

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Use of Spectrum Bands Above 24 GHz For Mobile)	GN Docket No. 14-177
Radio Services)	
)	
Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95,)	WT Docket No. 10-112
and 101 To Establish Uniform License Renewal,)	
Discontinuance of Operation, and Geographic)	
Partitioning and Spectrum Disaggregation Rules and)	
Policies for Certain Wireless Radio Services)	

REPLY COMMENTS OF T-MOBILE USA, INC.

Steve B. Sharkey
John Hunter
Christopher Wieczorek

T-MOBILE USA, INC.
601 Pennsylvania Avenue, N.W.
Suite 800
Washington, DC 20004
(202) 654-5900

September 28, 2018

TABLE OF CONTENTS

I.	INTRODUCTION AND SUMMARY	1
II.	THE PROPOSED SHARING TECHNIQUES FOR THE LOWER 37 GHz BAND ARE UNREALISTIC	2
III.	THE COMMISSION SHOULD DELAY ADOPTING RULES FOR SATELLITE ACCESS TO THE 50 GHz BAND	9
IV.	THERE IS BROAD SUPPORT FOR UMFUS USE OF THE 26 GHz AND 42 GHz BANDS AND FOR DENYING USE OF THE 26 GHz BAND FOR AERONAUTICAL PLATFORMS	12
	A. Commenters Strongly Support Licensing the 42 GHz Band for Flexible Use.....	12
	B. Commenters Urge the Commission to License the 26 GHz Band for UMFUS and to Reject Airborne Platform Uses of the Band	15
V.	CONCLUSIONS	17

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Use of Spectrum Bands Above 24 GHz For Mobile Radio Services)	GN Docket No. 14-177
)	
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
)	

REPLY COMMENTS OF T-MOBILE USA, INC.

T-Mobile USA, Inc. (“T-Mobile”)^{1/} submits these reply comments in response to the comments of other parties on the Third Further Notice of Proposed Rulemaking (“*Third Further Notice*”)^{2/} in the above-referenced proceedings, in which the Commission has the opportunity to take additional steps to establish U.S. leadership in Fifth Generation (“5G”) wireless services by making additional millimeter wave band spectrum available.

I. INTRODUCTION AND SUMMARY

In response to the *Third Further Notice*, commenters strongly supported making additional millimeter wave bands available for terrestrial wireless broadband. Parties made clear that, in each of the bands under consideration, the Commission should ensure that its actions promote the greatest level of commercial mobile use possible. Yet, for two of the bands under consideration in this proceeding – the 37.0-37.6 GHz band (the “Lower 37 GHz band”) and the

^{1/} T-Mobile USA, Inc. is a wholly-owned subsidiary of T-Mobile US, Inc., a publicly traded company.

^{2/} *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, et al.*, Third Report and Order, Memorandum Opinion and Order, and Third Further Notice of Proposed Rulemaking, FCC-18-73 (rel. Jun. 8, 2018).

50.4-52.6 GHz (“50 GHz”) band, the Commission has been asked to make spectrum decisions contrary to that goal. Based on the record in this proceeding, the Commission should –

- Reject the proposed techniques for shared use of the Lower 37 GHz band. They are either unrealistic because they do not adequately consider the requirements of mobile broadband operations or they ignore the likely scenario of competing applications for the same spectrum in the same geographic area.
- Permit industry groups to develop any protocol for shared non-federal use of the Lower 37 GHz band based on a more advanced form of dynamic spectrum access.
- Structure the rules for sharing between federal and non-federal users in the Lower 37 GHz band to promote certainty and the greatest level of commercial use.
- Determine the type of access it will permit for *all* services in the 50 GHz band, including potential use of the band for Upper Microwave Flexible Use Service (“UMFUS”) operations, before it adopts rules for Fixed Satellite Service (“FSS”).
- Authorize UMFUS operations in the 25.25-27.5 GHz (“26 GHz”) and 42-42.5 GHz (“42 GHz”) bands and issue exclusive licenses in the bands in 100 megahertz blocks on a Partial Economic Area (“PEA”) basis.
- Reject requests from airborne platform providers to limit UMFUS use of the 26 GHz band.

II. THE PROPOSED SHARING TECHNIQUES FOR THE LOWER 37 GHz BAND ARE UNREALISTIC

As the Commission notes, this is its second attempt to adopt rules governing the Lower 37 GHz band to permit access for federal and non-federal entities.^{3/} Appropriately, the Commission did not act on the proposals it received earlier – notably from Starry, Inc. (“Starry”) and Intel Corporation (“Intel”). Based on the comments received in response to the *Third Further Notice*, the record still does not support the approaches proposed by Starry, Intel and others, and the Commission should instead more fundamentally re-evaluate the future federal and non-federal use of the Lower 37 GHz band.

