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,	)	IB Docket No. 97-95
40.5-41.5 GHz and 48.2-50.2 GHz Frequency	)	
Bands; Allocation of Spectrum to Upgrade Fixed	)	RM-8811
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	)	
	)	

COMMENTS OF THE BOEING COMPANY

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SUMMARY

The Boeing Company ("Boeing") respectfully submits these comments in response to the Commission's Further Notice of Proposed Rulemaking ("FNPRM") regarding the development of spectrum resources in the 36-51 GHz band ("V-band"). The instant proceeding provides a timely opportunity for the Commission to take additional steps to improve its rules and spectrum policies for satellite services, as well as to promote the efficient development of "frontier" spectrum resources.

In particular, the Commission should re-evaluate its proposed division of spectrum resources between satellite and non-satellite uses in light of factual developments since the Commission's last examination in this proceeding. Recent bankruptcies of wireless service operators and the waning interest of the leading proponent of High Altitude Platform Service ("HAPS") bring into question the current unequal division of V-band spectrum resources in favor of non-satellite uses. This inequality is untenable given the increasing demand for satellite services and the hampered access to usable satellite spectrum in lower frequency bands. By provisioning additional satellite spectrum in the V-band now, the Commission can take steps to provide the resources necessary for satellite users to keep pace with the increasing customer demand for high bandwidth services.

The Commission also should not add or maintain wireless service designations outside of the existing sub-bands at 38.6-40.0 GHz, due to the lack of significant wireless deployment or demonstrated demand for such services elsewhere in the V-band. Instead, the Commission should await further developments in the broadband Fixed Service ("FS") market and assess whether existing spectrum allocations are adequate to meet

long-term demand. If a demand for additional FS spectrum is demonstrated in the future, the Commission should target the 42.5-43.5 GHz band for such expansion.

Furthermore, the Commission should refrain from re-designating the 37.6-38.6 GHz band to wireless services, but should instead keep the sub-band open to FS, Mobile, and Fixed Satellite Service ("FSS"). A designation for wireless services is inappropriate due to the propagation characteristics of the band and the experience of limited deployment of wireless services in comparable spectrum, such as the 38.6-40 GHz band.

Most of the proposed satellite service allocation changes proposed in the *FNPRM* should be adopted. Boeing supports a FSS allocation at 37.5-37.6 GHz for satellite systems using both geostationary and non-geostationary orbits. The record does not, however, support the addition of a primary allocation for Government mobile-satellite service in the 40.5-41.0 GHz band. Although Boeing does not object in principle to the inclusion of a Government FSS allocation at 40.5-41.0, such an allocation should be on a secondary basis, rather than co-primary with commercial FSS. Boeing also fully supports the addition of a primary FSS allocation in the 41-42 GHz band.

Finally, the Commission should adopt the PFD limits that were adopted at WRC-2000 without the premature imposition of power control requirements on satellite operators. Rather, the Commission should wait for the results of power control studies that will be considered at WRC-03. The Commission also should refrain from restricting earth station use in the 37.5-40 GHz band and should not delete the BSS allocation in the 42-42.5 GHz band before WRC-03 makes a determination regarding appropriate international protection measures for radio astronomy in this band.

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	)	

COMMENTS OF
THE BOEING COMPANY

The Boeing Company ("Boeing"), by its attorneys and pursuant to Section 1.415 of the Commission's rules, 47 C.F.R. § 1.415 (2000), respectfully submits these Comments in response to the above-captioned Further Notice of Proposed Rule Making (*"FNPRM"*) regarding frequency allocations and designations for satellite and other services.[1]

[1] *See Allocation and Designation of Spectrum for Fixed-Satellite Services in the 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*, FCC 01-182, Further Notice of Proposed Rulemaking, 16 FCC Rcd 12244 (2001)("*FNPRM*").

I. INTRODUCTION

Boeing commends the Commission's long-standing efforts to make spectrum above 30 GHz available for commercial use in a manner that is consistent with its original goals of promoting open entry, appropriate flexibility, technical innovation, and seamless satellite and terrestrial networks.[2] As a leading manufacturer of state-of-the-art satellite communications systems, Boeing maintains an active interest in the outcome of this proceeding. The 36-51 GHz band ("V-band") constitutes some of the last "frontier" spectrum and the efficient and reasoned development of this resource will have a great bearing on the future development of satellite-based systems. As consumer demand for and reliance on such services grows, it is imperative that satellite providers have the resources necessary to keep pace.

