

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)
)
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) IB Docket No. 97-95
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)

COMMENTS OF VIASAT, INC.

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COMMENTS OF VIASAT, INC.

ViaSat, Inc. (“ViaSat”) hereby responds to the *Notice of Proposed Rulemaking* (“*NPRM*”) adopted by the Commission on October 29, 2010 in the above-referenced proceeding. The *NPRM* proposes several measures intended to increase the availability of spectrum for satellite-based services at 37.5-42.5 GHz in the V band. More specifically, the *NPRM* proposes to: (i) add a new primary allocation for Fixed-Satellite Service (“FSS”) downlinks at 42.0-42.5 GHz in lieu of the existing allocations for the Broadcasting Satellite Service (“BSS”) and Broadcasting Service; (ii) adopt measures to allow forthcoming FSS systems to protect Radio Astronomy Service (“RAS”) facilities at 42.5-43.5 GHz; (iii) adopt new measures to facilitate coordination between Fixed Service (“FS”) stations and FSS earth station licensees at 37.5-40.0 GHz and 42.0-42.5 GHz; and (iv) adopt rules to enable FSS satellite downlink signals to compensate for rain fade at 37.5-40.0 GHz. ViaSat appreciates the opportunity to comment on these proposals, and looks forward to working with the Commission to ensure that V-band spectrum is utilized effectively to support next-generation satellite broadband networks.

I. INTRODUCTION AND SUMMARY

The V band promises to provide much-needed expansion capacity for the satellite broadband networks that are currently being deployed in the Ka band. Critically, these networks will be well-suited to provide broadband service to the seven million households that the Commission has estimated are unserved by terrestrial broadband networks. Thus, the effective development of the V band will advance the Commission's objectives under the *National Broadband Plan*.¹

ViaSat's current efforts in the Ka band, where it is authorized to deploy two new, state-of-the-art Ka-band spacecraft to serve the United States, demonstrate the company's willingness and ability to devote considerable resources to ensure that available spectrum is utilized fully for the benefit of the public. Notably, the innovative ViaSat spacecraft design yields capacity that is approximately 50-100 times greater than traditional Ku-band FSS satellites, and approximately 10-15 times greater than the highest capacity Ka-band satellites in use today. The first of these spacecraft, ViaSat-1, will be launched in early 2011, and the second can be launched by mid-2014. Thus, ViaSat will soon start to transform the nature of today's satellite-delivered broadband service by offering the highest speeds and best quality of broadband service ever offered by a satellite platform, at prices and performance levels that are competitive with many terrestrial alternatives. Other companies are doing the same in other parts of the world, and are certain to follow the example set by ViaSat and the United States.

ViaSat views the V band as an untapped resource that can and should be used to support satellite broadband and other high-throughput services. Sensible rules for the sharing of V-band spectrum are critical to the implementation of these services, and the advancement of the goals set forth by the Commission in the *National Broadband Plan*.

¹ Omnibus Broadband Initiative, *CONNECTING AMERICA: THE NATIONAL BROADBAND PLAN* (2010) ("*National Broadband Plan*").

Thus, ViaSat applauds the Commission's efforts to develop further the regulatory framework governing the V band through the *NPRM*.

In particular, ViaSat supports the Commission's efforts to facilitate the use of V-band spectrum by FSS operators by creating a new FSS downlink allocation in the 42.0-42.5 GHz band. The ability to utilize more spectrum on a given spacecraft would make it possible for FSS operators to offer improved service to a larger number of end users at a lower cost per bit.

In order to increase further the value of V-band spectrum for FSS, ViaSat requests that the Commission also add a footnote to the Table of Allocations making it clear that mobile satellite terminals operating throughout the V band are applications of the FSS, and therefore entitled to primary status to the extent that they are no more interfering than and no more susceptible to interference than a standard "fixed" earth station operating in the band, and would not increase unduly the coordination burden placed on FS operators. This measure would expand the potential uses of V-band spectrum and offer significant public interest benefits, without harming other users of the band. This approach should be adopted both in the FSS downlink band at 37.5-42.5 GHz and the FSS uplink band at 48.2-50.2 GHz.

ViaSat supports the Commission's efforts to facilitate coordination between FSS earth station licensees and FS operators in the 37.5-40.0 GHz and 42.0-42.5 GHz bands. However, because satellite earth stations would not transmit in these bands, but rather would only receive downlinks from separately licensed spacecraft, ViaSat urges the Commission to clarify that such coordination is required by an FSS earth station licensee only to the extent that it wishes to receive interference protection. Similarly, the Commission should clarify that any restrictions on the deployment of individual, consumer-type FSS user terminals at 37.5-40.0 GHz or 42.0-42.5 GHz apply only to the extent that the FSS earth station licensee

wishes to claim interference protection from FS operations, and that the use of such terminals on a non-interference basis is permitted in the absence of individual coordination.

