

FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

April 29, 1998

OFFICE OF
MANAGING DIRECTOR

George L. Hanbury, III, Esquire
Dow, Lohnes & Albertson
1200 New Hampshire Avenue, N.W.
Suite 800
Washington, D.C. 20036

Re: Fee Control # 9712238210221001

Dear Mr. Hanbury:

This will respond to your request for a fee determination, waiver and/or partial refund of application fees filed on behalf of Lockheed Martin Corporation ("Lockheed") in connection with its proposal to modify its Astrolink System.

You represent that the Lockheed's Astrolink System is a global satellite network, consisting of "nine geostationary satellites, with two satellites collocated in each of four orbit locations and one satellite in its own third location." Given that Lockheed proposes to make identical changes to the nine geostationary satellites and that the administrative and processing costs "that involve two identical satellites at the same orbit location is no more costly than processing applications that involve one satellite at one orbit location," you request that the Commission assess an application fee on a per orbit, not a per satellite, basis.

Section 1.1107(9)(d) of the Commission's rules, 47 C.F.R. § 1.1107(9)(d), specifies a fee of \$6,075.00 per geostationary satellite in connection with modification applications. Lockheed submitted with its application a check in the amount of \$54,675.00 (covering the fee of \$6,075.00 for each of its nine geostationary satellites). However, given that the modification proposals for the space stations are identical, and that the administrative and processing costs appear to be based on the number of orbits involved, a partial waiver is warranted. See Managing Director's Letter to John P. Janka, Esq. (August 26, 1997) (a copy of which is enclosed.) Based on the John P. Janka letter ruling, the assessment of a fee of \$30,375 (\$6,075.00 per five orbit locations) would be appropriate under the circumstances.

Mr. Hanbury

Page 2

Accordingly, a check made payable to the maker of the original check and drawn in the amount of \$24,300.00, will be sent to you at the earliest practicable time. If you have any questions concerning this refund, please contact the Chief, Fee Section, at (202) 418-1995.

Sincerely,


Thomas M. Holleran
Acting Associate Managing
Director - Financial Operations

Enclosure

9712238210221001

RECEIVED BCB
COBZ
DEC 22 1997

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

Federal Communications Commission
Office of Secretary

In the Matter of the Application of)
)
Lockheed Martin Corporation)
)
For Authority To Modify)
the Astrolink™ System)
_____)

File No.:

RECEIVED
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FCC
FEDERAL COMMUNICATIONS COMMISSION

To: The Managing Director

**REQUEST FOR
PARTIAL WAIVER AND REFUND OF FEES**

Lockheed Martin Corporation ("Lockheed Martin") has filed with the Commission an application to modify the Astrolink™ System, a global satellite network consisting of nine geostationary satellites, with two satellites collocated in each of four orbit locations and one satellite in its own orbit location. Accompanying the modification application are FCC Forms 159 and 312 and a check in the amount of \$54,675 to cover the prescribed FCC filing fee.^{1/} The total \$54,675 fee was calculated based on a fee of \$6,075 for each of the nine Astrolink™ satellites that Lockheed Martin seeks to modify. Lockheed Martin believes that the applicable fee should be calculated on a *per orbit location* basis rather than a *per satellite* basis. Accordingly, this Request for Partial Waiver and Refund of Fees seeks reimbursement of \$24,300, or that portion of the fee associated with the Astrolink™ satellites that are collocated in orbit locations with other Astrolink™ satellites.

^{1/} These materials are attached as Appendices 1, 2 and 3, respectively.

The Commission should waive Section 1.1107 of its rules and assess fees in connection with Lockheed Martin's modification application on a per orbit, rather than a per satellite basis.^{2/} Fees that the Commission imposes on applicants should bear a reasonable relation to the expenses that the Commission may be expected to incur in processing the application.^{3/} In the modification application that is the subject of this Request, Lockheed Martin proposes to make identical changes to a constellation of nine geostationary orbit satellites that comprise the Astrolink™ System. Although Lockheed Martin has tendered a fee of \$6,075 for each of the nine Astrolink™ satellites, for a total of \$54,675, this fee amount bears no reasonable relation to the costs associated with processing and coordinating an application to modify technically identical, collocated satellites.

Processing and coordinating modification applications that involve two identical satellites at the same orbit location is no more costly than processing applications that involve one satellite at one orbit location.^{4/} Indeed, the Commission's *Ka-Band Public Notice* waived

^{2/} See 47 C.F.R. 1.1107 (1997). Under the Communications Act, the Commission may waive its fees "in any specific instance for good cause shown, where such action would promote the public interest." 47 U.S.C. § 158(d)(2) (Supp. 1997); see also 47 C.F.R. § 1.1117 (1997).

^{3/} See, e.g., *Nat'l Cable Television Ass'n, Inc. v. FCC*, 554 F.2d 1094, 1108-09 (D.C. Cir. 1976) ("A 'fee' is a payment for a special privilege or service rendered, and not a revenue measure. If the 'fee' unreasonably exceeds the value of the specific services for which it is charged it will be held unlawful"); *Establishment of a Fee Collection Program to Implement the Provisions of the Omnibus Budget Reconciliation Act of 1989*, Memorandum Opinion and Order, 5 FCC Rcd 3558, 3574 (rel. Apr. 20, 1990) ("1989 Fee Waiver Order") ("The Schedule of Charges results from a determination by the Congress that the fees represent a fair approximation as to how the Commission's costs should be distributed We have worked with Congress to ensure that, to the best extent possible, fees reflect only the direct cost of processing the typical application or filing").

^{4/} See Federal Communications Commission, Public Notice 56031, *Interim Filing Fee Payment Established for Ka-Band Satellite Applications* (Sept. 28, 1995) ("Ka-Band Public Notice") (attached as Appendix 4) (waiving the per satellite fee for geostationary fixed satellite

fees assessed on a per satellite basis to reflect the reduced costs of coordinating of technically identical satellites collocated in the same orbital position.^{5/}

The \$6,075 per satellite fee required to modify a geostationary satellite authorization reflects expenses associated with Commission review, processing and coordination of the proposed changes. The Commission can be expected to perform these functions only once for a given orbit location, regardless of the number of satellites in the orbit location. When the Commission adopted the fee schedule contained in Section 1.1107, satellite operators lacked the technology needed to collocate satellites in the same orbital slot. Because operators then typically located only one satellite in each orbital position, the per satellite and per orbit location costs of processing a modification application were identical. Since then, satellite operators have developed the ability to position more than one satellite in a single orbit location.

The costs associated with processing identical technical changes to satellites varies only with the number orbit locations involved, not the total number of satellites being modified. Where, as here, the Commission incurs no additional costs in processing modifications to two technically identical, collocated satellites, the Commission should waive its rules, assess fees for

service applicants "because of the evolution in geostationary satellite technology and the multiple geostationary space stations that applicants are anticipated to deploy in their systems").

^{5/} See *Ka-Band Public Notice* at 1; see also, e.g., Letter to Stephen L. Goodman, AT&T Corp, from Marilyn J. McDermott, Associate Managing Director for Operations, (Jul. 1995) ("*AT&T Waiver*") (attached as Appendix 5) (granting partial waiver of application to construct, launch and operate satellite following the failure of AT&T's first satellite); Letter to James F. Rogers, Esq., Hughes Communications Galaxy, Inc. from Marilyn J. McDermott, Associate Managing Director for Operations, dated (Apr. 11, 1994) ("*Hughes Waiver*") (attached as Appendix 6) (granting partial waiver of application to construct, launch and operate satellite following the failure of Hughes' first satellite).

the Astrolink™ System on a *per orbit* basis, and refund the excess payment of \$24,300 to Lockheed Martin.

CONCLUSION

The Commission will be required to perform processing and coordination functions in connection with Lockheed Martin's modification application on a per orbit location basis only. The Commission should, therefore, assess only one modification fee per orbit location. Lockheed Martin respectfully requests that the Commission waive Section 1.1107 of its rules and assess fees associated with Lockheed Martin's modification application on a per orbit rather than a per satellite basis.

Respectfully submitted,

LOCKHEED MARTIN CORPORATION

A handwritten signature in black ink, appearing to read 'G. Hanbury, III', written over a horizontal line.

George L. Hanbury, III, Esquire*
Its Attorney

DOW, LOHNES & ALBERTSON
1200 New Hampshire Avenue, N.W.
Suite 800
Washington, D.C. 20036

December 22, 1997

*Admitted in Virginia

APPENDIX 1

READ INSTRUCTIONS CAREFULLY
BEFORE PROCEEDING

(1) LOCKBOX # 358210

FEDERAL COMMUNICATIONS COMMISSION
REMITTANCE ADVICE

APPROVED BY OMB 3060-0589

PAGE NO. 1 OF 1

SPECIAL USE
FCC USE ONLY

SECTION A - PAYER INFORMATION

(2) PAYER NAME (if paying by credit card, enter name exactly as it appears on your card) Lockheed Martin Corporation	(3) TOTAL AMOUNT PAID (dollars and cents) \$ 54,675.00	
(4) STREET ADDRESS LINE NO. 1 6801 Rockledge Drive		
(5) STREET ADDRESS LINE NO. 2		
(6) CITY Bethesda	(7) STATE MD	(8) ZIP CODE 20817
(9) DAYTIME TELEPHONE NUMBER (include area code) (301) 897-6000	(10) COUNTRY CODE (if not in U.S.A.)	

**IF PAYER NAME THE AND APPLICANT NAME ARE DIFFERENT, COMPLETE SECTION B
IF MORE THAN ONE APPLICANT, USE CONTINUATION SHEETS (FORM 159-C)**

SECTION B - APPLICANT INFORMATION

(11) APPLICANT NAME (if paying by credit card, enter name exactly as it appears on your card)		
(12) STREET ADDRESS LINE NO. 1		
(13) STREET ADDRESS LINE NO. 2		
(14) CITY	(15) STATE	(16) ZIP CODE
(17) DAYTIME TELEPHONE NUMBER (include area code)	(18) COUNTRY CODE (if not in U.S.A.)	

COMPLETE SECTION C FOR EACH SERVICE, IF MORE BOXES ARE NEEDED, USE CONTINUATION SHEETS (FORM 159-C)

SECTION C - PAYMENT INFORMATION

(19A) FCC CALL SIGN/OTHER ID	(20A) PAYMENT TYPE CODE (PTC)	(21A) QUANTITY	(22A) FEE DUE FOR (PTC) IN BLOCK 20A	FCC USE ONLY
	B F Y	9	\$ 6,075.00	
(23A) FCC CODE 1	(24A) FCC CODE 2			
(19B) FCC CALL SIGN/OTHER ID	(20B) PAYMENT TYPE CODE (PTC)	(21B) QUANTITY	(22B) FEE DUE FOR (PTC) IN BLOCK 20B	FCC USE ONLY
			\$	
(23B) FCC CODE 1	(24B) FCC CODE 2			
(19C) FCC CALL SIGN/OTHER ID	(20C) PAYMENT TYPE CODE (PTC)	(21C) QUANTITY	(22C) FEE DUE FOR (PTC) IN BLOCK 20C	FCC USE ONLY
			\$	
(23C) FCC CODE 1	(24C) FCC CODE 2			
(19D) FCC CALL SIGN/OTHER ID	(20D) PAYMENT TYPE CODE (PTC)	(21D) QUANTITY	(22D) FEE DUE FOR (PTC) IN BLOCK 20D	FCC USE ONLY
			\$	
(23D) FCC CODE 1	(24D) FCC CODE 2			

SECTION D - TAXPAYER INFORMATION (REQUIRED)

(25) PAYER TIN 0952693884	(26) COMPLETE THIS BLOCK ONLY IF APPLICANT NAME IN B-11 IS DIFFERENT FROM PAYER NAME IN A-2 APPLICANT TIN 0
----------------------------------	---

SECTION E - CERTIFICATION

(27) CERTIFICATION STATEMENT
I, Mel R. Brashears, Certify under penalty of perjury that the foregoing and supporting information
(PRINT NAME)
are true and correct to the best of my knowledge, information and belief. SIGNATURE *Mel R. Brashears*

SECTION F - CREDIT CARD PAYMENT INFORMATION

(28) MASTERCARD/VISA ACCOUNT NUMBER: <input type="checkbox"/> MASTERCARD <input type="checkbox"/> VISA	EXPIRATION DATE: MONTH YEAR	AUTHORIZED SIGNATURE	DATE
I hereby authorize the FCC to charge my VISA or MASTERCARD for the service(s)/authorization(s) herein described.			

APPENDIX 2

FCC 312
Main Form

FEDERAL COMMUNICATIONS COMMISSION

APPLICATION FOR SATELLITE SPACE AND EARTH STATION AUTHORIZATIONS

Approved by OMB
3060-0678

Est. Avg. Burden Hours
Per Response: 10 Hrs.

