

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

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| 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 |

REPLY COMMENTS OF AT&T

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REPLY COMMENTS OF AT&T

I. INTRODUCTION & SUMMARY

AT&T Services Inc. (“AT&T”), on behalf of the subsidiaries and affiliates of AT&T Inc. (collectively, “AT&T”), hereby submits the following reply comments in response to the Federal Communications Commission’s (“Commission”) Further Notice of Proposed Rulemaking

(“*FNPRM*”) in the above captioned proceeding.¹ The *FNPRM* raised numerous issues related to use of certain millimeter wave (“mmW”) for mobile broadband, focusing on “service rules allowing flexible fixed and mobile uses” and refinements to various licensing and technical rules, including sharing arrangements and performance requirements.²

As the record in this proceeding reveals, the wireless industry is embracing the potential of the ultra-high-speed, high-capacity, low-latency, secure mobile connectivity promised by fifth generation (“5G”) networks and services. This 5G opportunity can support groundbreaking use cases for consumers—from telemedicine and connected cars to virtual reality and the “Internet of Things” (“IoT”). To seize this potential, use of the mmW bands for mobile service is essential. Unleashing the additional mmW bands identified in this proceeding to support 5G will facilitate delivery of revolutionary services to consumers across the country.

The record shows overwhelming support for a simple, flexible, and consistent licensing framework for the additional mmW bands under consideration in the *FNPRM*. In particular, the Commission should focus on making the additional mmW spectrum bands available on a licensed, exclusive basis. Certainty in licensing rights will give investors the confidence to devote resources to innovative technologies and network deployment, which is critical for the robust rollout of 5G. Furthermore, the Commission should reject untested and impractical sharing mechanisms, such as use of a Spectrum Access System (“SAS”) or “use-it-or-share-it” requirements.

¹ Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, *Report & Order and Further Notice of Proposed Rulemaking*, FCC 16-89 (July 14, 2016) (“*Report & Order*” or “*FNPRM*”).

² *FNPRM* ¶ 369.

By developing a simple, flexible regulatory environment consistent with these principles, the Commission will allow 5G technology to flourish, and enable the United States to continue to lead in mobile broadband services.

II. COMMENTERS OVERWHELMINGLY AGREE THAT THE COMMISSION SHOULD REALLOCATE MMW SPECTRUM TO FURTHER ACCELERATE THE DEPLOYMENT OF 5G.

A. Making mmW Spectrum Available for Flexible, Licensed Use Must Be a Commission Priority.

Throughout this proceeding, the Commission has emphasized that adequate spectrum for 5G is a priority. Unlocking the mmW bands for mobile services is essential to keep pace with the meteoric rise in mobile broadband data usage and to support the connected services that consumers demand, such as IoT. It will also ensure the United States stays competitive with other countries looking to stake a claim to wireless innovation. As Chairman Wheeler stated, “[w]ithout question, 5G is a national priority. The interconnected world of the future will be the result of decisions we make today.”³ Commissioner Rosenworcel further noted, “[t]he race to 5G is on” and it is “a race that we want to win.”⁴ The *Report & Order* and *FNPRM* represent important steps toward making the promise of 5G a reality for consumers and the economy.

The record reflects widespread support for making additional mmW spectrum available to support 5G. Commenters like Samsung, CTIA, T-Mobile, CTA, and Nokia applauded the Commission’s efforts to unlock additional mmW spectrum for 5G networks and services.⁵ As

³ Statement of Chairman Tom Wheeler, GN Docket No. 14-177 (July 14, 2016).

⁴ Commissioner Rosenworcel, Remarks at Leadership Forum on 5G: The Next Generation of Wireless: Five Ideas for the Road to 5G (Feb. 9, 2016), https://apps.fcc.gov/edocs_public/attachmatch/DOC-337655A1.pdf.

⁵ See Comments of Samsung, GN Docket No. 14-177 at 3 (filed Sept. 30, 2016) (“Samsung Comments”); Comments of CTIA, GN Docket No. 14-177 at 4-6 (filed Sept. 30, 2016) (“CTIA Comments”); Comments of T-Mobile, GN Docket No. 14-177 at 3-4 (filed Sept.

Mobile Future noted, “[c]ontinued quick action in this proceeding to make high-band spectrum available for flexible use is essential to ensuring that the United States maintains its wireless leadership as the industry moves full steam ahead” with 5G networks.⁶ The mmW spectrum the Commission proposes to reallocate for mobile use will support a thriving ecosystem for the next generation of wireless services.