While the Commission seeks to make the Lower 37 GHz band an “innovation” band,^{4/} most of the proposals are not innovative at all – they rely on existing and often inappropriate

^{3/} See *Third Further Notice* ¶¶ 60-62.

^{4/} See *Third Further Notice* ¶ 63 (“[W]e envision Lower 37 GHz as an innovation band in the mmW spectrum.”).

spectrum management techniques. The only new approach is suggested by Qualcomm Incorporated (“Qualcomm”) and is effectively based on industry-generated dynamic spectrum sharing mechanisms – an improved version of what is being developed for the 3.5 GHz band. Therefore, while the Commission should still consider how to promote more certain access to the band for commercial users, any protocol for shared use of the band should be based on further industry-based refinement of Qualcomm’s opportunistic access approach.

Federal/Non-Federal Sharing. As several parties point out, the most effective way for both federal and non-federal entities to share the Lower 37 GHz band is to affirmatively identify federal needs and create coordination zones around those sites, allowing the remainder of the spectrum capacity to be used for non-federal operations.^{5/} It is essential that the Commission “provide as much certainty to licensees as possible[,]” as “[u]ncertainty . . . even for a ‘limited number’ of sites, could unnecessarily depress investment in the band.”^{6/} Moreover, any “coordination zones should be narrowly tailored to protect necessary operations.”^{7/} And as T-Mobile has advocated, the Commission should limit any additional federal use to a defined portion of the lower segment of the Lower 37 GHz band based on federal agency requirements,

^{5/} See, e.g., Comments of Ericsson, GN Dkt. Nos. 14-177 and 10-112, at 13 (filed Sept. 10, 2018) (“Ericsson Comments”) (“[I]f the Commission seeks to accommodate new Federal facilities at 37 GHz, it should establish a process that would permit Federal entities to identify a limited number of additional sites on an as-needed basis and coordinate those facilities with pre-existing non-Federal operations[.]”); Comments of Competitive Carriers Association, GN Dkt. Nos. 14-177 and 10-112, at 7 (filed Sept. 10, 2018) (“CCA Comments”) (“Any future federal operations should be considered based upon demonstrated need, and coordination zones should be narrowly tailored to protect necessary operations.”).

^{6/} Comments of the Telecommunications Industry Association, GN Dkt. Nos. 14-177 and 10-112, at 5 (filed Sept. 10, 2018) (“TIA Comments”).

^{7/} CCA Comments at 7.

to permit contiguous non-federal use of the upper portion of the Lower 37 GHz band with the licensed spectrum at 37.6-40 GHz.^{8/}

Non-Federal Sharing. The comments in response to the *Third Further Notice* propose two general approaches to use of the Lower 37 GHz band by non-federal entities. Both are flawed.

Dynamic Spectrum Sharing. Some parties suggest that the Commission rely on dynamic spectrum assignments managed through real-time database access for use of the Lower 37 GHz band, effectively mirroring the approach the Commission has already adopted in the 3.5 GHz band and in the television white spaces.^{9/} There are multiple reasons the Commission should reject these suggestions. *First*, database-driven dynamic spectrum sharing has not been successfully deployed in any spectrum band. Until it becomes fully operational in the bands already designated for its use and any adjustments have been made based on those initial deployments, the Commission should not dedicate additional spectrum to this approach.

Second, sole reliance on database-driven dynamic spectrum assignment is unrealistic for commercial providers. As T-Mobile has stated in the past, carriers require a stable and predictable spectrum environment in order to engage in effective network planning, and this planning takes into consideration the particular frequencies a licensee is assigned. Moreover, a database-controlled dynamic spectrum environment produces a continually changing interference environment and will reduce the overall efficiency of the spectrum use. Dynamic spectrum

^{8/} See Comments of T-Mobile USA, Inc., GN Dkt. Nos. 14-177 and 10-112, at 10-11 (filed Sept. 10, 2018) (“T-Mobile Comments”).

^{9/} See, e.g., Comments of Federated Wireless, Inc., GN Dkt. Nos. 14-177 and 10-112, at 1 (filed Sept. 10, 2018) (“Federated Wireless Comments”); Comments of Open Technology Institute at New America, GN Dkt. Nos. 14-177 and 10-112, at 4 (filed Sept. 10, 2018) (“OTI Comments”).

assignment does not optimally support commercial operations, which is a significant driver of technological development.

Comparisons to the spectrum access system in the 3.5 GHz band are unavailing.^{10/} There are key differences between that band and the Lower 37 GHz band. For instance, the three tier concept with dynamic assignment through a database created for the 3.5 GHz band was designed to protect federal and other incumbent operations.^{11/} Further, there is a licensed component of the 3.5 GHz band that ensures that commercial providers have access to spectrum – the Priority Access License, which will encourage commercial providers to invest in the band. That component would not exist under the proposals of those that support use of dynamic spectrum sharing in the Lower 37 GHz band. And suggesting that the Commission allow General Authorized Access or unlicensed indoor-only use of the band^{12/} will not cure these deficiencies. Even indoor use will prevent commercial providers from network planning. Moreover, the Commission explicitly declined to adopt unlicensed indoor use in the 37 GHz band in the *Report and Order*.^{13/}

Prior Coordination. The other general proposed approach to use of the Lower 37 GHz band would incorporate existing prior coordination procedures, generally as specified in Part 101

^{10/} See, e.g., Federated Wireless Comments at 2; OTI Comments at 10.

