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

In the Matter of	)	File No. 39-SAT-P/LA-98; Call Sign S2332
	)	IBFS File No. SAT-LOA-1997122-0208
	)	File No. 40-SAT-P/LA-98; Call Sign S2333
Lockheed Martin Corporation	)	IBFS File No. SAT-LOA-1997122-0206
	)	File No. 41-SAT-P/LA-98; Call Sign S2334
	)	IBFS File No. SAT-LOA-1997122-0212
Application for Authority to Construct,	)	File No. 42-SAT-P/LA-98; Call Sign S2335
Launch, and Operate a Ka-Band Satellite	)	IBFS File No. SAT-LOA-1997122-0211
System in the Fixed-Satellite Service	)	File No. 43-SAT-P/LA-98; Call Sign S2336
		IBFS File No. SAT-LOA-1997122-0213

ORDER AND AUTHORIZATION

Adopted: August 2, 2001 **Released: August 3, 2001**

I. INTRODUCTION

By the Chief, International Bureau:

1. By this Order, we authorize Lockheed Martin Corporation ("LMC") to launch and operate a satellite system in geostationary-satellite orbit to provide fixed-satellite services in the Ka-band.[1] In a companion order issued today, we assign LMC's satellites to the 129° W.L, 51° W.L., 52° E.L., 99° E.L. and 151.5° E.L. orbital locations.[2] This will allow LMC to provide businesses and consumers access to a variety of competitive satellite communications services in a frequency band suitable for advanced broadband interactive services.

II. BACKGROUND

2. LMC is one of 12 applicants seeking authority to operate geostationary satellite orbit (GSO) satellites in the second Ka-band processing round. In May 1997, the International Bureau licensed 13 applicants to launch and operate GSO satellite systems as part of the first Ka-band processing round ("First Round").[3] In October 1997, the Bureau established a second processing round ("Second Round"),

[1] For purposes of this order, the terms "Ka-band" or "28 GHz band" refer to the space-to-Earth communications (downlink) in radio frequencies at 17.7-20.2 GHz and the corresponding Earth-to space communications (uplink) in frequencies at 27.5-30.0 GHz. We authorize LMC to operate in a portion of these frequency bands indicated in this order.

[2] *In the Matter of Second Round Assignment of Geostationary Satellite Orbit Locations to Fixed Satellite Service Space Stations in the Ka-Band,* Order, DA 01-1693 (Int'l Bur. rel. August 3, 2001) ("*Second Round GSO Assignment Order*").

[3] The Bureau also licensed one non-geostationary-satellite orbit ("NGSO") Ka-Band system. *See Teledesic Corporation, Application for Authority to Construct, Launch and Operate a Low Earth Orbit Satellite System in the Domestic and International Fixed Satellite Service*, Order and Authorization, 12 FCC Rcd 3154 (Int'l Bur. 1997).

inviting interested parties to file applications on or before December 22, 1997 for consideration in this round. The Second Round GSO licenses and, in one case, reservation of orbit locations for a non-U.S. licensed satellite system, will enable new entrants to offer competitive services to those licensed in the First Round and will allow First Round licensees an opportunity to expand and improve the capabilities and service offerings of their licensed systems.

3. LMC is a publicly held corporation.[4] Its system is intended to provide a wide range of very high data rate circuit-switched services, worldwide, on a non-common carrier basis. In its application LMC proposes five technically identical satellites at five inter-linked orbital positions. LMC proposes one satellite at each of the following orbital positions: 127° W.L., 79° W.L., 52° E.L., 99° E.L. and 151.5° E.L.

4. LMC proposes to use spectrum in the 27.85-29.1 GHz and 29.25-30.0 GHz frequency bands for uplink (Earth-to-space) communications.[5] LMC proposes to use spectrum in the 17.8-19.3 GHz and 19.7-20.2 GHz frequency bands for downlink (space-to-Earth) communications. LMC also requests authority to conduct its tracking, telemetry, and command ("TT&C") operations during transfer orbit and on-orbit operations in the extended C-band frequencies.[6]

5. Three second-round Ka-band applicants filed petitions to deny the Second-Round LMC application.[7] The gravamen of two of these petitions is that LMC should not be assigned any further orbital locations within that portion of the geostationary satellite orbit arc that can serve the contiguous United States (full-CONUS). Hughes raises technical objections to LMC's proposed operation in portions of the Ka-band designated for other services on a primary basis, questions LMC's compliance with the Commission's two-degree orbit spacing policy so as not to interfere with Hughes' satellites, and asserts that LMC's system will not meet the requirement that earth stations utilize uplink adaptive power control pursuant to Section 25.204(g)[8] of the Commission's rules.[9]

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[4] *Application of Lockheed Martin Corporation. for Authority to Launch and Operate Astrolink-Phase II™, an Expansion of the Astrolink™ Ka-band Satellite System* ("*LMC Application*"), filed December 22, 1997, at pp. 19-20. At the time this application was filed, LMC was the 100% owner of the Astrolink System, which had been licensed by the Commission in the First Round. The Astrolink system is now owned by Astrolink International, LLC ("AI"). LMC owns 31.109% of AI through its wholly-owned subsidiary, Lockheed Martin Global Telecommunication, Inc. ("LMGT"). In that regard, AI recently filed an application to transfer control of AI to LMGT, TRW, Inc., LSAT Astro LLC, and Telespazio Luxembourg S.A. As the 100% owner of the Ka-band system proposed in the second round application, LMC indicates that its system is no longer simply an extension of the Astrolink system. Therefore, LMC has requested that its Ka-band system be referred to as "LM-GEO" instead of Astrolink II. Letter to Magalie Roman Salas, Secretary, FCC, from Keith H. Fagan, Lockheed Martin Global Telecommunications, dated March 29, 2001.