B. The FCC Should Heed Many Band-Specific Recommendations.

The Commission seeks input on authorizing flexible use licenses that would permit fixed and mobile services in the following bands: 24.25-24.45 GHz and 24.75-25.25 GHz (“24 GHz”), 31.8-33.4 GHz (“32 GHz”), 42-42.5 GHz (“42 GHz”), 47.2-50.2 GHz (“47 GHz”), 50.4-52.6 GHz (“50 GHz”), 71-76 GHz and 81-86 GHz (“70/80 GHz”).⁷ The Commission should make allocating the 24 GHz, 32 GHz, 42 GHz, 47 GHz, and 50 GHz bands for mobile broadband services a critical priority. Due to its significant usage today for point-to-point and anticipated growth in demand, AT&T recommends the Commission make allocation of the 70/80 GHz band for mobile a lower priority. Commenters offered many recommendations for maximizing the potential of the additional mmW bands proposed in the *FNPRM*. As explained below, AT&T supports many of those recommendations.

24 GHz Band. The Commission proposes several things in this band: to add a mobile allocation to the 24.25-24.45 and 24.75-25.25 GHz segments of the 24 GHz band, to add a fixed allocation to 24.75-25.05 GHz, and to authorize both mobile and fixed operations in those

30, 2016) (“T-Mobile Comments”); Comments of the Consumer Technology Association (“CTA”), GN Docket No. 14-177 at 2 (filed Sept. 30, 2016); Comments of Nokia, GN Docket No. 14-177 at 5-6 (filed Sept. 30, 2016) (“Nokia Comments”).

⁶ Comments of Mobile Future, GN Docket No. 14-177 at 2 (filed Sept. 30, 2016).

⁷ *FNPRM* ¶ 373.

segments under the new Part 30 rules.⁸ Commenters support this proposal.⁹ The Commission, consistent with its licensing policies in the 28 GHz band, should also provide for the continuation of services such as broadcasting-satellite service (“BSS”) that are already allocated in the 24 GHz band.

Commenters agree that the 24 GHz band should be licensed under the same rules as the 28 GHz band.¹⁰ A consistent licensing approach across the mmW bands allocated for fixed and mobile use will enable the robust deployment of 5G services. As CTIA noted, “[m]aintaining regulatory parity across the various millimeter wave bands will streamline compliance efforts and maximize spectrum efficiency.”¹¹

When it comes to possible sharing regimes, AT&T suggests that the Fixed Satellite Service (“FSS”)/mobile sharing model adopted in the 28 GHz band should be extended to the 24 GHz band for UMFUS/BSS sharing. As the only BSS licensee in 24 GHz, AT&T/DIRECTV has evaluated the proposed sharing models and believes the model adopted in the 28 GHz band best accommodates all users of the band while minimizing the risk of interference.¹² By contrast, the legacy rules for the 25.05-25.25 GHz band are not a good fit for the proposed 24 GHz band uses.¹³ Extending those existing rules, which prohibit the licensing of any BSS feeder

⁸ *Id.* ¶ 383.

⁹ *See, e.g.* CTIA Comments at 10; T-Mobile Comments at 9; Comments of Ericsson, GN Docket No. 14-177 at 2 (filed Sept. 30, 2016) (“Ericsson Comments”); Comments of Fibertower, GN Docket No. 14-177 at 2 (filed Sept. 30, 2016).

¹⁰ *See* Samsung Comments at 5; CTIA Comments at 10.

¹¹ CTIA Comments at 10.

¹² Comments of AT&T, GN Docket No. 14-177 at 14 (filed Sept. 30, 2016) (“AT&T Comments”).

¹³ *See FNPRM* ¶ 384.

link in the 25.05-25.25 GHz band in any area where there is a terrestrial licensee,¹⁴ to the entire 24.75-25.25 GHz band would be overly restrictive and would likely result in precluding necessary new feeder links in the band. Indeed, given the co-existence capabilities of UMFUS systems, the broad prohibition of Section 25.203(l)—which prohibits deployment of BSS earth stations that do not even spectrally overlap with 24 GHz licensees—is too restrictive. Instead, the existing rules should be replaced in their entirety with the construct developed for UMFUS/FSS sharing in the former Local Multipoint Distribution Service (“LMDS”) bands.¹⁵

In addition, Google’s proposal to impose the untested three-tiered SAS experiment in the 24 GHz band should be rejected.¹⁶ The 3.5 GHz band is a sufficient space to evaluate the concept. In the mmW bands, where the chief objective ought to be to make spectrum available quickly, under conditions conducive to rapid 5G deployment, the Commission should rely on its proven and successful exclusive use licensing framework, rather than subject the band to uncertainty and delay.