FCC Use Only
File Number:

Call Sign:

PAYOR AND FILING FEE INFORMATION

a. Payor Name Lockheed Martin Corporation				b. Daytime Telephone Number (301) 897-6000	
c. Mailing Street Address or P.O. Box 6801 Rockledge Drive				d. FCC Account Number 0952693884	
e. City Bethesda		f. State MD	g. Zip Code 20817		h. Country Code (if not U.S.A.)
i. Payment Type Code BFY	j. Quantity 9	k. Fee Due for Payment Type Code in (i) \$6,075.00	l. Total Amount Paid \$54,675.00	FCC Use Only	

APPLICANT INFORMATION

1. Legal Name of Applicant Lockheed Martin Corporation			2. Voice Telephone Number (301) 897-6000		
3. Other Name Used for Doing Business (if any)			4. Fax Telephone Number (301) 897-6083		
5. Mailing Street Address or P.O. Box 6801 Rockledge Drive ATTENTION: Mel R. Brashears			6. City Bethesda		8. Zip Code 20817
			7. State / Country (if not U.S.A.) MD		
9. Name of Contact Representative (If other than applicant) Raymond G. Bender, Jr., Esq.			10. Voice Telephone Number (202) 776-2758		
11. Firm or Company Name Dow, Lohnes & Albertson			12. Fax Telephone Number (202) 776-2222		
13. Mailing Street Address or P.O. Box 1200 New Hampshire Avenue, N.W., Suite 800 ATTENTION: Raymond G. Bender, Jr., Esq.			14. City Washington		16. Zip Code 20036
			15. State / Country (if not U.S.A.) DC		

CLASSIFICATION OF FILING

17. Place an "X" in the box next to the classification that applies to this filing for both questions a. and b. Mark only one box for 17a and only one box for 17b.					
<input type="checkbox"/> a1. Earth Station	<input type="checkbox"/> b1. Application for License of New Station	<input checked="" type="checkbox"/> b4. Modification of License or Registration			
<input checked="" type="checkbox"/> a2. Space Station	<input type="checkbox"/> b2. Application for Registration of New Domestic Receive-Only Station	<input type="checkbox"/> b5. Assignment of License or Registration	<input type="checkbox"/> b7. Notification of Minor Modification		
	<input type="checkbox"/> b3. Amendment to a Pending Application	<input type="checkbox"/> b6. Transfer of Control of License or Registration	<input type="checkbox"/> b8. Other (Please Specify):		
18. If this filing is in reference to an existing station, enter: Call sign of station: N/A			19. If this filing is an amendment to a pending application enter: (a) Date pending application was filed: N/A (b) File number of pending application: N/A		

TYPE OF SERVICE

20. NATURE OF SERVICE: This filing is for an authorization to provide or use the following type(s) of service(s): Place an "X" in the box(es) next to all that apply.

a. Fixed Satellite b. Mobile Satellite c. Radiodetermination Satellite d. Earth Exploration Satellite e. Other
 (please specify) _____

21. STATUS: Place an "X" in the box next to the applicable status. Mark only one box.

a. Common Carrier b. Non-Common Carrier

22. If earth station applicant, place an "X" in the box(es) next to all that apply. N/A

a. Using U.S. licensed satellites b. Using Non-U.S. licensed satellites

23. If applicant is providing INTERNATIONAL COMMON CARRIER service, see instructions regarding Sec. 214 filings. Mark only one box. Are these facilities: N/A

a. Connected to the Public Switched Network b. Not connected to the Public Switched Network

24. FREQUENCY BAND(S): Place an "X" in the box(es) next to all applicable frequency band(s).

a. C-Band (4/6 GHz) c. Other (Please specify) Ka-band (30/20 GHz, service links), extended C-band (4/6 GHz, TT&C), and ISLs at 22/23 GHz and 32/33 GHz

b. Ku-Band (12/14 GHz)

TYPE OF STATION

25. CLASS OF STATION: Place an "X" in the box next to the class of station that applies. Mark only one box.

a. Fixed Earth Station b. Temporary-Fixed Earth Station c. 12/14 GHz VSAT Network d. Mobile Earth Station e. Space Station f. Other
 If space station applicant, go to Question 27. Specify _____

26. TYPE OF EARTH STATION FACILITY: Mark only one box.

a. Transmit/Receive b. Transmit-Only c. Receive-Only N/A

PURPOSE OF MODIFICATION OR AMENDMENT

27. The purpose of this proposed modification or amendment is to: Place an "X" in the box(es) next to all that apply.

a – authorization to add new emission designator and related service

b – authorization to change emission designator and related service

c – authorization to increase EIRP and EIRP density

d – authorization to replace antenna

e – authorization to add antenna

f – authorization to relocate fixed station

g – authorization to change assigned frequency(ies)

h – authorization to add Points of Communication (satellites & countries)

i – authorization to change Points of Communication (satellites & countries)

j – authorization for facilities for which environmental assessment and radiation hazard reporting is required

k – Other (Please specify) _____

ENVIRONMENTAL POLICY

28. Would a Commission grant of any proposal in this application or amendment have a significant environmental impact as defined by 47 CFR 1.1307?
 If YES, submit the statement as required by Sections 1.1308 and 1.1311 of the Commission's rules, 47 C.F.R. §§ 1.1308 and 1.1311, as Exhibit A to this application.

YES NO

A Radiation Hazard Study must accompany all applications as Exhibit B for new transmitting facilities, major modifications, or major amendments. Refer to OET Bulletin 65.

ALIEN OWNERSHIP

29. Is the applicant a foreign government or the representative of any foreign government?	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
30. Is the applicant an alien or the representative of an alien?	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
31. Is the applicant a corporation organized under the laws of any foreign government?	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
32. Is the applicant a corporation of which more than one-fifth of the capital stock is owned of record or voted by aliens or their representatives or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
33. Is the applicant a corporation directly or indirectly controlled by any other corporation of which more than one-fourth of the capital stock is owned of record or voted by aliens, their representatives, or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
34. If any answer to questions 29, 30, 31, 32 and/or 33 is Yes, attach as Exhibit C an identification of the aliens or foreign entities, their nationality, their relationship to the applicant, and the percentage of stock they own or vote.		

BASIC QUALIFICATIONS

35. Does the applicant request any waivers or exemptions from any of the Commission's Rules? If Yes, attach as Exhibit D, copies of the requests for waivers or exceptions with supporting documents.	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
36. Has the applicant or any party to this application had any FCC station authorization or license revoked or had any application for an initial, modification or renewal of FCC station authorization, license, or construction permit denied by the Commission? If Yes, attach as Exhibit E, an explanation of the circumstances.	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
37. Has the applicant, or any party to this application, or any party directly or indirectly controlling the applicant ever been convicted of a felony by any state or federal court? *But see Exhibit K.	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO*
38. Has any court finally adjudged the applicant, or any person directly or indirectly controlling the applicant, guilty of unlawfully monopolizing or attempting unlawfully to monopolize radio communication, directly or indirectly, through control of manufacture or sale of radio apparatus, exclusive traffic arrangement or any other means or unfair methods of competition?	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
39. Is the applicant, or any person directly or indirectly controlling the applicant, currently a party in any pending matter referred to in the proceeding two items?	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
40. By checking Yes, the undersigned certifies, that neither the applicant nor any other party to the application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Act of 1988, 21 U.S.C. Section 862, because of a conviction for possession or distribution of a controlled substance. See 47 CFR 1.2002(b) for the meaning of "party to the application" for these purposes.	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO

41. Description. (Summarize the nature of the application and the services to be provided).	
<p>Lockheed Martin hereby seeks authority to modify its previously licensed Astrolink System to operate in additional Ka-band spectrum designated by the Commission for geostationary orbit ("GSO") fixed-satellite service ("FSS"); to perform telemetry, tracking and control ("TT&C") functions in extended C-band frequencies; and to use 1.2 GHz of spectrum for local inter-satellite links. Lockheed Martin also elects to perform Astrolink downlink operations in the 18.3-18.8 GHz band. A further description of the proposed system modifications is included in the narrative portion of this application.</p>	

CERTIFICATION

The Applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise, and requests an authorization in accordance with this application. The applicant certifies that grant of this application would not cause the applicant to be in violation of the spectrum aggregation limit in 47 CFR Part 20. All statements made in exhibits are a material part hereof and are incorporated herein as if set out in full in this application. The undersigned, individually and for the applicant, hereby certifies that all statements made in this application and in all attached exhibits are true, complete and correct to the best of his or her knowledge and belief, and are made in good faith.

42. Applicant is a (an): (Place an "X" in the box next to applicable response.)

- a. Individual b. Unincorporated Association c. Partnership d. Corporation * e. Governmental Entity f. Other
*See Exhibits L and M. (Please specify) _____

43. Typed Name of Person Signing

Mel R. Brashears

44. Title of Person Signing

President and Chief Operating Officer
Space & Strategic Missiles Sector, Lockheed Martin Corporation

45. Signature



46. Date

December 19, 1997

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. Code, Title 18, Section 1001), AND/OR REVOCATION OF ANY STATION AUTHORIZATION (U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).

APPLICATION OF

LOCKHEED MARTIN CORPORATION

TO MODIFY

THE ASTROLINK™ SYSTEM AUTHORIZATION

BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C.

DECEMBER 19, 1997

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)	
)	
LOCKHEED MARTIN CORPORATION)	
)	File No.
Application For Authority to Modify its)	
Authorization for a Global Ka-band Satellite)	
Communications System in Geostationary Orbit)	

ASTROLINK™ SYSTEM
MODIFICATION APPLICATION

Mel R. Brashears
President and Chief Operating Officer
Space and Strategic Missiles Sector
Lockheed Martin Corporation
6801 Rockledge Drive
Bethesda, MD 20817
(301) 897-6000

Counsel:
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Regulatory Affairs
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John K. Hane, Esquire
Director of Regulatory Affairs
Lockheed Martin Telecommunications
12350 Pinecrest Road
Reston, VA 20191
(703) 391-2240

December 19, 1997

EXECUTIVE SUMMARY

Lockheed Martin Corporation ("Lockheed Martin") hereby requests authority to modify the space station authorization issued to Lockheed Martin on May 9, 1997, for the Astrolink™ System, a geostationary satellite orbit ("GSO") fixed-satellite service ("FSS") system that will provide advanced, broadband communications services in the Ka-band.¹ By this application, Lockheed Martin requests authority (i) to operate in additional Ka-band spectrum designated by the Commission for GSO FSS use; (ii) to use 1.2 gigahertz of spectrum to operate local inter-satellite links ("LISLs") for short-range communications between collocated Astrolink™ satellites or between Astrolink™ satellites and near-collocated satellites of other compatible networks; and (iii) for other minor modifications, including to perform Astrolink™ downlink operations in the 18.3-18.8 GHz band, and to perform Astrolink™ telemetry, tracking and control ("TT&C") functions in extended C-band frequencies.

First, Lockheed Martin requests authority to provide Astrolink™ services in an additional one gigahertz of Ka-band uplink and downlink spectrum designated by the Commission for GSO FSS use. Specifically, Lockheed Martin proposes to utilize the 17.8-18.3 GHz and 18.8-19.3 GHz bands for space-to-Earth communications links, and the 27.85-28.35 GHz and 28.6-29.1 GHz bands for Earth-to-space links. Use of this additional GSO FSS spectrum will enhance the capability of the Astrolink™ System to meet the explosive growth in demand for domestic and international communications services. Moreover, because the requested GSO FSS spectrum is shared with other

¹ See *Lockheed Martin Corporation Application for Authority to Construct, Launch, and Operate a Ka-Band Satellite System in the Fixed-Satellite Service*, Order and Authorization, File Nos. 182—186-SAT-P/LA-95, D.A. No. 97-973, 1997 FCC LEXIS 2388 (Int'l Bur., rel. May 9, 1997) ("*Astrolink™ Authorization*").

services, this proposed modification is spectrally efficient and comes without sacrificing the ability of other services to utilize the requested frequency bands.

The additional Ka-band spectrum requested by Lockheed Martin is allocated to GSO FSS services on either a co-primary or secondary basis. Where spectrum is shared on a co-primary basis, Lockheed Martin will coordinate Astrolink™ operations pursuant to applicable regulatory procedures. Where GSO FSS services have a secondary allocation, the Astrolink™ System will coordinate with primary users and operate in conformance with constraints imposed on secondary operations. Lockheed Martin recognizes that its request for authority to provide Astrolink™ services in additional Ka-band spectrum may be considered in the context of the second Ka-band processing round.

Second, Lockheed Martin requests 0.6 gigahertz of spectrum in each of the 22.55-23.55 GHz and 32.0-33.0 GHz bands (1.2 gigahertz total) for LISLs for short-range communications between collocated Astrolink™ satellites or between Astrolink™ satellites and near-located satellites of other compatible networks, such as Lockheed Martin's proposed Q/V-band satellite system.