[5] LMC Application at p. 35.

[6] LMC requests authority for TT&C links in the 3.65-3.7 GHz and 6.425-6.525 GHz frequency bands. *LMC Application* at pp. 41-42, 60-62.

[7] Pacific Century Group, Inc., Petition To Deny Or Condition Grant Of Authorizations, filed May 21, 1999 ("PCG Petition"); Pegasus Development Corporation, Consolidated Petition to Deny, filed May 21, 1999 ("Pegasus Consolidated Petition"); Consolidated Petitions To Dismiss, Deny or defer Of Hughes Communications Galaxy, Inc. and Hughes Communications, Inc., filed May 21, 1999 ("Hughes Consolidated Petition"). We address all issues relating to the assignment of orbit locations, financial qualifications, and two-degree spacing in the *Second Round GSO Assignment Order* released today.

[8] 47 C.F.R. §25.204(g)

[9] *See* Section III.A.2.a. for a complete discussion of this issue.

III. DISCUSSION

A. Qualifications

6. All applicants requesting authority to launch and operate satellite space stations must present information sufficient to establish their legal, technical, and financial qualifications to hold a Commission license. The rules set forth in Part 25 of the Commission's rules govern fixed-satellite service ("FSS") applicants and licensees, including this application for geostationary satellite orbit GSO FSS in the Ka-band frequencies. The Commission modified the Part 25 FSS rules in 1997 to incorporate the particular technical requirements for operations in the Ka-band frequencies.[10] In this and other licenses issued to Second Round FSS applicants in the Ka-band, we will generally apply all Part 25 FSS rules, specifically noting, however, where we decide not to apply existing rules.

1. Number of Orbit Locations

7. The Commission's Part 25 FSS rules include a limit on the number of orbit locations that may initially be assigned to a qualified GSO FSS applicant.[11] The rules also limit the number of additional, expansion orbit locations that may be assigned to applicants with previously licensed systems using the same frequency bands.[12] Generally, the Commission may grant a waiver of its rules in a particular case only if the relief requested would not undermine the policy objective of the rule in question, and would otherwise serve the public interest.[13] The Commission waived the assignment limit rules in the First Round because the applicants had agreed to an arrangement that accommodated all pending applications for space stations and left room for additional assignments.[14] In this Second Round, we have determined that we can also accommodate all pending requests for space stations, with room for additional entry. We therefore again waive application of the Commission rule limiting GSO FSS orbit locations.[15] Consequently, we will not, as some applicants request, limit the number of assignments to Second Round applicants.

2. Technical Qualifications

8. Applicants for FSS space station authorizations must meet the technical qualification requirements set forth in the Commission's Part 25 rules. These requirements are designed primarily to implement two-degree orbital spacing between GSO FSS satellites. The Commission's two-degree spacing policy, which was established in 1983, was designed to maximize the number of satellites in orbit by ensuring that satellites in geostationary-satellite orbit can operate without causing harmful interference to other GSO satellites located as close as two degrees.[16]

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[10] *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 ("Ka-Band FSS Rules Order")*, Third Report and Order, FCC 97-378, 12 FCC Rcd 22310 (1997). *Memorandum Opinion and Order*, FCC 01-172 (rel May 25, 2001) (order on petitions for clarification or reconsideration).

[11] 47 C.F.R. § 25.140(e).

[12] 47 C.F.R. § 25.140(f).

[13] *WAIT Radio v. FCC*, 418 F.2d 1153, 1157 (D.C. Cir. 1969).

[14] *Ka-Band FSS Rules Order*, 12 FCC Rcd at 22320 ¶ 24.

[15] For a more detailed discussion, *see Second Round GSO Assignment Order*, at ¶ 17.

[16] *Licensing of Space Stations in the Domestic Fixed-Satellite Service*, 54 Rad. Reg. 2d (P&F) 577, 589 (1983) (*Two-Degree Spacing Order*).

9. In the *Ka-Band FSS Rules Order*, the Commission adopted its proposal to extend its two-degree spacing policy between in-orbit satellites to space stations in the Ka-band.[17] We believe that it remains in the public interest to maximize the number of satellites that can be accommodated in orbit by extending the Commission's existing two-degree GSO spacing policy to Ka-band orbital assignments in the Second Round. All GSO FSS licensees in the Second Round will therefore be required to be two-degree GSO spacing compliant.

10. LMC indicates that its system design is consistent with operation in a two-degree spacing environment.[18] Our review of LMC's application finds nothing to preclude operation in a two-degree spacing environment. The Second Round Ka-band applications were received subsequent to the *Ka-Band FSS Rules Order* but prior to the *18 GHz Band Report and Order*.[19] In both orders, rules affecting two-degree orbital spacing were adopted. We remind LMC of its continuing obligation to meet all Part 25 rules governing system operations, including Sections 25.202 (frequencies, frequency tolerances, and emission limitations) and 25.210 (technical requirements for space stations in the Fixed-Satellite service).[20] Further, LMC must meet the current Ka-band power flux-density ("pfd") limits of Sections 2.106 US255 and 25.208,[21] which were adopted after LMC filed its application. As a condition of authorization, LMC must meet these revised pfd limits. Hughes' arguments that LMC's satellites do not comply with our two-degree spacing policy are thus rendered moot.

