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BEFORE THE

Federal Communications Commission

WASHINGTON, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION
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In the Matter of	)	
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Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz, and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations	)	IB Docket No. 97-95 RM-8811

To The Commission:

COMMENTS OF LOCKHEED MARTIN CORPORATION

LOCKHEED MARTIN CORPORATION

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List A B C D E

TABLE OF CONTENTS

PAGE

SUMMARY ii

I. INTRODUCTION 2

II. THE COMMISSION'S PROPOSAL 6

III. DISCUSSION 8

A. Guiding Principles for Effective Spectrum Planning 8

1. The Commission Must Ensure Global Allocations for Satellite Services, and Provide Opportunities to Implement All Types of Satellite Applications, Fixed, Mobile, and Broadcast 8

2. The Commission Must Consider The Historical Development of Satellite Frequencies and Rationally Accommodate Long-Term Needs for Satellite Spectrum 9

3. The Commission Must Encourage Realistic Spectrum Sharing Wherever Feasible 12

4. The Commission Must Defer Finalizing Any Domestic Allocations Until The Full International Picture Is Known 13

B. The Commission's Proposed Band Plan Has A Number Of Substantial Defects 14

1. Proposed FSS Downlink Bands 14

2. Proposed FSS Uplink Bands 17

3. Proposed "Underlay" Wireless Services 17

IV. CONCLUSION 18

SUMMARY

Lockheed Martin congratulates the Commission on its timely efforts to accommodate current and anticipated future spectrum requirements in the 36-51.4 GHz bands, and to expedite the process of planning to meet these needs. Nonetheless, while Lockheed Martin supports the Commission's approach of addressing the spectrum as a whole, in the end Lockheed Martin does not believe that the plan described in the NPRM strikes the appropriate balance necessary to effect a rationally-based, globally-minded spectrum plan, and to promote the important goals that the Commission identifies.

In particular, the NPRM does not include satellite allocations of sufficient bandwidth to ensure the development of the multiple types of satellite systems that may be planning to utilize the frequencies above 36 GHz. The NPRM also neither addresses nor satisfies the requirement of preserving global satellite spectrum allocations, and the Commission has not reconciled its domestic proposals with known deployments of terrestrial services in other regions of the world. It is critically important that the Commission develop balanced international proposals for the 1997 World Radiocommunication Conference ("WRC-97") to ensure that viable spectrum is available for both space-based and terrestrial applications, and that harmonized global allocations are made, where possible.

In reassessing the underpinnings of the band plan that was put forth in the NPRM, and making the revisions that will be the direct product thereof, the Commission should be guided by several basic principles necessary to reasoned and efficient frequency planning:

First, the Commission, while acting domestically, must nevertheless continue to think globally. Global allocations are critical for most satellite applications — from both technical and economic points of view. (While global spectrum allocations may also be desirable for terrestrial users, they are not essential; with terrestrial systems, it is more of a question of

economies of scale than it is of economic and technological viability.) In general, it is far easier to maintain internationally an existing global allocation of spectrum than it is to secure a new global allocation. The reality is that any domestic action that removes extant global satellite spectrum from the allocation pool will make the United States' prospects of attaining additional global allocations of satellite spectrum through the WRC process exponentially more difficult.

Second, recognizing the inherent developmental differences between terrestrial and satellite services — differences that manifest themselves both in terms of the timetable for commercial roll out and in the magnitude of the investment of resources that is required — the Commission cannot expect to engage in rational decision making when it proposes to allocate spectrum based only on the requirements identified in a single pending satellite application. Satellite operators will rarely, if ever, be the initial commercial proponents of systems in new frequency bands allocated on a co-primary basis to both satellite and terrestrial users. Indeed, many of the difficulties in the just concluded 28 GHz proceeding stemmed from the Commission's licensing of a single terrestrial system that subsequently fought to be protected in the ensuing omnibus allocation proceeding. One of the most important lessons of that proceeding was that the Commission must employ an appropriate process to evaluate the needs of satellite-based communications systems in particular spectrum bands. The Commission should use the current proceeding to ensure that sufficient spectrum resources are available in bands allocated to both terrestrial and satellite systems to promote future growth of advanced U.S. space-based telecommunications.

Third, the Commission should endeavor, wherever possible, to optimize spectrum efficiency by exploring all realistic sharing scenarios between satellite and terrestrial services in order to maximize the ability to license providers in each service. At the very least, the

Commission should not foreclose the opportunity that sharing scenarios will emerge, and it must not abandon its responsibility to adopt the technical requirements necessary to facilitate such sharing.