Third, Lockheed Martin requests authority for other minor modifications to the Astrolink™ authorization. In authorizing Lockheed Martin to launch and operate the Astrolink™ System, the Commission deferred assigning specific downlink spectrum in the 17.7-18.8 GHz frequency band until Lockheed Martin was in a position to identify the exact 500 megahertz of spectrum it wished to use. Lockheed Martin has now determined the desired downlink frequencies and, pursuant to the Commission's instructions, hereby requests authority to perform Astrolink™ downlink operations in the 18.3-18.8 GHz band.

Additionally, Lockheed Martin seeks authority to perform transfer orbit, emergency-mode and on-station TT&C operations in extended C-band frequencies. Lockheed Martin will perform such TT&C functions on an unprotected, non-interference basis until such time as the Commission may designate extended C-band spectrum for TT&C operations of GSO FSS systems operating in frequency bands above Ku-band.

Lockheed Martin is simultaneously submitting an FCC application for authority to launch and operate the Astrolink-Phase II™ System, a satellite communications system comprised of five state-of-the-art GSO FSS satellites. The Astrolink-Phase II™ System will complement the worldwide coverage of the previously-licensed Astrolink™ System by providing additional capacity and operational flexibility required to meet the needs of today's digital telecommunications marketplace.

Grant of this modification application would be consistent with longstanding Commission policy whereby satellite licensees are permitted to update their proposed networks during system development and implementation. Moreover, grant of the requested modifications will serve the public interest in a number of other important respects. Authorizing the Astrolink™ System to operate in additional Ka-band spectrum, which is shared by GSO FSS and other services, will enhance the capabilities of the Astrolink™ System and promote the efficient use of spectrum. Authorizing LISL spectrum will enhance the reliability of the Astrolink™ System and add flexibility in meeting the needs of the communications marketplace. The performance of TT&C operations in extended C-band frequencies will facilitate deployment of the Astrolink™ System and avoid operational constraints that would otherwise apply if TT&C functions were required to be performed in the system's service bands.

TABLE OF CONTENTS

1.	REQUEST FOR ADDITIONAL KA-BAND SPECTRUM	2
1.1	ITU AND FCC FREQUENCY ALLOCATIONS.....	2
1.2	USE OF ADDITIONAL KA-BAND FREQUENCIES.....	6
1.3	SHARING IN ADDITIONAL KA-BAND SPECTRUM	9
2.	REQUEST FOR LOCAL INTER-SATELLITE LINK ("LISL") SPECTRUM	13
3.	OTHER PROPOSED MODIFICATIONS	14
3.1	IDENTIFICATION OF ASTROLINK™ DOWNLINK SPECTRUM IN THE 17.7-18.8 GHZ BAND.....	14
3.2	EXTENDED C-BAND TT&C	15
4.	PUBLIC INTEREST CONSIDERATIONS.....	16
5.	LEGAL, FINANCIAL, AND TECHNICAL QUALIFICATIONS	17
6.	U.S. AND INTERNATIONAL COORDINATION.....	18
7.	WAIVERS	18
8.	CERTIFICATION OF NO CHANGE.....	19
9.	FURTHER INFORMATION	19
	CONCLUSION.....	20

TABLE OF FIGURES

	<u>Page</u>
Figure 3.1- Frequency and Polarization Plan.....	7

TABLE OF TABLES

	<u>Page</u>
Table 1-1 - ITU Downlink Allocations.....	4
Table 1-2 - ITU Uplink Allocations.....	5
Table 1-3 - Uplink Frequency Bands.....	6
Table 1-4 - Downlink Frequency Bands.....	6

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)	
)	
LOCKHEED MARTIN CORPORATION)	
)	File No.
Application For Authority to Modify its)	
Authorization for a Global Ka-band Satellite)	
Communications System in Geostationary Orbit)	

ASTROLINK™ SYSTEM
MODIFICATION APPLICATION

Lockheed Martin Corporation ("Lockheed Martin"), pursuant to Sections 25.114 and 25.117 of the Commission's rules, hereby submits this application to modify the Astrolink™ System space station authorization issued to Lockheed Martin on May 9, 1997.² By this application, Lockheed Martin seeks authority to utilize additional Ka-band spectrum designated by the Commission for geostationary satellite orbit ("GSO") fixed-satellite service ("FSS") use; to use 1.2 gigahertz of

² See *Lockheed Martin Corporation Application for Authority to Construct, Launch, and Operate a Ka-Band Satellite System in the Fixed-Satellite Service*, Order and Authorization, File Nos. 182—186-SAT-P/LA-95, D.A. No. 97-973, 1997 FCC LEXIS 2388 (Int'l Bur., rel. May 9, 1997) ("*Astrolink™ Authorization*").

spectrum to operate local inter-satellite links ("LISLs") for short-range communications between collocated Astrolink™ satellites or between Astrolink™ satellites and near collocated satellites of other compatible networks, such as Lockheed Martin's proposed Q/V-band satellite system; and for other minor modifications, including to perform Astrolink™ downlink operations in the 18.3-18.8 GHz band, and to perform telemetry, tracking and control ("TT&C") functions in extended C-band spectrum. The modifications proposed herein will enhance the capability of the Astrolink™ System to provide advanced Ka-band satellite communications services to businesses and consumers around the world.³

1. REQUEST FOR ADDITIONAL KA-BAND SPECTRUM

As a result of detailed system design and market assessment in the Astrolink™ program, Lockheed Martin has determined a need for higher system capacities in certain geographic areas where large potential markets exist, such as high population metropolitan areas. The only way to respond to this demand is to utilize additional spectrum in the Astrolink™ System.

1.1 ITU AND FCC FREQUENCY ALLOCATIONS

As set forth in Table 1-1, the 17.8-19.3 GHz band and the 19.7-20.2 GHz band are allocated internationally to the FSS (space-to-Earth) on a primary basis, with the lower frequency band also allocated in its entirety on a co-primary basis to the terrestrial fixed and mobile services. Portions of

³ Pursuant to guidance from the Commission's staff, Lockheed Martin has included both "major" and "minor" modifications in the Astrolink™ modification application. Lockheed Martin acknowledges that its request to operate in an additional one gigahertz of Ka-band spectrum and for 1.2 gigahertz of LISL spectrum may be considered in the context of the second Ka-band processing round. However, Lockheed Martin believes that the Commission may separately consider, on an expedited basis, Lockheed Martin's requests for authority to operate in the 18.3-18.8 GHz downlink band and to perform TT&C operations in extended C-band spectrum.

that band are also allocated to the broadcasting satellite, mobile-satellite, Earth exploration-satellite, and space research services on a co-primary or secondary basis. Table 1-2 shows that the 27.85-29.1 GHz and 29.25-30.0 GHz bands are also allocated to FSS (Earth-to-space), generally on a co-primary basis with terrestrial fixed and mobile services, with portions of the bands allocated on a primary basis to the mobile-satellite service and Earth exploration-satellite service on either a co-primary or secondary basis.

Table 1-1 - ITU Downlink Allocations

International Allocation to Services 17.8-19.3 GHz and 19.7-20.2 GHz (downlink)		
Region 1	Region 2	Region 3
17.8-18.1 FIXED FIXED-SATELLITE MOBILE	17.8-17.8 FIXED FIXED-SATELLITE BROADCASTING- SATELLITE Mobile (MOBILE until 4/1/07)	17.8-18.1 FIXED FIXED-SATELLITE MOBILE
	17.8-18.1 FIXED FIXED-SATELLITE MOBILE	
18.1-18.4*	FIXED FIXED-SATELLITE MOBILE	
18.4-18.6	FIXED FIXED-SATELLITE MOBILE	
18.6-18.8 FIXED FIXED-SATELLITE MOBILE except aeronautical mobile Earth Exploration-Satellite (passive) Space Research (passive)	18.6-18.8 EARTH EXPLORATION- SATELLITE (passive) FIXED FIXED-SATELLITE MOBILE except aeronautical mobile SPACE RESEARCH (passive)	18.6-18.8 FIXED FIXED-SATELLITE MOBILE except aeronautical mobile Earth Exploration-Satellite (passive) Space Research (passive)
18.8-19.3	FIXED FIXED-SATELLITE MOBILE	
19.7-20.1** FIXED-SATELLITE Mobile-Satellite	19.7-20.1** FIXED-SATELLITE MOBILE-SATELLITE	19.7-20.1** FIXED-SATELLITE Mobile-Satellite
20.1-20.2	FIXED-SATELLITE MOBILE-SATELLITE	

* See S5.521 for alternative national allocations.

** See S5.524 for alternative national allocations.

Table 1-2 - ITU Uplink Allocations

International Allocation to Services 27.85-29.1 GHz and 29.25-30.0 GHz (uplink)		
Region 1	Region 2	Region 3
27.85-28.5	FIXED FIXED-SATELLITE MOBILE	
28.5-29.1	FIXED FIXED-SATELLITE MOBILE Earth Exploration-Satellite	
29.25-29.5	FIXED FIXED-SATELLITE MOBILE Earth Exploration-Satellite	
29.5-29.9* FIXED-SATELLITE Earth Exploration-Satellite Mobile-Satellite	29.5-29.9* FIXED-SATELLITE MOBILE-SATELLITE Earth Exploration-Satellite	29.5-29.9* FIXED-SATELLITE Earth Exploration-Satellite Mobile-Satellite
29.9-30*	FIXED-SATELLITE MOBILE-SATELLITE Earth Exploration-Satellite	

* See S5.542 for alternative national allocations.

With respect to U.S. non-government spectrum allocations, domestic FSS allocations exist in the 17.8-19.3 GHz and 19.7-20.2 GHz downlink bands, and in the 27.85-29.1 GHz and 29.25-30.0 GHz uplink bands. Portions of these bands are shared with a variety of other services allocated on either a co-primary or secondary basis.⁴ As a result of the 28 GHz rulemaking proceeding, the FCC adopted band plans for uplink and downlink frequencies as shown in Table 1-3 and Table 1-4.

⁴ See 47 C.F.R. §2.106 (1997) (U.S. Table of Allocations). The U.S. Table of Allocations contains a number of footnotes governing GSO FSS operations in the proposed Astrolink™ bands. The most pertinent of these include Footnote U.S. 255, which establishes a pfd limit of -101 dBW/m² for FSS downlink transmissions in the 18.6-18.8 GHz band; and Footnote U.S. 334, which requires coordination with government systems in the 17.8-20.2 GHz band. Lockheed Martin's proposed

Table 1-3 - Uplink Frequency Bands

LMDS fss	GSO FSS ngso fss	NGSO FSS gso fss	MSS FEEDER LINKS & LMDS (h-s)	MSS FEEDER LINKS & GSO FSS	GSO FSS ngso fss
850 MHz	250 MHz	500 MHz	150 MHz	250 MHz	500 MHz
27.5	28.35	28.60	29.1	29.25	29.5 30.0 GHz

Table 1-4 - Downlink Frequency Bands

GSO FSS FIXED ngso fss	NGSO FSS FIXED gso fss	MSS F.L. FIXED gso fss	GSO/FSS ngso fss
1100 MHz	500MHz	400 MHz	500 MHz
17.70	18.80	19.30	19.70 20.20 GHz

1.2 USE OF ADDITIONAL KA-BAND FREQUENCIES

Although an additional 600 megahertz of primary GSO FSS downlink spectrum exists in the Commission's frequency allocations (*i.e.*, 17.7-18.3 GHz), there is no matching uplink spectrum that is designated on a primary basis for GSO FSS operations. However, the uplink frequency ranges 27.5-28.35 GHz and 28.6-29.1 GHz, as well as the downlink frequency range 18.8-19.3 GHz, are allocated to GSO FSS on a secondary basis, and are therefore available for secondary operations in

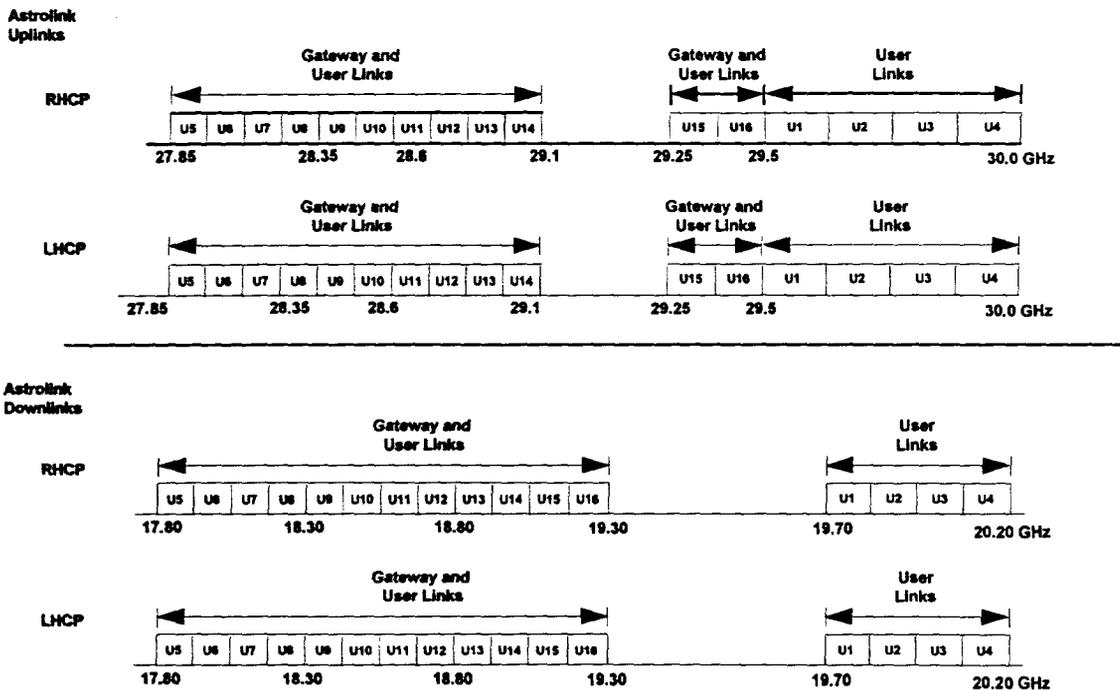
Astrolink™ System modifications will comply with these and all other footnotes applicable to FSS operations in the relevant bands.

the Astrolink™ System. Lockheed Martin therefore requests authority to add the following frequency bands to the Astrolink™ System:

- Earth-to-space (uplink): 27.85-28.35 GHz (500 megahertz)
28.6-29.1 GHz (500 megahertz)
- space-to-Earth (downlink): 17.8-18.3 GHz (500 megahertz)
18.8-19.3 GHz (500 megahertz).