While ViaSat understands the goal of protecting RAS and FS operations from harmful interference, ViaSat believes that the strict PFD limits set forth in the *NPRM* would unduly constrain the ability of FSS operators to design and implement innovative V-band systems, without providing material benefits to the public. Instead, modifying these proposals so that they establish “default” rules, and allowing an appropriate technical showing to the Commission in lieu of complying with such limits, would increase FSS flexibility without harming other licensees. Accordingly, ViaSat urges the Commission to: (i) permit FSS satellite operators to exceed “default” out-of-band power-flux density (“PFD”) limits if they demonstrate that they will protect RAS operations through appropriate system design; and (ii) permit FSS satellite operators to increase PFD levels to compensate for rain fade in the 37.5-40.0 GHz band, without first using non-power ameliorative measures, if they demonstrate that such increase would not create an additional risk of harmful interference into FS operations.

II. THE COMMISSION SHOULD AMEND THE U.S. TABLE OF ALLOCATIONS TO PROVIDE ADDITIONAL FLEXIBILITY IN DESIGNING AND IMPLEMENTING FSS V-BAND NETWORKS

A. Adopting the Proposed FSS Allocation at 42.0-42.5 GHz Would Speed the Delivery of Broadband Services to the Public

The *NPRM* proposes to add a new primary allocation for FSS downlinks in the 42.0-42.5 GHz band, consistent with the international allocation for the band.² ViaSat agrees that this allocation would provide much-needed spectrum for FSS operations, which could be leveraged to increase further the capacity available for the provision of advanced telecommunications and broadband services to the public. The ability to utilize more spectrum on a given spacecraft would result in increased throughput and a decreased cost per

² *NPRM* ¶ 17.

bit transmitted, making it possible for FSS operators to offer improved service to a larger number of end users, and better quality service for a given price. This result would facilitate the efforts of FSS operators to serve the seven million homes estimated by the Commission as currently lacking broadband service from terrestrial alternatives, consistent with the goals of the *National Broadband Plan*. As such, ViaSat sees no reason *not* to align the domestic and international Tables of Allocation in this fashion.

As the *NPRM* acknowledges, FSS systems should be able to operate within the technical limitations necessary to protect adjacent RAS operations from harmful interference.³ The architecture of modern FSS systems also will facilitate sharing with FS operators. Notably, modern FSS systems typically utilize spot-beam technologies to facilitate increased reuse of downlink spectrum and maximize system capacity. Because spot beams are relatively narrow in geographic scope, FSS operators can position those beams to avoid RAS sites and minimize the potential for interference into those sites. Of course, the Commission could verify as much through the satellite licensing process.

ViaSat takes no position with respect to the proposed deletion of the BSS and Broadcasting allocations at 42.0-42.5 GHz. However, ViaSat notes that many of today's direct-to-home ("DTH") satellite video services could be provided under the proposed FSS allocation, as they are presently in the Ka band, provided they utilize appropriate system architectures to protect RAS operations.

B. The Commission Should Clarify that Mobile Satellite Terminals Are Applications of the Fixed-Satellite Service in the V Band

In order to increase further the value of V-band spectrum for FSS, the Commission also should add a footnote to the Table of Allocations making clear that mobile satellite terminals (*i.e.*, earth stations on vessels, vehicle-mounted earth stations, and aircraft earth stations) operating anywhere within the V band are applications of the FSS, and

³ *Id.* ¶ 18.

therefore entitled to primary status to the extent that they are no more interfering than, and no more susceptible to interference than, a standard “fixed” earth station operating in the band. This footnote should cover both the FSS downlink band at 37.5-42.5 GHz and the FSS uplink band at 48.2-50.2 GHz.

Such treatment would promote the efficient use of spectrum and help to meet the growing demand for two-way mobile broadband capabilities, consistent with the priorities established by the *National Broadband Plan*, by offering a less restrictive operating environment with greater (*i.e.*, primary) regulatory rights. In addition, authorizing such terminals to operate on a primary basis would be consistent with the growing trend toward mobile applications of the FSS allocation in other bands, and would provide certainty to support needed investment.⁴ That being said, ViaSat recognizes that such terminals may need to operate on an unprotected basis in certain geographic areas so as not to increase unduly the coordination burden placed on FS operators.