32 GHz Band (31.8-33.4 GHz). The Commission proposes to add primary non-Federal fixed and mobile service allocations to the 32 GHz band under the new Part 30 rules.¹⁷

¹⁴ See 47 C.F.R. § 25.203(l).

¹⁵ In the 28 GHz band, the Commission concluded it should authorize gateway satellite earth stations under the existing Part 25 first-come, first-served basis and adopted a mechanism under which FSS earth stations will, so long as they comply with certain conditions, be able to deploy new gateways in limited circumstances without being required to take any additional actions to provide interference protection to UMFUS licensees. *Report & Order* ¶ 53.

¹⁶ Comments of Google, GN Docket No. 14-177 at 8 (filed Sept. 30, 2016); see T-Mobile Comments at 8; Comments of Competitive Carriers Association, GN Docket No. 14-177 at 5 (filed Sept. 30, 2016) (“CCA Comments”).

¹⁷ *FNPRM* ¶ 389.

Commenters urge the Commission to adopt this proposal.¹⁸ AT&T agrees. The Commission noted that 5G operations in the 32 GHz band must protect existing co-channel and adjacent channel operations.¹⁹ As commenters noted, while stakeholders will need to come together to share technical parameters and develop co-existence coordination mechanisms, the Commission’s concerns about interference to radionavigation operations in the 32 GHz band and radio astronomy observations in the adjacent 31.3-31.8 GHz band are premature and require additional information, but likely can be addressed through the use of exclusion and coordination zones.²⁰

42 GHz Band (42-42.5 GHz). The Commission proposes to authorize fixed and mobile service operations to operate in the 42 GHz band under the new Part 30 UMFUS rules.²¹ This proposal found support among commenters.²² AT&T supports this proposal. The Commission also raised concerns about protection of adjacent channel radioastronomy services (“RAS”).²³ It is premature to take action on such services. As noted by commenters, while some work remains to be done, it appears fixed and mobile services can be deployed in a manner that will protect adjacent RAS operations through the use of exclusion and coordination zones.²⁴

¹⁸ Comments of NCTA – the Internet & Television Association, GN Docket No. 14-177 at 13 (filed Sept. 30, 2016) (“NCTA Comments”); Comments of Qualcomm, GN Docket No. 14-177 at 8 (filed Sept. 30, 2016) (“Qualcomm Comments”); Ericsson Comments at 2.

¹⁹ *FNPRM* ¶ 390.

²⁰ *See* NCTA Comments at 14-15.

²¹ *FNPRM* ¶ 403.

²² CTIA Comments at 10; T-Mobile Comments at 13; Ericsson Comments at 2.

²³ *FNPRM* ¶ 403.

²⁴ T-Mobile Comments at 14; *see* NCTA Comments at 16.

47 GHz Band (47.2-50.2 GHz), 50 GHz Band (50.4-52.6 GHz). The Commission proposes to authorize fixed and mobile operations in the 47 GHz band and the 50 GHz band under the Part 30 UMFUS rules.²⁵ Commenters support adoption of these proposals.²⁶ AT&T agrees. The Commission’s proposals will give licensees the flexibility to offer an array of fixed and mobile services in these bands without undue regulatory burdens.

70/80 GHz Band (71-76 GHz and 81-86 GHz). The Commission asks whether incumbent fixed services, new more dynamic fixed services, and potential mobile services and equipment in the 70/80 GHz band could coexist and seeks input on how to accommodate sharing in the band.²⁷ The FCC should maintain the status quo in this band. Today, AT&T uses this spectrum for point-to-point use, primarily for backhaul. Bands that provide backhaul “are essential for the delivery of mobile broadband” and “are a key component in many mobile networks.”²⁸ Indeed, the 70/80 GHz band is critical for supporting “the evolution of LTE.”²⁹ With the advent of 5G, while some self-backhaul will be supported, additional high speed transport will be required, and the 70/80 GHz band is a strong candidate for such use due to its very wide bandwidth. Accordingly, allocating this band for mobile should be a lower priority for the Commission than the other bands identified in the *FNPRM*.³⁰

²⁵ *FNPRM* ¶¶ 410, 420.

²⁶ Comments of Facebook, GN Docket No. 14-177 at 4 (filed Sept. 30, 2016); Qualcomm Comments at 5-6; CTIA Comments at 10.

²⁷ *FNPRM* ¶¶ 437-440.

²⁸ Nokia Comments at 6; Ericsson Comments at 14.

²⁹ Comments of Comsearch, GN Docket No. 14-177 at 3 (filed Sept. 30, 2016) (“Comsearch Comments”).