Fourth, the Commission should defer finalizing a band plan domestically for the spectrum between 36 and 51.4 GHz until it, in conjunction with the satellite and terrestrial service communities, has developed, proposed and achieved appropriate global allocations at WRC-97. This means as well that the Commission must refrain in the interim from taking any action on the 36 - 51.4 GHz band, whether in the context of this proceeding or the related Millimeter Wave or 39 GHz proceedings, as they directly impact satellite interests and/or spectrum now allocated for satellite use at issue in this proceeding. The interrelationship of the domestic and international events could mean that the results of WRC-97 would require the revisiting or adjustment of any earlier Commission action. Accordingly, the Commission should defer action in the Millimeter Wave and 39 GHz proceedings and, instead, designate spectrum across the entire band in the instant proceeding.

With these principles in mind, the Commission can proceed to give the competing interests the attention and consideration they require. Lockheed Martin stands prepared to assist the Commission in developing a band plan for WRC-97 that strikes the appropriate balance between the interests of the early terrestrial entrants into the bands above 36 GHz and the satellite community's collective interest in advancing its historic leadership in the global marketplace into the bands they have been working toward commercializing for some time.

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To The Commission:

COMMENTS OF LOCKHEED MARTIN CORPORATION

Lockheed Martin Corporation ("Lockheed Martin"), pursuant to Sections 1.415 and 1.419 of the Commission's Rules (47 C.F.R. §§ 1.415 & 1.419 (1996)), hereby comments on the Commission proposals contained in the above captioned Notice of Proposed Rulemaking, ("NPRM").[1] In the NPRM, the Commission proposes to make domestic allocations and designations of certain frequency bands to the fixed-satellite services ("FSS"), and generally sets forth a spectrum plan for the millimeter wave bands between 36 and 51.4 GHz — earmarking certain portions of these bands for FSS and for High Density Fixed Services ("HDFS") and other terrestrial wireless services.

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[1] *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, IB Docket No. 97-95, RM-8811 (rel. Mar. 24, 1997).

I. INTRODUCTION

Lockheed Martin commends the Commission's timely efforts to develop a comprehensive plan for accommodating current and anticipated future spectrum requirements in the 36-51.4 GHz bands. As the Commission states in the NPRM, an omnibus approach to frequency allocation in these bands should "assist in planning for WRC-97, and ensure that all proposed uses are given due consideration." NPRM, FCC 97-85, slip op. at 5 (¶ 9). In that regard, Lockheed Martin believes that it is critically important for the Commission to devise international proposals for WRC-97 that are intended to secure availability of viable spectrum for both space-based and terrestrial applications, and to facilitate harmonized global allocations wherever possible. Consistent with these objectives, the Commission's disposition of this domestic proceeding should be informed by the outcome of the WRC-97 with respect to the 36-51.4 bands. Moreover, as the Commission has invited comment on the entire 36-51.4 GHz band in this omnibus proceeding, it should defer action in the Millimeter Wave and 39 GHz proceedings and, instead, designate spectrum across the entire band in the instant proceeding.[2] Piecemeal action on the various sub-bands under consideration or premature action based on the mere possibility of new allocations at WRC-97 will limit the Commission's flexibility and diminish the likelihood that this proceeding will result in fair and adequate provisions for meeting the needs of all likely uses of the 36-51.4 GHz bands.

While Lockheed Martin supports the Commission's approach of addressing the spectrum as a whole, and has carefully considered the many facets of the

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[2] *See Amendment of Parts 2 and 15 of the Commission's Rules to Permit Use of Radio Frequencies Above 40 GHz for New Radio Applications*, Notice of Proposed Rulemaking, 9 FCC Red 7078 (1994) ("*Millimeter Wave Proceeding*"). The Commission deferred issues relating to such licensed services to future proceedings. *See Millimeter Wave Proceeding*, First Report and Order and Second Notice of Proposed Rulemaking, 11 FCC Red 4481 (1995). *See Amendment of the Commission's Rules Regarding the 37.0-38.6 GHz and 38.6-40.0 GHz Bands C Implementations of Section 309(j) of the Communications Act*, Notice of Proposed Rulemaking and Order, 11 FCC Red 5930 (1995) ("*39 GHz Notice*").

proposal set forth in the NPRM, Lockheed Martin does not believe that the plan described in the NPRM strikes the appropriate balance necessary to effect a rationally-based, globally-minded spectrum plan, and to promote the important goals that the Commission identifies. In particular, the NPRM does not include satellite allocations of sufficient bandwidth to enable the implementation of the multiple types of satellite services that are capable of utilizing the frequencies above 36 GHz, thus effectively denying consumers worldwide of the competitive benefits of continued development of digital space-based communications services. The NPRM also neither addresses nor satisfies the requirement for global satellite spectrum allocations, and the Commission has not reconciled the domestic proposals with known deployments of terrestrial services in other regions of the world.