11. Hughes also asserts that LMC's Astrolink II™ system does not comply with Section 25.204(g)'s requirement for FSS earth stations to employ uplink adaptive power control.[22] This rule requires uplink adaptive power control "or other methods of fade compensation…" In its Consolidated Opposition, LMC states that it plans to employ adaptive coding to compensate for rain fades, on both uplink and downlink, and that, in addition, on the uplink the transmit power level will be controlled to ensure that the minimum transmit power is used to maintain the required link performance, depending on the location of the terminal within the beam, the elevation angle to the satellite, and a variety of other factors that are link-dependent.[23] If implemented, these methods would constitute an acceptable alternative to uplink adaptive power control under Section 25.204(g). We therefore find that LMC's satellite system design as represented comports with rule 25.204(g). Hughes' petition as it pertains to this issue is therefore moot.

3. Financial Qualifications

12. The Commission's FSS rules require that an applicant for a new fixed-satellite system possess sufficient financial resources to cover the construction, launch, and first-year operating costs of each proposed satellite.[24] We have waived these rules, however, in those cases where we can accommodate all pending applications. The Commission's financial qualification rules are designed to

[17] *Ka-Band FSS Rules Order*, 12 FCC Rcd at 22320 ¶ 23.

[18] LMC Application at ¶4.11.2.1

[19] *Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use ("18 GHz Band Report and Order")*, FCC 00-212, 15 FCC Rcd 13,430 (2000).

[20] 47 C.F.R. §§ 25.202 and 25.210.

[21] 47 C.F.R. §§ 2.106 US255 and 25.208.

[22] Hughes Consolidated Petition at 20-21.

[23] *See* Lockheed Martin Corporation's Consolidated Opposition, filed June 11, 1999, Technical Appendix at 3.

[24] 47 C.F.R. § 25.140(b)-(e).

prevent under-capitalized licensees from holding valuable orbit spectrum resources to the exclusion of others while they attempt to arrange financing to construct and launch the licensed system.[25] Where all applicants can be accommodated, however, granting a license to an under-capitalized applicant will not prevent another applicant from going forward.[26] In addition, there is a pro-competition public interest benefit in licensing all applicants, if possible. We waived the financial qualification rules for the First Round applicants because all of those applicants could be accommodated in the available orbital locations and there were additional orbital locations available for future entrants.[27] In the accompanying *Second Round GSO Assignment Order*, we also determine that we can accommodate all pending Second Round applicants' requests for GSO FSS space stations in the Ka-band, and still have some orbital locations available for future entrants. We therefore waive the financial qualification requirements for Second Round applicants. Consequently, it is unnecessary to rule on LMC's financial qualifications.

B. Spectrum Assignments

1. Service Links

13. In the *28 GHz Band First Report and Order*, the Commission adopted a band segmentation plan that designated one gigahertz of spectrum in each transmission direction for GSO FSS Ka-band systems.[28] For uplink (Earth-to-space) transmissions, the Commission designated 250 megahertz of spectrum between 28.35 and 28.6 GHz, 250 megahertz of spectrum between 29.25 and 29.5 GHz (shared on a co-primary basis with non-geostationary satellite orbit, mobile satellite service feeder links), and 500 megahertz of spectrum between 29.5 and 30.0 GHz for GSO FSS operations. For downlink (space-to-Earth) communications, the Commission designated 1100 megahertz of spectrum between 17.7 and 18.8 GHz for GSO FSS operations (shared on a co-primary basis with terrestrial fixed-service) and 500 megahertz of spectrum between 19.7 and 20.2 GHz for primary GSO FSS operations. The Commission later refined the downlink plan for the frequency band between 17.7 and 18.8 GHz, by designating 280 megahertz of spectrum between 18.3 and 18.58 GHz for co-primary GSO FSS and terrestrial-fixed operations and 220 megahertz of spectrum between 18.58 and 18.8 GHz for primary GSO FSS operations.[29]

a. Uplink Transmissions

14. In its application, LMC proposes to use two gigahertz of spectrum at the 27.85-29.1 GHz and 29.25-30.0 GHz frequency bands for its service uplinks. We will authorize LMC to operate its service uplinks consistent with the 28 GHz band plan in 1 gigahertz of spectrum in the 28.35-28.6 GHz, 29.25-29.5 GHz, and 29.5-30.0 GHz bands designated for GSO FSS on a primary or co-primary basis, subject to the sharing rules adopted in the *28 GHz Band First Report and Order*.

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[25] *See generally Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626/2483.5-2500 MHz Frequency Bands, Report and Order*, 9 FCC Rcd 5936, 5948 ¶ 26 (1994) ("*Big LEO Report and Order"*).

[26] *Id.*

[27] *See Ka-Band FSS Rules Order*, 12 FCC Rcd at 22318 ¶ 18.

[28] *Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services, First Report and Order and Fourth Notice of proposed Rulemaking*, FCC 96-311, 11 FCC Rcd 19005 (1996) *("28 GHz Band First Report and Order").*

[29] *18 GHz Band Report and Order*, 15 FCC Rcd 13430. Stations operating in primary services are protected against interference from stations of "secondary" services. Moreover, stations operating in a secondary service cannot claim protection from harmful interference from stations of a primary service. "Co-Primary" services have equal rights to operate in particular frequencies. *See* 47 C.F.R §§ 2.104(d) and 2.105(c).