³⁰ See Ericsson Comments at 13-14 (recommending assigning the lowest priority to the 70/80 GHz band due to its importance for backhaul).

In light of the band’s importance for backhaul, commenters oppose use of a SAS to facilitate the coexistence of fixed and mobile services.³¹ The SAS concept is new, unproven, and complex. At the same time, as the Commission noted, a convenient and efficient process is already in place for coordinating mobile uses with federal users of the band.³² Despite rapidly increasing usage of the band, commenters agree that the existing regime’s long track record of success demonstrates the benefits of a simple, proven, coordinated access scheme over a SAS.³³ Comsearch urged the Commission to instead examine the merits and benefits of spectrum management regimes and conduct a study and analysis of fixed/mobile coexistence to inform details of a coordination regime.³⁴ The Commission should not “jeopardize ongoing investment in the [70/80 GHz] band by introducing unnecessary uncertainty.”³⁵

III. COMMENTERS SUPPORT A SIMPLE AND FLEXIBLE LICENSING FRAMEWORK.

Millimeter wave spectrum undoubtedly will play a critical role in the 5G revolution, enabling myriad technological advancements. The Commission can encourage productive use of the additional spectrum bands proposed for mobile use in the *FNPRM* by adopting a simple and flexible licensing framework that promotes widespread innovation. Commenters offered several suggestions to improve the Commission’s proposed licensing rules to maximize the utility of additional mmW bands identified in the *FNPRM* for provision of 5G networks and services.

³¹ *FNPRM* ¶ 437; Comments of the Fixed Wireless Communications Coalition, GN Docket No. 14-177 at 11 (filed Sept. 30, 2016) (“FWCC Comments”).

³² *FNPRM* ¶ 439.

³³ Comments of Huawei, GN Docket No. 14-177 at 10 (filed Sept. 30, 2016); Ericsson Comments at 14-15.

³⁴ Comsearch Comments at 4-5.

³⁵ FWCC Comments at 11.

A. The FCC Should Promote Exclusive Use Licensing

Exclusive-use licenses with primary-only status will help ensure that 5G networks and services can operate in an interference-free environment. Such licenses also will foster the economic certainty that is necessary for the investment that will be required to support broadly deployed 5G services. As the Commission has noted, exclusive use licensing “will expedite deployment [and] provide licensees with flexibility to provide a variety of services,” while splitting a band into licensed and unlicensed segments “would potentially hinder deployment.”³⁶ Given past efforts to promote unlicensed use, commenters agree that the Commission should prioritize exclusively licensed spectrum in the additional mmW bands identified in this proceeding.³⁷ Flexible, exclusive-use licensing policies have long been a mainstay of the Commission’s strategy for wireless leadership.³⁸ Further, exclusive use licensing “assigns rights in a way that maximizes the utility of the spectrum, minimizes the potential for interference among co- and adjacent-channel users, and supports the necessary flexibility for licensees to meet the needs of end users.”³⁹ The Commission should not designate the additional mmW bands for unlicensed use, which is not necessary in light of the substantial amount of spectrum made available for unlicensed in the *Report & Order*.⁴⁰

³⁶ *FNPRM* ¶¶ 30-32.

³⁷ Comments of Verizon, GN Docket No. 14-177 at 3 (filed Sept. 30, 2016) (“Verizon Comments”); Qualcomm Comments at 5-6; CCA Comments at 8.

³⁸ See CTIA Comments at 8-9.

³⁹ Qualcomm Comments at 6.

⁴⁰ See CCA Comments at 8; CTIA Comments at 10; AT&T Comments at 11 (noting that of the 11.65 GHz of spectrum allocated in the *Report & Order*, only about 20% was allocated for licensed use).

Indeed, exclusively licensed spectrum is necessary for deployment of 5G technologies. As a threshold matter, it is needed to give investors the confidence to invest in developing novel network infrastructure, end-user devices, and other mmW technologies. From a technical perspective, exclusive use licensing is critical since, like today's mobile services, 5G systems in mmWave will more rely on directional beamforming at the base station as well as the mobile station to overcome stringent propagation conditions in these frequency bands. The presence of unmanaged and unpredictable emissions could cause significant degradation in system performance of 5G systems such as throughput, coverage, reliability etc. 5G systems will be capable of supporting a range of machine-to-machine services, such as connected cars, smart cities, telemedicine, and beyond. 5G is ideal for bandwidth-hungry applications such as 4K video, virtual reality, and IoT because 5G will support multiple radio interfaces, enable more spectrum efficiency, and take advantage of SDN and network function virtualization.⁴¹ In addition, the low latency demonstrated in 5G lab trials also shows positive signs for consumer experiences such as self-driving cars.⁴² Exclusive use licensing will promote investment in the new mmW spectrum, which will, in turn, spark innovation in these bands.