^{11/} See *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Report and Order, 30 FCC Rcd. 3959, ¶ 4 (2015).

^{12/} See Dynamic Spectrum Alliance Comments, GN Dkt. No. 14-177, at 2-3 (filed Sept. 10, 2018) (“DSA Comments”); OTI Comments at 10-12.

^{13/} See *Use of Spectrum Bands Above 24 GHz For Mobile Radio Service; et al.*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd. 8014, ¶ 440 (2016) (“*Report and Order*”) (“We have decided not to adopt the NPRM’s proposal to authorize unlicensed indoor-only operations in the 37 GHz band[.]”).

of the rules, and in some cases, based in particular on rules governing the 70/80 GHz band. The Commission should also reject these proposals.

Two related deficiencies affect most of these approaches. First are the fundamentally incompatible concepts that licenses will be non-exclusive but that licensees may be entitled to protection from later-in-time applicants.^{14/} Protection from subsequent applicants and licensees assumes that within the licensee's area of operation on its assigned frequencies, it has the right to exclude others – either explicitly by the second-in-time applicant's inability to demonstrate compliance with technical requirements or implicitly through a licensee's ability to decline coordination requests.^{15/} The suggestion by Intel and Cisco that licensees be required to “negotiate in good faith” is particularly unrealistic.^{16/} The requirement will only lead to the Commission becoming embroiled in applicant disputes with dueling engineering analyses.

The related deficiency is evident from the comments of those that assume that there will be some degree of protection of incumbent operations, but fail to consider how the Commission, consistent with its obligations under the Communications Act, will resolve the inevitable mutually exclusive applications it receives. Starry's approach is especially problematic for that reason.^{17/} It suggests that applicants be considered on a “first in time” basis but does not address

^{14/} See, e.g., Comments of Starry, Inc., GN Dkt. Nos. 14-177 and 10-112, at 5 (filed Sept. 10, 2018) (“Starry Comments”) (“Coordination should be based on first-in-time rights, and that licensees or registrants should have an expectation of use and reasonable interference protection, but not of exclusion.”); Federated Wireless Comments at 3.

^{15/} See, e.g., Starry Comments at 6-9; Wireless Internet Service Providers Association, GN Dkt. Nos. 14-177 and 10-112, at 3-4 (filed Sept. 10, 2018) (“WISPA Comments”).

^{16/} Joint Comments of Intel Corporation and Cisco Systems, Inc., GN Dkt. No. 14-177, at 8, 13 (filed Sept. 10, 2018) (“Intel and Cisco Comments”).

^{17/} This failure to consider the mechanism to resolve mutually exclusive applications is one of the many limitations of the Starry proposal. For example, Starry suggests that licensees be required to construct base station facilities within 90 or 120 days. See Starry Comments at 14. But even assuming the accuracy of Starry's assumption that small cell use will predominate the use of the 37 GHz band, this time frame is unrealistic. While some network planning can occur in advance of Commission

how the Commission will resolve mutually exclusive applications submitted during its suggested filing window.^{18/} And this flaw persists regardless of the area of operation that would be protected (whether defined by a polygon or in some other manner).^{19/} Whatever the area of operation selected, an opportunity to submit applications for licenses that incorporate protection will certainly produce mutually exclusive applications, and selection between those applications must be accomplished pursuant to the Commission's auction processes.^{20/}

Further, the coordination mechanisms on which these proposals are based – for Part 101 and Part 96 in general, and the 70/80 GHz band in particular – are not appropriate for spectrum that will be used for mobile operations. Ironically, even those that suggest that the Commission begin by using Part 101 coordination techniques decry its shortcomings.^{21/} As the Commission and other parties in this proceeding highlight, mobile operations are one of the planned uses of the Lower 37 GHz band.^{22/} But the coordination methods proposed are designed for when new

authorization, it is unreasonable for licensees to invest meaningful siting resources until spectrum use is permitted. And after that, equipment must be ordered and installed. Moreover, Starry's proposal assumes that state and local siting authority processes can be initiated (at great cost and no certainty of Commission action) before a provider is able to demonstrate that it has the Commission authorization for the proposed operations. But state and local governments – in order to preserve their own resources – may only wish to consider non-speculative siting proposals.

^{18/} See Starry Comments at 13-14.