In reassessing the underpinnings of the band plan that was put forth in the NPRM, and making the revisions that will be the direct product thereof, the Commission should be guided by several basic principles necessary to reasoned and efficient frequency planning:

First, the Commission, while acting domestically, must nevertheless think globally. The International Table of Frequency Allocations currently provides 3 GHz of global FSS spectrum in each direction (47.2-50.2 GHz for Earth-to-space use, and 37.5-40.5 GHz for space-to-Earth use).[3] Global allocations are critical for most satellite applications — from both technical and economic points of view. In general, it is far easier to maintain internationally an existing global allocation of spectrum than it is to secure a new global allocation. While global allocations of spectrum may also be desirable for terrestrial systems, they are not essential; with terrestrial systems, it is more of a question of economies of scale than it is of economic and technological viability. By contrast, global and regional satellite systems are inherently dependent upon harmonized allocations to achieve global/regional coverage; moreover, the same economies of scale that

[3] See 47 C.F.R. § 2.106 (1996).

are desirable for terrestrial systems are no less desirable for the satellite systems' ground and satellite equipment.

The reality is that any domestic action that removes extant global satellite spectrum from the allocation pool will make the United States' prospects of attaining additional global allocations of satellite spectrum at an International Telecommunication Union ("ITU") World Radiocommunication Conference ("WRC") exponentially more difficult.[4]

Second, the Commission's decision-making with respect to spectrum planning must take into account the inherent developmental differences between terrestrial and satellite services — differences that manifest themselves both in terms of the timetable for commercial roll out and in the magnitude of the investment of resources that is required. The Commission's decision-making clearly does not proceed from an understanding of these fundamental and important differences when it proposes to allocate spectrum based only on the requirements identified in a single pending satellite application.[5] It is often the case that satellite operators are not the initial commercial proponents of systems in new frequency bands allocated on a co-primary basis to both satellite and terrestrial users. Indeed, many of the difficulties in the just concluded 28 GHz proceeding[6] stemmed from the Commission's decision to license a single terrestrial system that subsequently fought to be protected in the ensuing omnibus allocation

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4 What happened to the U.S. at WRC-95 in connection with the 2 GHz MSS bands is an example of the type of difficulties that can arise. At WARC-92, the U.S. successfully proposed the international allocation of spectrum at 2 GHz for MSS services. By 1995, the U.S. had concluded a domestic allocation proceeding over the objection of many in the satellite industry that resulted in a portion of the WARC-92 MSS allocation being reallocated for Personal Communications Services (PCS), an incompatible terrestrial use. The U.S. proposal to WRC-95 for yet another international MSS spectrum allocation to replace the spectrum won at WARC-92 and then, in the interim, reallocated domestically in the U.S. to an incompatible service met with strong resistance. The matter was not finally resolved at that conference, and remains a US agenda item for WRC-97.

5 *Application of Motorola Satellite Systems, Inc. to Construct, Launch, and Operate the M-Star System*, File No. 157-SAT-P/LA-96(72) (Sept. 4, 1996).

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, 3 CR 857 (1996).

proceeding. This recent and difficult experience should serve to underscore the appropriate approach for evaluating the needs of satellite-based communications systems in particular spectrum bands, given the differential lead times for satellite and terrestrial services. The Commission should use this proceeding to alter its prior approach to identifying spectrum needs and service development opportunities; the Commission needs to ensure that sufficient useable spectrum is available in bands allocated to both terrestrial and satellite systems to enable the continued future growth of advanced U.S. space-based telecommunications.

Third, the Commission should endeavor, wherever possible, to optimize spectrum efficiency by exploring all realistic sharing scenarios between satellite and terrestrial services in order to maximize the ability to license providers in each service. At the very least, the Commission should not foreclose the opportunity that sharing scenarios will emerge, and it must not shrink from its responsibility to do so, whether through specific technical requirements or other means. Moreover, as a general matter, radiocommunications services suffer greater atmospheric and rain attenuation problems as frequency increases. Such problems are much more severe for satellite networks than for terrestrial systems as a result of differences in communication path lengths and design constraints on link power margins aboard spacecraft. Thus, the Commission has significantly more flexibility in designating terrestrial bands throughout the entire 36-51.4 GHz range than it has for satellite bands. In light of these technical considerations, Lockheed Martin believes generally that spectrum for satellite services should be designated at the lowest possible frequencies in the 36.0-51.4 GHz band.

Fourth, the Commission should defer finalizing a band plan domestically for the spectrum between 36 and 51.4 GHZ until it, in conjunction with the satellite and terrestrial communities, has developed, proposed and achieved global allocations at WRC-97. This means as well that the Commission must refrain in the interim from taking any action on the 36-51.4 GHz bands, whether in the context of this proceeding or the related Millimeter Wave and 39 GHz proceedings, as they directly impact satellite interests

and/or spectrum now allocated to satellite use at issue in this proceeding. Clearly, the interrelationship of the domestic and international events could mean that the results of WRC-97 would require the revisiting or adjustment of any earlier Commission action. With these principles in mind, the Commission can proceed to give the competing interests the attention and consideration they require. Lockheed Martin stands prepared to assist the Commission in developing a band plan for WRC-97 that strikes the appropriate balance between the interests of the early terrestrial entrants into the bands above 36 GHz and the satellite community's collective interest in advancing its historic leadership in the global marketplace into the bands they have been working toward commercializing for some time.