Treating ubiquitous mobile satellite terminals in the V band as applications of the FSS need not increase the potential for harmful interference. The Commission can ensure through its licensing procedures that such terminals are no more interfering than, and no more susceptible to interference than, a standard “fixed” earth station operating in the band in a two-degree-compatible manner. Further, antennas employing spread spectrum technologies would present virtually no threat of interference even where deployed in a ubiquitous fashion.⁵ In short, increasing the efficiency with which V-band is used by authorizing mobile

⁴ See, *e.g.*, *Amendment of Parts 2 and 25 of the Commission’s Rules to Allocate Spectrum and Adopt Service Rules and Procedures to Govern the Use of Vehicle-Mounted Earth Stations in Certain Frequency Bands Allocated to the Fixed-Satellite Service*, Report and Order, 24 FCC Rcd 10414 (2009); *Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz/3700-4200 MHz Bands and 14.0-14.5 GHz/11.7-12.2 GHz Bands*, Report and Order, 20 FCC Rcd 674 (2005); Order on Reconsideration, 24 FCC Rcd 10369 (2009).

⁵ See, *e.g.*, Comments of ViaSat, Inc., IB Docket No. 07-101, at 5 (Aug. 17, 2007).

operations would offer significant public interest benefits without harming other uses of the band.

III. THE COMMISSION SHOULD CLARIFY THAT COORDINATION REQUIREMENTS AND TERMINAL-TYPE RESTRICTIONS APPLY ONLY TO THE EXTENT THAT A FSS EARTH STATION LICENSEE SEEKS INTERFERENCE PROTECTION

A. The Commission Should Require FSS Earth Station Licensees and FS Operators to Coordinate Only to the Extent that They Seek Interference Protection in the 37.5-40.0 GHz and 42.0-42.5 GHz Bands

The *NPRM* seeks comment on the “criteria for coordination between FSS gateway earth stations and FS stations in the 37.5-40.0 and 42.0-42.5 GHz bands.”⁶ As an initial matter, though, these bands are allocated for FSS downlinks, and FSS earth stations would receive transmissions, but would not transmit, in these bands. Consequently, those earth stations themselves would pose no threat of harmful interference to FS stations, and coordination would serve only to provide the FSS earth station licensee with interference protection. Accordingly, the Commission should clarify that a FSS earth station licensee must engage in coordination with a FS licensee only to the extent that the FSS earth station licensee is entitled to, and seeks, such protection. To the extent that the FSS earth station licensee is willing to forego such protection, it also should be able to forego coordination.

B. The Commission Should Clarify that Individual, Consumer-Type FSS User Terminals May Operate at 37.5-40.0 GHz on a Non-Conforming Basis

The *NPRM* notes that footnote 15 to Section 25.202(a)(1) of the Commission’s rules restricts FSS operations in the 37.5-40.0 GHz downlink band to “gateway” earth stations—*i.e.*, earth stations deployed at installations or corporate campuses, and not used by individual consumers.⁷ However, the *V Band Second Report and Order* makes clear that the Commission intended that footnote not as an absolute restriction on the ability of FSS earth

⁶ *NPRM* ¶ 26.

⁷ *Id.*; 47 C.F.R. § 25.202(a)(1) n.15.

station licensees to deploy individual, consumer-type user terminals at 37.5-40.0 GHz, but rather as a restriction “on the type of earth station that will receive interference protection from fixed terminals” in the band.⁸ The *NPRM* echoes this theme, noting that FSS operators may operate on a non-protected basis at their own risk “so as not [to] hinder the deployment of ubiquitous fixed service operations”⁹

To eliminate any uncertainty, though, the Commission should clarify that individual, consumer-type FSS user terminals may operate at 37.5-40.0 GHz on an unprotected, non-interference basis, without first coordinating with or obtaining the consent of any FS licensee.¹⁰ At a minimum, the Commission should clarify that FSS earth station licensees may seek authority to deploy individual, consumer-type user terminals at 37.5-40.0 GHz on a non-conforming basis by requesting a waiver of footnote 15. Notably, the Commission has acknowledged that such waivers are appropriate to permit the operation of non-conforming FSS earth stations where (i) such earth stations would only receive transmissions in the relevant band, and thus would not be capable of causing interference into FS operations and (ii) the FSS earth station licensee agrees to accept any level of interference

⁸ *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, at ¶ 32 (2003) (“*V Band Second Report and Order*”).