The instant proceeding provides a timely opportunity for the Commission to take additional steps to improve its rules and spectrum policies for satellite services. In the past, the Commission has adjusted its spectrum allocations and designations based on demonstrated need, modified its rules to allow flexible band use, and has permitted harmonized use of spectrum resources by terrestrial and satellite users. Boeing urges the Commission to use this opportunity to redress a spectrum shortfall that is inhibiting satellite providers, to allow flexible use of spectrum below 40 GHz by satellite operators, and to permit satellite operators to share spectrum with Fixed Service ("FS") wireless

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[2] *See 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*, Notice of Proposed Rulemaking, 12 FCC Rcd 10130, 10135 (1997) (*"1997 NPRM"*).

services, where feasible. Such actions will help promote the Commission's goal of promoting the delivery of next generation communications services to all Americans.

II. BACKGROUND

The Commission's *FNPRM* relates the long history that led up to the current proceeding and the pending proposals.[3] Decisions regarding this frequency band were made in a number of related proceedings from 1994 to the present, both in this docket[4] and in other related dockets.[5]

Much of the spectrum at issue in these proceedings features multiple service allocations, including a variety of satellite and terrestrial services. As part of these proceedings, the Commission has made critical decisions regarding the amount of spectrum in the band that would be available for satellite and terrestrial services. To implement its decisions, the Commission primarily utilized different designations regarding spectrum use in a number of sub-bands with minimal changes to the Table of Frequency Allocations.[6]

As the *FNPRM* also summarizes, the domestic approach previously taken by the Commission differed from the decisions that were reached through international

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[3] *See FNPRM* ¶¶ 2-11.

[4] *See 1997 NPRM, supra* note 2; *36-51 GHz Proceeding,* Report and Order, 13 FCC Rcd 24649 (1998)(*"36-51 GHz Order"*); *36-51 GHz Proceeding*, Order on Reconsideration, 15 FCC Rcd 1766 (1999)(*"36-51 GHz Reconsideration Order"*).

[5] *See, e.g., Amendment of the Commission's Rules Regarding the 37.0-38.6 and 38.6-40.0 GHz Band – Implementation of Section 309 (j) of the Communications Act,* Notice of Proposed Rulemaking and Order, 11 FCC Rcd 4930 (1995).

[6] *See FNPRM* ¶ 14.

consensus at the 2000 World Radiocommunication Conference ("WRC-2000").[7] The Commission initiated this *FNPRM*, in part, to revise its previous decisions in light of Final Acts of WRC-2000.[8]

While the *FNPRM* proposes a number of improvements in the Commission's spectrum sharing plan, it does not propose to alter the unequal division of spectrum between satellite and terrestrial services: only "2 + 2" GHz of paired spectrum is designated on a primary basis for the Fixed-Satellite Service ("FSS"), compared to 5.6 GHz of spectrum designated on a primary basis for terrestrial wireless services. The demonstrated needs of the respective services warrant access by satellite users to additional spectrum resources in order to meet growing service demands.

III. NEW FACTUAL DEVELOPMENTS WARRANT RE-EVALUATION OF THE COMMISSION'S UNDERLYING SPECTRUM DIVISION BETWEEN SATELLITE AND NON-SATELLITE USES

Since the Commission's adoption of its *36-51 GHz Reconsideration Order*, there have been new factual developments that warrant a re-evaluation of the proposed division of spectrum resources between satellite and non-satellite uses. The recent bankruptcies of FS operators and the waning interest of High Altitude Platform Service ("HAPS") in the V-band bring into question the designation of 5.6 GHz of spectrum in the V-band for non-satellite commercial uses.

In contrast, satellite operators demonstrate a need for additional spectrum resources in the 36-51 GHz band and are increasingly hampered in deploying systems due to congestion in lower spectrum allocations. The instant proceeding provides a

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[7] *See id.* ¶¶ 8-11.

[8] *See id.* ¶ 11.

timely opportunity to take into account these new developments. Accordingly, the Commission should ensure that suitable spectrum is available in the V-band for future commercial satellite services by re-provisioning spectrum resources that are no longer needed by non-satellite users, such as the one gigahertz of spectrum at 47.2-48.2 GHz previously requested by HAPS. Removal of the wireless service designation in this band and converting it to primary satellite use would make an additional gigahertz of primary satellite spectrum available at 40/50 GHz, and would contribute to a full "3+3" GHz of satellite spectrum when combined with Boeing's proposal to permit satellite operations to co-exist with wireless services in the 37.6-38.6 GHz band. [9]

Recent developments call into question the need to maintain all of the current spectrum designations for FS and HAPS operators in the V-band. Since the last time that the Commission examined this issue, many terrestrial operators offering similar services have encountered severe financial difficulties that call into question their ability to build out and utilize existing spectrum allocations.[10] In addition, the Commission acknowledges in the *FNPRM* that the most active proponent of stratospheric platform use

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[9] *See infra*, Part V.