In this regard, Lockheed Martin has been an active participant in several post-NPRM meetings between loose coalitions of satellite and terrestrial interests aimed at arriving at an agreeable modification to the Commission's band plan. Lockheed Martin is also continuing to explore, on its own, potential compromise solutions, and will pursue additional initiatives to this end in the very near future.

II. THE COMMISSION'S PROPOSAL

Examination of the proposed band plan contained in the NPRM and the U.S. Table of allocations reveals drastic modifications of existing U.S. allocations. The Commission's overall concept for the 36-51.4 GHz band, which includes proposals under consideration in the Millimeter Wave and 39 GHz proceedings, is depicted below:

Frequencies	Proposed Commercial Designations[7]
36.0-37.0 GHz	No Change (includes Fixed/Mobile)
37.0-37.5 GHz	CWS
37.5-38.5 GHz	FSS (NGSO) and CWS Underlay
38.5-38.6 GHz	CWS
38.6-40.0 GHz	CWS
40.0-40.5 GHz	CWS
40.5-41.5 GHz	FSS (GSO) and CWS Underlay
41.5-42.5 GHz	CWS
42.5-43.5 GHz	No Change (includes Fixed/Mobile and FSS uplink)
43.5-45.5 GHz	No Non-Government Allocation
45.5-46.7 GHz	No Change
46.7-46.9 GHz	No Change
46.9-47.0 GHz	CWS
47.0-47.2 GHz	No Change
47.2-48.2 GHz	CWS
48.2-49.2 GHz	FSS (NGSO) and CWS Underlay
49.2-50.2 GHz	FSS (GSO) and CWS Underlay
50.2-50.4 GHz	No Change (includes Fixed/Mobile)
50.4-51.4 GHz	CWS

[7] *See* NPRM, FCC 97-85, Slip op. at ¶14. We have included allocations contained in the U.S. Table of Allocations to accurately depict all spectrum potentially available for terrestrial and satellite services

Comparing the amounts of spectrum designated or retained for the various communications services with existing U.S. allocations reveals the severity of the changes under consideration by the Commission. Although the Commission suggests that its proposal balances the interests of the satellite and terrestrial communities, the band plan is, from a purely quantitative standpoint, weighed heavily in favor of terrestrial interests at the expense of the U.S. satellite industry. Under the proposal, spectrum allocated to satellite services would retain only 38.5 percent of the spectrum originally allocated to satellite services generally, while particular services, such as MSS and BSS, would have no designation. Lockheed Martin believes that the Commission can, and should, strike a more appropriate balance among satellite and terrestrial services in the 36-51.4 GHz band.

III. DISCUSSION

A. Guiding Principles for Effective Spectrum Planning

1. The Commission Must Ensure Global Allocations for Satellite Services, and Provide Opportunities to Implement All Types of Satellite Applications, Fixed Mobile, and Broadcast.

As indicated above, it is of critical importance to the proper development of new services in the bands above 36 GHz that the Commission allocate sufficient spectrum, preferably in contiguous blocks, for satellite services in bands that can actually be used to implement global systems.[8] While the current FSS allocations in the bands 37.5 - 40.5 GHz and 47.2 - 50.2 GHz cover all three ITU regions, in most instances the satellite services are co-primary with other services, which in some cases are already using portions of the spectrum. Because the ability of global satellite systems to use portions

[8] The greater the amount of spectrum that the Commission allocates on a contiguous basis for satellite use, the more competitive digital satellite-based communications will be to the existing terrestrial service providers due to the inherent efficiencies gained from contiguous bandwidth is no indication how, or even whether, the Commission would accommodate these services in the future. For example, the Commission's proposed designation of terrestrial fixed and mobile, both as primary and underlay services, in the 40.5-42.5 GHz band raises serious questions as to future availability of this spectrum for BSS.

of the existing spectrum is already limited in some regions by the early entry of terrestrial systems, the Commission must act swiftly and aggressively to close the breach, and preserve what it can of the current global allocations and the ability to implement all three types of satellite services — fixed (FSS), mobile (MSS) and broadcast (BSS) that exist in the bands that are the subject of the instant NPRM.