^{19/} See, e.g., Intel and Cisco Comments at 11 (recommending polygons “as the most flexible geographic configuration for site licenses”); TIA Comments at 4 (“User-defined polygons should be used to define site registrations[.]”); Ericsson Comments at 12 (“[S]ite licenses should be defined by polygons.”); WISPA Comments at 3 (suggesting geographic protection zones); Starry Comments at 7 (“[W]e suggest the Commission establish protection zones using propagation analysis considering some basic characteristics of each base station.”).

^{20/} See 47 U.S.C. §309(j)(1).

^{21/} See OTI Comments at 5-6 (“[A] streamlined version of Part 101 coordination can readily serve as the foundation (with modifications) for an initial coordination process in the Lower 37 GHz band[.] . . . Traditional Part 101 coordination is a relic, not a model for efficient spectrum sharing.”).

^{22/} See *Third Further Notice* ¶ 63 (listing the expected types of non-federal deployments in the Lower 37 GHz Band, including “carrier-based deployments of mobile systems using the Lower 37 GHz Band as supplemental capacity”); see also CCA Comments at 6.

systems can be “engineered” in or around existing facilities. That concept is inconsistent with mobile areas of operation. In fact, the existing UMFUS rules recognize this by specifying different protection parameters for co-channel mobile networks on the one hand and fixed networks on the other.^{23/} And as T-Mobile demonstrated, the coordination mechanisms designed for the 70/80 GHz band – in which “pencil-beam” technology is used – are particularly inappropriate for coordination of mobile area of operations.^{24/}

True Sharing Means a Better Version of Dynamic Spectrum Access. As noted above, any version of dynamic spectrum access is likely to depress investment by commercial providers – which require spectrum-access certainty to undertake the massive investments necessary to establish or supplement networks – and will reduce the overall spectral efficiency that can be realized from the spectrum. If the Commission nevertheless adopts rules intended to promote sharing, it should permit industry to develop the appropriate protocol, building on the approach suggested by Qualcomm. For new federal and non-federal users in the band, Qualcomm recommends using an over-the-air coordination procedure relying on unlicensed sharing standards and technologies, such as 5G NR-Unlicensed/Shared Spectrum (“5G NR-U/SS”), currently being standardized by the 3rd Generation Partnership Project.^{25/} Existing federal operations in the band would be protected via a database new users could check.^{26/} Qualcomm’s recommendation is still non-optimal for licensed services – it does not provide the certainty that

^{23/} See *Report and Order* ¶¶ 312, 314 (“[A] field strength limit would not be appropriate for fixed point-to-point operations because it would require large power reductions by fixed service providers. . . . [W]e will retain the existing Part 101 technical rules for traditional fixed point-to-point links.”); 47 C.F.R. § 30.204.

^{24/} See T-Mobile Comments at 13-14.

^{25/} See Comments of Qualcomm, GN Dkt. Nos. 14-177 and 10-112, at 10-12 (filed Sept. 10, 2018) (“Qualcomm Comments”).

^{26/} See Qualcomm Comments at 10.

licensed users need to dedicate the resources to build a network. However, its plan would at least streamline the spectrum access mechanism and remove the need for maintenance of third party databases. Should the Commission proceed in this direction, it should permit industry to further develop the rules that support it. Because of the flaws of the database-driven dynamic sharing and coordination approaches outlined above, and the fact that Qualcomm’s approach remains untested, the Commission may also wish to consider a compromise approach under which it would allow the opportunistic access suggested by Qualcomm in the lower half of the Lower 37 GHz band, with licensed use in the upper half, which is adjacent to spectrum the Commission has committed to auction.

III. THE COMMISSION SHOULD DELAY ADOPTING RULES FOR SATELLITE ACCESS TO THE 50 GHz BAND

The Commission has made a substantial amount of spectrum available for satellite use in this proceeding – it retained the 48.2-50.2 GHz band and the 40-42 GHz band for satellite operations,^{27/} and it expanded satellite access to the 24 GHz, 28 GHz, 37 GHz, 39 GHz, and 47 GHz bands.^{28/} As T-Mobile has detailed previously,^{29/} satellite operators have thus far made limited use of the spectrum already designated for their operations, they have not demonstrated that the additional spectrum granted to them in this proceeding is required, and they have certainly not demonstrated that even more spectrum is needed. In contrast, the wireless industry and demand for terrestrial mobile broadband services continue to grow,^{30/} and additional licensed

^{27/} See *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, et al.*, Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order, 32 FCC Rcd. 10988, ¶¶ 189, 192 (2017).

^{28/} See 47 C.F.R. § 25.136; *Third Further Notice* ¶ 22.

^{29/} See, e.g., Opposition of T-Mobile USA Inc., GN Dkt. No. 14-177 *et al.*, at 15-17 (filed Jan. 31, 2017); Reply Comments of T-Mobile, GN Dkt. No. 14-177 *et al.*, at 12-13 (filed Oct. 31, 2016).