[10] For example, Winstar, Advanced Radio Telecom Corp. ("ART"), and Teligent, all major providers of terrestrial fixed wireless services, have filed for Chapter 11 bankruptcy protection. *See, e.g., Winstar Files Voluntary Chapter 11 Petition,* News Release, Winstar, Apr. 18, 2001; *Teligent Announces Plans to Reorganize Voluntarily Under Chapter 11 of the U.S. Bankruptcy Code: Company to Continue Serving Business Customers*, News Release, Teligent, May 21, 2001; *Rainy Days Continue for Teligent, Winstar*, RCR Wireless News, Aug. 6, 2001, *available at* http://www.rcrnews.com.

The Commission has taken notice of such bankruptcies in its sixth report to Congress on competition in the Commercial Mobile Radio Service ("CMRS") industry. *See Implementation of Section 6002 (b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services,* Sixth Report, FCC 01-192 at Appendix A (rel. July 17, 2001) (*"Sixth CMRS Competition Report"*).

has withdrawn its interest in developing service in the 47.2-48.2 GHz band, indicating that it is not suitable for its proposed broadband service.[11] Thus, the record since the Commission's *36-51 GHz Reconsideration Order* shows that the demand for non-satellite uses of the V-band has decreased significantly.

In contrast, satellite operators have demonstrated an increasing demand for additional spectrum resources in the V-band. After the notice and comment period in the earlier phase of this proceeding, the Commission opened a filing window for satellite applications utilizing 36.0-51.4 GHz.[12] Fifteen applications were received, and seven of those applications requested access to at least six gigahertz of spectrum.[13] These applications covered the full range of satellite services and orbit constellations: FSS, Mobile-Satellite Service ("MSS"), and Broadcasting Satellite Service ("BSS")-type uses utilizing geostationary ("GSO") and non-geostationary ("NGSO") constellations.

Part of this demand for V-band spectrum stems from the fact that satellite operators are hampered from planning and deploying systems in the lower frequency bands due the increasing congestion of those bands. The Ka-band is an example of this development. Most first-round Ka-band licensees are actively proceeding with their

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[11] *See FNPRM* ¶ 40 ("[HAPS] has modified its technological approach and has withdrawn its interest to develop its service in the 47.2-48.2 GHz band at this time.").

[12] *See* Report No. SPB-89, *Applications Accepted for Filing; Cut-Off Established for Additional Space Station Applications and Letters of Intent in the 36-51.4 GHz Frequency Band*, DA 97-1551 (July 22, 1997).

[13] *See 36-51 GHz Reconsideration Order* ¶ 3. *See also*, Petition for Reconsideration by Hughes Communications, Inc., IB Docket No. 97-95, at 4 (filed Feb. 16, 1999)(*citing* applications of Hughes Communications, Inc. – Spacecast and Expressway; Motorola, Inc. – M-Star; GE American Communications – GE*StarPlus; Lockheed Martin Corp. – Global Q/V–Band Satellite Communications System; TRW, Inc. – TRW Global EHF Satellite Network; and PanAmSat Corp. – V-Stream).

systems, and a new set of licensees from the second processing round are beginning to implement their businesses now that the Commission has issued their licenses.[14] The ever-increasing demand for communications capabilities, combined with the higher data rates required by all types of users – ranging from individuals to small and large businesses – will ensure that the Ka-band will ultimately be fully developed and subject to the same congestion as other lower frequency spectrum bands experience now.

This proceeding provides an opportunity for the Commission to redress the shortfall of spectrum for satellite operations and to ensure that usable spectrum is available in the V-band to accommodate the growth of commercial satellite services. The 36-51 GHz band is the "next frontier" for commercial satellite services, and presents the Commission with the opportunity to make spectrum available that is unencumbered and suitable in technical characteristics necessary for new satellite systems. In addition, the 36-51 GHz band presents an opportunity to make spectrum available in large enough bandwidths to meet customers' increasing capacity requirements.