The combination of these new frequencies and the already licensed frequencies amounts to a total of two gigahertz of uplink and two gigahertz of downlink spectrum that will be used by the Astrolink™ System. Figure 3-1 gives the overall frequency and polarization plan for the Astrolink™ satellites including these proposed new frequency bands.

Figure 3-1 - Frequency and Polarization Plan



Up to 10 existing Astrolink™ 125 megahertz transmission channels operating in the 29.5-30.0 GHz and 19.7-20.2 GHz bands, as well as six of the existing Astrolink™ 125 megahertz transmission channels operating in the 28.35-28.6 GHz, 29.25-29.5 GHz and 18.3-18.8 GHz bands, will be able to

be switched into the proposed additional frequency bands. This will give a total of up to sixteen 125 megahertz channels operating in the additional frequency bands. The additional Ka-band frequency bands will utilize the same transmission schemes as used in the existing Astrolink™ System. These schemes use multi-carrier TDMA/FDMA (time division multiple access/frequency division multiple access) on the uplink and a single wideband TDM carrier on the downlink. Only single polarization (RHCP or LHCP) will be used in order to allow additional flexibility for coordination with other services in these bands.

The Astrolink™ satellites will have the same traffic capacity as previously stated in the original Astrolink™ application. The ability to switch certain Astrolink™ capacity into the requested additional Ka-band spectrum provides increased flexibility and increased aggregate capacity within certain geographic areas, but not increased capacity at the satellite level. Because the majority of the additional spectrum will be used on a secondary basis to other primary services, Lockheed Martin's proposed use of additional Ka-band frequencies is extremely spectrally efficient. In addition to the spectrum efficiency resulting from secondary use of the requested spectrum, through the use of spatial separation between co-frequency beams, Lockheed Martin will achieve two times frequency re-use when all sixteen 125 megahertz channels are switched into the additional spectrum.

In all other respects, the operation of the Astrolink™ System in the additional Ka-band spectrum requested herein will be consistent with the information provided in the original Astrolink™ application.

1.3 SHARING IN ADDITIONAL KA-BAND SPECTRUM

In the uplink direction, Lockheed Martin plans to utilize the 27.85-28.35 GHz and 28.6-29.1 GHz bands, which are allocated internationally to FSS on a co-primary basis and designated domestically to GSO FSS on a secondary basis, for certain gateway and user terminal links. In the downlink direction, the Astrolink™ System will use the 17.8-18.3 GHz band, which is allocated to GSO FSS on a co-primary basis with terrestrial fixed services, for certain gateway and user terminal downlinks. Lockheed Martin will perform similar downlink operations in the 18.8-19.3 GHz band, which has a secondary GSO FSS and primary NGSO FSS and fixed service allocations. Lockheed Martin will deploy Astrolink™ services in these frequency bands in a manner that ensures that their operation is consistent with co-primary or secondary status, as appropriate, as discussed in more detail below.

In the 17.7-18.8 GHz, 19.7-20.2 GHz, 28.35-28.6 GHz and 29.5-30.0 GHz frequency bands, GSO FSS systems such as the Astrolink™ System have a primary domestic U.S. allocation, while NGSO FSS is designated on a secondary basis. In these bands, NGSO FSS systems must protect the Astrolink™ System from unacceptable interference and the Astrolink™ System will not be required to protect the secondary operation of NGSO FSS systems. The most promising technique to achieve this interference protection will be the use of satellite diversity in the NGSO FSS system.

The Commission requires any NGSO FSS system operating in these bands to make a technical showing to demonstrate in detail the level of interference protection it will provide to GSO FSS systems before it can be brought into operation on a secondary basis. The recent WRC-97 has implemented provisional “epfd” and “apfd” limits on NGSO FSS systems in these bands, and there will be further debate in the United States concerning the applicability of these limits to U.S.-

licensed systems.⁵ Lockheed Martin is confident that the Commission will ensure that any eventual regulatory mechanisms adopted to protect GSO FSS systems from NGSO FSS systems will be acceptable to all GSO FSS licensees.

In the 18.8-19.3 GHz and 28.6-29.1 GHz frequency bands, the situation is reversed and the Astrolink™ System will operate on a secondary basis to primary, U.S.-licensed NGSO FSS systems.⁶ Thus, the Astrolink™ System must protect these NGSO FSS systems. To achieve this result, Lockheed Martin will ensure that transmissions to and from particular Astrolink™ satellites are ceased whenever interference alignment situations occur with respect to operational NGSO FSS satellites. There are two different ways in which this will be implemented, depending on the type of service being provided by the Astrolink™ System. The first method will require link outages in the Astrolink™ System, and therefore will only be used for communications applications that can tolerate sporadic short-term outages (*e.g.*, a single-user requiring delay-insensitive Internet access). The second method involves satellite or earth station diversity, similar to that proposed by NGSO FSS systems in order to protect GSO FSS systems. In this case, the Astrolink™ communications traffic will be switched to an alternative Astrolink™ (or Astrolink-Phase II™) satellite or through an alternative and geographically separate Astrolink™ earth station whenever interference alignment situations occur, thereby ensuring continuity of service in the Astrolink™ System.⁷

⁵ These “apfd” and “epfd” limits quantify the application of ITU Radio Regulation S22.2.

⁶ Internationally, GSO FSS and NGSO FSS are co-primary in these bands, and coordination between them is subject to Resolution 46 (S9.11A). Therefore, the Astrolink™ System will be coordinated with non-U.S. NGSO FSS systems under these ITU procedures.

⁷ This technique will be usable for geographic areas of the world that are served by more than one Astrolink™ or Astrolink-Phase II™ satellite. It will require Astrolink terminals to be

To implement these interference mitigation techniques, the geometry of each NGSO FSS satellite serving the same geographic area as the Astrolink™ satellites will be determined by the Astrolink™ Network Control Center (“NCC”) using orbit data provided by the relevant NGSO system operators. This analysis will provide the essential data for accurate prediction of interference events, and thereby determine the times at which cessation of emissions or diversity switching must take place.

Without mitigation, the interference between NGSO FSS systems and the Astrolink™ System would be sporadic in nature, with the duration of the interference events being a function of earth station locations, antenna beamwidths, general link parameters, and operational procedures of both systems. Therefore, the criteria that will trigger the cessation of emissions or diversity switching in the Astrolink™ System will depend on the operational parameters of the two systems, and on the agreed upon levels of interference protection of the NGSO FSS system. Lockheed Martin will coordinate the secondary operations of the Astrolink™ System with NGSO FSS licensees in view of the above-referenced factors. Of course, Lockheed Martin will also operate its Astrolink™ System in primary NGSO FSS bands in accordance with all applicable rules governing secondary operations.

The additional frequency bands are all shared on a co-primary basis with the fixed and mobile services in the international table of frequency allocations. Sharing with these other services in foreign countries in the additional bands will be the same as that originally proposed for Astrolink™ operations in the already licensed bands (28.35-28.6 GHz, 29.25-29.5 GHz and 18.3-

equipped with two fixed antennas, each pointed towards an Astrolink™ or Astrolink-Phase II™ satellite.

18.8 GHz). Coordination of the Astrolink™ earth stations will take place in accordance with international and local regulations in the jurisdiction where the earth stations will be located.

In the United States, the additional 27.85-28.35 GHz uplink band is designated for use by LMDS (Local Multipoint Distribution Service) on a primary basis and for GSO FSS use on a secondary basis. The possible interference cases will be from LMDS transmitters into the Astrolink™ satellite receivers and from the Astrolink™ transmit earth stations into the LMDS receivers. It is unlikely that the Astrolink™ satellite receivers will experience interference from LMDS transmitters due to the high propagation and path losses in this band. Consistent with its obligations as a secondary user, Lockheed Martin will operate the Astrolink™ System in a manner that will not cause unacceptable interference to the LMDS receivers. This will be ensured by geographic separation of the Astrolink™ System transmit earth stations and LMDS receivers and by the use of larger Astrolink™ earth stations that provide the required off-axis EIRP protection levels. In addition, other mitigation techniques, such as site-specific shielding, can be employed.

It is apparent that the principal deployment of the LMDS systems will be in major metropolitan areas. Therefore, the Astrolink™ System may be required to limit its use of this band in the United States to earth stations deployed outside of these metropolitan areas. Lockheed Martin believes that it will be possible to conduct site-specific coordination with LMDS operators in specific geographic areas to permit Astrolink™ operations in this band. Site-specific coordination will provide affected parties the opportunity to take into account the particular system parameters of the LMDS system and the level of acceptable interference between the operators.

2. REQUEST FOR LOCAL INTER-SATELLITE LINK ("LISL") SPECTRUM

The original Astrolink™ System design envisioned the use of ISLs only between widely spaced Astrolink™ satellites. However, four of the five Astrolink™ orbit locations will be operated with two collocated satellites. Although interconnection between these collocated satellites could be achieved using a downlink and uplink signal since both satellites would be in the communication path of a single earth station, the preferred method is to provide direct interconnection between collocated satellites through the use of LISLs. The use of this technique provides additional communications paths through the Astrolink™ System, without the use of additional space-to-Earth or Earth-to-space links, and thereby increases the system reliability and spectral efficiency.

In addition to providing a communication path to collocated Astrolink™ satellites, LISLs can also be used to provide interconnectivity between the Astrolink™ satellites and other near-collocated satellite networks, such as Lockheed Martin's proposed Q/V-band satellite system.

Lockheed Martin, therefore, requests additional LISL spectrum for the Astrolink™ System. This spectrum will be used only for short-range LISLs between geostationary satellites spaced no more than 1° apart in longitude. These LISLs are proposed to operate in lower ISL frequency bands than those to be used for the long-range Astrolink™ ISLs, because their low power and short range characteristics make them well able to share with other ISL systems which may be in operation in these lower bands. Lockheed Martin proposes to use one 600 megahertz LISL channel in the 22.55-23.55 GHz ISL band and another 600 megahertz LISL channel in the 32.0-33.0 GHz ISL band. An alternative, but less attractive option, would be to operate these two LISL channels, with a 1.075 gigahertz guard band between them, in the 65-71 GHz ISL band. Lockheed Martin is confident that

these LISL channels can be successfully coordinated with existing and other planned users, and will work with such users to achieve this goal.

Although at this time Lockheed Martin does not wish to make any modifications to its existing long-range ISLs in the Astrolink™ System, it is likely that its previously-stated requirement for 2 gigahertz of ISL spectrum in the 54.25-58.2 GHz or 59-64 GHz bands will be reduced to a total of 1.8 gigahertz in these bands.

3. OTHER PROPOSED MODIFICATIONS

3.1 IDENTIFICATION OF ASTROLINK™ DOWNLINK SPECTRUM IN THE 17.7-18.8 GHZ BAND

Lockheed Martin's Astrolink™ System is already licensed to operate in the following frequency bands designated for GSO FSS operations on a primary basis:

Earth-to-space (uplink):	28.35-28.6 GHz (250 MHz)
	29.25-30.0 GHz (750 MHz)
space-to-Earth (downlink):	19.7-20.2 GHz (500 MHz).

