

**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
)	
Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create Service Rules for the 42-43.5 GHz Band)	RM-11664
)	

REPLY COMMENTS OF VIASAT, INC.

ViaSat, Inc. (“ViaSat”) submits this reply to comments filed in the Commission’s *Notice of Inquiry* examining the possible use of frequency bands above 24 GHz for 5G terrestrial mobile radio services.¹

I. INTRODUCTION AND SUMMARY

In commencing this proceeding, the Commission has indicated that it seeks to foster innovation and develop a framework for a regulatory environment that can accommodate the “coalescence of technologies that could lead to the emergence of a new and radically more capable generation of wireless mobile service,” focusing on flexible service rules that “accommodate as wide a variety of services as possible.”² In its comments, ViaSat embraced this forward-looking perspective and asked the Commission to recognize the critical role that satellite technologies play today in the mobile wireless ecosystem, and to ensure that the growing consumer demand for satellite services, and the corresponding need for spectrum, is factored into this proceeding. ViaSat and a variety of other commenters detailed the existing investment of the satellite industry in the bands above 24 GHz that are the subject of the *Notice of Inquiry* (the

¹ *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services; Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create Service Rules for the 42-43.5 GHz Band*, GN Docket No. 14-177, RM-11664, Notice of Inquiry, FCC 14-154 (rel. Oct. 17, 2014) (“*Notice of Inquiry*”).

² *Id.* ¶¶ 13, 15.

“High-Band Spectrum”) and that are being considered for mobile wireless services.³ Among other things, ViaSat explained how terrestrial networks are not the only means by which mobile wireless traffic can be off-loaded from congested “low-band” mobile wireless networks. To the contrary, satellite broadband networks currently rely on access to part of the High-Band spectrum for the same purposes for which many other commenters urge that spectrum be made available for terrestrial “offloading” technologies.⁴

Specifically, satellite broadband networks operate today in the Ka band portion of the High-Band Spectrum, including the 27.5-28.35 GHz segment also designated for LMDS, making continued access to this band segment of paramount importance to satisfy the growing demands of consumers. And once the Ka band is fully saturated with satellite services, access to the V band will be essential, including the 37.5-40.0 GHz segment currently designated for shared use between fixed wireless and satellite.

In advocating for designating the LMDS band or the Ka or V band for their own uses (to the exclusion of other competitors), a number of commenters rely reflexively, and without any relevant technical analysis, on sharing paradigms that were developed as long as 20 years ago—well before technologies developed in the intervening period radically altered the potential for sharing between terrestrial and satellite services. Even a cursory review of the comments of leading technology companies such as Google, Motorola and Huawei reveals that interpretations

³ “High-Band Spectrum” in this reply refers to the frequency bands identified for consideration in the *Notice of Inquiry*: the 27.5-28.35 GHz, 29.1-29.25 GHz and 31.0-31.3 GHz portions of the Ka band; the 38.6-40 GHz, 37.0-38.6 GHz and 42.0-42.5 GHz portions of the V band; the 24.25-24.45 GHz and 25.05-25.25 GHz portions of the 24 GHz band; and the 57-64 GHz, 64-71 GHz, 71-76 GHz, and 81-86 GHz portions of the 60/70/80 GHz bands.

⁴ *See, e.g.*, Comments of T-Mobile USA, Inc., GN Docket No. 14-177, at 5 (filed Jan. 15, 2015) (“T-Mobile Comments”); Comments of CTIA – The Wireless Association, GN Docket No. 14-177, at 7 (filed Jan. 15, 2015) (“CTIA Comments”); Comments of Mobile Future, GN Docket No. 14-177, at 5 (filed Jan. 15, 2015) (“Mobile Future Comments”); Comments of Qualcomm Inc., GN Docket No. 14-177, at 5 (filed Jan. 15, 2015) (“Qualcomm Comments”); Comments of the Consumer Electronics Association, GN Docket No. 14-177, at 13 (filed Jan 15, 2015) (“CEA Comments”).

of existing band plans that would constrain the wide deployment of small FSS terminals in these band segments have no legitimate basis in today's world.

