. THE COMMISSION SHOULD MAKE BANDS ABOVE 24 GHZ AVAILABLE PREDOMINANTLY ON A LICENSED, EXCLUSIVE USE BASIS.

CTIA believes that as a general matter, the Commission should apply its exclusive use, flexible licensing framework to the millimeter wave spectrum bands. These policies have been extremely successful when applied in other bands and will be particularly important to promoting investment in these nascent technologies. Further, the existing licensing framework for the 28 and 39 GHz bands is consistent with these principles, and the Commission could help promote a seamless transition of these bands to 5G use. CTIA also believes that the Commission should apply the exclusive use, flexible licensing framework to the 37 GHz band and reject the "hybrid" licensing approach proposed for that band, which is unnecessarily complicated and inefficient and which would undermine investment in the 37 GHz band. Finally, CTIA is committed to a balance between unlicensed and licensed spectrum in the millimeter wave bands,

²⁵ FCC Chairman Tom Wheeler's Statement on World Telecommunication Conference 2015 (Dec. 17, 2015), https://apps.fcc.gov/edocs_public/attachmatch/DOC-336917A1.pdf; FCC Commissioner Michael O'Rielly, *2015 World Radiocommunication Conference: A Troubling Direction*, FCC BLOG (Jan. 15, 2016), <https://www.fcc.gov/news-events/blog/2016/01/15/2015-world-radiocommunication-conference-troubling-direction>.

and believes that the 64-71 GHz band should contain opportunities for both unlicensed and licensed uses.

A. The Commission’s Successful Exclusive-Use, Flexible Licensing Policies Will Promote Investment and Innovation in the Millimeter Wave Bands.

CTIA believes that for the majority of spectrum bands under consideration in the *NPRM*, the Commission should adopt a flexible, exclusive-use licensing framework that will serve the public interest by promoting innovation and investment in millimeter wave technologies and services. These higher-frequency spectrum bands hold tremendous potential as enablers for innovative new 5G services, but for them to flourish it is imperative that the Commission establish a regulatory framework that will promote investment and prompt deployment. The Commission’s flexible, exclusive-use model is ideally suited for this purpose. Given the nascent state of mobile broadband and 5G technologies for millimeter wave spectrum, this certainty and flexibility is even more important.

There can be no question that the wireless ecosystem has flourished under the Commission’s flexible, exclusive-use licensing framework. The Commission has recognized the value that such bands offer – they are often the most intensively used and serve as a “runway” for the launch of innovative services.²⁶ In fact, it was on exclusively-licensed spectrum that the industry migrated to digital mobile, evolved from 2G to 3G service, and produced global leadership by the U.S. in 4G LTE deployment and adoption. Investment by the wireless industry in licensed spectrum is extensive, with exclusively-licensed spectrum generating \$400 billion in economic activity each year.²⁷ Commenters in this proceeding agree that an exclusive licensing

²⁶ Federal Communications Commission, *CONNECTING AMERICA: THE NATIONAL BROADBAND PLAN*, at 84 (Mar. 16, 2010) (“NBP”).

²⁷ Brattle Group May 2015 White Paper at 23.

regime “provides the greatest certainty and efficiency in the use of the spectrum.”²⁸ Nokia, meanwhile, observed that “[d]edicated spectrum for exclusive use is still the ‘gold standard’ preferred to meet the expected demand from future 5G networks.”²⁹ The Commission has agreed, noting that exclusive use licensing “strike[s] the right balance between the benefits of competition, on the one hand, and the efficiencies of scale and scope that justify investments of capital and expertise.”³⁰

Certainty for prospective spectrum users is especially important where, as here, significant research and development will be required to fully utilize the spectrum. By having the certainty associated with exclusive spectrum rights, players in the emerging 5G ecosystem will be able to more confidently invest in network infrastructure, end-user devices, and other technologies for use in the millimeter wave bands. This, in turn, will increase the likelihood of realizing the full innovation potential of these bands for 5G mobile broadband services. The United States has been a global leader in 4G LTE, and the Commission has quite appropriately expressed a strong desire to maintain this status in a 5G world.³¹ The Commission can best achieve this result through the application of an exclusive-licensing framework that broadly and clearly defines users’ rights.

²⁸ Reply Comments of AT&T, GN Docket No. 14-177, RM-11664, at 5 (filed Feb. 18, 2015) (“AT&T NOI Reply Comments”).

²⁹ Comments of Nokia (d/b/a Nokia Solutions and Networks US LLC, GN Docket No. 14-177, Appendix at 5 (filed Feb. 17, 2015).

³⁰ *NOI* ¶ 88.

³¹ *See, e.g., NPRM* at Statement of Chairman Tom Wheeler (“The U.S. led the way in 4G deployment, partly because the FCC identified spectrum for next-generation wireless, largely in the 700 MHz band, and made it available as part of the DTV transition. We want to build on this great success story and capitalize on the 5G opportunity.”); *NOI* at Statement of Commissioner Ajit Pai (“By seeking comment now on the potential use of these bands, we will help ensure that our nation continues to lead the world in mobile wireless when the time comes to transition to 5G technologies.”).