15. LMC also proposes to use additional uplink spectrum for domestic use in the 27.85-28.35 GHz and 28.6-29.1 GHz bands. The spectrum at 27.85-28.35 GHz is designated for GSO FSS operations on a secondary basis to the primary Local Multipoint Distribution Service (LMDS), a terrestrial-fixed service. LMC's requested spectrum at 28.6-29.1 GHz is designated on a primary basis to non-geostationary satellite orbit ("NGSO") FSS, while GSO FSS operations have secondary status. Therefore, LMC will be required to demonstrate that it can operate domestically on a secondary or "non-harmful interference" basis both to the LMDS and NGSO FSS services To facilitate such a sharing arrangement, LMC proposes to cease transmissions to and from its GSO satellites whenever interference alignment situations with respect to an operational NGSO FSS satellite occur. LMC explains that it is prepared to either tolerate communications link outages or rely on GSO satellite diversity in order to mitigate expected disruptions of its transmission links.[30] LMC acknowledges, however, that it has not provided an adequate technical showing in its application that it can operate on a secondary basis to NGSO FSS, but states that it will do so when the specific implementation of mitigation principles and associated criteria are better quantified through the work of international study groups.[31]

16. LMC and other concerned parties acknowledge that before GSO FSS systems can be permitted to operate on secondary basis to NGSO FSS systems, at a minimum, an appropriate interference protection level must be established to protect NGSO FSS operations.[32] At this time however, technical studies analyzing the protection of NGSO FSS systems from GSO FSS systems' interference have not been completed. We recognize that in the absence of established NGSO FSS protection interference criteria, satellite operators cannot fully assess the impact proposed GSO and NGSO FSS sharing would have on NGSO FSS operations. We further note that without such criteria LMC cannot make the required technical showing that its system can operate on a non-harmful interference basis in the designated NGSO FSS-primary bands. We, therefore, do not have sufficient evidence on the record to consider LMC's request to operate its GSO FSS system in the 28.6-29.1GHz frequency band. Therefore, we dismiss LMC's request for this GSO FSS /NGSO FSS shared spectrum without prejudice pending the establishment of sharing criteria for GSO FSS and NGSO FSS in these bands. Once such criteria are established, LMC may file an application to modify its license to operate on this additional spectrum, together with a showing that its proposed secondary operations meet the established measures and criteria for non-interfering GSO FSS operations.

17. Similarly, LMC's request to use spectrum 27.85-28.35 GHz on a secondary basis to the primary LMDS service is also dismissed without prejudice as sharing criteria between FSS and LMDS operations have not been established. LMC may file a license modification application requesting this spectrum once sharing criteria for GSO FSS and LMDS operations have been established. Hughes' petition to deny LMC's application as it pertains to LMC's request to share both the NGSO FSS and LMDS spectrum bands is therefore moot.

18. LMC also requests authority to use the 27.85-28.35 GHz frequency band for uplink transmissions outside of the United States.[33] Unlike the domestic allocation, which contains a primary designation for LMDS, the band is allocated internationally for FSS, on a primary basis. The Commission recently clarified its policy for use of the 27.5-28.35 GHz band by U.S.-licensed FSS operators.[34] We will authorize LMC's operations in the 27.5-28.35 GHz band in accordance with the

[30] LMC Application at 99-101.

[31] LMC Consolidated Opposition at pp. 40-41.

[32] LMC Consolidated Opposition at pp. 39-40 and n. 109.

[33] LMC Application at p. 37.

[34] *Memorandum Opinion and Order, 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,* FCC 01-172 (released (continued....)

conditions specified in the *Reconsideration of Ka-Band FSS Rules Order*.

b. Downlink Transmissions

19. In its application, LMC also proposes to use two gigahertz of spectrum at the 17.8-19.3 GHz and 19.7-20.2 GHz frequency bands for its service downlink bands. We grant this request consistent with the *18 GHz* band plan.[35] Specifically, we authorize LMC to operate its service downlinks in a total of one gigahertz of spectrum in the 18.3-18.8 GHz and 19.7-20.2 GHz frequency bands. Because the 280 megahertz of spectrum at 18.3-18.58 GHz is to be shared on a co-primary basis with terrestrial-fixed services, GSO FSS operations in this band must be coordinated with these terrestrial operations.

20. LMC also requests authority to use the 17.8-18.3 GHz frequency band for downlink transmissions outside of the United States. As with the companion uplink spectrum at 27.85-28.35 GHz, the 17.8-18.3 GHz band is allocated internationally for FSS. These additional downlink frequencies were also addressed in the *Reconsideration of Ka-Band FSS Rules Order*.[36] We will therefore authorize LMC's operations in these bands in accordance with the conditions specified in that Order.

21. In addition, LMC must coordinate with U.S. Government systems in accordance with footnote US334 to the Table of Frequency Allocations.[37] This footnote requires coordination of commercial systems with U.S. Government GSO and NGSO FSS systems that are presently operating throughout the 17.8-20.2 GHz frequency band. These Government systems plan to operate in accordance with the power flux-density limits contained in the current International Telecommunication Union ("ITU") Radio Regulations.[38] LMC must also comply with footnote US255 to the Table of Frequency Allocations that contains power flux-density limits to protect the Earth exploration satellite service (passive) for the 18.6-18.8 GHz band.[39]

22. LMC also proposes to operate downlinks in the 17.8-18.3 GHz and 18.8-19.3 GHz bands. In the 17.8-18.3 GHz band, LMC proposes to operate on a co-primary basis with U.S.-licensed terrestrial

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May 25, 2001 (*Reconsideration of Ka-Band FSS Rules Order.* In this Order, the Commission issued a clarifying statement that stated that U.S licensed Ka-band licensees may use the frequency bands 17.7-18.8 GHz and 27.5-28.6 GHz to communicate with earth stations in foreign countries, subject to coordination with foreign administrations and certain U.S.-licensed operators as well as subject to the laws of the foreign countries in which these earth stations are located.

[35] *See 28 GHz Band First Report and Order*, 11 FCC Rcd 19005, as modified in *18 GHz Band Report and Order* 15 FCC Rcd at 13443, ¶ 28.

[36] *Memorandum Opinion and Order, 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*, FCC 01-172 (released May 25, 2001) (*Reconsideration of Ka-Band FSS Rules Order).*

[37] *See* 47 C.F.R. §2.106 US334.