B. The FCC Should Apply the Part 30 Rules and Use Geographic Licensing

The Commission proposes to apply the Part 30 technical rules to all of the bands referenced in the *FNPRM* and to license spectrum in the 24 GHz, 32 GHz, 42 GHz, 47 GHz, and

⁴¹ AT&T, Press Release, *AT&T Unveils 5G Roadmap Including Trials in 2016*, http://about.att.com/story/unveils_5g_roadmap_including_trials.html (Feb. 12, 2016).

⁴² See AT&T, Press Release, *AT&T Highlights Progress in 5G Lab Trials, New Markets and Vendors*, http://about.att.com/story/att_highlights_progress_in_5g_lab_trials_and_new_markets.html (June 6, 2016).

50 GHz bands on a Partial Economic Area (“PEA”) basis.⁴³ The record shows support for both of these proposals.⁴⁴ Application of the Part 30 rules to the additional bands would generally allow for consistency throughout the mmW spectrum.⁴⁵ Use of PEAs is also consistent with recent licensing decisions by the Commission in, for example, the 600 MHz band, as well as the license areas set for the 39 GHz and the upper band segment of the 37 GHz band.⁴⁶ Maintaining regulatory parity across the various mmW bands will streamline compliance efforts and maximize spectrum efficiency.

C. AT&T Supports Large Channel Sizes

Commenters agree that the Commission should strive to accommodate the largest channel sizes in the proposed bands consistent with licensee diversity, with minimum block sizes of 200 MHz.⁴⁷ Large channel sizes will enable licensees to harness the full potential of the bands, including enhancing system performance and delivering the ultra-high throughputs required to meet anticipated 5G data demand. Large, 200 MHz channels will also optimize traffic management and support the peak data rates expected with 5G services.⁴⁸ AT&T also

⁴³ *FNPRM ¶¶ 377, 375.*

⁴⁴ Samsung Comments at 6; AT&T Comments at 13; T-Mobile Comments at 7.

⁴⁵ Note, however, that AT&T and commenters raised objections to rule 30.8, 5G Provider Cybersecurity Statement Requirements, adopted in the *Report & Order*. See AT&T Comments at 14-15 (noting there is no justification for the rule and raising concerns about unintended consequences); CTIA Comments at n. 28 (stating the FCC has not afforded stakeholders sufficient notice and opportunity to comment on rule 30.8 and opposing the mandate as it is premature and unnecessary).

⁴⁶ Samsung Comments at 6; AT&T Comments at 13.

⁴⁷ Comments of the Telecommunications Industry Association, GN Docket No. 14-177 at 5 (filed Sept. 30, 2016) (“TIA Comments”); CTIA Comments at 11; Samsung Comments at 5.

⁴⁸ AT&T Comments at 10.

supports the Commission’s proposal to allow users to aggregate channels into larger channel sizes,⁴⁹ and supports application of secondary market policies, including the ability to disaggregate and partition spectrum, to the proposed bands. Adoption of these proposals would only increase the bands’ utility for mobile broadband services.

D. Performance Requirements Are Premature At This Time

The Commission seeks input on additional performance metrics that would accommodate new services while fulfilling the agency’s statutory obligation to encourage productive use of spectrum and avoid warehousing and speculation.⁵⁰ At this time, it is still too early in the product cycles of 5G technologies to identify metrics tailored to 5G deployments. The *Report & Order* properly addressed this issue by adopting a list of performance metrics for measuring sufficient use of a license to qualify for renewal, while recognizing that the list is “not exhaustive, and in particular, does not contain metrics designed to accommodate new and innovative services” that may develop in the mmW bands.⁵¹ AT&T and other commenters urge the Commission to continue this approach and not rush to create rigid performance requirements before use cases are established.⁵²

E. Digital Station Identification Requirements Are Unnecessary

The *FNPRM* queried whether the Commission should require a digital identification for the mmW band systems under consideration in this proceeding.⁵³ Commenters oppose such a

⁴⁹ *FNPRM* ¶ 455.

⁵⁰ *Id.* ¶ 465.

⁵¹ *Id.*

⁵² Verizon Comments at 8.