B. CTIA Supports the Commission’s Proposed Licensing Rules for the 28 and 39 GHz Bands.

CTIA supports the Commission’s proposed licensing rules for the 28 and 39 GHz bands, as they are generally consistent with the principles of exclusivity and flexibility discussed above. The Upper Microwave Flexible Use Service contemplated by the Commission will, as explained below, promote innovation and investment in the 28 and 39 GHz bands. At the same time, the Commission’s proposed licensing rules will balance the needs of incumbent and new licensees and promote a seamless deployment of new services in these bands.

For the 28 and 39 GHz bands, the Commission has proposed rules for an Upper Microwave Flexible Use Service under which licensees would be authorized to provide any form of fixed or mobile service.³² Incumbent licensees would be granted new licenses providing flexible rights to operate in their existing spectrum and geographic service area.³³ In areas with no incumbent licensees, the Commission proposes to assign new Upper Microwave Flexible Use Service licenses via competitive bidding.³⁴ Fixed-Satellite Service (“FSS”) providers would be permitted to acquire licenses through auction or the secondary market and continue their existing operations.³⁵

All of these proposals by the Commission will promote rapid, efficient deployment of millimeter wave services in the 28 and 39 GHz bands. Granting existing incumbents flexible fixed and mobile rights is particularly appropriate in light of the fact that the Commission contemplated such rights when these initial licenses were auctioned, but the technology did not

³² *NPRM* ¶ 93.

³³ *Id.*

³⁴ *Id.*

³⁵ *Id.*

yet exist to permit such operations.³⁶ As the Commission notes, this approach will minimize transaction costs and enable rapid expansion of services in the band.³⁷ Flexible license rights will be especially beneficial in these millimeter wave bands because fixed and mobile services can coexist, given the technical realities associated with propagation in these bands.³⁸ By auctioning license rights to geographic areas without incumbent licensees, the Commission can allow for the seamless deployment of 28 and 39 GHz spectrum throughout the country.

C. The Commission’s Proposed Hybrid Licensing Approach for the 37 GHz Band Will Unnecessarily Complicate and Undermine Service Deployment.

The Commission has deviated from the successful exclusive use model in its proposed approach to the 37 GHz band, and CTIA believes that the Commission should instead adopt the same licensing policy proposed for the 28 and 39 GHz bands. The Commission’s proposed “hybrid” licensing approach in the 37 GHz band is unduly complicated, inefficient, and would thwart investment. Further, the reasons proffered by the Commission for adopting an alternate licensing scheme for the 37 GHz band are inapt and do not justify the adoption of a licensing regime that would significantly undermine the Commission’s and industry’s goals for the millimeter wave bands.

In contrast to the 28 and 39 GHz bands, the Commission has proposed a hybrid scheme for the 37 GHz band in which premises occupants would receive licenses by rule within their indoor space, while the Commission would issue geographic area licenses for wide area use.³⁹ The Commission suggests two reasons for this hybrid approach. First, argues the Commission, radio signals in this band propagate over short distances and signals are heavily attenuated and

³⁶ *Id.* ¶ 96.

³⁷ *Id.* ¶ 95.

³⁸ *Id.*

³⁹ *Id.* ¶ 100.

therefore the properties of the spectrum could be leveraged to create hybrid indoor/outdoor licensing.⁴⁰ Second, local area millimeter wave deployments will require the cooperation of property owners for siting, installation, and backhaul, and therefore it may be more efficient to grant spectrum usage rights directly to property owners.⁴¹ Neither of the Commission's stated reasons for adopting hybrid licensing in the 37 GHz band – propagation and siting approval issues – are unique to the 37 GHz Band. Indeed, these characteristics apply with equal force to the 39 and 28 GHz bands. Yet the Commission has proposed service rules for those spectrum bands that are more consistent with the flexible, exclusive-use model that has been wildly successful in other frequencies. The Commission fails to acknowledge that the cited factors are not unique to the 37 GHz band and offers no additional explanation for why it nonetheless has proposed to treat the 37 GHz band differently.

As applied to any of these bands, the Commission's hybrid licensing proposal has the potential to seriously undermine the fundamental goals of this proceeding. The Commission and several commenters have observed that a key advantage of millimeter wave bands is the ability to aggregate significant blocks of contiguous spectrum.⁴² Indeed, some of the most promising 5G technologies and services will require extremely wide swaths of spectrum.⁴³ The most effective way to ensure that the efficiencies of the 37 GHz band can be harnessed is to promulgate similar technical and service rules for the 37 GHz band as have been proposed for the 39 GHz band. By doing so, the Commission will allow for a contiguous three gigahertz block of spectrum with similar licensing and service rules. CTIA also notes that the 37 GHz

⁴⁰ *Id.* ¶ 101.

⁴¹ *Id.*

⁴² *Id.* ¶ 16.