⁹ *NPRM* ¶ 26.

¹⁰ The *V Band Second Report and Order* suggests that a licensee deploying “non-protected earth stations” would need “the express agreement from the affected Part 101 EA licensees prior to the deployment of the earth stations.” *V Band Second Report and Order* at ¶ 32. However, no such requirement is found in the Commission’s rules. Moreover, because FSS earth stations would receive, and not transmit, in the 37.5-40.0 GHz band, those stations would not “affect” any FS operator unless they sought interference protection. Requiring FSS earth station licensees to obtain the FS operator’s consent under these circumstances, in the absence of any potential for adverse impact to FS operations, would provide the FS operator with an unwarranted and unprecedented veto right over a secondary, non-conforming use.

from FS operations.¹¹ As the Commission has recognized in the years following the adoption of the *V Band Second Report and Order*, under such circumstances the ubiquitous deployment of FSS earth stations would not place any additional coordination burden upon FS operators, or restrict their ability to expand service in the future.¹² The Commission should follow suit with respect to FSS operations at 37.5-40.0 GHz.

C. The Commission Should Clarify that FSS User Terminals May Operate at 42.0-42.5 GHz, Consistent with the Proposed Primary FSS Allocation

As noted above, the *NPRM* seeks comment on the criteria for coordination applicable to “FSS gateway earth stations . . . in the . . . 42.0-42.5 GHz band[.]” Curiously, though, the *NPRM* does not seek comment on the criteria for coordination applicable to FSS user terminals in the 42.0-42.5 GHz band. ViaSat notes that there currently is no rule restricting the use of the 42.0-42.5 GHz band to FSS gateway earth stations, and none is proposed in the *NPRM*.¹³ To the contrary, the *NPRM* proposes a new FSS allocation at 42.0-42.5 GHz, without qualification. Accordingly, the Commission should clarify that any coordination criteria it adopts for the 42.0-42.5 GHz band will apply to coordination between FSS earth stations, including both user terminals and gateway facilities, and FS stations. At a bare minimum, and for the reasons discussed above, the Commission should clarify that FSS operators may deploy individual, consumer-type user terminals at 42.0-42.5 GHz without first coordinating if they are willing to operate on a non-interference basis.

¹¹ See, e.g., *PanAmSat Licensee Corp.*, Order and Authorization, 20 FCC Rcd 14642, at ¶ 9 (2005) (granting waiver of NG104 to permit provision of domestic service in the extended Ku band receive bands used by terrestrial microwave links).

¹² *Id.* See also *EchoStar KuX Corporation*, Order and Authorization, 20 FCC Rcd 919, at ¶ 9 (2004); *EchoStar Satellite LLC*, Order and Authorization, 20 FCC Rcd. 930 (2004); *EchoStar KuX Corporation*, Order and Authorization, 20 FCC Rcd 942 (2004).

¹³ Moreover, no such restriction would be appropriate. Once the FSS spacecraft’s PFD levels are set—and approved by the Commission through the application process—the nature of the earth stations on the ground has no bearing on the interference potential of the spacecraft into FS operations.

IV. THE COMMISSION SHOULD PERMIT FSS OPERATORS TO EXCEED “DEFAULT” PFD LIMITS FOLLOWING AN APPROPRIATE SHOWING

A. The Commission Should Permit FSS Operators at 42.0-42.5 GHz to Demonstrate that Restrictive Power and PFD Limits Are Unnecessary to Protect Adjacent RAS Operations at 42.5-43.5 GHz

The *NPRM* seeks comment on whether and how FSS operations in the 42.0-42.5 GHz band should be limited in order to protect adjacent RAS operations in the 42.5-43.5 GHz band. While ViaSat appreciates the Commission’s desire to prevent FSS operations from causing harmful interference into RAS facilities, ViaSat urges the Commission to recognize that placing *unnecessary* limitations on FSS operations in the 42.0-42.5 GHz band would harm the ability of FSS operators to deploy broadband services to the public.

As the Commission itself recognizes, modern FSS systems typically utilize narrow spot beams to communicate with earth stations.¹⁴ Far from representing a technological constraint, the use of these spot beams facilitates increased frequency reuse and system capacity. Spot beams also give the operator the flexibility to avoid illuminating a given terrestrial point in a given frequency range. As such, a FSS operator could design its system to avoid illuminating RAS facilities in the 42.0-42.5 GHz band, while still using those frequencies elsewhere to support network operations, and while using other frequency bands to serve the area around the RAS facilities. The Commission, and NTIA, would have the opportunity to review the FSS operator’s proposed spot beam plan during the application process to confirm that RAS facilities would be adequately protected.