The limited designations proposed by the Commission in the *FNPRM*, however, will likely be inadequate to meet future demand for satellite services. The increasing throughput required by users, combined with challenging propagation effects at these high frequencies, dictates that substantially more satellite bandwidth is needed – especially if satellite services are to be economically attractive for consumers. To achieve this result, the Commission should take steps to provide additional V-band spectrum resources for satellite use.

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[14] *See Assignment of Orbital Locations to Space Stations in the Ka-Band*, Order, DA 97-967, 13 FCC Rcd 1030 (1997)("*First Round Assignment Order*"); *Second Round Assignment of Geostationary Satellite Orbit Locations to Fixed Satellite Service Space Stations in the Ka-Band,* Order, DA 01-1693 (rel. Aug. 3, 2001).

Such a decision would clearly serve the public interest. The Commission has already recognized that the provision of broadband service to rural areas is a high priority. This public interest policy of encouraging universal availability of broadband telecommunications services should be applied fully to this proceeding and V-band frequencies. In contrast, even under the best of circumstances the most optimistic terrestrial FS build-out plans targeted only large urban areas, depriving most rural areas of any service at all on this spectrum.[15]

Furthermore, re-provisioning portions of the V-band now for satellite services will further efficient spectrum management and assist the Commission in avoiding the mistakes of the Ka-band. In that proceeding, a large, highly-usable and unencumbered satellite spectrum allocation was inadvertently eroded, reduced, or otherwise compromised by a series of actions that delayed and hampered the cost effective implementation of satellite systems in the remaining satellite service allocations.

Accordingly, the Commission should re-apportion spectrum from non-satellite uses that no longer demonstrate a demand for the additional spectrum resources. This additional satellite spectrum allocation would serve the public interest and would create a full 3+3 GHz of satellite spectrum, which could be used to meet the requirements identified by seven of the satellite applications that have previously filed applications with the Commission.

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[15] *See Satellites: Connecting the World*, Satellite Industry Association ("SIA"), at 5 (June 2001) (concluding that 56% of the U.S. population lives in counties where deployment of some type of terrestrial FS is not likely and in the 59 markets where terrestrial wireless services are currently offered, 66% have only one or two providers); *see also* Regulatory Access, LLC, *FS Broadband Internet Access Deployment Analysis* (finding that only 2.6% of the U.S. landmass, excluding Alaska, is being served by the 39 GHz band as part of a report for the SIA).

IV. THE COMMISSION SHOULD LIMIT WIRELESS DESIGNATIONS TO 38.6-40.0 GHz AND POTENTIALLY TARGET THE 42.5-43.5 GHz BAND FOR ANY DEMONSTRATED NEED FOR FUTURE FIXED SERVICE EXPANSION

Based on the record in this proceeding, only the existing wireless services sub-bands at 38.6-40 GHz warrant a wireless services designation in the V-band. Because there is no significant wireless deployment or demonstrated demand for such services anywhere else in the 36-51 GHz band, the Commission should not add or maintain wireless service designations anywhere outside of this limited sub-band, but should instead await further developments in the broadband FS market and assess whether existing spectrum allocations are adequate to meet long-term demand. If, however, a need for additional terrestrial wireless spectrum is demonstrated in the future, the Commission should target the 42.5-43.5 GHz sub-band (which also includes a domestic Radio Astronomy ("RA") allocation) for such expansion.

The existing wireless services designation in the 38.6-40 GHz sub-band is warranted. A number of wireless systems have been built and operate in this band, even though many of these system operators are in bankruptcy proceedings.[16] Although such systems are – and always will be – far from ubiquitous, their limited deployment in even a few major urban areas renders this sub-band an undesirable candidate for ubiquitous service links for satellite operators. For this reason, the designation of the 38.6-40 GHz band for wireless services remains appropriate.

Because there is no significant wireless deployment or demonstrated demand anywhere else in the 36-51 GHz band, the Commission should not, at this time, add or

[16] *See Sixth CMRS Competition Report*, Appendix A (observing the bankruptcy filings of ART and Winstar).

maintain a wireless services designation outside of this sub-band. Designating such additional spectrum now would foreclose other important alternatives that the Commission may wish to pursue at a later date when the public's needs are much clearer. Refraining from adding additional terrestrial fixed wireless designations in the V-band will also provide the Commission with maximum flexibility to meet satellite system requirements or the long-term needs of other services.