[38] *See 18 GHz Report and Order*, 15 FCC Rcd at 13473 ¶ 90. The power flux-density limits in the 18.3-18.6 GHz band are -115/-105 dB (W/m^2) in any one megahertz band, depending upon the angle of arrival. There are currently no power flux-density limits in the 19.7-20.2 GHz band. *See* Letter from William T. Hatch, National Telecommunications and Information Administration, to Dale Hatfield, Chief, Office of Engineering and Technology, Federal Communications Commission (March 29, 2000).

[39] 47 C.F.R Section 2.106 US 255 (as revised in the *18 GHz Band Report and Order*, 15 FCC Rcd at 13489) states: In addition to any other applicable limits, the power flux-density across the 200 MHz band 18.6-18.8 GHz produced at the surface of the Earth by emissions from a space station under assumed free-space propagation conditions shall not exceed –95db(W/m2) for all angles of arrival. This limit may be exceeded by up to 3 dB for no more than 5% of the time.

fixed services.[40] This spectrum is allocated domestically exclusively for terrestrial fixed service operations.[41] We therefore deny LMC's request for domestic use of this spectrum.

23. Similarly, the downlink spectrum that LMC requests in the 18.8-19.3 GHz band is currently allocated domestically for NGSO FSS use only.[42] Further, as noted above, LMC has not demonstrated that it can operate its GSO FSS system on a non-interference basis to NGSO FSS in these bands. We therefore deny LMC's request for domestic use of this spectrum without prejudice to refiling. In any future filing, LMC must also demonstrate that a waiver of the Table of Frequency Allocations is warranted.

24. LMC also requested authorization to use the 17.8-18.3 GHz band outside of the United States. These additional downlink frequencies were also addressed in the recent Commission clarification.[43] We will authorize LMC's operations in these bands in accordance with the conditions specified in the *Reconsideration of Ka-Band FSS Rules Order*.

2. Inter-Satellite Links

25. LMC proposes to use inter-satellite links (ISLs) between adjacent satellites to provide connectivity between coverage regions of different satellite orbit locations.[44] LMC's Ka-band satellite system will consist of five satellites located at five different orbital locations. Each of the five satellites will be inter-connected to other satellites within its system. Therefore, each satellite will require a maximum of five ISL channels in each direction. To support a data rate of 500 Mbps (net circuit capacity after removal of ATM cell header overhead) each channel will require a bandwidth of 600 megahertz.[45] With the use of dual polarization, each satellite within the system will be capable of re-using the same spectrum at different orbital locations. According to LMC, the ISLs will provide direct satellite-to-satellite communication, thereby avoiding the need for double-hop connectivity, increase system level reliability, and provide seamless global connectivity.

26. LMC proposes to use 1800 megahertz (600 megahertz x 3) of spectrum within the 54.25-58.2 GHz band for its long-range ISLs.[46] It also proposes use of spectrum for local inter-satellite links ("LISLs").[47] Based on LMC's representations, we find that it has demonstrated a need for 1800

[40] LMC Application at pp. 37-38.

[41] *18 GHz Band Report and Order*, 15 FCC Rcd at 13445-46, ¶¶ 31-33. Prior to that rulemaking this segment of the 18 GHz band was designated for shared co-primary use between GSO/FSS and terrestrial fixed service operations. *Id*. at ¶ 31.

[42] *Id*. at 13454-56, ¶¶ 50-52. Prior to that rulemaking this segment of the 18 GHz band was designated for co-primary use by NGSO FSS and terrestrial fixed service operations, and for secondary use by GSO FSS. *Id*. at 13435 ¶ 10.

[43] *Reconsideration of Ka-Band FSS Rules Order*, FCC 01-172.

[44] ISLs are communication links between in-orbit satellites. ISLs operate in spectrum allocated to the inter-satellite service. *See* International Telecommunication Union Radio Regulation S1.22.

[45] LMC Application at p. 40.

[46] LMC also proposed using spectrum in the 59-64 GHz band for its long-range ISLs. *See* LMC Application at p. 40. This band, however, is not available for non-Government ISS use.

[47] LMC initially proposed to use 600 megahertz within the 22.55-23.55 GHz band and 600 megahertz within the 32.0-33.0 GHz band for ISL communications, or in the alternative, 1200 megahertz in the 65-71 GHz band for its local inter-satellite links ("LISLs"). LISLs are designed for short range communications only and are used to communicate with compatible satellites within 1° of longitude. *See* LMC Application at pp. 39-40. LMC subsequently withdrew this request for LISLs. *See* Written Ex Parte Presentation of Lockheed Martin Corporation (continued....)

megahertz of ISL spectrum. Sharing studies done by the first-round Ka-band licensees concluded that those applicants could share the ISL spectrum with minimal constraints. We expect the same conclusion to be reached by Second Round applicants.[48] Consequently, we will authorize LMC to conduct ISL operations in 1800 megahertz of spectrum within the 54.25-58.2 GHz band, subject to coordination among the First and Second Round ISL licensees, and with U.S. Government (non-ISL) operations through NTIA's Interdepartment Radio Advisory Committee's Frequency Assignment Subcommittee. Additionally, within 30 days after the release of this Order, LMC must inform the Commission which specific spectrum within the 54.25-58.2 GHz band it has chosen for its ISL operations.