In the Astrolink™ application, Lockheed Martin also requested authority to operate in the 18.55-18.8 GHz and 19.45-19.7 GHz downlink bands. However, the Commission subsequently designated the 19.45-19.7 GHz band for non-geostationary satellite orbit ("NGSO") mobile-satellite service ("MSS") feeder links on a primary basis, precluding primary GSO FSS operations in the band. Furthermore, the Commission stated in the *Astrolink™ Authorization* that it was premature to license downlink operations in the 17.7-18.8 GHz bands at that time. The Commission, therefore, instructed Lockheed Martin to identify the exact 500 megahertz of spectrum it wished to use in this range.

Pursuant to the Commission's instructions, Lockheed Martin hereby elects to use the 18.3-

18.8 GHz downlink band. This is in addition to the 19.7-20.2 GHz band already assigned to Lockheed Martin for downlink operations. Lockheed Martin will coordinate its operations in this band with the terrestrial fixed service.

3.2 EXTENDED C-BAND TT&C

Lockheed Martin originally proposed to perform on-station TT&C operations of the Astrolink™ System in Ka-band, and transfer orbit and emergency-mode TT&C in C-band. However, the Commission declined to grant the request for C-band TT&C without a further detailed technical showing concerning the potential interference to other C-band users. After more detailed evaluation of the options, Lockheed Martin now desires to perform TT&C for all phases of the Astrolink™ mission (transfer orbit, emergency-mode and on-station) in extended C-band.⁸ Exhibit D-1 provides a technical showing concerning the proposed Astrolink™ extended C-band TT&C operations, and demonstrates that the performance of TT&C functions in this band can be successfully coordinated with other users.²

⁸ A petition for rulemaking to designate a portion of extended C-band spectrum for TT&C operations of GSO FSS space stations operating in bands above Ku-band has been filed with the Commission. *See Amendment of Parts 2 and 25 of the Commission's Rules to Designate Extended C-band Spectrum for TT&C Functions of GSO FSS Systems Operating in Bands Above Ku-band*, Petition for Rulemaking (Aug. 7, 1997) (filed by Comm, Inc., EchoStar Satellite Corp., GE American Communications, Inc., Hughes Communications Galaxy, Inc., KaStar Satellite Communications Corp., Lockheed Martin Corp., Orion Network Systems, Inc., PanAmSat Licensee Corp., and VisionStar, Inc.). To the extent that these frequencies are not made available for TT&C functions of Ka-band systems, Lockheed Martin hereby reserves the right to request other TT&C frequencies consistent with the Commission's rules.

² Lockheed Martin recognizes that if the Commission declines to grant this portion of the Astrolink™ modification application, the *Astrolink™ Authorization* requires Lockheed Martin to perform on-station TT&C functions in Ka-band frequencies. In that event, however, Lockheed Martin would plan to pursue the use of standard C-band spectrum for transfer orbit and emergency-mode TT&C, and would submit a separate modification application in accordance with the Commission's instructions in the *Astrolink™ Authorization*.

4. PUBLIC INTEREST CONSIDERATIONS

Grant of this modification application will further a number of important public interest objectives. The Astrolink™ System will provide a broad range of high-quality, flexible, and reliable telecommunications capabilities to meet the needs of businesses and consumers worldwide.

Authorizing the use of additional Ka-band spectrum will enhance the capabilities of the Astrolink™ System and enable it to address the growing demand for advanced communications systems and services. As a result of the WTO Agreement on Basic Telecommunications and other factors, the \$600 billion global telecommunications market is expected to double or even triple within the next ten years.¹⁰ Meeting the needs of the marketplace must be a core objective of any new communications network. The proposed modifications will enable the Astrolink™ System to provide additional capacity in high traffic areas to respond to growing demand for innovative voice, data, and video services delivered rapidly and globally.

The other system modifications described in this application will also serve the public interest. Specifying downlink operations in the 18.3-18.8 GHz band responds to Commission instructions for Lockheed Martin to identify the precise 500 megahertz of downlink spectrum it wishes to use in the 17.7-18.8 GHz band. The proposal to perform TT&C operations in extended C-band frequencies will facilitate deployment of the Astrolink™ System and avoid operational constraints that would otherwise apply were TT&C functions required to be performed in the

¹⁰ See Statement of Ambassador Charlene Barshefsky, *Basic Telecom Negotiations*, Office of the United States Trade Representative (Feb. 15, 1997) (the \$600 billion telecommunications industry "will double or even triple over the next ten years" under the Basic Telecommunications Agreement).

system's service bands.¹¹ Authorizing LISL spectrum will enhance the reliability of the Astrolink™ System and incorporate added flexibility in meeting the needs of the communications marketplace. In addition, the proposed modifications will promote the efficient use of spectrum, encourage frequency sharing between and among systems, and provide for the use of co-primary or secondary allocations that might otherwise lie fallow.

5. LEGAL, FINANCIAL, AND TECHNICAL QUALIFICATIONS

Lockheed Martin, a Maryland corporation, has headquarters offices located at 6801 Rockledge Drive, Bethesda, MD 20817. Lockheed Martin is a diversified, advanced technology company with \$27 billion in 1996 sales and core businesses in defense, space, energy, commercial, and government markets. Lockheed Martin is a publicly held corporation and its stock is traded on the New York Stock Exchange under the symbol LMT. The legal qualifications of Lockheed Martin to implement the proposed modifications to the Astrolink™ System are demonstrated in FCC Form 312, which is submitted as part of this application.

Lockheed Martin does not anticipate that the costs associated with the requested modification will appreciably impact the overall costs of the Astrolink™ System. Lockheed Martin's financial strength is a matter of public record and its financial statements are on file with the Commission.

Lockheed Martin possesses the technical qualifications, expertise, and resources to implement the proposed modifications to the Astrolink™ System. Lockheed Martin has participated in all aspects of U.S. government and commercial space programs for the past four decades, from

¹¹ Public interest reasons supporting the use of extended C-band spectrum for TT&C functions are more fully described in the Petition for Rulemaking filed with the FCC on August 7, 1997, by Lockheed Martin and other satellite licensees to designate extended C-band spectrum for TT&C functions of GSO FSS systems operating in bands above Ku-band.

system development and manufacture to launch processing and operations. Accordingly, Lockheed Martin is technically qualified to implement the proposed Astrolink™ System modifications.

6. U.S. AND INTERNATIONAL COORDINATION

Lockheed Martin will comply with all U.S. and international requirements in coordinating all Astrolink™ operations. The Commission has already forwarded to the Radiocommunication Bureau of the International Telecommunications Union ("ITU") Advance Publication (AP4) and Request for Coordination (AP3) materials which cover most of the frequency ranges requested herein.¹²

Lockheed Martin will support the Commission's staff in ongoing coordination efforts with regard to the Astrolink™ orbital locations.

7. WAIVERS

Exhibit D to this modification application is a request for waiver of the Commission's rules to permit Lockheed Martin to perform TT&C functions in extended C-band spectrum. Lockheed Martin believes that it has complied fully with all pertinent Commission rules and policies, and has supplied all relevant information required to authorize the proposed Astrolink™ modifications. To the extent the Commission views any portion of this application as not fully in accordance with current regulatory requirements, Lockheed Martin hereby requests that the Commission grant any additional waivers that may be necessary or appropriate in the context of this application.

¹² Additional Requests for Coordination that cover frequency ranges 18.8-18.9 GHz and 28.6-28.7 GHz need to be submitted to the ITU. These bands have not been included in previously filed Requests for Coordination in light of Resolution 118 (WRC-95).

8. CERTIFICATION OF NO CHANGE

Except for the changes to the Astrolink™ System specified herein, Lockheed Martin certifies that the remaining items of information listed in Section 25.114(c) of the Commission's rules have not changed.¹³ Other minor modifications to the Astrolink™ System may be made in the future as is normal in the satellite development and implementation process.¹⁴ Such minor changes will be reported to the Commission once they are finalized.

9. FURTHER INFORMATION

Lockheed Martin has attempted to comply fully with all aspects of the space station modification application requirements set out in Part 25 of the Commission's rules. To the extent that the Commission requires additional information in connection with this modification application, Lockheed Martin will respond promptly to any Commission request for such information.

¹³ See 47 C.F.R. § 25.117(d) (1997).

¹⁴ See, e.g., *GTE Spacenet Corp.*, 5 FCC Rcd 4112, 4112 (Comm. Carr. Bur., 1990) (citing cases).

CONCLUSION

The modifications proposed herein will facilitate deployment of the Astrolink™ System and enhance the ability of Lockheed Martin to provide new and innovative satellite communications technologies and services. These modifications will augment the capabilities of the Astrolink™ System, increase system reliability and flexibility, and promote the efficient use of spectrum. Lockheed Martin requests that the Commission grant the modifications described herein at the earliest possible time.

Respectfully submitted,

Lockheed Martin Corporation

By:



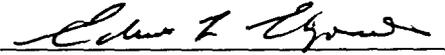
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December 19, 1997

ENGINEERING CERTIFICATE

I hereby certify that I am the technically qualified person responsible for the preparation of the engineering information contained in the technical portions of the foregoing application, that I am familiar with Part 25 of the Commission's rules, and that the technical information is complete and accurate to the best of my knowledge and belief.



Eduardo L. Elizondo
Systems Engineer Consultant
Lockheed Martin Telecommunications

December 19, 1997

Exhibit D-1

Waiver Request

Lockheed Martin's Astrolink™ modification application requests authority to perform TT&C operations in extended C-band frequencies. Under the U.S. Table of Frequency Allocations, TT&C functions are normally conducted in bands allocated to the space operation service or in the band in which the underlying service is being conducted.^{1/} If the Commission finds that Section 2.1, Section 25.202(g) or any other provision of its rules would preclude TT&C operations in extended C-band absent a waiver, then Lockheed Martin respectfully requests that the Commission waive these rules (or provide other appropriate authorization) to permit grant of this portion of the Astrolink™ application.

Section 1.3 of the Commission's rules permits a waiver of any rule, in whole or in part, for good cause.^{2/} For reasons set forth in this application, compelling technical and public interest considerations support permitting Lockheed Martin to perform TT&C functions for the Astrolink™ System in extended C-band frequencies.

Lockheed Martin is submitting herewith a technical showing that the proposed Astrolink™ TT&C operations would not cause interference to other conforming operations in the extended C-band.^{3/}

^{1/} See 47 C.F.R. § 2.1 (1997); *see also* 47 C.F.R. § 25.202(g) (1997).

^{2/} 47 C.F.R. § 1.3 (1997).

^{3/} See *Lockheed Martin Corporation Application for Authority to Construct, Launch and Operate a Global Ka-Band Communications Satellite Systems in Geostationary Orbit*, File Nos. 182—186-SAT-P/LA-95, D.A. No. 97-973, 1997 FCC LEXIS 2388, ¶23 (Int'l Bur., rel.

Permitting Lockheed Martin to perform TT&C operations in extended C-band spectrum would facilitate implementation of the Astrolink™ System by improving system reliability, by lowering system construction and operational costs, and by facilitating early deployment of this global satellite network. Permitting Lockheed Martin to perform Astrolink™ TT&C functions in extended C-band would also serve the public interest by improving the operational characteristics of the Astrolink™ System, reducing the cost of Astrolink™ services, and hastening the introduction of new and innovative broadband communications services in the U.S. and foreign markets.

Commission precedent supports the grant of a waiver or other appropriate authorization in this situation. Indeed, the Commission has previously approved TT&C operations on a non-conforming basis in circumstances nearly identical to this case. Thus, for example, the Commission recently granted Directsat Corporation's modification application to consolidate on-station, transfer-orbit, and emergency-mode TT&C functions in C-band spectrum, which was neither the underlying service bands nor a band allocated to the space operations service.^{4/} Similarly, the Commission authorized Space Imaging L.P., an Earth Exploration Satellite Service

May 9, 1997), wherein the Commission stated that should Lockheed Martin wish to pursue TT&C operations in non-conforming bands, it should submit an exhibit demonstrating that such TT&C operations will not interfere with other conforming operations in the band.