⁴³ *Id.* (“Huawei suggests 1-2 GHz of spectrum may be necessary to provide 100 MB/sec throughput.”).

band is to be studied for globally harmonized licensed services, based on the recommendations of WRC-15 for 5G mobile services.⁴⁴

Moreover, by creating uncertainty for prospective geographic area licensees, the hybrid licensing approach would completely undermine the ability for licensees to attract investment to deploy the 37 GHz spectrum (and quite possibly the 39 GHz band as well). The Commission can best encourage investment by adopting license areas that allow licensees to leverage economies of scale and that minimize the need for coordination at border areas. Under this proposal, however, the Commission would in effect create a “Swiss cheese” license area that is unduly complicated for wide area licensees, while simultaneously creating “holes” that would be uneconomic for the facility owner to invest in. Such an outcome is highly inefficient and will undermine productive use of the 37 GHz band. Conversely, by extending flexible, exclusive-use licensing to the 37 GHz band, the Commission will leverage efficiencies in this spectrum and promote investment.

D. The Commission Should Bifurcate the 64-71 GHz Band Between Licensed and Unlicensed Uses.

CTIA believes that the Commission can best promote a successful millimeter wave ecosystem by striking a balance between licensed and unlicensed spectrum. CTIA is a strong supporter of unlicensed spectrum and supports adoption of an unlicensed framework for the 64-66 GHz band. As explained below, CTIA believes that the Commission should make the 66-71 GHz band available for licensed services, which would be consistent with the Commission’s policy – reiterated in this proceeding – of promoting international harmonization of spectrum.

⁴⁴ WRC-15, *Resolution 238, 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 28 (2015), <http://www.itu.int/md/R00-CA-CIR-0226/en> (“WRC-15 Resolution 238”).

In the *NPRM*, the Commission has proposed that the entire 64-71 GHz band be made available under the Commission’s Part 15 unlicensed rules.⁴⁵ Specifically, the Commission has proposed to apply the same technical rules currently in force for the unlicensed 57-64 GHz band, thus creating a 14-gigahertz contiguous segment of spectrum for unlicensed use.⁴⁶ In the *NPRM*, the Commission explains that this action “will encourage the development of very high-speed wireless links with higher connectivity, bandwidth and throughput between small cell sites to support spectral efficiency in existing communications systems as well as in future 5G systems, consistent with the Commission’s objectives to bring broadband access to every American and to provide additional competition in the broadband market.”⁴⁷

CTIA believes that the Commission can achieve its goal of creating a substantial and contiguous block of unlicensed spectrum while also making a portion of this band available for licensed services. The reasons for bifurcating the 64-71 GHz band between unlicensed and licensed uses are two-fold. First, this action would reflect the fact that the 66-71 GHz band can be internationally harmonized for licensed services. The 66-71 GHz band is to be studied for globally harmonized licensed services, based on the recommendations of WRC-15 for 5G mobile services.⁴⁸ Because the Commission in this very proceeding has stressed the importance of international harmonization,⁴⁹ this action would be consistent with the Commission’s overall policy objectives for new high-frequency 5G spectrum. Moreover, the wireless industry strongly believes that there is a substantial likelihood that the 66-71 GHz band could be a truly global

⁴⁵ *NPRM* ¶ 300.

⁴⁶ *Id.*

⁴⁷ *Id.*

⁴⁸ WRC-15 Resolution 238 at 28.

⁴⁹ *NPRM* ¶ 21.

band for licensed services, something that would greatly enhance the scale and scope brought to bear for deployment and innovation in the band. Second, if the Commission adopts its proposal for the above 24 GHz spectrum, only 3.85 gigahertz of spectrum would be made available for licensed services while 14 gigahertz of millimeter wave spectrum (57-71 GHz) would be accessible for unlicensed uses. This greatly imbalances the overall spectrum resources in the millimeter wave band.

CTIA therefore respectfully suggests that the 66-71 GHz band be made available for licensed services and the 64-66 GHz band be made available for unlicensed use. Under this division of spectrum, the 64-66 GHz band can be combined with the 57-64 GHz band to create a 9-gigahertz contiguous unlicensed band while retaining 8.85 gigahertz of spectrum for licensed services (850 gigahertz at 28 GHz, plus 3 gigahertz at 37-40 GHz, plus 5 gigahertz at 66-71 GHz). This more equitable distribution of millimeter wave spectrum is consistent with international efforts and balances the amount of spectrum accessible for both unlicensed and licensed purposes.

V. THE COMMISSION SHOULD MODIFY SOME OF ITS PROPOSALS FOR LICENSED OPERATION IN THE 28 GHZ, 39 GHZ, AND 37 GHZ BANDS.

As the Commission notes in the *NPRM*, there are a variety of licensing, operating, and regulatory issues surrounding the millimeter wave bands. While CTIA supports many of the Commission's proposals, it offers suggestions in five areas. First, CTIA believes there is no need to create a new rule part for the Upper Microwave Flexible Use Service, and that this service can be accommodated under the existing Part 27. Second, the Commission should adopt block sizes for each band that best leverage the properties of the spectrum. Third, the Commission can promote innovation and investment by adopting ten-year license terms with a renewal expectancy. Fourth, the performance requirements proposed by the Commission are not

viable and should be rejected in favor of use of substantial service requirements routinely used for similarly situated licensed services. Fifth, and finally, in light of the nascent nature of mobile broadband based on millimeter wave technology, a “use it or share it” requirement is inappropriate.