3. Tracking, Telemetry and Command

27. Under the Commission's rules, tracking, telemetry, and command ("TT&C")operations may be provided at the edges of the frequency bands in which the particular satellite will be providing service.[49] LMC proposes to conduct its TT&C operations during transfer-orbit maneuvers and on-orbit in extended C-band frequencies. Specifically, LMC proposes to conduct its command functions in the 6425-6525 MHz band and its telemetry functions in the 3650-3700 MHz band.[50] All of these requested operations are within the C-band frequencies, which are not the system's service band. Thus, the request is not consistent with Section 25.202 of the rules.[51] As the Commission recently indicated, this rule serves the valid purpose of simplifying coordination among satellites at adjacent orbital locations, and promoting efficient spectrum use.[52] Although LMC has provided a showing seeking to demonstrate that a waiver of Section 25.202(g) for TT&C operations outside its service band is warranted,[53] that showing only addressed potential coordination concerns with respect to other U.S. licensees, and therefore does not fully address the underlying purpose of the rule, nor did it demonstrate that the public interest otherwise requires a waiver. Thus we deny LMC's request.

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by Raymond G. Bender, Jr., and Carlos M. Nalda, Counsel for LMC, submitted to Magalie R. Salas, Secretary, F.C.C. (filed July 16, 2001).

[48] For a detailed discussion of spectrum available for ISL operations, *see Amendment of Part 2 of the Commission's Rules to Allocate Additional Spectrum to the Inter-Satellite, Fixed, and Mobile Services*, ET Docket No. 99-261, *Report and Order*, FCC 00-442, at ¶ 45 (rel. Dec. 22, 2000).

[49] 47 C.F.R § 25.202(g).

[50] Specifically, Command and Tracking operations would take place at 6425.5 and 6427.5 MHz and Telemetry will be received at 3650.5 and 3699.5 MHz. LMC Application at p. 60. The Commission has proposed to modify Section 25.202 to permit TT&C operations in the 3.65-3.7 GHz frequencies, if the applicant makes a "particularized showing of need." *Amendment of the Commission's Rules With Regard to the 3650-3700 MHz Government Transfer Band*, FCC 00-363 15 FCC Rcd 20488, 20539 at 130 (2000). The Commission specifically sought comment on the types of showings that would warrant such an authorization. *Id*. at 131. DirectCom made no such showing. Additionally, we note that the Government operates high-power radar within the 3600-3650 MHz band. Therefore, because proposed TT&C functions are crucial to satellite operations and do not appear to be compatible with the Government's radar operations, we will not consider any request to operate in the 3600-3650 GHz band. *See* Letter from William T. Hatch, Acting Associate Administrator, NTIA, to Dale, N. Hatfield, Chief, Office of Engineering and Technology, FCC, dated November 2, 1999.

[51] *See Amendment of the Commission's Rules With Regard to the 3650-3700 MHz Government Transfer Band*, 15 FCC Rcd at 20538 ¶ 129 (the rule "effectively limits FSS operators to operating TT&C links in the same frequency bands as their FSS operations").

[52] *Id*. at ¶¶ 129-130.

[53] *See* LMC Application, Exhibit D-1.

C. Regulatory Treatment

28. In the *DISCO I Order*, the Commission determined that all fixed-satellite service operators in the C-band and Ku-band could elect to operate on a common carrier or non-common carrier basis.[54] The Commission extended this treatment to satellite operators in the Ka-band in the *Ka-Band FSS Rules Order*.[55] Consequently, Second Round Ka-band applicants may elect their regulatory status. LMC has elected to operate on a non-common carrier basis,[56] and we authorize it to do so.

D. License Conditions

1. Milestone Schedule

29. As in all other satellite services, all Second Round Ka-band licensees will be required to adhere to a strict timetable for system implementation. This ensures that licensees are building their systems in a timely manner and that the orbit-spectrum resource is not being held by licensees unable or unwilling to proceed with their plans. The implementation schedules for GSO FSS systems in the Ka-band generally track the schedules imposed in other satellite services.

30. Specifically, Section 25.145(f) of the Commission's rules requires Ka-band GSO FSS licensees "[1] to begin construction of [their] first satellite within one year of grant, [2] to begin construction of the remainder within two years of grant, [3] to launch at least one satellite into each of [their] assigned orbit locations within five years of grant, and [4] to launch the remainder of [their] satellites by the date required by the International Telecommunication Union to assure international recognition and protection of those satellites."[57] Failure to meet any of these construction milestones will render those satellite authorizations null and void without further action by the Commission.

31. The dates by which LMC's satellites must be "brought into use" to protect the date priority of the U.S. ITU filings for its service links at these orbital locations are March 9, 2003 – with a two-year extension available under certain circumstances, July 9, 2005, July 16, 2005, and July 23, 2005.[58] We

[54] *See In the Matter of Amendment to the Commission's Regulatory Policies Governing Domestic Fixed Satellites and Separate International Satellite Systems and DBSC Petition for Declaratory Rulemaking Regarding the Use of Transponders to Provide International DBS Service*, 11 FCC Rcd 2429, 2436 (1996) (*"DISCO I Order").*

[55] *Ka-Band FSS Rules Order*, 12 FCC Rcd at 22333 ¶¶ 58-60.

[56] *See* LMC Application at p. I, 18-19.

[57] 47 C.F.R. § 25.145(f). *See also Ka-Band FSS Rules Order*, 12 FCC Rcd at 22334-35 ¶ 61 & n.77.