If a demonstrable need for additional FS spectrum in the V-band arises in the future, the Commission should target the 42.5-43.5 GHz sub-band for an additional FS allocation, rather than other sub-bands that are more suited and needed for satellite service use. The 42.5-43.5 GHz band is not well suited for satellite service use because of the current domestic RA allocation in that band. Terrestrial FS coverage is more local than satellite coverage, enabling terrestrial FS to be better able to share spectrum with RA operators and still benefit from substantial use of the available spectrum. The allocation of FS in the 42.5-43.5 GHz band should not, however, be in exchange for re-allocating the 47.2-48.2 GHz band to exclusive Government use. The Commission should convert the 47.2-48.2 GHz band to primary satellite use, as discussed previously in these comments.[17]

V. THE 37.6-38.6 GHz BAND SHOULD NOT HAVE A DESIGNATION SOLELY FOR WIRELESS SERVICES

The *FNPRM* proposes to re-designate the 37.6-38.6 GHz band from FSS to wireless services, reasoning that this "will better correspond to the international sharing

[17] *See supra*, Part III.

arrangement established at WRC-2000."[18] The Commission should refrain at this time from adopting this proposal. Instead, the 37.6-38.6 GHz band should have no designation for any service, but should remain allocated for FS, Mobile, and FSS. This solution provides the most efficient use of this spectrum, given the propagation characteristics of the spectrum and the ability of satellite and FS operators to cover more geographic area through shared use of the spectrum.

A. The Propagation Characteristics of the 37.6-38.6 GHz Band Make Designation for Wireless Services Inappropriate

Experience demonstrates that the propagation characteristics of the 37.6-38.6 GHz band make it unsuitable for a designation to wireless services. A designation for wireless services would result in an unfavorable regulatory environment for the band, similar to current regime for the 38.6-40.0 GHz band ("39 GHz band").

In 1998, the Commission instituted a band plan for 36.0-51.4 GHz, which included a designation for wireless services in the 39 GHz band.[19] The physical propagation characteristics of the 39 GHz band, coupled with the Commission's licensing scheme for the band, led to use of the spectrum that is extremely limited and that serves only a small number of large office buildings in urban areas. Repeating such limited usage in the 37.6-38.6 GHz band would constitute inefficient use of spectrum resources.

By itself, FS is unlikely to ever be ubiquitous in the 37.6-38.6 GHz band. This fact can be demonstrated by comparing the length of links in this band with the area needed to cover the United States. Radio signals in these frequency bands suffer

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[18] *See FNPRM* ¶ 15.

[19] *See 36-51 GHz Order*, 13 FCC Rcd at 24656-57.

relatively high atmospheric and precipitation attenuation losses. Also, associated links require a clear line-of-sight because radio wavelengths in these bands are less than one millimeter. Thus, links in these bands are relatively short to avoid high propagation losses and blockage.[20] As a result, the Commission has concluded that FS systems operating above 24 GHz typically have a cell radius of less than five miles.[21] Metropolitan areas in the U.S. in the 39 GHz band, on the other hand, are characterized as having over two-thirds of their links being at most one kilometer in length.[22] Accordingly, links in the 37.6-38.6 GHz band generally will be at most five miles long.

Short link lengths require the deployment of a large quantity of base stations, which limits ubiquitous coverage throughout the United States. The sum total area of all the Metropolitan Statistical Areas ("MSAs") in the U.S. is about 580,000 square miles based on calculations made from U.S. Census Bureau information. Assuming a maximum possible 78.5 square mile service area for each base station in a wireless network, at least 7,400 base stations would be required to cover the metropolitan areas of the U.S. Assuming a price of $625,000 per base station,[23] the cost to set up even a

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[20] In an ITU document discussing Fixed Service deployment in the 37-40 GHz band, the example of Germany having a maximum 38 GHz band link length of 10 km, with over 99 % being at most 6 km is given. *See Deployment Characteristics of Fixed Service Systems in the Band 37-40 GHz for Use in Sharing Studies*, Rec. ITU-R F.1498.

[21] *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*, Second Report, 15 FCC Rcd 20913, 20935 ¶ 50 (2000) ("Fixed wireless technologies operating in these bands have relatively small cell sizes, with an average cell radius of between three and five miles.").

[22] *See* Rec. ITU-R F.1498, *supra* note 20.