It is in part in recognition of these new technologies and sharing possibilities that the Commission has moved toward policies that promote the shared use of certain spectrum to enable opportunistic uses where feasible. Thus, ViaSat urges the Commission to consider and thereby ensure that satellite uses of these band segments can continue to develop to meet the growing demands of consumers, even should the Commission decide at some time to introduce 5G mobile services in portions of that spectrum.

II. TECHNOLOGY DEVELOPMENTS SHOULD DRIVE THE SHARING PARADIGM IN SHARED BANDS

A. Currently Available Technology Renders Obsolete Previously Adopted Limitations on Use of the LMDS band and 37.5-40.0 GHz

Should the Commission proceed further in this proceeding, it will be essential for the Commission to undertake a thorough examination of the technical characteristics of the current and proposed uses for the LMDS band and the 37.5-40.0 GHz band by both terrestrial and satellite technologies. In doing so, ViaSat urges that the Commission reevaluate any historical notions about the ability of such services to coexist in those band segments. In particular, although the Commission's current designations in the 27.5-28.35 GHz portion of the LMDS band and the 37.5-40.0 GHz portion of the V band (which are shared with terrestrial services) are focused on "gateway-type" satellite earth stations, such a limitation is not the only way to facilitate coexistence in those band segments today. Contrary to the views of a number of commenters (discussed in more detail below), the sharing techniques available today no longer require the perpetuation of such designations, which needlessly hamper the more-intensive use of spectrum that is critically needed to increase the capacity of satellite networks and thus serve the needs of consumers.⁵

⁵ See, e.g., Comments of EchoStar Satellite Operating Corporation, Hughes Network Systems, LLC, and Alta Wireless, Inc., GN Docket No. 14-177, at 19-20 (filed Jan. 15, 2015) ("EchoStar Comments") (the projected growth in satellite broadband in the Ka

In order to fully respond to the arguments raised by some commenters, some historical context is helpful. The Commission’s Ka-band band plan from 1996 designated the LMDS band for only certain satellite uses based on perceptions at the time about the feasibility of sharing between widely-deployed satellite earth stations and LMDS receivers.⁶ Specifically, the Commission attempted to identify a class of earth stations with reference to the ability to coordinate with LMDS operations and not with respect to the functionality of those terminals.⁷ In the negotiated rulemaking process that preceded that decision, the industry committee (“28 GHz Committee”) formed to develop negotiated proposed rules for satellite and LMDS services in parts of the Ka band was not able to agree on commercially acceptable terms by which widely deployed FSS earth stations and LMDS systems could share spectrum throughout the same geographic areas.⁸

Notably, the 28 GHz Committee identified a number of techniques that could enable sharing of widely deployed FSS transmitters with LMDS receivers, including cognitive radio technologies and mitigation techniques, such as FSS monitoring of LMDS transmissions before transmitting and requiring a database of LMDS subscribers to be maintained.⁹ In fact, certain participants in that proceeding advocated for rules that permitted sharing between widely deployed FSS terminals and LMDS based on these technologies.¹⁰ Unfortunately, the 28 GHz

band supports the need for greater access to Ka band spectrum for both gateway and user terminals).

⁶ *Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission’s Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, First Report and Order, 11 FCC Rcd 19005 ¶ 10 (1996) (“28 GHz First Report and Order”).

⁷ *See id.* ¶ 10, n.13.

⁸ Report of the LMDS/FSS 28 GHz Band Negotiated Rulemaking Committee, CC Docket No. 92-297, at 85 (dated Sept. 23, 1994, filed Nov. 9, 1994) (“Committee Report”).

⁹ Committee Report at 43, 45.

¹⁰ *28 GHz First Report and Order* ¶¶ 26, 27, n.39, 41; *see also Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission’s Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, CC Docket No. 92-297, Third Notice of Proposed Rulemaking, FCC 95-287 ¶ 40 (rel. July 28, 1995).