^{30/} Comments of CTIA, GN Dkt. Nos. 14-177 and 10-112, at 3-4 (filed Sept. 10, 2018) (“CTIA Comments”) (“Wireless broadband adoption and use has increased exponentially in recent years. . . . The

spectrum for terrestrial use is essential.^{31/} Granting satellite operators increased access to the 50 GHz band, especially access beyond the sharing framework adopted for the 24 GHz and 47 GHz bands, would be an inefficient use of spectrum resources – particularly as any increased use of the spectrum for satellite operations means decreased utility of the spectrum for terrestrial mobile use. But that is exactly what satellite industry representatives seek, claiming that they require access to additional spectrum and asking the Commission to give them broad access to the 50 GHz band.^{32/} As noted above, the Commission should be deeply skeptical of this purported need for additional capacity.

Moreover, adopting rules governing satellite use of the 50 GHz band now would constitute premature spectrum management that may foreclose additional and more efficient and socially desirable uses of the band. Notably, satellite operators even disagree among themselves about the level of access to the 50 GHz band they require and on what terms terrestrial mobile providers should be able to access the band, if at all. Boeing, for example, argues for more relaxed numerical limits on earth stations, contending that that sharing between terrestrial licensees and satellite earth stations in the entire 50 GHz band “will not be difficult . . .

rapid increase in wireless connections and data-only devices has created a corresponding explosion in data usage.”).

^{31/} See CTIA, LICENSED SPECTRUM: THE KEY TO CONTINUING AMERICA’S WIRELESS LEADERSHIP AND GROWING OUR ECONOMY (Feb. 2017), <https://api.ctia.org/docs/default-source/default-document-library/ctia-white-paper-licensed-spectrum.pdf> (“Even with the recent progress, it’s clear the wireless industry needs more licensed spectrum. Mobile data continues to grow, providers are taking steps to deploy 5G, and municipalities and other industries across the economy are looking to wireless connectivity to transform their communities and how they deliver goods and services. . . . Even after accounting for additional infrastructure and spectrum efficiency enhancements, wireless traffic per site is projected to grow by an adjusted 343 percent – all of which additional spectrum must be ready to absorb.”) (internal quotations omitted).

^{32/} See, e.g., Comments of Boeing, GN Dkt. Nos. 14-177 and 10-112, at 3 (filed Sept. 10, 2018) (“Boeing Comments”); Comments of SES Americom and O3b Limited, GN Dkt. No. 14-177 *et al.*, at 2 (filed Sept. 10, 2018) (“SES and O3b Comments”); Comments of Viasat, Inc., GN Dkt. Nos. 14-177 and 10-112, at 2 (filed Sept. 10, 2018) (“ViaSat Comments”).

particularly if satellite operators locate their earth stations primarily outside of populated communities[.]” given the band’s propagation characteristics.^{33/} SES Americom and O3b Limited also propose that the Commission adopt an earth station siting approach “more permissive” than that adopted for the 24 GHz band.^{34/} And, going even further, SpaceX urges the Commission to adopt a “broader, more truly co-primary sharing framework” between satellite and terrestrial operations in the 50.4-51.4 GHz band segment and to implement more technologically neutral rules.^{35/} In contrast, Viasat supports the Commission’s proposal to allow individual earth station licensing using the framework adopted for the 47 GHz band, but also advocates for use of the 50.4-51.4 GHz segment on a secondary basis.^{36/}

Terrestrial providers also seek access to this spectrum, and the comments filed in response to the *Third Further Notice* make it clear that many parties favor allocating the 50 GHz band for terrestrial mobile use, as proposed earlier in this proceeding.^{37/} The only way for the Commission to meaningfully ensure that all potential users of the band can be accommodated under its rules is for it to simultaneously adopt service rules for all uses of the spectrum. Indeed, as T-Mobile has suggested before, in cases where satellite and terrestrial services are competing for spectrum, the Commission should consider making spectrum available for both terrestrial and satellite use, with all interested parties participating in an auction that will permit winning bidders to determine use of the band.^{38/} Just permitting satellite use today, without the

^{33/} Boeing Comments at 5.

^{34/} SES and O3b Comments at 2.

^{35/} Comments of SpaceX, GN Dkt. Nos. 14-177 and 10-112, at 4 (filed Sept. 10, 2018).

^{36/} See ViaSat Comments at 4.

^{37/} See, e.g., CCA Comments at 7; CTIA Comments at 14.