[23] The figure is estimated from the mid-level price of a PCS base station. *See* Paul Bedell, *Wireless Crash Course* 37 (McGraw-Hill 2001).

minimum required wireless infrastructure to serve all MSAs would amount to $4.6 billion dollars, not including customer equipment costs. Rural Service Areas in the U.S. (distinct from MSAs) cover a total of about 3,000,000 square miles. Coverage of these areas would require approximately 38,000 base stations at a total cost of about $23.8 billion dollars. Because of these costs, it is likely that FS will be able to serve only a small portion of the U.S. using the 37.6-38.6 GHz band.

This result can be confirmed through the experience of the 39 GHz band. Most areas do not have access to 39 GHz wireless services. A few small, high-density areas within cities have 39 GHz service, but even within those cities the overall percentage of area covered is minimal. Instead, major operators in the 39 GHz band are either not providing significant service, are bankrupt, or are principally offering 39 GHz service only to urban office buildings.[24] Build-out in this band to cover large geographic areas has not occurred, nor can it be expected in the foreseeable future. This low utilization of the 39 GHz band exists despite the Commission's adoption of minimal build-out requirements[25] and exclusive area-wide licenses.

The Commission should avoid repeating the disappointing history of the 39 GHz band in the 37.6-38.6 GHz band. Instead, the Commission should not limit satellite services in the 37.6-38.6 GHz band by re-designating this band for wireless services, but

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[24] *See Sixth Annual CMRS Competition Report*, Appendix A.

[25] Build out requirements for the 39 GHz band can be met through a minimal showing of "substantial service," which can consist of as little as four links per million population within a service area. *See Amendment of the Commission's Rules Regarding the 37.0-38.6 GHz and 38.6-40.0 GHz Bands, Implementation of Section 309(j) of the Communications Act – Competitive Bidding, 37.0-38.6 GHz and 38.6-40.0 GHz*, Report and Order and Second Notice of Proposed Rule Making, 12 FCC Rcd 18600, 18624 ¶ 46 (1997).

rather should maintain the current general allocation for FS, Mobile, and FSS in this band.

B. Sharing Between Fixed and Satellite Services is Feasible in the 37.6-38.6 GHz Band and Provides Greater Geographic Coverage

The 37.6-38.6 GHz band should not be designated for either terrestrial or satellite services because it is feasible for fixed and satellite services to share the band. Furthermore, shared use of the band would enable the provision of service throughout the United States.

Sharing between wireless and satellite services is feasible in the 37.6-38.6 GHz band because of the limited lengths of potential terrestrial links. Accordingly, spectrum sharing between FS and FSS actually is easier in this band than in currently shared lower frequency bands. Indeed, the ITU has concluded, "The geographical areas in which the FSS will not need to coordinate with the FS will be larger in the 37-40 GHz band"[26]

The Commission should allow sharing arrangements to be worked out between terrestrial operators and satellite operators in place of *a priori* designating the 37.6-38.6 GHz band for wireless services. Otherwise, the experience of the 39 GHz band may be repeated, in which no satellite operators are sharing spectrum with the terrestrial operators, and communication services are generally restricted to a limited number of office buildings in urban areas.

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[26] *See Deployment Characteristics of Fixed Service Systems in the Band 37-40 GHz for Use in Sharing Studies,* Section 3, Rec. ITU-R F.1498.

VI. MOST OF THE PROPOSED SATELLITE SERVICE ALLOCATION CHANGES SHOULD BE ADOPTED

The *FNPRM* proposes a number of additional spectrum allocations to satellite services. Specifically, the Commission proposes to (1) add an FSS allocation at 37.5-37.6 GHz; (2) move an MSS allocation from 39.5-40.0 GHz to 40.5-41.0 GHz; and (3) add an FSS allocation at 40.5-41.0 and 41.0-42.0 GHz.[27] Each of these proposals is discussed in turn below.

The *FNPRM* asks if an FSS allocation should be added at 37.5-37.6 GHz despite the proposal to designate the entire 37.5-40 GHz for wireless services.[28] Boeing believes the FSS allocation at 37.5-37.6 GHz should be made because the band is useful for satellite services, and the allocation table should reflect and permit such use given the demand for satellite services. This is consistent with Boeing's position, discussed earlier in these comments, that the wireless services designation should be withdrawn from all sub-bands below 38.6 GHz.[29]

In addition, the 37.5-37.6 GHz sub-band should be opened for potential use by both GSO and NGSO satellite systems, rather that limiting its availability to GSO operations as suggested by the National Telecommunications and Information Administration ("NTIA").[30] In the past, the Commission has consistently refrained from dividing the 36-51 GHz bands between NGSO and GSO technologies. NTIA has not demonstrated a compelling reason to foreclose use this sub-band from potential NGSO

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[27] *See FNPRM* ¶ 13.