While the Commission recognizes at several points in the NPRM the need to ensure that there are consistent worldwide allocations in these bands,[9] its proposed band plan, if adopted, would actually undermine this goal with respect to satellite services by permanently foreclosing significant portions of the current global FSS and MSS allocations to satellite use. Although harmonized international allocations are desirable for almost any satellite service, they are critical for particular types of satellite systems, such as nongeostationary orbit systems. In the case of geostationary systems, there is an increasing need for harmonized allocations because of the trend toward building and deploying identical satellites with the capability of reconfiguring the service area in orbit, as required. It is self-evident that systems that seek to provide global coverage using a single set of space-based facilities that cross international boundaries must have the ability to operate throughout the areas that they cover. Thus, while common global allocations to wireless services are undeniably desirable, because they allow equipment manufacturers to achieve economies of scale, some satellite system proposals would be thwarted entirely if the same frequencies are not available on a worldwide basis.[10]

2. The Commission Must Consider The Historical Development of Satellite Frequencies and Rationally Accommodate Long- Term Needs for Satellite Spectrum.

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[9] Contiguous spectrum for satellite services is important because it provides greater flexibility for satellite services to operate with multiple adjacent wide bandwidth channels, while minimizing the overall required operating bandwidth of the on-board communications equipment.

[10] Even if consistent global allocations were not absolutely required for a particular satellite service, they would be desirable for all of the same reasons — economies of scale, portability of ground equipment, common satellite sparing, etc. — that apply in the case of terrestrial applications.

In order to make a rational allocation decision in a frequency band that is allocated internationally for satellite and terrestrial use, the Commission must not lose sight of the fact that it is inherent in the nature of satellite and terrestrial services that they develop according to different timetables. In the race to implement systems in bands shared on a co-primary basis by the fixed service and the FSS, the fixed service will win every time. It happened at C-band, Ku-band, 30/20 GHz, and is now happening too at 36/51 GHz.

The reasons are obvious: the lead time for fixed services, whether point-to-point or point-to-multipoint, is shorter than the time needed for the satellite industry. Quite simply, the technology required to deploy satellite systems is more complex and requires more development time to ascertain what is technically feasible and, ultimately, commercially viable. In the case of the 30/20 GHz bands, it took a NASA-sponsored, decade-long initiative (ACTS) to prove the viability of these bands for commercialization. In the interim, terrestrial users deployed a limited number of systems, effectively gaining "first come-first served" rights that contributed significantly to the Commission's difficulties in the 28 GHz decision-making process.

The resource investments seemingly valued by the Commission in rendering allocation decisions differ exponentially as well. A satellite system with space-qualified hardware that has to be specially developed for the particular characteristics of the frequency bands involved, requires a much greater long-term upfront expenditure than a terrestrial system. Yet, it does not take national roll-out of service by a terrestrial system — which admittedly can cost hundreds of millions of dollars — to gain the type of "rights" to a band that the Commission will seek to accommodate; in the 28 GHz proceeding, the licensing of a single-cell analog demonstration system in the point-to-multipoint fixed service formed the basis for the domestic allocation to fixed services of 1000 MHz in the 28 GHz band. By contrast, satellite networks comprised of specially-designed space and earth stations are required to be deployed before exploitation of a new FSS band can occur. Because of the inherent differences in development and lead time

between the satellite and terrestrial communities, the burden of this approach falls disproportionately on the satellite community.

If an FSS allocation that has not yet been used can be eviscerated by the inevitably-earlier arrival of terrestrial interests and employment by the Commission of a first-come, first-served allocation policy — as the Commission proposes in the NPRM — the upshot will be the thwarting of commercial research and development by U.S. satellite companies (thereby, reversing the current trends away from relying on government-led advanced technology developments); the costly sacrificing of the commercial dividends of the government-proven and -deployed advanced satellite technology; the consequential stifling of innovation and advancement; and ultimately, the end of the leadership role the U.S. has occupied in the field of satellite communications for almost the last half-century. Put simply, the fact that a band allocated to the FSS appears "vacant" does not mean that it is not at that same time being aggressively researched and developed for use by satellite interests.

Under these circumstances, the Commission cannot base the satellite industry's future in the 36-51.4 GHz bands on the single pending application.[11] At the very least, it was and is incumbent upon the Commission to invite satellite applications (pursuant to a filing window) for the entire 36-51.4 GHz band, and base its balancing of requirements on the applications it receives.[12] Because the FCC has not yet opened a filing window for other satellite applications, it is lacking critical information concerning the range of system proposals that these bands can support. This information is crucial to the development of a comprehensive and rational international allocation proposal for WRC-97. Therefore, Lockheed Martin believes the Commission should move forward in

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11 See NPRM, FCC 97-85, slip op. at 4 (¶ 10). While the Commission notes that it took into account "other expressions of interest in providing services in these bands," id., it does not specify whether those expressions were from satellite interests.