A. The Commission Should License These Bands Under Part 27 of the Rules.

CTIA believes that Part 27 of the Commission’s rules can readily accommodate the proposed service rules for the 28 GHz, 39 GHz, and 37 GHz bands; the creation of a new rule part therefore is not necessary. In the *NPRM*, the Commission has proposed that the 28 GHz, 39 GHz, and 37 GHz bands be licensed under a new rule part, Part 30, as the “Upper Microwave Flexible Use Service.”⁵⁰ The Commission has asked whether this new rule part is appropriate, or whether the service should remain in Part 101 or be placed in the existing Part 27 of the Commission’s rules.⁵¹

CTIA sees no need for the creation of a new rule part and believes that the licensing rules for millimeter wave spectrum should be placed in the existing Part 27 rules. Part 27 contains the majority of service rules governing mobile broadband and there is no reason why these new spectrum bands could not be governed under these existing rules. To the extent there are service-specific technical or licensing requirements, the Commission can do what it has done with other Part 27 rule parts and adopt a separate section to govern the millimeter wave band spectrum. Regulating these millimeter wave services under Part 27 will promote simplicity and consistency across bands used for the provision of mobile broadband services.

⁵⁰ *Id.* ¶ 177.

⁵¹ *Id.* ¶ 178.

B. The Commission Can Best Leverage These Bands Through Adoption of Appropriate Block Sizes for Each Band.

CTIA supports the adoption of a band plan that allows licensees to leverage large, contiguous blocks of spectrum to deliver high-speed data in an effective fashion. The Commission has proposed maintaining the existing band plans for the 28 GHz and 39 GHz bands and dividing the 37 GHz band into three or four blocks.⁵² CTIA instead proposes that the Commission subdivide the 28 GHz band, increase channel sizes for the 39 GHz band, and align the 37 GHz band plan with the 39 GHz band. This will best enable licensees to harness the potential of these bands. In a similar vein, CTIA supports the division of the 66-71 GHz band into ten 500 megahertz channels in the event this spectrum is licensed.

In the 28 GHz band, CTIA believes that the Commission can balance the desire for large blocks of spectrum with accommodating multiple licensees in a market area. Under the Commission's current proposal, the 28 GHz band would be licensed in a single, 850 megahertz block.⁵³ Instead, CTIA suggests dividing this band into four blocks: three 200 megahertz blocks and one 250 megahertz block. This will allow existing and future licensees to leverage wideband blocks of spectrum for mobile broadband services to deliver high-speed data in an effective fashion. Under this band plan, up to four licensees may be accommodated in each market, promoting the Commission's competition policy objectives.

In the 39 GHz band, the Commission should expand block sizes to capitalize on this spectrum's potential for millimeter wave services. CTIA opposes the Commission's proposal to maintain the 39 GHz band plan, which provides for 14 50 x 50 megahertz channel pairs.⁵⁴ As

⁵² *Id.* ¶¶ 116-118.

⁵³ *Id.* ¶ 116.

⁵⁴ *Id.* ¶ 117.

the Commission itself has noted, the critical element of the millimeter wave spectrum is the ability to have access to large blocks of contiguous spectrum.⁵⁵ By maintaining the existing fragmented band plan for the 39 GHz band, the Commission would be inhibiting the ability of incumbent licensees and new entrants from taking full advantage of the spectrum. Instead, CTIA suggests that the Commission alter the 39 GHz band plan to: (1) abandon any pairing of spectrum, (2) require licensees to deploy mobile broadband services in accordance with the new band plan and synchronize their use with new entrants, and (3) establish spectrum blocks with 200 megahertz bandwidth at a minimum.

CTIA believes that the 37 GHz spectrum should be divided in the same fashion as the 39 GHz band. Thus, the 37 GHz band should also be divided into 200 megahertz license blocks. By adopting a consistent block size from 37 to 40 GHz, the Commission would be providing a band plan that will enable equipment manufacturers to develop equipment in the most efficient and effective manner possible and also help to make interoperability within the band more feasible. This also has the added benefit of potentially reducing equipment costs for 37-40 GHz licensees.

C. Ten-Year License Terms With a Renewal Expectancy Will Provide Much-Needed Flexibility to Innovate.

CTIA believes that the public interest and principles of regulatory parity would be advanced by adoption of ten-year license terms in the 28 GHz, 39 GHz, and 37 GHz bands, with a renewal expectancy provided to licensees. CTIA notes that this approach has been followed in other mobile broadband spectrum bands with great success, and the Commission should apply the same approach in these bands.

⁵⁵ *Id.* ¶ 20.

CTIA strongly supports the Commission’s proposed ten-year term for licensees in the Upper Microwave Flexible Use Service,⁵⁶ and also believes this should be coupled with a renewal expectancy for subsequent license terms. This approach is consistent with that adopted for other mobile broadband service. Similar to those services, licensees will be developing and deploying new technologies and services to the public, and the ability to invest with certainty will be crucial. Deploying a new network is an extensive multi-year process and licensees must devote considerable resources to standardizing the band, developing and certifying equipment, and deploying infrastructure, all at significant cost. The ten-year (or longer) license terms adopted by the Commission for bands such as AWS-1, 700 MHz, AWS-3, and the future 600 MHz band⁵⁷ reflect the Commission’s recognition of this fact, and the Commission should do the same in the Upper Microwave Flexible Use Service.