[28] *See id.* ¶ 19.

[29] *See supra*, Part III.

[30] *See FNPRM* ¶ 21.

technology. Therefore, NGSO systems should not be prematurely ruled out in these sub-band.

Regarding the proposed change of the MSS allocation from 39.5-40.0 GHz to 40.5-41.0 GHz, the *FNPRM* notes that WRC-2000 adopted a secondary MSS allocation for Region 2 at 40.5-41.0 GHz and asks whether the Commission should adopt a primary or secondary allocation for Government MSS.[31] The need to change the government allocation is questionable, given that the terrestrial fixed services have long been aware of the allocation and are likely to have already accounted for the potential sharing requirement in their system designs. Given the concentration of commercial satellite service requirements in these critical frequencies, Boeing believes the record does not support the addition of a primary allocation for Government MSS in this sub-band.

In the 40.5-41.0 GHz band, the *FNPRM* requests comment on whether to include a primary FSS allocation to the Government column of the Table of Frequency Allocation.[32] Boeing does not object to a Government FSS allocation in principle; however, any Government FSS allocation in this band should be on a secondary basis, rather than co-primary with non-Government FSS. Non-Government FSS should not be required to share this limited amount of spectrum that the U.S. successfully supported at WRC-2000, having carefully crafted a balance between the needs of commercial terrestrial and satellite services. Requiring commercial FSS systems to shoulder the burden of sharing with Government FSS would upset this careful balance.

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[31] *See id.* ¶¶ 24-25.

[32] *See id.* ¶ 26.

Boeing fully supports the Commission's proposal to add a primary FSS allocation in the 41-42 GHz band, which would provide two gigahertz of contiguous satellite spectrum for FSS operations and which promotes the more efficient design and deployment of such systems. With this allocation, the Commission has also aligned its domestic spectrum allocation with the WRC-2000 decision to favor satellite services over wireless services in the 40-42 GHz band through the establishment of a set of global power flux density ("PFD") limits.

VII. THE COMMISSION SHOULD ADOPT THE WRC-2000 PFD LIMITS FOR THE 37.5-40 GHz FREQUENCY BAND AND SHOULD NOT REQUIRE SATELLITE DOWNLINK POWER CONTROL AT THIS TIME

The Commission should adopt the same PFD limits that were adopted at WRC-2000. Adoption of the WRC-2000 approach will have the important benefit of minimizing deviation between the United States and international use of the V-band. Because satellite services are almost universally multinational, it is extremely important to avoid differences in national allocations for satellite services. As the Commission recognized in an earlier phase of this proceeding, "[s]eamless global networks are facilitated by global allocation of spectrum for the same or similar services. This not only supports a compatible technical environment and minimizes harmful interference, but creates economies of scale for equipment manufacturers and ease of use for consumers."[33]

In addition, it would be premature for the Commission to adopt power control requirements on system operators prior to WRC-03. WRC-2000 specifically requested further study on the issue of power control requirements, and WRC-03 is expected to

[33] *1997 NPRM*, 12 FCC Rcd at 10135.

review the results of these studies. WRC-2000 recognized that "the use of downlink fade compensation techniques affects the design of FSS links."[34] It would therefore be inappropriate for the Commission to impose untried power control requirements before the results of these studies are considered at WRC-03.

An inspection of satellite V-band applications reveals that about half of the proposed satellite systems plan to implement satellite downlink power control, whereas the other half do not, due to different system designs and/or service applications. This fact also counsels against adopting rules that would require power control technology to be incorporated in future satellite systems. If the Commission were to adopt such a rule, it would clearly depart from its long-standing policy of technology neutrality in the establishment of its rules. Instead of adopting satellite downlink power control, the Commission should adopt WRC-2000 PFD limits in the 37.5-40 GHz band without any modifications, as specified in Table S.21-4.[35]

VIII. THE COMMISSION SHOULD NOT RESTRICT EARTH STATION USE IN THE 37.5-40 GHz FREQUENCY BAND

The Commission has aptly recognized that the WRC-2000 PFD limits favor wireless services over satellite services in the 37.5-40 GHz frequency band.[36] PFD limits

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[34] *See* Resolution 84 at *recognizing further b)* (WRC-2000).