[58] Specifically, the satellites at 129° W.L. and 51° W.L. must be brought into use by March 9, 2003, the satellite at 52° E.L. must be brought into use by July 9, 2005, the satellite at 99° E.L. must be brought into use by July 16, 2005, and the satellite at 151.5° E.L. must be brought into use by July 23, 2005. With regard to the 129° W.L. and 51° W.L. orbital locations, ITU Radio Regulations require that the satellites be "brought-into-use" (BIU) no later than five years after ITU receipt of advance publication information (ITU Radio Regulations Article S11.44). The ITU may extend the BIU date by two years under the conditions specified in ITU Radio Regulations Articles S11.44B through S11.44I (launch failure; launch delays due to circumstances outside the control of the administration or operator; delays caused by modifications of satellite design necessary to reach coordination agreements; problems in meeting the satellite design specifications; delays in reaching coordination after a request for ITU Radiocommunication Bureau assistance; financial circumstances outside the control of the administration or operator; and force majeure). In cases where the two year extension is necessary, the licensee must inform the Commission, in writing, six months before the end of the five year period so that the Commission can timely inform the ITU of the extension request. Should LMC indeed wish to extend its milestone at the 129° W.L. and 51° W.L. orbital locations to 2005, it must provide the Commission, six months before March 9, 2003, information demonstrating good cause to request an ITU extension on the grounds specified in the ITU Radio Regulations. As to LMC's remaining orbital location assignments, ITU Radio Regulations require that these satellites be brought into use at the ITU no later than nine years from the date the ITU publishes the advance publication information. The (continued....)

recognize that, in this case, comparing these ITU "bringing into use" dates to our launch milestones has the incongruous result of our rules requiring LMC to launch its satellites into each of its assigned orbit locations by August 2006, *i.e.*, after the dates by which LMC is required to bring its satellite locations into use to protect the date priority of the U.S. ITU filings for its orbital locations. To address this misalignment, we require LMC to launch its satellites into each licensed orbit location and "bring into use" all of the frequency assignments it plans to operate at that orbit location by the ITU "bringing into use" date. At present, that date at the 129º W.L. and 51º W.L. orbital location is March 9, 2003. Should the ITU grant a two-year extension of that date, the launch milestone for that licensed orbit location will automatically change to the new ITU "bringing into use" date without further Commission action. This will protect the United States filings at these locations and thus, LMC's ability to coordinate and gain international recognition for the satellite at each of its assigned orbit locations. Moreover, we do not anticipate that meeting this milestone will be unduly difficult. Under standard industry practice, it generally takes two to three years to construct and launch a satellite.[59] LMC will have nearly four years in which to launch its satellites into their assigned locations by the ITU "bringing into use" dates, assuming it has received the extension.

2. Reporting Requirements

32. We will follow the Part 25 rules for reporting requirements for FSS systems, including an annual report describing the status of satellite construction and anticipated launch dates, and a detailed description of the use made of each transponder on each of the in-orbit satellites.[60] LMC must file this report on June 30 of each year, containing information current as of May 31 of that year.

3. International Coordination.

33. In general, we will follow the applicable advance-publication, coordination, and notification procedures as set forth in the ITU Radio Regulations in coordinating LMC's satellites with other affected administrations. We will also require that LMC provide the Commission with the international coordination information required by our rules.[61] The orbit locations assigned today may be co-located or within two degrees of a non-U.S. licensed satellite filing having ITU date priority in its ITU filings. Under these circumstances, U.S. licensees assigned to these locations are reminded that they take these licenses subject to the outcome of the international coordination process, and that the Commission is not responsible for the success or failure of the required international coordination. In addition, the Commission has reached coordination agreement with the administration of Malaysia for two of the orbital locations assigned to Lockheed Martin in this proceeding.[62] Lockheed Martin is required to

(...continued from previous page)
ITU initially required that these locations be brought into use within six years after receipt of their advance publication information, with an option to extend that date by an additional three years upon request. Since WRC 2000, satellite networks at orbit locations whose advance publication information was received by the ITU before November 22, 1997 have been automatically granted the optional three-year extension. Because the remaining orbit locations assigned to LMC fall in this category, their July 2005 bringing into use dates cannot be further extended.

[59] *See*, *e.g.*, *In the Matter of the Application of Comsat Corporation*, 12 FCC Rcd 12059, 12075 ¶ 33 n. 68 (Int'l Bur. 1997) ("It has been our experience that it takes an average of two years to construct and launch a satellite….").

[60] *See* 47 C.F.R. § 25.210(l)(1)(2)(3).

[61] *See* 47 C.F.R. § 25.111(b).

[62] In particular, the U.S. Ka-band satellite network at 99° E.L. has been coordinated with the Ka-band portion of the MEASAT-3 and MEASAT-5 satellite networks at 91.5° E.L. and 95° E.L., respectively; and the U.S. Ka-band satellite network at 151.5° E.L. has been coordinated with the Ka-band portion of the MEASAT-2 satellite network at 148° E.L. A copy of the relevant portions of the agreement is available to the Licensee upon request.

operate its satellites at these locations in a manner consistent with this agreement.

IV. CONCLUSION

34. Upon review of LMC's application, we find that LMC is qualified to be a Commission licensee and that, pursuant to Section 309 of the Communications Act of 1934, as amended, 47 U.S.C. § 309, grant of this application will serve the public interest, convenience, and necessity. As specified in the *Second Round GSO Assignment Order*, we have assigned LMC to the 129° W.L, 51° W.L., 52° E.L., 99° E.L. and 151.5° E.L. orbital locations.

V. ORDERING CLAUSES

35. IT IS ORDERED that Applications File Nos. 39-SAT-P/LA-98, 40-SAT-P/LA-98, 41-SAT-P/LA-98, 42-SAT-P/LA-98,and 43-SAT-P/LA-98 ARE GRANTED IN PART, as discussed above, and Lockheed Martin Corporation IS AUTHORIZED to launch and operate five GSO FSS satellites to provide fixed-satellite service in the 18.3-18.8 GHz, 19.7-20.2 GHz, 28.35-28.6 GHz, 29.25-29.5 GHz, and 29.5-30.0 GHz frequency bands at the 129° W.L, 51° W.L., 52° E.L., 99° E.L. and 151.5° E.L. orbital locations.