⁵³ *FNPRM* ¶ 503.

requirement as both unnecessary and burdensome.⁵⁴ As Verizon noted, “the costs, burdens, and potential delays of developing, testing, and implementing such protocols would outweigh any benefit they might have in the context of licensees deploying operations in their licensed spectrum.”⁵⁵ Further, other similarly situated services such as cellular, PCS, and AWS are not subject to a digital ID requirement, indicating that the Commission has not previously found a need for one.⁵⁶ This proposal should not be adopted.

F. The FCC Should Protect Against Added Interference in the mmW Bands.

The Commission’s stated goal in the *FNPRM* is to “ensure that additional spectrum is available to allow the next generation of wireless services to flourish in the mmW bands.”⁵⁷ In light of this goal, the Commission should vigilantly protect the mmW bands from the threat of harmful interference—particularly interference which could render the bands unusable for 5G or drastically delay 5G deployment.

Commenters such as SIA asked the Commission to permit satellite end user terminals to receive downlink transmissions in the 37 GHz and 39 GHz bands despite the presence of UMFUS systems.⁵⁸ Allowing widespread use of satellite end user terminals in these bands would decimate the bands’ utility for mobile broadband services and delay or even stall deployment of 5G, which in turn would delay the rollout of groundbreaking services to

⁵⁴ See, e.g. TIA Comments at 21-22; Samsung Comments at 7.

⁵⁵ Verizon Comments at 10.

⁵⁶ Samsung Comments at 7; Ericsson Comments at 21.

⁵⁷ *FNPRM* ¶ 369.

⁵⁸ See, e.g. Comments of the Satellite Industry Association (“SIA”), GN Docket No. 14-177 at 11-12 (filed Oct. 3, 2016).

consumers. The Commission must reject any proposal that would threaten the productive use of the mmW bands for 5G services. In addition, FSS already has extensive spectrum allocations—“more than five times the spectrum available for licensed terrestrial mobile services.”⁵⁹

Additional allocations in the 37 GHz and 39 GHz bands are unnecessary and this request should be denied.

IV. SPECTRUM AGGREGATION POLICIES SHOULD BE CRAFTED TO ENCOURAGE INNOVATION.

In the *Report & Order*, the Commission imposed a spectrum aggregation limit of 1250 MHz for purposes of the spectrum auctions in the 28 GHz, 37 GHz, and 39 GHz bands.⁶⁰ As AT&T discusses below, this was unfortunate, unnecessary, and potentially harmful to competition and innovation. In the *FNPRM*, the Commission asks how it should calculate mmW spectrum holdings for the purpose of determining bidding eligibility in 28 GHz, 37 GHz, and 39 GHz auctions.⁶¹ The record shows support for using a company’s average, population-weighted holdings in the license’s service area.⁶² To the extent that the Commission retains its spectrum aggregation limits, the average, population-weighted holdings approach should be adopted here.

The Commission’s proposal to impose a three year holding period on licensees that purchase 28 GHz, 37 GHz or 39 GHz⁶³ is flawed and should be rejected.⁶⁴ If the point of

⁵⁹ CTIA, Opposition to Petition for Rulemaking, RM-11773 at 2 (filed Oct. 17, 2016).

⁶⁰ *Report & Order* ¶ 184.

⁶¹ *FNPRM* ¶¶ 484-87.

⁶² Verizon Comments at 2.

⁶³ *FNPRM* ¶¶ 488-490.

⁶⁴ See Comments of Straight Path Communications, GN Docket No. 14-177 at 12-13 (“Straight Path Comments”).

allocating this mmW spectrum is to create the conditions for rapid 5G innovation and deployment, then prohibiting the operation of secondary markets—in effect walling spectrum off for years from new sources of capital and innovation, casting in concrete today’s notions of the best and highest use of the spectrum—would be counterproductive and shortsighted. Nor would such a rule deter spectrum speculators (if that was its purpose). Instead, it would merely lengthen speculators’ investment horizon while they wait out the holding period. Moreover, preventing secondary markets from operating only with respect to those who paid market prices at auction (as opposed to also applying the holding period to those whose existing LMDS licenses were transformed into broadband licenses by the *Report & Order*) would be unjust, in addition to being inefficient. It would be better to allow the Commission’s secondary markets processes to marry any unused spectrum with valuable ideas and ready capital, to yield rapid innovative deployments, rather than imposing a rule requiring unused mmW spectrum to remain on the shelf.

The Commission should not impose spectrum aggregation limits on additional “frontier” spectrum bands.⁶⁵ As Straight Path notes, these proposals “ignore[] the fact that millimeter wave band spectrum is not fungible. In addition to different propagation characteristics, each band will have different regulatory limitations—for example, satellite or federal sharing obligations.”⁶⁶ Spectrum aggregation limits would restrict consideration of performance factors and other unique circumstances that may be relevant to the still-emerging 5G competitive landscape. For example, if one licensee’s holdings are exclusively in the 37-39 GHz bands while

⁶⁵ *FNPRM* ¶ 491.