12 Given the fact that satellite manufacturers — a highly competitive industry — derive different technical approaches to a frequency band, it would be unrealistic for the Commission to expect applications to be filed until late in a filing window, in order that the technical approaches and design features can be withheld from potential competitors for as long as possible. This same competitiveness makes it unreasonable for the Commission to rely on the lone M-Star filing as representative of the industry's requirements.

this proceeding by soliciting additional applications for the 36-51.4 GHz band to be considered concurrently with Motorola's M-Star proposal, while simultaneously learning of the full range of contemplated satellite uses of this spectrum.[13]

Ironically, the Commission's eschewing of satellite interests comes just at the time when commercial exploitation of the subject bands is becoming viable. As the Commission notes in the NPRM, "most millimeter wave technology [prior to 1994] had been funded by the Government for military and scientific applications." NPRM, FCC 97-85 slip op. at 3 (¶ 3). Lockheed Martin has been directly involved in the development of hardware for use in the 43.5-45.5 GHz band in connection with the Defense Department's Milstar satellite program. For many companies, such U.S. government projects serve as a "proof of concept" for development of future commercial space applications in nearby bands.[14] In these bands, as in other frequency bands, private satellite ventures based on the technology devised to meet the needs of the military or other government agencies will arise, creating in their wake thousands of new jobs in the private sector.

The Commission must not pursue the course it proposes in the NPRM. Instead, it must step back, consider the impact of its proposal on the satellite industry, and revise the plan to correct the significant policy and regulatory defects of its proposed approach.

3. The Commission Must Encourage Realistic Spectrum Sharing Wherever Feasible

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[13] In the NPRM, the Commission states its intention to place the Motorola application on public notice in the near future, but suggests that it might limit applicants to applying for the band segments identified in its proposal for FSS use. This is counterproductive to the goal to preserve the ability for a variety of services to be implemented in the band. See NPRM, 97-85, slip op. at 12 (¶ 22). Such an approach would be a mistake, as it could arbitrarily limit the new technical approaches to frequencies that the Commission has identified for satellite use based on minimal information. The Commission's approach appears backward; the Commission should first learn (by opening a filing window) where the satellite industry needs spectrum to implement new advanced communications systems and then determine how those needs can be accommodated.

[14] In fact, additional benefits may be had by the Commission allocating spectrum in bands as close as technically feasible to the Milstar bands. For example, equipment may be mass-produced that can tune over 1-2 GHz enabling multiple types of users (government and private) to benefit from the economies of scale offered to the ground terminal community.

Another defect in the Commission's approach is its apparent decision to close the door on frequency sharing over substantial portions of the 36-51.4 GHz band between space-based communications systems and terrestrial wireless services. Lockheed Martin believes that it is premature for the Commission to limit the prospects for sharing between such services until it becomes clearer what types of proposals are being made for the spectrum at issue. All realistic sharing possibilities should be explored, and even where the details are currently unproved, care should be taken not to foreclose preemptively opportunities for co-frequency operation.[15] If this requires the imposition of technical regulations that require efficient use of spectrum by terrestrial and satellite systems — as opposed to a laissez faire approach that allows currently proposed characteristics to be utilized without regard to the maximization of efficiency — the Commission must be prepared to take this step. Finally, as a further means of maximizing spectrum use, Lockheed Martin supports, in principle, the Commission's suggestion that some spectrum may be appropriate for sharing between government and non-government satellite and terrestrial users, where such sharing is feasible.[16]

4. The Commission Must Defer Finalizing Any Domestic Allocations Until The Full International Picture Is Known.

Several of the proposals contained in the Commission's band plan require changes in the international frequency tables — either to add new services to particular bands or to upgrade existing secondary allocations to co-primary status. As the Commission is well aware, proposals of this nature are fraught with risk of possible rejection through the WRC process. Given these dangers, the Commission cannot reasonably proceed with any part of its proposal without first making sure that the entire

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[15] Similarly, Lockheed Martin also believes it is premature for the Commission to segment FSS spectrum between GSO and NGSO. For example, in the ITU-R Study Groups and in the CPM process, the US has supported the continuous examination of possible sharing scenarios studies between GSO and NGSO FSS sharing.

[16] See NTRM, FCC 97-85, Slip OP. at 10 (¶ 18)

package it ultimately decides to embrace is accomplished internationally. Any other course of action will prejudice the interests of the services that rely on international allocation changes.

The best near term opportunity to gauge the sentiment among other ITU members concerning these issues will be the Conference Preparatory Meeting ("CPM") for WRC-97, which commences today and is scheduled to conclude on May 16, just three days before the due date for Reply comments in this proceeding. Given the fact that developments at the CPM may provide some insight into the international viability of whatever band plan the US should ultimately decide to pursue at WRC-97, it may be advisable to permit parties the opportunity to file reply comments after the developments at the CPM can be fully digested.[17]

In any event, because of the uncertainty inherent in seeking changes to the international allocation tables, the Commission must not move to finalize a domestic spectrum plan for the subject bands until the necessary international changes are definitively secured. It must also take no action in any of the other proceedings mentioned in the NPRM [18] that would prejudice in any way the reaching of an omnibus solution in the instant proceeding. Accordingly, it will likely be necessary to delay adoption of a final frequency plan until after WRC-97.[19]

B. The Commission's Proposed Band Plan Has A Number Of Substantial Defects.

1. Proposed FSS Downlink Bands

The gravest defect in the Commission plan set forth in the NPRM is its proposal not to permit FSS in two-thirds of the downlink band that is allocated in the

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17 In this case, Lockheed Martin believes that a 30 day extension of the reply comment deadline in this proceeding — to June 18, 1997 — is warranted, and is filing simultaneously with these comments an extension request to this end.