Committee did not come to agreement on those types of techniques for a variety of reasons, ranging from the fact that the negotiated rulemaking process “timed out,” to concerns about the commercial viability of those approaches in 1996. Wisely, the Commission kept the door open for the future—acknowledging that sharing technologies could develop to the point of allowing terrestrial and satellite operations to co-exist in the LMDS band, even on a ubiquitous basis.¹¹

Similarly, the Commission’s V-band band plan designated the 37.5-40.0 GHz portion of the V band for gateway-type earth stations, in order to reduce the number of earth stations that would require protection from wireless uses also designated for that band.¹² Such a designation no longer is necessary in circumstances where earth stations are able to make opportunistic uses of this spectrum band without impeding terrestrial operations.

As with the LMDS band, advanced sharing techniques and antenna technologies exist today that enable productive sharing in the 37.5-40.0 GHz band as well.¹³ For these reasons, ViaSat submits that the time is ripe to revamp the sharing paradigm that applies in those band segments.

B. Sharing Technologies Can Enable Compatibility of New and Existing Uses in the High-Band Spectrum

As ViaSat explained in its comments, while satellite broadband networks need access to a “core” of dedicated spectrum, “opportunistic” access to additional spectrum would facilitate the commitment of satellite broadband operators to continue to respond to the evolving definition of “broadband” and underlying consumer demand. For satellite systems, “opportunistic” access to additional spectrum is necessary to support increased capacity to ensure that satellite broadband providers can continue to provide a service that is “reasonably comparable” to that offered by

¹¹ *28 GHz First Report and Order* ¶ 27 (regarding co-frequency sharing between ubiquitously deployed FSS and LMDS terminals, “if future technology becomes available to facilitate this type of sharing we would consider revisiting this conclusion”).

¹² *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*, Second Report and Order, 18 FCC Rcd 25428 ¶ 32 (2003).

¹³ *See, e.g.*, Comments of Ericsson Inc., GN Docket No. 14-177, at 38 (filed Jan. 15, 2015).

other technologies, as well as to meet the Commission’s challenge for providers to offer higher broadband speeds to meet consumer demands.¹⁴

Given the pressing demand for continued access to the LMDS band and the 37.5-40.0 GHz band by satellite networks, ViaSat supports the commenters that acknowledge the need for broad access to these bands for satellite services.¹⁵ In light of this demand, ViaSat also endorses the views of those who urge that 5G mobile operations not be introduced in these bands without considering the existing services for which the bands are allocated.¹⁶ In that respect, ViaSat agrees with commenters that underscore the importance of ensuring that the introduction of 5G services does not preclude existing uses from continuing operations or stifle future growth, particularly in the LMDS band where satellite operators have made investments of billions of dollars.¹⁷

ViaSat’s recommendation that the LMDS band and the 37.5-40.0 GHz portion of the V band be considered for such opportunistic uses is based on same types of factors that other

¹⁴ *See Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act*, GN Docket No. 14-126, 215 Broadband Progress Report and Notice of Inquiry on Immediate Action to Accelerate Deployment, FCC 15-10 (rel. Feb. 4, 2015) (revising the definition of “broadband” to require actual download speeds of at least 25 Mbps and actual upload speeds of at least 3 Mbps).

¹⁵ *See, e.g.*, Comments of Inmarsat, GN Docket No. 14-177, at 4 (filed Jan. 15, 2015) (“Inmarsat Comments”) (LMDS bands can be expected to be used more extensively by satellite networks, include for user terminals through coordination); CEA Comments at 9 (acknowledging the importance of other uses including satellite); Comments of the Telecommunications Industry Association, GN Docket No. 14-177, at 3-4 (filed Jan. 15, 2015) (urging consideration of the expansion and innovation of existing services); EchoStar Comments at 12 (the Commission should allow spectrum flexibility for existing licensees).

¹⁶ *See, e.g.*, Comments of Motorola Mobility LLC, GN Docket No. 14-177, at 7 (filed Jan. 15, 2015) (“Motorola Comments”); Qualcomm Comments at 14.