^{4/} See *Directsat Corporation Application for Modification of Construction Permit for a Direct Broadcast Satellite System*, Order, 11 FCC Rcd 22375 (Office of Eng'g Tech. and Int'l Bur., rel. Sept. 9, 1996).

licensee, to perform TT&C functions in spectrum outside of its service bands and space operations bands.^{5/}

Lockheed Martin proposes to perform Astrolink™ TT&C operations in extended C-band frequencies pursuant to the same conditions imposed by the Commission in granting similar requests, *viz.*, Lockheed Martin would operate in the requested bands on an unprotected, non-interference basis only, thereby protecting conforming users in the band.^{6/}

A number of other considerations support this request. For example, advanced Ka-band communications systems and services are at a relatively early stage of development and issues regarding spectrum utilization and system deployment are still being defined. Thus, a measure of flexibility as to TT&C operations is appropriate to facilitate the introduction of these advanced broadband communications systems and services. In addition, any party believing it may be adversely affected by TT&C operations in the extended C-band will have a full opportunity to address any potential interference concerns. In this regard, Lockheed Martin and eight other GSO FSS Ka-band licensees have submitted a *Petition for Rulemaking* to designate extended C-band spectrum for TT&C functions of GSO FSS satellites operating in bands above Ku-band.^{7/}

^{5/} See *Space Imaging L.P. Application to Construct, Launch and Operate a Commercial Remote-Sensing Satellite System in Low-Earth Orbit*, 10 FCC Rcd 10911 (Int'l Bur., rel. Aug. 23, 1995).

^{6/} See *Directsat Corporation*, 11 FCC Rcd at 22377-78; see also *Space Imaging*, 10 FCC Rcd at 10913.

^{7/} See *Amendment of Parts 2 and 25 of the Commission's Rules to Designate Extended C-Band Spectrum for TT&C Functions of GSO FSS Systems Operating in Bands Above Ku-*

For these reasons, Lockheed Martin requests that the Commission waive Section 2.1, Section 25.202(g) or any other applicable rule, or provide other appropriate authorization necessary to permit Lockheed Martin to perform TT&C operations using extended C-band frequencies.

Band, Petition for Rulemaking (filed Aug. 7, 1997, on behalf of Comm, Inc., EchoStar Satellite Corp., GE American Communications, Inc., Hughes Communications Galaxy, Inc., KaStar Satellite Communications Corp., Lockheed Martin Corp., Orion Network Systems, Inc., PanAmSat Licensee Corp., and VisionStar, Inc.) ("*Petition for Rulemaking*").

Exhibit D-1

Technical Showing

The use of extended C-band frequencies in the bands 3650-3700 MHz and 6425-6525 MHz for the tracking, telemetry and control ("TT&C") operations of the Astrolink™ System will greatly facilitate the deployment of its geostationary orbit ("GSO") constellation. It will permit the use of highly reliable and cost-effective space and ground equipment for orbital insertion, station keeping and on-orbit maneuvers and other spacecraft housekeeping functions. As this usage will be on a non-conforming basis, the Astrolink™ System will operate its extended C-band TT&C operations on a non-protected, non-interfering basis with respect to conforming services licensed in this band. Should the Commission act on the pending rulemaking requesting the use of extended C-band for TT&C operations, the Astrolink™ System will be operated in conformance with the rules adopted in that proceeding.¹ The Astrolink™ System will maintain a 24-hour point of contact that can arrange to remedy any interference problems that may arise.

The Astrolink™ System will require no more than two TT&C sites in the U.S. Use of other TT&C sites around the world will be subject to coordination with affected satellite networks and with terrestrial networks, as required by the country where the TT&C sites are located.

¹ See *Amendment of Parts 2 and 25 of the Commission's Rules to Designate Extended C-Band Spectrum for TT&C Functions of GSO FSS Systems Operating in the Bands Above Ku-Band*, Petition for Rulemaking (filed Aug. 7, 1997, on behalf of Comm, Inc.; EchoStar Satellite Corp.; GE American Communications Corp.; Lockheed Martin Corp.; Orion Network Systems, Inc.; PanAmSat Licensee Corp.; and VisionStar, Inc.) ("*Petition for Rulemaking*").

The required TT&C spectrum for the Astrolink™ System consists of only one telecommand carrier of 1.5 MHz bandwidth and two 600 kHz bandwidth telemetry carriers. The preferred frequencies are at the edges of the bands to facilitate coordination with other users.² The technical characteristics of the Astrolink™ proposed C-band TT&C operations are provided in Table 1 below.

² The requested TT&C frequencies are 6425.5 MHz and 6427.5 MHz for uplink and 3650.5 MHz and 3699.5 MHz for downlink. Lockheed Martin understands that these frequencies may be subject to change as a result of coordination with other users.

Lockheed Martin Corporation
Astrolink™ Modification Application
FCC Form 312

Table 1 - Technical Characteristics of the Proposed Extended C-band TT&C Operations

Parameter		Unit	Normal Mission Operations	Launch, Early Orbit and Emergency Operations
Command	Frequency	MHz	6425.5 and 6427.5	6425.5 and 6427.5
	Coverage	N/A	Pyramidal Horn Antenna	Omni Antenna
	Flux Density	dBW/m2	-90	-80
	Modulation	N/A	PCM-RZ/FSK/FM	PCM-RZ/FSK/FM
	Data Rate	Bps	1024	1024
Telemetry	Frequency	MHz	3650.5 and 3699.5	3650.5 and 3699.5
	Coverage	N/A	Pyramidal Horn Antenna	Omni Antenna
	EIRP	dBW	+4	-5.4
	Modulation	N/A	PCM BiPhase/PSK/PM	PCM BiPhase/PSK/PM
	Data Rate	Bps	4096	4096
Tracking	Frequency U/L	MHz	6425.5 and 6427.5	6425.5 and 6427.5
	Frequency D/L	MHz	3650.5 and 3699.5	3650.5 and 3699.5
	Modulation U/L	N/A	FM/FM	FM/FM
	Modulation D/L	N/A	FM/PM	FM/PM
	Tone Frequencies	Hz	0, 35, 283, 3968 on 27.78 kHz Subcarrier or 27.778 kHz Fine Tone	0, 35, 283, 3968 on 27.78 kHz Subcarrier or 27.778 kHz Fine Tone

Operation with Other U.S.-Licensed GSO Networks

Only a limited number of U.S.-licensed and/or operational GSO FSS networks operate in the extended C-band. Coordination on a case-by-case basis with such networks for the operation of the Astrolink™ TT&C sites in extended C-band is therefore feasible. U.S. satellite filings that overlap the extended C-band TT&C frequency ranges exist for the following orbit locations: 174.3°W, 165°W, 119°W, 47°W, 12°W, 68°E, 72°E, 126°E, 139°E, 144°E and 172°E.³ As noted above, the proposed Astrolink™ TT&C frequencies will be at the edge of the frequency bands. GSO operators typically reserve the edges of the frequency band for TT&C operations and this facilitates coordination of these signals with other GSO systems.⁴

During normal on-station operations it should only be necessary to coordinate with other GSO satellites in the proximity of the Astrolink™ orbit locations. Because of the characteristics of TT&C operations (*i.e.*, relatively small amounts of spectrum and large earth stations), the coordination of TT&C operations with other GSO networks is feasible with orbital separations as close as 2° or less.

³ This list of filings was obtained from a review of the December 1997 version of Section 9 of the ITU's SNL (Space Network List) and the September 1997 version of the ITU's SRS (Space Radiocommunications Stations) on CD-ROM.

⁴ Section 25.202(g) of the Commission's rules requires TT&C signals to remain at the edge of the band. 47 C.F.R. § 25.202(g) (1997).

The Astrolink™ orbit locations are 97°W, 21.5°W, 2°E, 130°E and 175.25°E.⁵ The closest U.S. satellite to a potential Astrolink™ satellite is therefore 3.25° away. This occurs between the USASAT-14K filing at 172° E and the proposed Astrolink™ network at 175.25°E. Lockheed Martin remains confident that coordination can be achieved with all of the U.S. filed networks, including USASAT-14K, without burdensome constraints.

In the event that other U.S. Ka-band satellites utilize extended C-band spectrum for their TT&C operations, there will never be orbit spacings of less than 2°, and coordination can therefore be readily achieved.⁶ In cases where the spacing is only 2°, it may be advisable to coordinate exact TT&C carrier frequencies to avoid co-frequency operation. As all of these Ka-band satellites are still in the construction phase, coordination of the carrier frequencies should not pose any problem.

The use of extended C-band for transfer-orbit TT&C could potentially cause short-term interference to GSO FSS networks operating in the bands that are at orbit locations far removed from the Astrolink™ orbital locations. However, transfer-orbit operations occur for only a limited period of time. Interference effects will therefore be only of short duration given the movement of the satellites relative to each other during this period. At such times, interference may occur from the Astrolink™ telecommand signal to GSO FSS networks when the tracking Astrolink™ earth station is in line with an operational GSO satellite. Another potential

⁵ The 2°E orbit location has been requested as a substitute for the 38°E orbit location as part of the first Ka-band processing round.

⁶ The Commission's Ka-band orbital assignment plan is designed to ensure at least 2° orbital spacing between adjacent U.S. Ka-band satellites.

interference path will be from the Astrolink™ satellite telemetry signal into a GSO receiving earth station when the Astrolink™ satellite is in-line with the GSO earth station. To avoid these potential interference occurrences, Lockheed Martin will determine, prior to launch, which GSO orbital locations may be affected based on the transfer orbit path (which is a function of the launch vehicle and launch site). The Astrolink™ System operations will then be coordinated with the potentially affected GSO networks and, if necessary, the TT&C operations will be ceased for the short duration of any in-line events.

Operations with U.S.-Licensed Terrestrial Networks

The downlink frequency bands (in the range 3650-3700 MHz) requested for the TT&C operations of the Astrolink™ System are also allocated for government use to Aeronautical Radionavigation (ground based) and Radiolocation on a primary basis.⁷ The Astrolink™ System will be coordinated with all U.S. government systems operating in these frequency bands. As the most likely source of interference is related to the interaction between Astrolink™ earth stations and government terrestrial systems, and is therefore highly location dependent, this coordination will be more appropriate once Lockheed Martin submits its TT&C earth station applications to the Commission.⁸ Lockheed Martin notes that, in similar situations where operations are

⁷ Lockheed Martin notes that the NTIA has identified the 3650-3700 MHz band for reallocation to shared government/non-government use in January 1999. See Gerald F. Hundt, et al., *Spectrum Reallocation Final Report*, NTIA, Dept. of Commerce, Special Pub. No. 95-32 (Feb. 1995).

⁸ Protection of terrestrial services from satellite downlinks in the adjacent 3700-4200 MHz band is ensured by the power flux density ("pfd") limits in Section 25.208 of the Commission's rules. The same limits are applied to the 3650-3700 MHz band in § 21.16 of the ITU Radio Regulations. The proposed Astrolink™ System complies fully with these pfd limits.

proposed within government-allocated spectrum on a non-interference basis, NTIA has not objected.²

The uplink frequency bands (in the range 6425-6525 MHz) requested for the TT&C operations of the Astrolink™ System are also allocated for non-government use to the fixed and mobile services on a primary basis. The TT&C earth stations will be located in geographic areas away from metropolitan areas where the majority of these systems will operate. Geographic separation will therefore be a primary method of coordinating with these terrestrial services. In addition, other mitigation techniques such as site specific shielding can be employed. As with coordination with government systems, coordination with the non-government terrestrial services in the 6425-6525 MHz band will be more appropriate when Lockheed Martin submits its TT&C earth station applications to the Commission.

² See *Directsat Corporation Application for Modification of Construction Permit for a Direct Broadcast Satellite System*, Order, 11 FCC Rcd 22375, 22376 (Office of Eng'g & Tech. & Int'l Bur., rel. Sept. 9, 1996).

Exhibit K

Statement of Facts

The Filer, Lockheed Martin Corporation ("Lockheed Martin"), a Maryland corporation, was formed in connection with the merger of Lockheed Corporation and Martin Marietta Corporation, a business combination which was consummated on March 15, 1995. Lockheed Martin has never been convicted of a felony by any state or federal court. The following matters relating to predecessor companies are being reported out of an abundance of caution.

On January 27, 1995, Lockheed Corporation pleaded guilty in federal district court in Atlanta, Georgia, to a single count of conspiracy to violate the Foreign Corrupt Practices Act and conspiracy to falsify its books, records, and accounts. The plea was related to a 1989 contract between Lockheed Corporation and Egypt for the sale of C-130 aircraft. As part of the resolution of this litigation, Lockheed Corporation paid certain fines to the United States Government.

In March 1987, pursuant to an agreement entered into with the United States Attorney for Maryland, Martin Marietta Corporation pleaded guilty in federal district court in Maryland to two counts of mail fraud (18 U.S.C. §1341) and one count of false statements (18 U.S.C. §1001) in connection with activities of a subsidiary of Martin Marietta Corporation which provided travel-related services. As part of this agreement, Martin Marietta paid certain fines and reimbursed investigative costs to the United States Government.

Additionally, in April 1996, Loral Corporation became a wholly-owned subsidiary of Lockheed Martin by merging with a subsidiary of Lockheed Martin. The business units acquired by Lockheed Martin in this transaction were subsequently integrated into Lockheed Martin Corporation and Loral Corporation ceased to exist. On December 8, 1989, Loral Corporation pleaded guilty in federal district court in Virginia to charges of conspiracy, conversion of government property, and false statement. The pleas were related to the activities of Loral Defense Systems in obtaining competitor proprietary and government source selection information to assist it in securing certain defense contracts. As part of the resolution of this litigation, Loral Corporation paid certain fines, civil damages, penalties, and investigative costs to the United States Government.