18 See Amendment of Parts 2, 15, and 97 of the Commission's Rules to Permit Use of Radio Frequencies Above 40 GHz for New Radio Applications, 11 FCC Rcd 4481 (1995).

19 A possible exception to this would be 38.5-39.5 GHz.

international tables (37.5-40.5 GHz). The Commission would preserve only the 37.5-38.5 GHz segment of this spectrum band for satellite service, and would further limit its use to non-geostationary FSS proposals.[20] Other FSS use for geostationary proposals would be forced into the lower portion of the current BSS band between 40.5 and 42.5 GHz, with the Commission further proposing to make the upper 1 GHz of this band available for terrestrial wireless services rather than BSS. Even the proposal to make the 37.5-38.5 GHz band available for satellites is deficient, however, because wireless services that are incompatible with ubiquitous-user satellite operators are already using the 37.0 - 39.5 GHz band in Europe.[21] Thus, such a proposal appears inconsistent with the Commission's stated goal of achieving global allocations. The effect of this odd rejiggering is to eliminate entirely all downlink spectrum available on a global basis for each of the existing satellite services, except for the 40.5 - 41.5 GHz band in which FSS and BSS would be thrown together. Furthermore, the terrestrial downlink allocation for MSS (at 40.0-40.5 GHz) is eliminated entirely for domestic U.S. purposes under this proposal.

In addition, the Commission should refrain from adopting a 36-51.4 GHz band plan which upgrades the terrestrial (fixed and mobile) allocations from secondary to primary in the 40.5-42.5 GHz band. This band is allocated internationally and domestically to BSS (downlinks), and does not include any primary terrestrial fixed or mobile allocation as a result of sharing difficulties. Thus, the proposed upgrade of the terrestrial fixed and mobile allocations to primary in any portion of this band, which may lead to unavoidable sharing difficulties, should be preceded by closer technical study in order to avoid rendering the band useless for global BSS (uplinks). Lockheed Martin, however, believes that sufficient spectrum for terrestrial fixed and mobile services can be

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20 See NPRM, FCC 97-85, slip op. at 7 (Chart) and 11-12 (¶ 21).

21 Although the Commission took some international factors into account (see NPRM, FCC 97-85 slip op. at 4 (¶ 10)), the apparent unavailability of the band 37.5-38.5 GHz for satellite use in ITU Region 1 — a situation that would render the band inappropriate for global FSS systems — seems not to have been one of them.

identified in the 36-51.4 GHz band without sacrificing the BSS allocation in the 40.5-42.5 GHz band.[23]

The practical implication of the Commission's proposal for the 40.5-42.5 GHz band is the elimination of the global BSS allocation there, without sufficient regard for the domestic requirements for expansion BSS spectrum. Internationally, there is a severe shortage of global BSS spectrum in the planned bands at 12 GHz, and the 40.5-42.5 GHz band is a logical overflow band. There also are acute sensitivities, particularly among developing nations, when it comes to BSS spectrum, and these sensitivities might be heightened by a U.S. proposal that may effectively foreclose the use of BSS in any band where it currently exists or adds new FSS allocations in existing BSS bands. Notwithstanding the political aspects, if the Commission is to propose at WRC-97 that FSS also be allocated in the 40.5 -41.5 GHz band it must be on world-wide basis (not just in Region 2) to ensure that US companies providing FSS service have the opportunity to do so globally. Moreover, Lockheed Martin feels that the Commission cannot allow primary terrestrial fixed and mobile allocations in the frequency range 40.5 - 42.5 GHz. Furthermore, a primary allocation to FSS in the current BSS band will not safeguard future FSS orbital resources from the effects of any future BSS planning of the band.[24]

The spectrum plan for these frequencies needs to be retooled in light of the principles outlined above, particularly the need for satellite allocations that can be implemented on a global basis. In light of the existing wireless uses in Europe below 39.5 GHz, it would seem appropriate for the U.S. to proceed with terrestrial high density fixed services ("HDFS") in the band 38.6-39.5 GHz, but to defer any further licensing for such

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23 With respect to the 40.5 to 41.5 GHz band, the Commission correctly notes that the operation of GSO FSS and BSS systems generally have similar technical characteristics and there is no overwhelming evidence that this would not be the case in the 40 GHz band. However, proposing that two services share the same spectrum does reduce the availability of spectrum/orbital resources for both services. Depending on the orbital spacing and other technical rules that the Commission imposes on the relevant bands this could significantly reduce the number of satellite entities able to compete in the provision of either service.