ViaSat recognizes that not all FSS systems would be able to protect RAS facilities through the use of spot-beam technologies, and that “default” out-of-band PFD limits are desirable for such systems. The PFD limits set forth in footnote 5.551I to the International Table of Frequency Allocations certainly would be sufficient to protect RAS operations from harmful interference. That being said, the Commission should permit FSS

¹⁴ *NPRM* ¶ 24.

operators to demonstrate their ability to protect RAS sites through appropriate system design before subjecting them to the out-of-band PFD limits set forth in either footnote 5.551I or 5.551H. Similarly, the Commission should permit FSS operators to exceed those PFD limits if higher limits are coordinated with adjacent RAS facilities.¹⁵

B. The Commission Should Permit FSS Operators in the 37.5-40.0 GHz Band to Demonstrate that They Can Increase PFD Levels Without Creating a Risk of Harmful Interference into FS Operations

The *NPRM* proposes to require FSS operators in the 37.5-40.0 GHz band to take ameliorative measures other than raising the PFD of the satellite signal to compensate for signal attenuation due to rain before they may increase PFD.¹⁶ Among the non-power ameliorative measures identified by the *NPRM* are: (i) changing to more robust modulation schemes; (ii) increasing channel coding; and (iii) reducing data throughput.¹⁷ More specifically, the Commission proposes to require FSS operators whose systems suffer from rain fade to apply non-power ameliorative measures to a level of X dB, where X depends upon the rain rate at the location of the earth station, after which FSS operators would be permitted to increase PFD up to 12 dB to compensate for additional rain fade.¹⁸

ViaSat is still in the process of reviewing the particulars of the Commission's proposal. However, ViaSat views the general approach proposed in the *NPRM* as a sensible one *where an increase in PFD would pose a threat of harmful interference into FS operations*. In such cases, the use of non-power ameliorative measures could permit FSS operators to overcome rain fade without increasing PFD into FS operations, or creating an increased risk of harmful interference.

¹⁵ See *Row 44, Inc.*, Order and Authorization, 24 FCC Rcd 3042 (2009).

¹⁶ *NPRM* ¶ 30.

¹⁷ *Id.* ¶ 36.

¹⁸ *Id.* ¶ 38.

As the Commission recognizes, though, the use of non-power ameliorative measures necessarily results in a reduction in FSS system capacity.¹⁹ ViaSat submits that this capacity reduction can be justified only where and to the extent that increasing PFD would create an additional risk of harmful interference into FS operations. Where increasing PFD would cause no such additional risk, the loss in FSS system capacity—and the ability of FSS operators to provide advanced telecommunications and broadband services to the public—is simply unacceptable. Notably, FSS operators can design their systems to mitigate such risk. For example, the Commission itself acknowledges in the *NPRM* that FSS operators can configure their spot beams to minimize the impact of higher PFD levels on FS stations.²⁰

ViaSat urges the Commission to afford FSS operators the flexibility to design their systems in a manner that will minimize—or obviate altogether—the need to rely upon non-power ameliorative measures in order to protect FS stations. More specifically, FSS operators should be permitted to demonstrate to the Commission that they can raise PFD levels without causing a threat of harmful interference into FS stations. Where higher PFD levels would pose such a threat, FSS operators should have the flexibility to implement any combination of non-power ameliorative measures to the extent necessary to mitigate the actual threat of interference into FS operations.

V. CONCLUSION

For the reasons set forth herein, ViaSat urges the Commission to: (i) add the proposed FSS allocation at 42.0-42.5 GHz; (ii) add a footnote to the Table of Allocations clarifying that mobile satellite terminals are applications of the FSS in the V band; (iii) require FSS earth station licensees to coordinate with FS operators only to the extent that they seek interference protection in the 37.5-40.0 GHz and 42.0-42.5 GHz bands; (iv) clarify that

¹⁹ *Id.* ¶ 36.

²⁰ *Id.* ¶ 51.

FSS user terminals may operate at 37.5-40.0 GHz on a non-conforming basis, and at 42.0-42.5 GHz consistent with the proposed primary FSS allocation; (v) permit FSS operators at 42.0-42.5 GHz to demonstrate that restrictive power and PFD limits are unnecessary to protect RAS; and (vi) permit FSS operators at 37.5-40.0 GHz to demonstrate that they can increase PFD levels without causing interference into FS operations.

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