36. IT IS FURTHER ORDERED that Lockheed Martin Corporation is authorized to transmit in the 17.8-18.3 GHz frequency bands to earth stations in foreign countries, and receive transmissions from such earth stations in the 27.85-28.35 GHz frequency bands, in accordance with the technical specifications set forth in its application and the pertinent provisions of Part 25 of the Commissions rules.

37. IT IS FURTHER ORDERED that when requesting international coordination of proposed use of frequencies in the 17.8-18.3 GHz band for downlinks to earth stations in foreign countries, Lockheed Martin Corporation shall certify in an affidavit filed with the Satellite and Radiocommunication Division of the Commission's International Bureau, that it has coordinated the proposed operation with other licensees with authority from this Commission for non-U.S. geostationary or non-geostationary satellite operation in that band. When requesting international coordination of proposed use of frequencies in the 27.5-28.35 GHz band for links with earth stations in foreign countries, Lockheed Martin Corporation shall certify that it has coordinated the proposed operation with other licensees with authority from the Commission for non-U.S. geostationary satellite operation in that band. The filing shall include certification of service on the licensees with whom such coordination is required.

38. IT IS FURTHER ORDERED that Lockheed Martin Corporation's authorization shall become NULL and VOID with no further action on the Commission's part in the event the space station is not constructed, launched, and placed into operation in accordance with the technical parameters and terms and conditions of this authorization by the following dates:

Construction Commenced		Launch and Operate	
First satellite	August 2002	129 ° W.L. Orbit Location	March 9, 2003[63]
Remaining satellites	August 2003	51 ° W.L. Orbit Location	March 9, 2003[64]
		52 ° E.L. Orbit Location	July 9, 2005
		99 ° E.L. Orbit Location	July 16, 2005
		151.5 °E.L. Orbit Location	July 23, 2005

39. IT IS FURTHER ORDERED that Lockheed Martin Corporation must coordinate its Ka-band downlink operations with U.S. Government systems, including Government operations to earth stations in foreign countries, in accordance with footnote US334 to the Table of Frequency Allocations, 47 C.F.R. § 2.106, and in accordance with the *18 GHz Report and Order*, 15 FCC Rcd at 13473 ¶ 90.

40. IT IS FURTHER ORDERED that Lockheed Martin Corporation, within 30 days from the date of the release of this Order and Authorization, must inform the Commission which specific spectrum in the 54.25-58.2 GHz band it has chosen for its inter-satellite link operations, and must coordinate its FSS inter-satellite link operations in this chosen spectrum through the National Telecommunications and Information Administration's Interdepartmental Radio Advisory Committee's Frequency Assignment Subcommittee. Lockheed Martin Corporation must also coordinate its FSS inter-satellite operations with all other non-government inter-satellite link operations in its chosen spectrum.

41. IT IS FURTHER ORDERED that Lockheed Martin Corporation shall conduct its operations pursuant to this authorization in a manner consistent with the power flux-density requirements of footnote US255 to the Table of Frequency Allocations, 47 C.F.R. § 2.106, and 47 C.F.R. § 25.208, of the Commission's Rules.

42. IT IS FURTHER ORDERED that the license term for each space station is ten years and will begin to run on the date Lockheed Martin Corporation certifies to the Commission that the authorized satellite has been successfully placed into orbit and the operations fully conform to the terms and conditions of this authorization.

43. IT IS FURTHER ORDERED that Lockheed Martin Corporation will prepare any necessary submissions to the International Telecommunication Union and to affected administrations for the completion of the appropriate coordination and notification obligations for these space stations in accordance with the International Telecommunication Union Radio Regulations. We also remind Lockheed Martin Corporation that no protection from interference caused by radio stations authorized by other administrations is guaranteed unless coordination procedures are timely completed or, with respect to individual administrations, by successfully completing coordination agreements. Any radio station authorization for which coordination has not been completed may be subject to additional terms and conditions as required to effect coordination of the frequency assignments of other Administrations, 47

[63] If the International Telecommunication Union grants a two-year extension of this date, this milestone will automatically change to March 9, 2005 without further Commission action.

[64] If the International Telecommunication Union grants a two-year extension of this date, this milestone will automatically change to March 9, 2005 without further Commission action.

C.F.R. § 25.111(b). Further Lockheed Martin Corporation must operate its satellites in accordance with any international coordination agreements already in existence.

44. IT IS FURTHER ORDERED that the temporary assignment of any orbital location to Lockheed Martin Corporation is subject to change by summary order of the Commission on 30 days notice and does not confer any permanent right to use the orbit and spectrum. Neither this authorization nor any right granted by this authorization, shall be transferred, assigned or disposed of in any manner, voluntarily or involuntarily, or by transfer of control of any corporation holding this authorization, to any person except upon application to the Commission and upon a finding by the Commission that the public interest, convenience and necessity will be served thereby.

45. IT IS FURTHER ORDERED that Lockheed Martin Corporation is afforded 30 days from the date of the release of this order and authorization to decline this authorization as conditioned. Failure to respond within that period will constitute formal acceptance of the authorization as conditioned.

46. This Order is issued pursuant to Section 0.261 of the Commission's rules on delegations of authority, 47 C.F.R. § 0.261, and is effective upon release. Petitions for reconsideration under Section 1.106 or applications for review under Section 1.115 of the Commission's rules, 47 C.F.R. §§ 1.106, 1.115, may be filed within 30 days of the date of public notice of this Order (see 47 C.F.R. § 1.4(b)(2)).

FEDERAL COMMUNICATIONS COMMISSION

Donald Abelson
Chief, International Bureau