Exhibit L

**Stockholders Owning and/or Voting
10% or More of Filer's Voting Stock**

Lockheed Martin Corporation ("Lockheed Martin"), a diversified advanced-technology company, is a Maryland corporation with its principal place of business at 6801 Rockledge Drive, Bethesda, MD 20817. Lockheed Martin is a publicly held corporation whose stock is traded on the New York Stock Exchange under the symbol LMT.

The following stockholders hold 10% or more of the voting stock of Lockheed Martin as trustees of certain employee benefit plans:

US Trust Company of California, N.A. ("US Trust")
555 South Flower Street
Los Angeles, CA 90071

State Street Bank and Trust Company ("State Street")
225 Franklin Street
Boston, MA 021100

All of the shares held by US Trust and State Street are registered in the name of the following company:

CEDE & Co.
The Depository Trust Company
P.O. Box 20
Bowling Green Station
New York, NY 10274

Exhibit M

**Officers and Directors
of the Filer**

The names and addresses of the officers and directors of the Filer, Lockheed Martin Corporation, are listed below:

Officers:

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**Lockheed Martin Corporation
Astrolink™ Modification Application
FCC Form 312
Exhibit M, Page 2 of 6**

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Lockheed Martin Corporation
Astrolink™ Modification Application
FCC Form 312
Exhibit M, Page 3 of 6

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**Lockheed Martin Corporation
Astrolink™ Modification Application
FCC Form 312
Exhibit M, Page 4 of 6**

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FCC Form 312
Exhibit M, Page 5 of 6

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Astrolink™ Modification Application
FCC Form 312
Exhibit M, Page 6 of 6**

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APPENDIX 3

No. 226511

LOCKHEED MARTIN MISSILES & SPACE
REMITTANCE ADVICE

DECEMBER 18, 1997

*****54,675.00

FEDERAL COMMUNICATIONS COMMISSION (FCC)

FILING FEES FOR AMENDMENT TO ORIGINAL ASTROLINK
FILING

PREVIOUS

PLEASE DETACH BEFORE DEPOSIT TO THE
FOLLOW YOUR ENDORSEER'S REQUIREMENTS

LOCKHEED MARTIN

FUNNYVALE, CALIFORNIA 94066

ASTROLINK

0226511

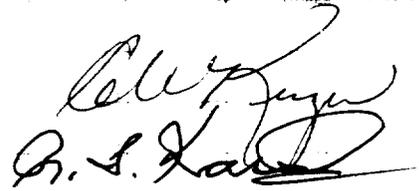
DECEMBER 18, 1997

FEDERAL COMMUNICATIONS COMMISSION (FCC)

*****54,675.00

GENERAL ACCOUNT

ASTROLINK or aware



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38834692⑈

APPENDIX 4



PUBLIC NOTICE

FEDERAL COMMUNICATIONS COMMISSION
1919 M STREET N.W.
WASHINGTON, D.C. 20554

56031

News media information 202/418-0500 Recorded listing of releases and texts 202/418-2222.

Release Date: September, 28, 1995

INTERIM FILING FEE PAYMENT ESTABLISHED FOR Ka-BAND SATELLITE APPLICATIONS

The Managing Director has established an interim filing fee payment for fixed Ka-band (17.7-20.2/27.5-30) satellite applications, based upon the total number of orbital locations that an applicant proposes to occupy. This action will afford the Commission an opportunity to determine whether to seek congressional amendment of the statutory filing fee schedule, as it now applies to geostationary space stations, because of the evolution in geostationary satellite technology and the multiple geostationary space stations that Ka-band applicants are anticipated to deploy in their systems.

The interim payment should be filed, along with underlying applications, no later than September 29, 1995. Ka-band satellite applicants should submit a filing fee payment of \$2,330 per orbital location (Payment Code BBY) to cover their applications for authority to construct and an additional fee payment of \$80,360 per orbital location (Payment Code BNY) for authority to launch and operate Ka-band satellites at each orbital location, regardless of how many space stations are proposed for operation. Thus, for example, if an applicant requests authorization for nine satellites to operate at three orbital locations, it should submit three fee payments to construct and three additional fee payments to launch and operate its space stations, totalling \$248,070.

Any Ka-band applicant submitting an interim fee payment, as described above, should also file with its check and Form 159 a cover letter stating that it is making an interim payment and that it will submit any further payment, if required by the Commission, within thirty (30) days of notification from the Commission that an additional payment remains due.

For further information, see letter to John P. Janka, Esquire from Andrew S. Fishel, Managing Director, dated September 28, 1995. Questions regarding the foregoing should be directed to Thomas M. Holleran, Deputy Associate Managing Director for Operations (202) 418-1925.

APPENDIX 5

FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

OFFICE OF
MANAGING DIRECTOR

1111 11 11

DOCKET FILE COPY DUPLICATE

Stephen L. Goodman, Esquire
Halprin, Temple and Goodman
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Suite 650 East
Washington, D.C. 20005

AT&T Corp.
Request for refund of fee for
application to launch and
operate emergency replacement
satellite
Fee Control #: 9506148160425001

Dear Mr. Goodman:

This is in response to your request for waiver and refund of the fee submitted by AT&T Corp. (AT&T) in connection with its application to launch and operate a satellite.

You state that AT&T filed the application and fee payment in the amount of \$80,360 in order to obtain the necessary authorization to construct and operate a satellite to replace an earlier authorized satellite that was lost shortly after launch.

You contend that the waiver is justified because, as a request for emergency replacement of an authorized satellite, the Commission will incur little or no costs in processing the application. You state that AT&T received construction authority for its replacement satellite at the time that the Commission authorized the construction of the lost satellite. Moreover, you state that, because the replacement satellite is operationally identical to the satellite AT&T initially launched, the technical analysis, interference coordination, and international advance notification activities that were associated with that satellite will not have to be repeated.

We are aware that the fees submitted by AT&T to cover its application for its replacement satellite are substantial, and that Congress has granted the Commission narrow authority to waive or reduce each fee contained in the schedule of fees governing applications and other filings. Further, we note that each fee contained in the fee schedule represents a congressional judgment on the appropriate fee for the particular matter in question. As such, there will frequently be individual cases where the cost burden on the Commission's processes will be more or less than the required fee. For example, it is not unusual that an applicant withdraws before substantive processing of its application begins. In these circumstances, the Commission, except in the most compelling circumstances, retains the fee payment in its entirety.

Stephen L. Goodman, Esquire
Page 2

In the case of AT&T, we recognize that the fees contained in the fee schedule bear scant relationship to the resources required to process the replacement satellite's authorizations because much of the processing is insignificantly different from that required for AT&T's initial satellite. However, the Commission will incur costs in the processing of AT&T's application to launch and operate its replacement satellite.

In a similar instance, where Hughes Communications Galaxy, Inc. (Hughes) requested a reduction in the fees for the construction, launch and operation of a satellite to replace a satellite destroyed during launch, its fees were reduced to \$5,000, the fee then applicable to an application to modify a space station authorization. See letter to James F. Rogers from Marilyn J. McDermett, Associate Managing Director, dated April 11, 1994. The fee for such a modification is currently \$5,740. Since AT&T already possesses construction authority for its replacement satellite, we will adjust AT&T's fee to \$5,000 rather than \$5,740 required with an application to modify a space station authorization.

Accordingly, for good cause shown, your request is granted to the extent specifically indicated above. We will assess AT&T a fee of \$5,000 to cover its application for authority to launch and operate its replacement satellite. Therefore, AT&T is entitled to a refund of \$75,360. A check, made payable to the maker of the original check and drawn in the amount of \$75,360, will be sent to you at the earliest practicable time. If you have any questions concerning this refund, please contact the Chief, Fee Section at (202) 418-1995.

Sincerely,



Marilyn J. McDermett
Associate Managing Director
for Operations

APPENDIX 6

FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

OFFICE OF
MANAGING DIRECTOR

11 APR 1994

DOCKET FILE COPY ORIGINAL

James F. Rogers, Esquire
Latham & Watkins
1001 Pennsylvania Avenue, N.W.
Suite 1300
Washington, D.C. 20004-2505

Dear Mr. Rogers:

This is in response to your request for a partial waiver of the fee submitted by Hughes Communications Galaxy, Inc. (Hughes) in connection with its applications for a construction permit and to launch and operate a satellite.

You state that Hughes filed the instant applications and fee payments, totalling \$72,030.00, in order to obtain the necessary authorizations to construct, launch and operate a satellite to replace an earlier authorized satellite which was destroyed during its launch because of a malfunction. The requisite application fee for a construction permit for the satellite is \$2,030.00 and for the application for launch and operational authority is \$70,000.00. However, you ask for an adjustment of Hughes' fee requirement to \$500.00 and a refund of the remaining \$71,530.00 submitted to the Commission.

You contend that the authorizations now requested by Hughes for its replacement satellite are identical in all respects with those which the Commission initially granted Hughes for its destroyed satellite, except that new construction and launch dates must be assigned. Moreover, the replacement satellite will be technically and operationally indistinguishable from its predecessor, and its orbital location will be unchanged. Consequently, the only Commission action required is the approval of new "milestone" dates, similar to the action requested by an application for an extension of a launch date. Finally, you state that the requested authorizations do not raise new issues of policy since any issue relating to the applications now before the Commission has already been resolved in the earlier proceedings. Therefore, in your view, Hughes' combined applications covering the replacement satellite constitute no more than a request for an extension of a satellite's launch date.

We are aware that the fees submitted by Hughes to cover its applications for its replacement satellite are substantial, and that Congress has granted the Commission narrow authority to waive or reduce the fees prescribed by the Fee Schedule. Further, we note that each fee contained in the Fee Schedule represents a congressional judgment on the appropriate fee for the matter in question. As such, there will frequently be individual cases where

James F. Rogers, Esquire

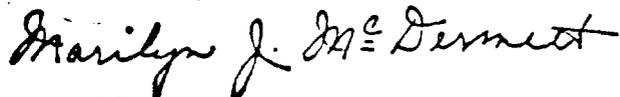
2.

the cost burden on the Commission's processes will be more or less than the required fee. For example, it is not unusual that an applicant withdraws before substantive processing of its application begins. In these instances, the Commission, except in the most compelling circumstances, retains the fee payment in its entirety.

In the case of Hughes, we recognize that the fees contained in the Fee Schedule bear scant relationship to the resources required to process the replacement satellite's authorizations because much of the processing is insignificantly different from that required for Hughes' initial satellite. However, the fee that Hughes suggests as adequate to cover both its applications relates only to an extension of time to construct or launch a satellite. Inasmuch as the processing of its application for construction, launch and operational authority is consistent with the processing burden for an application to modify a space station authorization, we will assess the fee required by the Schedule of Fees for a modification of a space station authorization. Thus, Hughes will be assessed a fee in the amount of \$5,000.00.

Accordingly, for good cause shown, your request is granted to the extent specifically indicated above. We will assess Hughes with a total fee of \$5,000.00 to cover its applications to construct, launch and operate its replacement satellite. Therefore, Hughes is entitled to a refund of \$67,030.00. A check, made payable to the maker of the original check and drawn in the amount of \$67,030.00, will be sent to you at the earliest practicable time. If you have any questions concerning this refund, please contact the Chief, Fee Section at (202) 632-0241.

Sincerely,



Marilyn J. McDermott
Associate Managing Director
for Operations

Payment Transactions Detail Report

Date: 2/12/98

BY: FEE CONTROL NUMBER

Fee Control Number	Payor Name	Account Number	Received Date
9712238210221001	LOCKHEED MARTIN CORPORATION 6801 ROCKLEDGE DRIVE BETHESDA MD 20817	FCC2047118	12/22/97

Payment Amount	Current Balance	Seq Num	Payment Type Code	Quantity	Callsign Other Id	Applicant Name	Applicant Zip	Bad Check	Detail Amount	Trans Code	Payment Type
\$54,675.00	\$54,675.00	1	BFY	9		LOCKHEED MARTIN CORPORATION	20817		\$54,675.00	1	PMT
Total									<u>\$54,675.00</u>		

FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

April 29, 1998

OFFICE OF
MANAGING DIRECTOR

Suzanne E. Rogers, Esquire
455 Capitol Mall
Suite 604
Sacramento, CA 95814

Re: Request for Refund of Regulatory Fees
Meridian Communications Company
Fee control # 9609308835020005
Fee Paid: \$4,425

Dear Ms. Rogers:

This is in response to your request for a refund of the Fiscal Year (FY) 1996 regulatory fee for Channel 34, Lake Havasu City, Arizona, licensed to Meridian Communications Company. In support of your request, you submitted a copy of the Construction permit for Channel 34, which was not granted until May 14, 1996.