D. Geographic or Population Coverage Performance Requirements Are Not Viable For Millimeter Wave Band Spectrum.

The Commission should adopt a flexible, substantial service performance requirement containing safe harbors for licensees. Such action is particularly appropriate in light of the nascent nature of millimeter wave technologies. Further, a substantial service performance requirement with a “safe harbor” is reflective of the technical characteristics and proposed usage of the millimeter wave bands.

CTIA disagrees with the Commission’s approach to performance requirements for the 28 GHz, 39 GHz, and 37 GHz bands. The Commission has proposed to apply performance requirements for these bands at the county level.⁵⁸ Specifically, the Commission asserts that a

⁵⁶ *Id.* ¶ 121.

⁵⁷ 47 C.F.R. § 27.13.

⁵⁸ *NPRM* ¶ 200.

single metric for performance requirements would be desirable and that population coverage is most naturally suited to encompass both mobile and fixed network topologies.⁵⁹ Under the Commission’s proposal, coverage would be measured at the census block level, and that census block would be considered “covered” if a reliable signal level is placed over the centroid of the census block.⁶⁰ If a licensee provides coverage to a census block or multiple census blocks that have a total population equal to 40 percent of a county’s population, the licensee would be deemed to have met the performance requirement and would retain the license for the entire county.⁶¹

CTIA believes that the Commission’s proposed performance requirement is overly rigid and fails to reflect the unique properties of the millimeter wave bands and the services contemplated for them. As noted above, CTIA anticipates that millimeter wave spectrum will be used primarily for adding capacity and high speed data, as opposed to traditional “macro” mobile broadband networks characterized by seamless buildout and coverage. While population or geographic area coverage benchmarks are logical for “coverage bands” such as the 700 MHz band, the millimeter wave bands will have uses more in line with those bands that carry substantial service performance requirements. In fact, the millimeter wave bands have propagation characteristics that make extensive, coverage-based performance requirements economically infeasible. Further, the millimeter wave bands will house a variety of different services. Not only will both fixed and mobile architectures be present in the band, but these bands also may host non-traditional network architectures such as “mesh” networks (a network topology in which each node of the network, including receivers, relays data for the network).

⁵⁹ *Id.* ¶ 206.

⁶⁰ *Id.* ¶ 207.

⁶¹ *Id.*

The Commission should encourage these and other innovations in the millimeter wave bands and should not adopt performance requirements that would force innovators to “build to the rules,” as opposed to allowing innovators to maximize the potential of the technologies and architectures in play. If anything, the performance requirement for this band should be much *more* flexible than has been the case for other mobile broadband spectrum bands.

CTIA suggests that a “substantial service” requirement should be the relevant benchmark for buildout of the millimeter wave band spectrum. Indeed, most bands licensed by auction have substantial service requirements rather than performance requirements tied to coverage of a specific population or geographic area.⁶² Notably, both the 28 and 39 GHz bands are currently subject to substantial service requirements.⁶³ A substantial service requirement better reflects the technical characteristics of the millimeter wave spectrum, as well as the network and device ecosystem completed for the band.

CTIA also believes that the Commission should adopt a “safe harbor” to demonstrate substantial service. This safe harbor would not be a requirement, but instead would provide examples of potential deployment scenarios that would meet the Commission’s substantial service requirement. For example, for the 3650-3700 MHz, 24 GHz, and 39 GHz bands, the safe harbor was four links per one million in population.⁶⁴ Meanwhile, for Multichannel Video Distribution and Data Services (“MVDDS”), the safe harbor is the installation of four

⁶² Federal Communications Commission, *Wireless – Construction Requirements by Service*, <https://www.fcc.gov/general/wireless-construction-requirements-service> (last visited Jan. 20, 2016).

⁶³ *Id.*

⁶⁴ *The 39 GHz Band*, Report and Order and Second Notice of Proposed Rulemaking, 12 FCC Rcd 18600 (1997); *3650-3700 MHz Government Transfer Band (Extended C-Band)*, First Report and Order and Second Notice of Proposed Rulemaking, 15 FCC Rcd 20448, ¶¶ 85-91 (2000).

transmitting locations per one million in population.⁶⁵ As it has previously, the Commission should consider the technical properties of services to be deployed in the millimeter wave bands and adopt a safe harbor that is reflective of likely deployment scenarios.⁶⁶ The safe harbor approach would provide certainty and guidance to licensees on potential means of compliance with performance requirements. Moreover, a “safe harbor” would assist licensees in meeting their performance requirements without requiring the use of any particular technology or coverage choice.

Where, as here, a spectrum band or bands is held out as having particularly great innovation potential, it is essential that the Commission provide users with the flexibility to achieve the band’s promise. Flexible performance requirements best reflect the millimeter wave bands’ ability to host a variety of services and to serve in a complementary role to more traditional uses. Additionally, adoption of a “safe harbor” will prove very instructive to licensees as they experiment with innovative network architectures and deployment strategies.