⁶⁶ Straight Path Comments at 12.

another licensee has exclusively 28 GHz band licenses, applying the same threshold to both licensees could build in competitive advantages that should be taken into consideration.⁶⁷

Finally, spectrum holding limits should be rejected because they would neither facilitate innovation nor promote the efficient use of spectrum. Limits would potentially foreclose a licensee of one mmW band from acquiring needed spectrum in another mmW band, which may restrict the utility of the bands. The Commission has not employed spectrum aggregation limits in connection with auctions occurring over the past decade,⁶⁸ yet auction results consistently show large numbers of licensees winning spectrum,⁶⁹ and the mobile broadband industry continues to be robustly competitive.⁷⁰ There simply is no justification for aggregation limits in these bands.⁷¹

⁶⁷ See also Letter from Joan Marsh, AT&T to Marlene H. Dortch, FCC, GN Docket No. 14-177 (filed July 5, 2016) (noting that AT&T’s preliminary calculations suggest that, to achieve the same performance results, a carrier using 37-39 GHz spectrum will require approximately 50 percent more spectrum than a carrier deploying in the 28 GHz band) (“AT&T July 5, 2016 *Ex Parte*”).

⁶⁸ See Policies Regarding Mobile Spectrum Holdings Expanding the Econ. & Innovation Opportunities of Spectrum Through Incentive Auctions, *Report & Order*, 29 FCC Rcd 6133 ¶ 218 (2014) (declining to adopt mobile spectrum holdings limits for the AWS-3 auction); Advanced Wireless Servs. in the 1.7 GHz & 2.1 GHz Bands, *Report & Order*, 18 FCC Rcd 25162 ¶ 67 (2003) (declining to adopt mobile spectrum holdings limits for the AWS-1 auction); Reallocation and Service Rules for the 698-746 MHz Spectrum Band, *Report & Order*, 17 FCC Rcd 1022 ¶ 140 (2002) (declining to adopt mobile spectrum holdings limits for the Lower 700 MHz band auction).

⁶⁹ Public Notice, *Auction of 700 MHz Band Licenses Closes*, 23 FCC Rcd 4572 (2008) (stating Auction 73 had 101 winning bidders); Public Notice, *Auction of Advanced Wireless Services (AWS-3) Licenses Closes*, 30 FCC Rcd 630 (2015) (stating Auction 97 had 31 winning bidders); Public Notice, *Auction of AWS-1 and Broadband PCS Licenses Closes*, 23 FCC Rcd 12749 (2008) (stating Auction 78 had 14 bidders winning AWS-1 licenses and 8 bidders winning broadband PCS licenses).

⁷⁰ Indeed, the Commission’s most recent report on mobile wireless competition shows the price of wireless services continues to decline, even as data usage continues to grow significantly. The report also discussed the changes in wireless providers’ market shares over the past few years and noted the disruptive pricing strategies introduced by Sprint and T-Mobile.

V. COMMENTERS BROADLY OPPOSE IMPOSITION OF SHARING MECHANISMS OR REQUIREMENTS THAT COULD DISCOURAGE 5G DEPLOYMENT.

The record in this proceeding shows widespread opposition to two sharing proposals: use of an SAS and imposition of a “use-it-or-share-it” requirement. Imposing such requirements would add complexity to (and likely delay) the deployment of 5G services and could jeopardize the investment necessary to deliver the benefits of 5G to consumers. Instead, the Commission should create a regulatory environment that will promote certainty through the use of proven co-existence techniques. To the extent innovative approaches become necessary to maximize use of the mmW bands, the industry is in the best position to collaboratively find solutions. The SAS and the “use-it-or-share-it” proposals should be abandoned.

As commenters have made clear, implementing a SAS in the mmW bands would be impractical and unwise. The novel SAS model adopted at 3.5 GHz has not even been tested, much less proven to effectively manage spectrum allocation and interference coordination.⁷² Once the SAS experiment in the 3.5 GHz band is implemented, the Commission should evaluate the results in consultation with affected stakeholders before imposing it on additional bands.⁷³ Instituting an untested SAS regime in the mmW bands, which are so vital to 5G deployments,

See Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, *Eighteenth Report*, 30 FCC Rcd 14515 ¶¶ 21, 29, 79, 149 (2015).