The FY 1996 Mass Media regulatory fees were assessed against licensees and permittees whose authorizations were granted on or before October 1, 1995. However, because the Construction Permit for Channel 35 was not granted until May 14, 1996, no regulatory fee was due, and any amounts improperly paid will be refunded.

Accordingly, a check, made payable to the maker of the original check and drawn in the amount of \$4,425, will be sent to you at the earliest practicable time. If you have any questions concerning the refund, please contact the Chief, Fee Section at (202) 418-1995.

Sincerely,


Thomas M. Holleran
~~Deputy~~ Deputy, Associate Managing
Director - Financial Operations

4609308835020005

LAW OFFICES OF
SUZANNE E. ROGERS

455 CAPITOL MALL, SUITE 604
SACRAMENTO, CALIFORNIA 95814
(916) 448-8800 FAX (916) 448-6455
E-MAIL: SEROGERS@PACBELL.NET
ROSEVILLE OFFICE (916) 784-1768

9/25/97
→ FOD/BC
TO OCC
Reg Fee Refund
Request
RC
4

September 17, 1997

Managing Director
Federal Communications Commission
1919 M. Street, N.W., Room 852
Washington, D.C. 20554

Re: **Ch. 34, Lake Havasu City, AZ**
Request for Refund of Regulatory Fees Paid - FY 1996

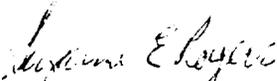
Dear Managing Director:

Due to an inadvertent error, Meridian Communications Company ("MCC"), the licensee at the time of Channel 34, Lake Havasu City, Arizona ("Ch. 34"), submitted regulatory fees for fiscal year 1996 which were not due at the time. Therefore, by this letter MCC hereby requests a refund of the fiscal year 1996 regulatory fees paid for Ch. 34.

Similar to the instructions for fiscal year 1997, regulatory fees for fiscal year 1996 were to be paid by licensees of commercial VHF and commercial UHF television stations and holders of construction permits for new stations whose license or permit was granted on or before October 1, 1995. However, the construction permit for Ch. 34 was not granted until May, 1996 (the "Permit"), and as such, no fees were owed for fiscal year 1996. (A true and correct copy of the Permit is enclosed as Exhibit A to this letter.) Thus, in error, MCC paid regulatory fees for fiscal year 1996 in the amount of \$4,425.00, of which it now requests reimbursement. (A true and correct copy of the front and back side of this payment is enclosed as Exhibit B to this letter.)

Thank you for time and consideration concerning this request. If you have any questions regarding the above request, please feel free to contact me at the phone number and address listed above.

Sincerely,


Suzanne E. Rogers

SER/wc
Enclosures



United States of America

FEDERAL COMMUNICATIONS COMMISSION
TELEVISION BROADCAST STATION
CONSTRUCTION PERMIT

Official Mailing Address:

MERIDIAN COMMUNICATIONS COMPANY
910 SUNRISE AVE
SUITE A1, BOX 160
ROSEVILLE, CA 95661

Authorizing Official
[Signature]

Clay C. Pendarvis
Chief, TV Branch
Video Services Division
Mass Media Bureau

ORIGINAL

Grant Date: May 14, 1996

Call Sign: 941031KN

This permit expires 3:00 a.m.
local time, May 14, 1998

Permit File No.: BPCT-941031KN

This authorization re-issued to correct expiration date and
operating parameters.

Subject to the provisions of the Communications Act of 1934, as
amended, subsequent acts and treaties, and all regulations heretofore
or hereafter made by this Commission, and further subject to the
conditions set forth in this permit, the permittee is hereby
authorized to construct the radio transmitting apparatus herein
described. Installation and adjustment of equipment not specifically
set forth herein shall be in accordance with representations contained
in the permittee's application for construction permit except for such
modifications as are presently permitted, without application, by the
Commission's Rules.

This permit shall be automatically forfeited if the station is not
ready for operation within the time specified (date of expiration) or
within such further time as the Commission may allow, unless
completion of the station is prevented by causes not under the control
of the permittee. See Sections 73.3598, 73.3599 and 73.3534 of the
Commission's Rules.

Equipment and program tests shall be conducted only pursuant to
Sections 73.1610 and 73.1620 of the Commission's Rules.

Name of Permittee:

MERIDIAN COMMUNICATIONS COMPANY

Station Location:

AZ-LAKE HAVASU CITY

EXHIBIT A

Frequency (MHz): 590.0 - 596.0

Carrier Frequency (MHz): 591.26 Visual 595.76 Aural

Channel: 34

Hours of Operation: Unlimited

Transmitter location (address or description):

NEAR CROSSMAN PK, 13.8 KM E-NE OF HAVASU CITY, AZ

Transmitter: Type Accepted. See Sections 73.1660, 73.1665 and 73.1670 of the Commission's Rules.

Antenna type: (directional or non-directional): Directional

Description: BOGNER B16UE

Beam Tilt: 3.00 Degrees Electrical

Major lobe directions (degrees true): 230.0 320.0

Antenna Coordinates: North Latitude : 34 33 6
West Longitude : 114 11 37

Transmitter output power.....: As required to achieve authorized ERP

Maximum effective radiated power (PEAK): 468.0 kW
: 26.7 DBK

Height of radiation center above ground.....: 17 Meters

Height of radiation center above mean sea level.: 1443 Meters

Height of radiation center above average terrain: 817 Meters

Antenna structure registration number: none

Overall height of antenna structure above ground
(including obstruction lighting if any).....: 22 Meters

Obstruction marking and lighting specifications for antenna structure:

It is to be expressly understood that the issuance of these specifications is in no way to be considered as precluding additional or modified marking or lighting as may hereafter be required under the provisions of Section 303(q) of the Communications Act of 1934, as amended.

None Required

Special operating conditions or restrictions:

None Required

*** END OF AUTHORIZATION ***

Payment Transactions Detail Report

Date: 11/10/97

BY: FEE CONTROL NUMBER

Fee Control Number	Payor Name	Account Number	Received Date
9609308835020005	MERIDIAN COMMUNICATIONS COMPAN 910 SUNRISE AVE SUITE A1 BOX 160 ROSEVILLE CA 95661	FCC2030280	09/20/96

Payment Amount	Current Balance	Seq Num	Payment Type Code	Quantity	Callsign Other Id	Applicant Name	Applicant Zip	Bad Check	Detail Amount	Trans Code	Payment Type
\$4,425.00	\$4,425.00	1	MKU6	1	CH34LAKEHA	MERIDIAN COMMUNICATIONS COMPAN			\$4,425.00	1	PMT
Total									\$4,425.00		

FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

Chief, Fee Section
Room 452

OFFICE OF
MANAGING DIRECTOR

April 17, 1998

Mr. Dennis J. Rowley
President
NFO, Inc.
510 Northland Drive
Cameron, MO 64429

Re: Petition for Reduction of Regulatory Fee
AM Radio Station KMRN
Fee Control # 9709178835027004

Dear Mr. Rowley:

This is in response to the Petition that you filed for a reduction of the Fiscal Year (FY) 1997 regulatory fee for AM Radio Station KMRN, Cameron, Missouri, licensed to NFO, Inc. You argue that reliance on the 0.5 mV/m service contour for calculating the population served by KMRN to develop its FY 1997 regulatory fee, resulted in a gross misstatement of the population served by your station.

Congress established the total amount of fees that we are to collect for all services for FY 1997 and our fee schedule is formulated to spread the burden of the total fee requirement equitably among the various categories of fee payers, including broadcast licensees. The FY 1997 regulatory fees for all AM stations were derived by calculating the populations within the 0.5 mV/m contour of each individual station, which is their daytime protected service contour. Consequently, as a matter of equity, recalculating a station's service area using a different contour for measuring population would require recalculating the service areas, populations, and fees, at a minimum, for all radio broadcast stations, in order to insure the Commission's ability to collect the required amount in fees and that licensees are treated equally.

We recognize that some broadcasters believe that the city grade contour which each licensee is required to place over its community of license may be a better reflection of the "core" population served by that station, and we contemplate using the city grade contour to calculate FY 1998 radio regulatory fees. However, the 0.5 mV/m contour is appropriate for calculating the FY 1997 regulatory fees because that contour represents the area in which listeners receive the station's protected signal. Thus, the Commission will not reduce, on an ad hoc basis, an individual station's regulatory fee solely because its population served would be lower had we relied on a different service contour.

Mr. Rowley

Page 2

Accordingly your request for reduction of the regulatory fee is denied. If you have any questions concerning the regulatory fees, please contact the Chief, Fee Section at (202) 418-1995.

Sincerely,

W. Lewis Fox

Thomas M. Holleran
Acting Associate Managing
Director for Operations

9709178835027004

KNOZ-FM

K-News
Your Information Station
100.1 MHz

510 Northland Drive
Cameron, MO 64429
(816) 632-6661
fax (816) 632-1334

KMRN-AM

The Voice of the
Cameron Area
1360 KHz

PETITION FOR REDUCTION

FCC
Attention: Petitions
P.O. Box 358835
Pittsburgh, PA 15251-5835

NFO, Inc.

September 12, 1997

Sirs:

I am sending Regulatory Payments as required, (via FedEx to Mellon Bank) but under protest. **We Petition for a Reduction in the Regulatory Fee Assessed KMRN (AM) in Cameron, Missouri; licensed to NFO, Inc.**

This Petition for Reduction being filed as instructed under Code of Federal Regulations, Title 47, Part 1.1165(d). However, unlike the Code states is permissible, we are sending the full amount required to the Mellon Bank address (via FedEx) because of our fear of being assessed a 25% penalty.

While we do not disagree with the population figures used to calculate the fee for our other station, KNOZ-FM (65-thousand people), we want you to know that it certainly is a hardship for a small radio station like ours to pay the \$1,000 assessed that station. That is not the purpose of our Petition, however.

Specifically, the method used for calculating the population served by KMRN, our 500 watt, Class D AM station, is using the .5mv contour, resulted in a gross misstatement of our population served by almost 10 times. We believe that fee should be \$200 and not \$1,000.

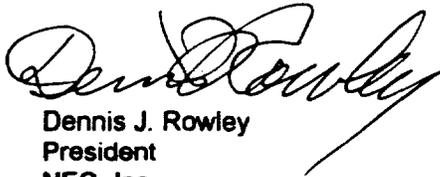
That fee amount of \$200 is derived as an estimate, since we have been unable to get a direct answer to exactly how the fees were calculated. We do know that the .5 mv contour was used to determine the supposed population served by our station, and that contour forced the population calculation for our little AM station to be 365-thousand people! This is outrageous. This is placing part of the population of Kansas City, MO in our area served, and nothing could be further from the truth.

- 1) Our broadcast area serves our 4-county area (Clinton, DeKalb, Daviess and Caldwell Counties), which does not include any part of Kansas City. We are proud of the service we give the 4-county area, but that area's total population under the 1990 census was 42,807 persons.
- 2) We are able to derive income based on those population figures only, and certainly not on any Kansas City (or St. Joseph for that matter) listeners. Those people don't listen to a 500-watt small-town station in Cameron. Our signal is not listenable to any degree of quality in that high-population area.
- 3) Using the .5 mv contour to determine population served is unreasonable and unfair. It uses a standard to fix assessment of fees that the Commission's itself would never use to determine if a community can be considered "served" by a Class D radio station.

We also believe the instructions that came with the August 1, 1997 Public Notice regarding the Regulatory Fees are in direct conflict with the Code of Federal Regulations which allow for the fees to be sent LESS the amount of the requested reduction (Sec. 1.1165(d)). But the threats of imposition of the penalty are forcing us to send the full amount. You see, we can't afford even a 25% penalty, let alone the \$1,000 fee assessed our station.

I am sending this letter to the normal PO Box just to insure that there is no question as to the fact that we did file timely, but under protest.

We would appreciate your serious reconsideration of this unreasonable fee.



Dennis J. Rowley
President
NFO, Inc.

Payment Transactions Detail Report

Date: 10/16/97

BY: FEE CONTROL NUMBER

Fee Control Number	Payor Name	Account Number	Received Date
9709178835027004	NFO INC	FCC2042244	09/15/97

510 NORTHLAND DRIVE

CAMERON MO 64429

Payment Amount	Current Balance	Seq Num	Payment Type Code	Quantity	Callsign Other Id	Applicant Name	Applicant Zip	Bad Check	Detail Amount	Trans Code	Payment Type
\$2,000.00	\$2,000.00	1	MGF7	1	KMRN	NFO INC	64429		\$1,000.00	1	PMT
\$2,000.00	\$2,000.00	2	MGF7	1	KNOZ	NFO INC	64429		\$1,000.00	1	PMT
Total		2							\$2,000.00		