E. A “Use It or Share It” Requirement Will Complicate Service Deployment and Depress Investment.

As it has in the past,⁶⁷ CTIA opposes any form of “use it or share it” requirements for the Upper Microwave Flexible Use Service. The Commission suggests in the *NPRM* that portions of a license area that remain unused five years after an initial license is issued should be made

⁶⁵ *Multichannel Video Distribution and Data Service*, Memorandum Opinion and Order and Second Report and Order, 17 FCC Rcd 9614, ¶ 177 (2002).

⁶⁶ *Id.* at n.425 (“We believe that the nature of this service requires us to provide a different example from that suggested in other fixed wireless services such as the 39GHz Service. We anticipate that an MVDDS license will more likely be used to provide a wireless service as opposed to being used to provide backbone support for other networks by way of independent point-to-point links as in the 39GHz Service.”).

⁶⁷ *See, e.g.*, Comments of CTIA – The Wireless Association[®], WT Docket Nos. 12-70 and 04-356, ET Docket No. 10-142, at 14-16 (filed June 1, 2012).

available for shared use by other users.⁶⁸ Under this proposal, a licensee would be free to expand its operations, with the requirement that other users retract service from the expanded area.⁶⁹ Given the nascent nature of technology available for the millimeter wave spectrum bands, it is entirely premature to require licensees – who have made considerable investments in spectrum acquisition – to share their spectrum. These licensees will require unfettered access to their licensed service area to test equipment and services. Requiring licensees to share their spectrum with other uses while deploying or expanding their networks would undermine and/or delay the provision of service. Instead, licensees that have met the performance requirement or substantial service threshold should not be subject to any additional sharing of their licensed spectrum. To the extent that various entities seek spectrum access for non-licensee operations, the Commission’s private commons framework is the more appropriate and equitable means of obtaining such access.⁷⁰

VI. THE COMMISSION’S TECHNICAL RULES SHOULD PROVIDE FLEXIBILITY TO LICENSEES WHILE PROMOTING AN INTERFERENCE-FREE ENVIRONMENT.

While CTIA generally believes that technical rules should be drafted to ensure maximum flexibility to licensees, it does offer comment on three of the Commission’s technical rule proposals. First, CTIA believes the Commission should allow licensees to adopt either

⁶⁸ *NPRM* ¶ 216.

⁶⁹ *Id.*

⁷⁰ *See* 47 C.F.R. § 1.9080. The Commission’s private commons option provides a cooperative mechanism for licensees or lessees to make licensed spectrum available to users employing advanced technologies in a manner similar to that by which unlicensed users gain access to spectrum to suit their particular needs. This framework eliminates the need to enter into individual spectrum leasing arrangements under the Commission’s rules. *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, Second Report and Order, Order on Reconsideration, and Second Further Notice of Proposed Rulemaking, 19 FCC Rcd 17503, ¶ 92 (2004).

Frequency-Division Duplexing (“FDD”) or Time-Division Duplexing (“TDD”) in their licensed spectrum, so long as systems are properly coordinated and synchronized. Second, CTIA submits that the Commission’s power limits and antenna heights should reflect the diversity of equipment likely to be deployed in the band. Third, and finally, CTIA seeks clarification on the Commission’s proposed interoperability requirement.

Flexible Duplexing. In the *NPRM*, the Commission has proposed to permit both FDD and TDD in the millimeter wave bands at this stage.⁷¹ As a general matter, CTIA supports the concept of allowing licensees to determine whether FDD or TDD is best for them. However, CTIA does note that the initial standards work points toward TDD as the likely technology choice for mobile services in the millimeter wave band spectrum.⁷² To take full advantage of the millimeter wave bands, antenna arrays and beamforming will be required – and both of these technologies are much better suited to TDD rather than FDD. This is because beamforming and smart antennas require accurate information within the network about the channel conditions. Use of TDD technology allows this data to be known to the network operator rather than assumed or estimated as is true under an FDD configuration (where different frequencies are used for mobile and base transmissions). FDD requires calibration of the network for beamforming and smart antennas to properly function – and this leads to more complexity and inefficiency in network design as compared to TDD. TDD also will allow for more dynamic aggregation of bandwidth – whether for the base or mobile station transmissions – to meet consumer demands.

⁷¹ *NPRM* ¶ 268.

⁷² See e.g., 4G Americas, 4G Americas’ Recommendations on 5G Requirements and Solutions, at 7 (Oct. 2014), available at http://www.4gamericas.org/files/2714/1471/2645/4G_Americas_Recommendations_on_5G_Requirements_and_Solutions_10_14_2014-FINALx.pdf

While CTIA supports the Commission’s proposal to permit both FDD and TDD in the millimeter wave bands, interference prevention is essential. To ensure an interference-free environment, the Commission should recommend that parties deploying mobile systems in millimeter wave spectrum coordinate and synchronize their operations with all potentially-affected stakeholders. By adopting this framework up front, the Commission will empower the marketplace to work collaboratively to resolve any interference issues that arise. The Commission should promote such collaboration and only involve itself in interference disputes where absolutely necessary.