^{38/} See Comments of T-Mobile USA, Inc., GN Dkt. No. 14-177, *et al.*, at 17-18 (filed Jan. 27, 2016) (“[I]f satellite licensees wish to secure interference protection . . . they should obtain the geographic area rights in an auction or the secondary market just as a terrestrial licensee would.”)

development of a full record on how terrestrial and satellite services can both use the 50 GHz band, will certainly prejudice any use of the band except for satellite services. Only by considering the adoption of rules for *all* services in the band can the Commission fairly develop rules for *any* service in the band.^{39/}

Other commenting parties agree. For instance, CTIA states that the Commission should adopt UMFUS services rules for the band before considering satellite use, since the Commission asked parties to submit comment on UMFUS use of the band over two years ago.^{40/} Nokia agrees that it would be “premature” for the Commission to now adopt satellite and terrestrial sharing rules, since the Commission’s UMFUS rules for the band are pending.^{41/} In order to develop a robust record and ensure that the rules for the band enable the most productive and efficient uses of the spectrum, the Commission should adopt a Further Notice of Proposed Rulemaking considering mobile broadband use and other uses of the 50 GHz band before it adopts service rules governing use of the band by satellite services.

IV. THERE IS BROAD SUPPORT FOR UMFUS USE OF THE 26 GHz AND 42 GHz BANDS AND FOR DENYING USE OF THE 26 GHz BAND FOR AERONAUTICAL PLATFORMS

A. Commenters Strongly Support Licensing the 42 GHz Band for Flexible Use

The record contains broad support for licensing the 42 GHz band under the Part 30

^{39/} Of course, the Commission need not always consider the use of spectrum by *every* potential other service each time it proposes to adopt rules for *any* service in a band. However, in this case, the Commission has specifically acknowledged that mobile use of the band “remains an open issue in this proceeding.” *Third Further Notice* ¶ 94 n.289.

^{40/} CTIA Comments at 14.

^{41/} Comments of Nokia, GN Dkt. Nos. 14-177 and 10-112, at 4 (filed Sept. 10, 2018) (“Nokia Comments”).

rules^{42/} and for issuing licenses in 100 megahertz blocks on an exclusive basis, using PEAs.^{43/}

As commenters note, this licensing approach is consistent with the proposals for licensing in other millimeter wave bands – namely the Upper 37 GHz, 39 GHz, and 47 GHz bands.^{44/}

Implementing the same regulatory framework here “will encourage the buildout of new and innovative services in the band, including 5G.”^{45/} And as CTIA, U.S. Cellular, and Nokia correctly point out, the 42 GHz band can be paired with the 37 GHz and 39 GHz bands to create a 500 megahertz block of mostly unencumbered spectrum that is highly desirable for the development and deployment of 5G technologies.^{46/}

Moreover, as several parties highlight, the 42 GHz band is being considered internationally for mobile broadband use. The International Telecommunication Union (“ITU”), for instance, has identified the 37-42.5 GHz band for mobile services.^{47/} As AT&T explains, international harmonization of the band would facilitate economies of scale, improve international roaming, and reduce the costs of devices, thereby “ensur[ing] that U.S. companies

^{42/} See, e.g., CTIA Comments at 11 (“[T]he 42 GHz band should utilize the Part 30 UMFUS rules, given that it could be paired with the 37/39 GHz bands and has 500 megahertz of contiguous spectrum.”); Comments of AT&T, GN Dkt. Nos. 14-177 and 10-112, at 3 (filed Sept. 10, 2018) (“AT&T Comments”) (“AT&T largely concurs with the proposal in the *Third FNPRM* that the 42-42.5 GHz band should be allocated for terrestrial mobile broadband services under a regulatory framework that parallels other UMFUS allocations.”); TIA Comments at 2.

^{43/} See, e.g., AT&T Comments at 6 (supporting UMFUS licensing in the band on a PEA geographic basis in five 100 megahertz blocks); Comments of United States Cellular Corporation, GN Dkt. Nos. 14-177 and 10-112, at 7-8 (filed Sept. 10, 2018) (“US Cellular Comments”) (“USCC further urges the Commission to license . . . the 42 GHz band using 100 megahertz blocks. . . . USCC also urges the Commission to license . . . the 42 GHz band on the basis of PEAs.”).

^{44/} See. CCA Comments at 4 (“[C]onsistent with its proposals for the Upper 37 GHz, 39 GHz and 47 GHz bands, the Commission should license the 42 GHz band in five 100 MHz blocks.”); see also US Cellular Comments at 6-7 (stressing that the “42 GHz band falls within the same tuning range as existing UMFUS bands” and should therefore have a similar licensing scheme).

^{45/} See CTIA Comments at 2.

^{46/} See CTIA Comments at 11-12; US Cellular Comments at 6; Nokia Comments at 3.

^{47/} See AT&T Comments at 4; US Cellular Comments at 6.

are at the leading edge of development and commercialization of that band, thus continuing the U.S. leadership role in 5G.”^{48/} The Commission should seize this opportunity to advance U.S. leadership and make the band available for terrestrial mobile use.