[35] In light of Boeing's recommendation not to adopt satellite downlink power control, Boeing does not address the time limits on PFD exceptions. If, however, the Commission decides to require satellite downlink power control technology to be implemented in a future satellite system in the 37.5-40 GHz band, it should not adopt any time limits on the duration that downlink power control is applied. An operator should be able to apply downlink power control in fade conditions for as long as necessary to overcome signal degradation and to provide users with the same link performance as in clear sky conditions.

[36] *See FNPRM* ¶ 40.

act as a technical discriminator on the types of earth stations that can be practically deployed in this band, thus facilitating predominant use of the band by wireless services. Both wireless and satellite service proponents have invested substantial resources over the past several years to achieve consensus at WRC-2000 regarding global PFD limits in the 37.5-40 GHz frequency band. The Commission has concluded that, under these limits, the development of wireless systems would be enhanced.[37] Hence, the Commission can achieve its objective of promoting wireless services in this band without additional restrictions on earth station function or usage.

Additionally, it is in the public interest and in the interests of the wireless services that satellite services have as much flexibility and incentive as possible to use the licensed 38.6-40 GHz frequency band – a possibility that the Commission clearly permits.[38] Use of this approach will enhance spectrum efficiency by allowing the same spectrum to be reused to provide multiple services in adjacent locations.

IX. THE COMMISSION SHOULD WAIT FOR WRC-03 RESULTS ON THE PROTECTION OF THE RADIO ASTRONOMY SERVICE IN THE 42.5-43.5 GHz FREQUENCY BAND

The Commission should not delete the BSS allocation in the 42-42.5 GHz frequency band until a determination is made regarding appropriate protection requirements for the radio astronomy service. The ITU-R and interested Administrations are currently conducting studies in accordance with Resolution 128 to promptly identify

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[37] *See id.*

[38] *See 36-51 GHz Reconsideration Order* ¶¶ 8-9 (noting that satellite operators could gain access to additional spectrum either through a license won at auction – thereby becoming a wireless licensee – or through a post-auction arrangement with a winning bidder of a wireless service auction).

technical and operational measures that can be implemented to protect adequately stations in the radio astronomy service.[39] So far these studies have produced conflicting data on the measures that would be most appropriate to protect the radio astronomy service in the 42.5-43.5 GHz frequency band.[40]

The Commission should permit ITU-R working parties to reconcile conflicting study data and reach consensus on an approach that can be adopted by WRC-03 before the Commission adopts its own protection measures for the radio astronomy service in the United States. Waiting until WRC-03 finalizes international interference protection measures for radio astronomy will help to ensure that satellite operators are able to operate pursuant to a consistent regulatory framework in all regions of the world.

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[39] *See, e.g.,* Informal Working Group 4 (Fixed/Fixed Satellite Service) of the Commission's WRC-03 Advisory Committee, *available at* http://www.fcc.gov/wrc-03/iwg_4.html. If the Commission chooses not to wait for WRC-03 outcome on the protection of radio astronomy service in the 42.5-43.5 GHz frequency band, it should create an industry working group to address the issues and requests which have been identified in Resolution 128 (WRC-2000) on a shorter study cycle.

[40] *See* Hau H. Ho, *Compatibility Between the Radio Astronomy Service in the 42.5-43.5 GHz Band and FSS/BSS Systems Operating in the 40.5-42.5 GHz Band,* ITU-R Doc. No. USTG 1-7/9 rev. 2, USWP 4A/TRW3 (Aug. 2001). Section 6.1.2 discusses geographical separation in the context of protecting RAS stations in the 42.5-43.5 GHz band. The RA community has not advanced its position beyond suggesting that the RA protection criteria as described in Recommendation ITU-R RA.769 should be met.

X. CONCLUSION

Boeing urges the Commission to take the actions discussed above in order to permit access to necessary spectrum resources by satellite users in the V-band and to avoid inadvertently hampering the development of satellite services in this frontier spectrum. Furthermore, the Commission should not prematurely impose restrictions on domestic satellite operations in these bands, particularly in light of on-going studies in preparation for WRC-03.

Respectfully submitted,

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September 4, 2001

CERTIFICATION OF PERSON RESPONSIBLE FOR PREPARING ENGINEERING INFORMATION SUBMITTED IN THESE COMMENTS

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in these Comments, that I am familiar with Part 25 of the Commission's Rules, that I have either prepared or reviewed the engineering information submitted in these Comments, and that it is complete and accurate to the best of my knowledge.

By: _____

Vu Phan
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Boeing Satellite Systems
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September 4, 2001