¹⁷ EchoStar Comments at 20 (ensure that 5G services do not restrain the growth of existing services); *see also* Comments of Avanti Communications Group plc, GN Docket No. 14-177, at 2 (filed Jan. 15, 2015) (“Avanti Comments”); Comments of O3b Limited, GN Docket 14-177, at 4 (“O3b Comments”) (emphasizing the global investments in Ka band made by GSO and NGSO FSS systems).

commenters recognize as relevant to spectrum sharing in their comments.¹⁸ Specifically, a number of commenters correctly recognize that propagation characteristics make these bands ideal for line-of-sight operations, and that highly directional antennas are easy to protect with limited interference risk.¹⁹ Commenters also recognize that dynamic shared access to spectrum, including Licensed Shared Access or Authorized Shared Access techniques, as well as unlicensed deployments, can facilitate the shared use of spectrum in the same geographic area.²⁰ Such techniques, as well as location cognitive radio technologies and database management, can be used to facilitate shared use by satellites as well.²¹ Regardless whether these types of sharing techniques were mature when the band plans for the Ka band and the V band first were adopted, the fact remains that they are readily available today, and in fact have been endorsed by the Commission as an essential means of making more intensive use of spectrum. Indeed, in other contexts, the Commission has developed operating and service rules based on these sharing capabilities.

For instance, unlicensed devices operating in the TV White Spaces are required to employ geo-location/database access and spectrum sensing capabilities that enable the device to

¹⁸ See, e.g., Comments of Google Inc., GN Docket No. 14-177, at 4 (filed Jan. 15, 2015) (“Google Comments”); Comments of National Cable & Telecommunications Association, GN Docket No. 14-177, at 4 (filed Jan. 16, 2015) (corrected version) (“NCTA Comments”); Comments of the Wireless Innovation Forum, GN Docket No. 14-177, at 4 (filed Jan. 15, 2015) (“WIF Comments”).

¹⁹ See Google Comments at 8; see also Comments of Marcus Spectrum Solutions, GN Docket No. 14-177, at 5 (filed Jan 15, 2015) (sharing is easier in the mmW bands because of the high path loss and the ability to build small antennas that are very directional in this spectrum.); Qualcomm Comments at 9 (narrow beamwidths can make sharing possible with incumbents); Comments of Huawei Technologies, Inc. (USA) and Huawei Technologies, Ltd., GN Docket No. 14-177, at 15 (filed Jan. 15, 2015) (“Huawei Comments”) (coordination of spectrum assignments and use among incumbent users and new mobile services will be aided by the rapid deterioration of signal strengths in the local clutter or indoor environments).

²⁰ See, e.g., Motorola Comments at 9; Qualcomm Comments at 8; Huawei Comments at 15.

²¹ See, e.g., EchoStar Comments at 24.

listen for and identify the presence of signals from other transmitters.²² In addition, and as a number of commenters recommend, it may be possible to enable opportunistic satellite uses of these bands based on the type of tiered dynamic access approach that is being developed for the 3.5 GHz Citizens Broadband Radio Service.²³ Under this approach, a multi-tiered shared access approach would be managed by a spectrum access system consisting of a dynamic database and possibly other interference mitigation techniques.²⁴ Three tiers of users could exist in the band with varying levels of protection priority: (i) licensed operations that receive protection, (ii) licensed opportunistic (non-interfering, secondary uses); and (iii) general unlicensed uses.²⁵ ViaSat recommends that these techniques be considered in this proceeding, including an assessment of the impact on both existing and planned uses of the LMDS band and the 37.5-40.0 GHz portion of the V band.

Moreover, it is not sufficient to maintain the *status quo* and keep segments of the High-Band Spectrum locked up by a small number of incumbent users, as some commenters suggest. Particularly given the lack of facilities deployment by terrestrial licensees in the LMDS, 24 GHz and 39 GHz bands, proposals for these bands should not be driven by a small number of remaining licensees that seek to monetize their hold on this underutilized spectrum. Access by others is the fastest path to enabling robust use of these bands,²⁶ thereby maximizing efficient use of scarce spectrum resources.²⁷ Given the feasibility of sharing and the opportunities for making more intensive and efficient use of spectrum, the Commission should reject calls to designate

²² See Google Comments at 4; see also *Unlicensed Operation in the TV Broadcast Bands*, Second Report and Order, 23 FCC Rcd 16807 ¶¶ 72, 125 (2008); see also 47 C.F.R. §§ 15.711, 15.713.