The National Academy of Sciences’ Committee on Radio Frequencies (“CORF”) agrees with T-Mobile that “[w]ith proper coordination, fixed service operations at 42.0-42.5 GHz could probably protect [radio astronomy service (“RAS”)] adequately. The minimum distance between prospective fixed stations and RAS sites will need to be calculated for each individual case, based on factors such as altitude and surrounding terrain.”^{49/} It also agrees with T-Mobile that use of the criteria in ITU-R RA.769 continues to “remain the cornerstone of protection for the radio astronomy service”.^{50/}

CORF asserts that the use of the ITU-R RA.769 standard requires a 200 megahertz guard band.^{51/} T-Mobile disagrees. T-Mobile submitted a study demonstrating that coexistence between 5G operations and RAS in the 32 GHz band is readily feasible.^{52/} The results demonstrated that even under conservative assumptions, with moderate exclusion distances, the ITU protection threshold can be met without a need for guard band. Similar results can be

^{48/} AT&T Comments at 4.

^{49/} Comments of CORF-National Academy of Science, GN Dkt. Nos. 14-177 and 10-112, at 8 (filed Sept. 10, 2018) (“CORF Comments”). CORF expresses concern about the use of “unlicensed” mobile devices. CORF Comments at 8-9. However, devices operated with licensed mobile services will be unable to operate outside the range of fixed facility with which they are associated. These devices are considered “licensed” to the commercial operator. The Commission has not proposed the use of the 42 GHz band for unlicensed operations.

^{50/} See CORF Comments at 8.

^{51/} CORF Comments at 8-9.

^{52/} Letter from Steve Sharkey, Vice President, Government Affairs, Technology and Engineering Policy, T-Mobile USA, Inc., to Marlene H. Dortch, Secretary, FCC, GN Dkt. No. 14-177, *et al.* (filed Oct. 2, 2017); T-MOBILE, UNLEASHING MILLIMETER WAVE SPECTRUM IN THE 32 GHz, 47 GHz, AND 50 GHz BANDS: COEXISTENCE OF MOBILE BROADBAND OPERATIONS WITH THE EARTH EXPLORATION SATELLITE SERVICE AND RADIO ASTRONOMY SERVICE (2017) (“5G Coexistence Study”).

expected with respect to 5G mobile broadband deployment in the 42 GHz band and RAS use of the 42.5-43.5 GHz band.

B. Commenters Urge the Commission to License the 26 GHz Band for UMFUS and to Reject Airborne Platform Uses of the Band

The record also contains near unanimous support for licensing the 26 GHz band under the Part 30 rules.^{53/} Like the 42 GHz band, commenters highlight that the 26 GHz band is being considered globally for terrestrial mobile 5G services.^{54/} In fact, Qualcomm points out that 24.25-27.5 GHz, and in particular the 26 GHz band, has been identified internationally as the leading frequency range for 5G services.^{55/} Thus, allocating the 26 GHz band for UMFUS would enable it to become globally harmonized, which is one of the Commission’s “key policy goal[s].”^{56/}

Parties also explain that making the 26 GHz band available for terrestrial mobile use would be beneficial for American consumers, equipment manufacturers, and wireless carriers given the band’s proximity to the 24 GHz and 28 GHz bands – two bands that the Commission has already allocated for UMFUS. The 26 GHz band is ideally situated in the tuning range of

^{53/} See, e.g., US Cellular Comments at 3; AT&T Comments at 16; TIA Comments at 6; Nokia Comments at 3; Qualcomm Comments at 13; Ericsson Comments at 5; Comments of 5G Americas, GN Dkt. No. 14-177, at 2 (filed Sept. 10, 2018) (“5G Americas Comments”).

^{54/} See Nokia Comments at 3 (“Nokia further agrees that a key driver of the band is a ‘growing international consensus that terrestrial mobile services should be authorized in the band,’ which can lead to a global ecosystem and economies of scale.”); CTIA Comments at 9 (“[T]he 26 GHz band has been a primary focus for other countries for 5G use and is likely to be globally harmonized.”); TIA Comments at 5 (“TIA supports the Commission’s goal of opening the 26 GHz band for commercial use. As the Commission notes, the band has been the subject of significant ‘international momentum.’”).

^{55/} Qualcomm Comments at 13-14 (“The 26 GHz band has been a primary 5G focus of other countries and, because of this, the band is likely to be globally harmonized and support manufacturing economies of scale and international roaming.”); see also Comments of Samsung, GN Docket No. 14-177, at 5 (filed Sept. 10, 2018) (“Samsung Comments”) (“[T]he European Conference of Postal and Telecommunications Administrations identified the 26 GHz band for early European harmonization. . . . Asia is also actively planning to use the 26 GHz band for 5G.”).