Power Limits and Antenna Heights. The NPRM makes a variety of proposals for base and mobile station power limits and antenna heights.⁷³ CTIA believes, as it has noted in the past, that any technical limits should not unfairly penalize the use of larger bandwidths in the millimeter wave bands.⁷⁴ For example, the proposed Effective Isotropic Radiated Power (“EIRP”) limits of 1640 W/100 MHz (62 dBm) or 3280 W/100 MHz (65 dBm) are 100 times more restrictive than the values for existing wireless bands at lower frequencies.⁷⁵ Moreover, the proposed limits are significantly more restrictive than those for existing fixed microwave use of the millimeter wave bands (85 dBm)⁷⁶ and for the Part 15 operations in the 57-64 GHz band (82 dBm).⁷⁷ CTIA notes that output power is the most challenging and costly resource associated with operating a mobile broadband system and users of the spectrum will have no rational basis

⁷³ *Id.* ¶¶ 271-279.

⁷⁴ *See, e.g.,* Comments of CTIA – The Wireless Association®, GN Docket No. 14-177, RM-11664, at 10-11 (filed Jan. 15, 2015).

⁷⁵ While the 1640 W values are the same, the bandwidth in the millimeter wave bands is 100 times greater (100 megahertz as compared to 1 megahertz) making the proposed power limits much more restrictive than in other mobile bands.

⁷⁶ 47 C.F.R. §101.113(a).

⁷⁷ 47 C.F.R. §15.255(b)(1)(ii).

for using more power than necessary when designing their equipment and networks. As such, CTIA suggests that the Commission modify the power limits in a manner that makes them consistent with other mobile broadband spectrum bands. CTIA continues to work with its members to develop a consensus value for output power and expects to provide that to the Commission in the near future.

Additionally, CTIA notes that the values provided by the Commission suggest an ecosystem based on the traditional base station/mobile handset model. The millimeter wave bands, however, are likely to be home to a wider range of equipment. CTIA therefore believes that the Commission should draft its technical rules in a way that permits an “in between” class of equipment that would be larger than a handheld but smaller than a base station. These customer premises equipment (for example, similar in size to the access points used to deliver Wi-Fi) should be allowed to have more output power than mobile devices but much less power than a traditional, fixed base station.

Interoperability. CTIA asks that the Commission provide additional information regarding its proposed interoperability requirement which, as written and in the absence of clarification, appears to significantly curtail innovation in the millimeter wave bands. The Commission has proposed to require that mobile equipment operating within each millimeter wave band be interoperable using all interfaces that the equipment utilizes on those frequencies.⁷⁸ However, as a single mobile device may employ a variety of air interfaces, while others may employ only one or two, it is unclear whether the Commission is essentially mandating particular equipment capabilities. For example, current mobile broadband smartphones today have any number of air interfaces that they utilize: LTE, GSM, CDMA,

⁷⁸ *NPRM* ¶ 296.

Wi-Fi, Bluetooth, and many others. As currently drafted, the FCC proposal seems to contemplate that a device must be able to use any of these air interfaces throughout the millimeter wave bands. This does not seem consistent with what CTIA assumes the Commission's intent was for interoperability. CTIA is concerned that an interoperability requirement, particularly an unclear one, has the potential to curtail experimentation, equipment development, and deployment. CTIA is a strong supporter of permitting the wireless ecosystem to organically develop devices and capabilities, and asks the Commission not to adopt any interoperability requirement that would undermine this goal.

VII. THE COMMISSION SHOULD PROTECT PRIMARY LICENSED INCUMBENTS FROM HARMFUL INTERFERENCE BUT SHOULD NOT ELEVATE THE PROTECTION STATUS FOR ANY PARTY.

CTIA recognizes the impact this proceeding will have on FSS, Local Multipoint Distribution Service ("LMDS"), 39 GHz, and other incumbents, and believes all primary incumbents should receive interference protection, but does not support elevating the interference protection rights of any non-primary incumbent. Specifically, CTIA opposes the *NPRM's* proposal to elevate the status of secondary FSS earth stations. CTIA similarly believes that primary millimeter wave licensees should not be required to provide granular information regarding their network deployments for purposes of enabling secondary access. Finally, CTIA recognizes the need for coordination zones surrounding certain Federal facilities, but submits that they should be as small as possible.

The Commission has proposed a variety of mechanisms to accommodate incumbent FSS systems, which CTIA supports so long as any elevation to primary status is attained through the auction or secondary market process. The Commission has proposed that existing FSS incumbents could acquire co-primary status in the 28 GHz band either through an auction or

through the leasing of a partitioned license.⁷⁹ CTIA supports this proposal, and sees no reason why a FSS licensee, if it employs the same mechanisms a wireless licensee would to obtain spectrum access, should not be permitted to purchase co-primary usage rights. However, this should be the only means by which secondary FSS earth stations achieve primary status in these bands.