24 It should be noted that WRC- Resolution 507 in the International Radio Regulations calls for the planning of all bands allocated to BSS.

use from 39.5-40 GHz pending a determination whether this band might be shared with satellite systems, and if so, under what conditions.

2. Proposed FSS Uplink Bands

The Commission's plan for the FSS uplink bands, while somewhat less problematic than the downlink band, also has significant defects. First, with the proposals to allocate the band 47.2-48.2 GHz to terrestrial services and the band 48.2-49.2 GHz to NGSO FSS, the Commission has totally removed the prospect for BSS feeder links in the band 47.2-49.2 GHz. BSS feeder links are given a preference in these bands by operation of Radio Regulation S5.552. Apart from the proposal of one terrestrial user — which seeks 600 MHz of spectrum in the band 47.2-48.2 GHz for a system of stratospheric repeaters, there is no known requirement for terrestrial systems on the FSS uplink bands.[25]

Second, the Commission does not contemplate that any type of sharing is possible between satellite users (e.g., BSS feeder links or other large-dish operators) and terrestrial systems in the 47.2-48.2 GHz band. There have been, however, some favorable preliminary indications in U.S. contributions to the ITU-R Study Groups that some sharing is possible in this band. For example, Sky Station has proposed that sharing with BSS feeder links may be a possibility. This should be factored into the revision of the band plan.

3. Proposed "Underlay" Wireless Services

Finally, the Commission has raised the possibility of issuing "underlay" licenses to terrestrial users in bands designated for FSS use to the extent that potential terrestrial uses of these frequencies are not exhausted by the satellite uses. While, as a general matter, Lockheed Martin supports efforts to maximize spectral efficiency, it is

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[25] *See Application of Sky Station International, Inc. for Authority to Construct, Deploy, and Operate a Global Stratospheric Telecommunications System*, File No. 96-SAT-P/LA-96 (Mar. 20, 1996). It is interesting to note that Sky Station has indicated that "it can deploy its platforms economically and conduct its proposed" fixed service "operations with as little as 10+10 MHz of bandwidth", while the 300+300 MHz request is based on market studies which "project a need for more than 250 million [simultaneous] broadband channels worldwide." See Sky Station's Reply Comments at 8, ET Docket 94-124. Since Sky Station can reuse the same frequencies throughout the world, this may allow a reduction in the bandwidth designated to stratospheric repeaters.

entirely unclear just what the Commission intends by the "underlay" notion. Indeed, the Commission specifically raises the question of how an "underlay" service might be distinguished from a secondary service. (NPRM, FCC 97-85, slip op. at 13 (¶ 24).) Given the fact that the Commission suggests that this use "would not interfere with the predominant use" (NPRM, FCC 97-85 slip op. at 12 (¶ 23)), it seems logical to conclude that an underlay service would either be secondary, or would be a hybrid between primary and secondary status, *i.e.*, neither causing interference to primary users nor receiving protection from them, while at the same time having priority over any other use in the band. In fact, in most instances there would appear to be no substantive difference between the two approaches as they would apply to terrestrial wireless services, either because they are currently the only secondary service allocated in a particular band or because FSS and fixed and mobile services are the only primary services in the band.[26] Yet the Commission also notes that "underlay operations may need to be restricted so that they do not substantially impact" the predominant use of the band. Therefore, Lockheed Martin seeks clarification of what is intended by the concept of "underlay" licensing.

III. CONCLUSION

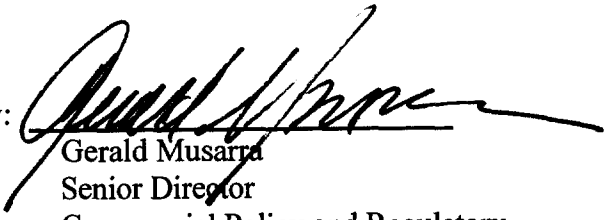
As described in the foregoing comments, many challenges lie ahead in adapting the initial band plan proposal offered by the Commission to take into account both existing frequency use around the world and the emerging requirements of both satellite and terrestrial users. Lockheed Martin believes strongly that any further action in the domestic proceeding should await the outcome of WRC-97, and that an equitable international allocation proposal must be developed and obtained at WRC-97, for subsequent implementation domestically. Under the current proposal in the NPRM, the US satellite industry would suffer a serious setback that would have a profound negative impact on the development of future advanced satellite communications networks. Lockheed Martin is fully prepared, however, to continue making the substantial efforts

[26] One exception would be the 37.5-38 GHz band, where there is a primary downlink allocation for Space Research and a secondary downlink allocation for the Earth Exploration-Satellite Service.

that will be necessary in the upcoming months to improve and refine this initial proposal, and it is committed to taking a leadership role in this process.

Respectfully submitted,

LOCKHEED MARTIN CORPORATION

By: 

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