⁷¹ While AT&T supported ensuring multiple licensees per market in 28 GHz, as that band will be ready for 5G first, imposing the 1250 cap on the 28/37/39 GHz auctions was also unjustified and is potentially harmful to competition and innovation. AT&T July 5, 2016 *Ex Parte*.

⁷² *See* Comments of 5G Americas, GN Docket No. 14-177 at 10 (filed Sept. 30, 2016) (“5G Americas Comments”); Comments of Nextlink, GN Docket No. 14-177 at 25 (filed Sept. 30, 2016) (“Nextlink Comments”).

⁷³ *See* CTIA Comments at 14; CCA Comments at 5-6.

presents the substantial (and unnecessary) risk of delaying 5G deployments. As Commissioner O’Rielly observed, one way to “stall 5G deployment is to impose untested licensing regimes on the new bands identified for mobile use.”⁷⁴ Further, technology development could be stifled if innovators are limited by the need to accommodate an SAS in the mmW bands.⁷⁵

Commenters also roundly reject adoption of a “use-it-or-share-it” model.⁷⁶ Such a requirement would “discourage the high degree of innovation that results from undisputed spectrum ownership.”⁷⁷ This is because, in the nascent mmW band spectrum market, a new ecosystem of suppliers, providers, and use cases has yet to be developed. As 5G Americas noted, “[t]echnology and market development for the mmW bands is best undertaken without non-essential distractions and distortions” such as a “use-it-or-share-it” requirement.⁷⁸ The FCC’s use-it-or-share-it proposal is also impractical and cumbersome, as it would require licensees to frequently update the status of their spectrum and create an additional layer of spectrum management to facilitate use of licensed spectrum.⁷⁹ Finally, a “use-it-or-share-it” regime could forestall investment. For licensees to invest in both the licenses and infrastructure

⁷⁴ Remarks of Michael O’Rielly, FCC Commissioner, Before Hogan Lovells’ Technology Forum: The 5G Triangle, at 4 (May 25, 2016), https://apps.fcc.gov/edocs_public/attachmatch/DOC-339558A1.pdf.

⁷⁵ CTIA Comments at 24.

⁷⁶ *See, e.g.* Nextlink Comments at 24; Straight Path Comments at 7-10.

⁷⁷ CCA Comments at 6.

⁷⁸ 5G Americas Comments at 15.

⁷⁹ Straight Path Comments at 9-10.

needed to bring 5G to bear, they must have certainty that they will be able to freely and fully access their licensed spectrum without interference or premature obligations.⁸⁰

VI. COMMENTERS SUGGEST CERTAIN MODIFICATIONS TO THE COMMISSION'S PROPOSED TECHNICAL RULES.

The Commission seeks comment on whether further consideration of antenna heights and power limits is warranted to mitigate interference between licensees and promote sharing among services.⁸¹ Three refinements to the Commission's proposed rules on power levels and antenna heights would best promote beneficial use of the additional mmW bands.

First, the Commission should set the power limits for fixed and base stations at 75dBm/100 MHz or higher to avoid precluding the deployment of the broadest range of 5G uses for the public. The Commission should also establish a power limit of 43 dBm EIRP for mobile stations and 55 dBm EIRP for transportable stations, as it established in the 28, 37, and 39 GHz bands.⁸² Given the propagation limits in the mmW bands, licensees will be required to use technically sophisticated beam steering, which will have the added benefit of being better able to manage and control higher power operations.

Second, the Commission should refrain from setting a peak to average power ratio ("PAPR") at this point. Absent a PAPR restriction, developers could maximize opportunities to achieve better data rate coverage, for example by running a high level modulation scheme such as 64 QAM and 256 QAM.

⁸⁰ CCA Comments at 6; Comments of AT&T, GN Docket No. 14-177 at 20-22 (filed Jan. 28, 2016).

⁸¹ *FNPRM* ¶ 505.

⁸² *Report & Order* ¶¶ 283, 287.

Third, AT&T joins commenters in opposing antenna height restrictions on millimeter wave base stations.⁸³ At this point, it is unclear what use cases and deployment scenarios will emerge to harness advancements in 5G. Accordingly, it is premature to adopt restrictive technological limitations in the mmW bands.

VII. CONCLUSION

AT&T appreciates the opportunity to provide input on the Commission's proposed service rules for mobile use of certain mmW bands. While mmW spectrum alone will not enable next generation services, it is a vital piece of the puzzle. To secure the United States' leadership role for the next generation of wireless, it is imperative that the Commission adopt a simple and flexible regulatory framework in the mmW bands that allows innovation to thrive.

Respectfully submitted,

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⁸³ See, e.g. Qualcomm Comments at 14-15.