^{56/} Samsung Comments at 5-6; see also CTIA Comments at 9.

those bands, allowing a significant amount of high-band spectrum – nearly 4 GHz – “to potentially be covered by a single radio.”^{57/} Moreover, “a contiguous swath of spectrum extending from 24.75 GHz to 28.35 GHz . . . would enable carriers to aggregate very large channels of virtually unprecedented size, allowing deployment of broadband wireless services with unparalleled speed and throughput.”^{58/} To maximize success in the band, the Commission should adopt the same UMFUS licensing rules for the 26 GHz band that it adopted for the 24 GHz band – PEA geographic area licensing and 100 megahertz channelization. As the Commission has explained, and as commenters agree, there is an overall “benefit to harmonizing the regulatory environment of nearby bands as much as possible.”^{59/}

Despite the clear suitability of the band for terrestrial mobile use, the Elefante Group (“Elefante”) urges the Commission to limit UMFUS use of the band, and to instead allocate the band for its proposed Stratospheric-Based Communications Service, a type of high altitude platform service (“HAPS”). No other party supports Elefante’s position.^{60/} Qualcomm correctly

^{57/} CCA Comments at 5; *see also* Qualcomm Comments at 14 (“Indeed, opening the 26 GHz band would provide a nearly contiguous 4 GHz-wide block of spectrum for 5G services when considered with the already allocated 24 GHz and 28 GHz bands.”); TIA Comments at 5 (“[E]quipment manufacturers could readily integrate the 26 GHz band into a tuning range that already includes the 24 GHz and 28 GHz bands[.]”); CTIA Comments at 8 (“The Part 30 framework has been adopted in other millimeter wave bands, including the adjacent 24 GHz and 28 GHz bands, and adopting the same approach for the 26 GHz band would provide a nearly contiguous four gigahertz block.”).

^{58/} AT&T Comments at 12.

^{59/} US Cellular Comments at 6; *see also* 5G Americas Comments at 6 (“Spectrum harmonization delivers many benefits, including higher economies of scale, better battery life, improved roaming, and reduced interference along borders.”); CTIA Comments at 8 (“CTIA supports harmonizing the 26 GHz band with adjacent bands by employing geographic area licensing on a PEA basis in 100-megahertz license block sizes.”); AT&T Comments at 12-13 (“[T]he regulatory regime for the 26 GHz band should parallel, to the greatest degree possible, the existing UMFUS licensing constructs used for 24 GHz and 28 GHz.”).

^{60/} *See, e.g.,* Ericsson Comments at 8 (“[I]t would make no sense for the Commission to . . . make the band available for airborne platform systems (including HAPS), as Elefante calls for.”); CTIA Comments at 9 (“CTIA supports the Commission’s suggestion that it prohibit use of the 26 GHz band for HAPS like the stratospheric platform stations (‘STRAPS’) proposed by Elefante.”); Samsung Comments

stresses that unaffiliated HAPS could interfere with terrestrial services in the 26 GHz band.^{61/} Just as federal aeronautical mobile use of the Lower 37 GHz band will not be feasible without disrupting mobile broadband use of the band – as T-Mobile previously explained^{62/} – Elefante’s proposed use of the 26 GHz band will not be feasible without harming terrestrial mobile use. Even if co-existence were possible, Samsung points out that Elefante’s request would “impede the progress” of 5G services in the band because, “[a]s Elefante acknowledges, coordination and/or sharing between UMFUS and stratospheric systems will be technically difficult due the large geographic area that would be covered by a stratospheric station.”^{63/} Therefore, the Commission should reject Elefante’s request and allocate the band for UMFUS use.

V. CONCLUSIONS

T-Mobile commends the Commission for its continued efforts to make millimeter wave spectrum available for 5G use. The Commission should advance the U.S.’s position in the race to 5G by taking the following actions –

- Reject the proposed sharing techniques for the Lower 37 GHz band because they do not adequately consider the requirements of mobile broadband operations or they ignore the likely scenario of competing applications for the same spectrum in the same geographic area.
- Permit industry groups to develop any protocol for shared non-federal use of the Lower 37 GHz band based on a more advanced form of dynamic spectrum access.
- Structure the rules for sharing between federal and non-federal users in the 37 GHz band to promote certainty and the greatest level of commercial use.
- Determine the type of access it will permit for *all* services in the 50 GHz band, including potential use of the band for UMFUS operations, before it adopts rules for FSS.
- Authorize UMFUS operations in the 26 GHz and 42 GHz bands and issue exclusive licenses in the bands in 100 megahertz blocks on a PEA basis.

at 8 (“[T]he Commission should reject Elefante’s proposal to permit the deployment of stratospheric-based communications in the 26 GHz band.”).

^{61/} See Qualcomm Comments at 14.

^{62/} See T-Mobile Comments at 18.

^{63/} Samsung Comments at 8 (citing Petition of Elefante Group, Inc., GN Dkt. No. 14-177, *et al.* (May 31, 2018)).

- Reject requests from airborne platform providers to limit UMFUS use of the 26 GHz band.

Respectfully submitted,

/s/ Steve B. Sharkey

Steve B. Sharkey

John Hunter

Christopher Wieczorek

T-MOBILE USA, INC.

601 Pennsylvania Avenue, N.W.

Suite 800

Washington, DC 20004

(202) 654-5900

September 28, 2018