The Commission also has proposed that FSS earth stations located within the service area of an active 28 GHz licensee maintain their secondary status, but that earth stations located outside a licensed 28 GHz area be permitted to upgrade their licensing status to co-primary through a closed filing window.⁸⁰ CTIA opposes upgrading the status of any existing FSS earth stations outside of the competitive bidding process or a secondary market transaction. Existing FSS licensees were aware when they acquired their licenses that they were authorized only on a secondary basis, and that primary licensees in the band had the option of deploying mobile services. Should these licensees desire additional protection, they should participate in the license auction or obtain such rights via the secondary market.

Because FSS operations in the 28 GHz band are secondary, CTIA opposes any requirement that primary licensees be required to divulge commercially sensitive information to protect secondary FSS earth stations. Specifically, the Commission has sought comment on allowing additional secondary FSS use of the 28 GHz band, potentially using a Spectrum Access System (“SAS”) or other mechanism to govern spectrum sharing.⁸¹ Under this regime, 28 GHz licensees would be required to file or otherwise publish the locations and technical

⁷⁹ *Id.* ¶¶ 132-134.

⁸⁰ *Id.* ¶¶ 136-142.

⁸¹ *Id.* ¶¶ 147-152.

characteristics of their individual transmitters and receivers to enhance spectrum sharing.⁸² This is extremely commercially sensitive data that wireless licensees should not be required to provide to secondary licensees, and such a requirement would impose considerable burdens on licensees. Provision of commercially sensitive information of this nature runs counter to the exclusive use, flexible licensing regime that has been the hallmark of the Commission's successful mobile broadband regulatory framework. Moreover, CTIA opposes the use of a SAS for the 28 GHz spectrum band when it has yet to be tested and operated in intensively used spectrum. The Commission has identified the 3.5 GHz band as an appropriate opportunity to experiment with SAS development. Until the 3.5 GHz SAS experiment develops and can be evaluated, the Commission should not attempt to import it to other spectrum bands.

Finally, CTIA proposes that coordination zones surrounding Federal facilities be as small as possible. Portions of the 39 and 37 GHz bands are shared with the Federal government, and there are passive Federal and non-Federal allocations below 37 GHz that also will require protection from new uses in the 37 GHz band.⁸³ In addition to adopting protection zones, the Commission asks whether bi-directional sharing between Federal and non-Federal services could be accomplished in the millimeter wave band spectrum.⁸⁴ Consistent with past proceedings,⁸⁵ CTIA believes the Commission can best balance the needs of Federal and commercial users by adopting stringent, but small, coordination zones. Overly conservative coordination zones will inhibit the value of licensed spectrum rights and diminish the investment incentives and certainty associated with these rights. Such an outcome is flatly inconsistent with the Commission's

⁸² *Id.* ¶ 152.

⁸³ *Id.* ¶¶ 166-176.

⁸⁴ *Id.*

⁸⁵ *See, e.g.,* Comments of CTIA – The Wireless Association[®], GN Docket No. 12-354, at 11-13 (filed July 14, 2014).

vision for these bands, and CTIA is confident that through collaboration, both Federal and non-Federal primary users can coexist while not sacrificing service quality. Furthermore, CTIA recommends that the Commission defer consideration on bi-directional sharing issues between Federal and non-Federal services. The NTIA's Commerce Spectrum Management Advisory Committee ("CSMAC") has a sub-committee studying the issues associated with bi-directional sharing.⁸⁶ This sub-committee is likely to provide recommendations, based upon feedback from affected Federal spectrum users, in 2016. CTIA suggests that deferring action on this issue until this effort is completed would be the best approach.

VIII. THE COMMISSION SHOULD DEFER CONSIDERATION OF SECURITY CONCEPTS.

Finally, while wireless network security has been and continues to be a wireless industry priority that transcends individual spectrum bands, CTIA submits that this proceeding is not the proper venue for consideration of security issues. In the *NPRM*, the Commission seeks comment on how to ensure that effective security features are built into key design principles for all millimeter wave band communications devices and networks.⁸⁷ Such an inquiry is unprecedented for a licensing and service rules proceeding. The Commission should instead focus on developing licensing and service rules for millimeter wave spectrum in this proceeding. As for network security issues, the Commission should defer consideration of such matters to a broader, more holistic proceeding that can better evaluate security issues across the mobile ecosystem.

⁸⁶ See e.g., <https://www.ntia.doc.gov/other-publication/2015/12022015-csmac-meeting-agenda>

⁸⁷ *NPRM* ¶ 261.

IX. CONCLUSION.

CTIA and its members believe that millimeter wave spectrum holds great potential for addressing spectrum demand and serving as a launch pad for new 5G services. CTIA encourages the Commission to develop licensing and service rules for these bands in an expeditious fashion, but the Commission also should continue to identify high-, mid-, and low-frequency spectrum bands for mobile broadband. In the millimeter wave bands, the Commission should generally uphold its policies of flexible, exclusive-use licensing and adopt licensing and service rules that promote innovation and provide certainty to licensees. By providing a stable environment in which to innovate, CTIA is confident that the Commission will help ensure that the U.S. remains a leader in mobile services.

Respectfully submitted,

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