²³ See, e.g., T-Mobile Comments at 8; WIF Comments at 4; Google Comments at 5-6.

²⁴ *Amendment of the Commission's Rules with Regard to the Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354, Notice of Proposed Rulemaking and Order, FCC 12-148 ¶ 7 (rel. Dec. 12, 2012).

²⁵ *Id.* ¶¶ 8-10.

²⁶ Google Comments 7-8 (noting that satellite and LMDS share spectrum today).

²⁷ NCTA Comments at 4; see also Avanti Comments at 2; O3b Comments at 9 (satellite networks already are designed to efficiently share spectrum with many other users and each other).

these bands for exclusive uses by terrestrial interests, or maintain legacy sharing paradigms that have been made obsolete by technological advancements.

C. An Outdated View of Sharing Capabilities Colors Certain Comments

The record contains a small number of commenters proposing to exclude certain services on a wholesale basis and oppose sharing in the LMDS band or the 37.5-40.0 GHz band, in some cases even with services that currently operate in those band segments today. These commenters assert that 5G operations should be categorically excluded because of existing uses of certain portions of the High-Band Spectrum, without any supporting technical demonstration that sharing would be infeasible.²⁸ Moreover, although ViaSat agrees that certain satellite operations in the 27.5-28.35 GHz band should be afforded protection,²⁹ as reflected in ViaSat's comments, ViaSat believes it is equally important that the Commission enable opportunistic access to this spectrum by other types of satellite operations. As discussed above, advanced sharing techniques have dramatically changed the sharing environment that formed the basis for the paradigm reflected in the Commission's 1996 band plan decision, and it is time for the Commission to revisit this issue, as it indicated it would do based on technological developments.

ViaSat opposes Straight Path's proposal to remove the FSS allocation in the 39 GHz band altogether and instead make this band available for mobile use.³⁰ Underlying this proposal is Straight Path's erroneous presumption that "it is not technically feasible for mobile services to coexist with FSS operations in the same geographic area."³¹ Straight Path's assertion that this band is not needed for satellite because there are not currently licensed systems is inconsistent

²⁸ See, e.g., Comments of XO Communications, LLC, GN Docket No. 14-177, at 7 (filed Jan. 15, 2015) (opposing any 5G operations in any existing licensed area above 24 GHz, even on dynamic sharing terms).

²⁹ See EchoStar Comments at 24; Joint Comments of SES Americom, Inc., Intelsat Corporation, O3b Networks USA LLC, and Inmarsat, Inc., GN Docket No. 14-177, at 2 (filed Jan. 15, 2015).

³⁰ See Comments of Straight Path Communications, Inc., GN Docket No. 14-177, at 19-20 (filed Jan. 15, 2015) ("Straight Path Comments").

³¹ *Id.* at 20.

with the long-lead time required for planning the construction and launch of a satellite network, and the need for access to this band as detailed in the comments of the Satellite Industry Association and ViaSat.³² This band is slated for use as an expansion band for Ka band broadband satellite systems, and satellite operators have commenced plans for next-generation networks on the availability of V-band spectrum.³³ Thus, ViaSat urges the Commission to maintain the designation in the V band for satellite use.

ViaSat urges the Commission to refrain from grounding any determinations on unsubstantiated views about the prospects for coexistence of different services. As is to be expected at this early stage in this proceeding, significant analysis and sharing studies need to be conducted before any such matters can be fully addressed.

III. CONCLUSION

For the foregoing reasons and as set forth in its Comments in this proceeding, ViaSat urges the Commission to consider the availability of advanced sharing techniques that can make greater levels of coexistence possible among satellite and wireless services in the LMDS bands and the 37.5-40.0 GHz segment of the V band. The proposals developed in this proceeding regarding these bands should be free from the constraints of the outdated sharing paradigms adopted decades ago.

Respectfully submitted,

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³² See, e.g., Comments of the Satellite Industry Association, GN Docket No. 14-177, at 4, 8-9 (filed Jan. 15, 2015).

³³ See, e.g., *id* at 9; EchoStar Comments at 20, 25; Inmarsat Comments at 6.