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

In the Matter of	)	
	)	
NEW SKIES SATELLITES B.V.	)	File No. SAT-MPL-_____
	)	Call Sign S2591
Request for Modification of the Terms of	)	
U.S. Market Access for NSS-806	)	

MODIFICATION

New Skies Satellites B.V. ("New Skies," doing business as "SES"), hereby respectfully requests that the Commission modify the terms pursuant to which the Netherlands-licensed NSS-806 space station is authorized to serve the U.S. market. Specifically, SES proposes to relocate NSS-806 from 40.5° W.L.[1] to 47.5º W.L. (+/- 0.1°) and to provide service from that location using the conventional and extended C-band, standard C-band and standard Ku-band frequencies.[2] In addition, SES seeks future pointing flexibility for its steerable Ku-band spot beam. The proposed initial pointing for the steerable beam will cover a portion of the United States and the Caribbean.

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[1] *See New Skies Satellites N.V.*, Order, DA 01-513, 16 FCC Rcd 6740 (Sat. Div., rel. Mar. 29, 2001) ("NSS-806 Order") (adding NSS-806 to the Permitted List for operations at 40.5º W.L.), as modified by File No. SAT-MPL-20110923-00187 (the "2011 Modification"), grant-stamped June 28, 2012 ("2011 Modification Grant") (updating the Permitted List to allow use of NSS-806 for direct-to-home services on specified routes).

[2] Specifically, SES is seeking modified market access for NSS-806 at 47.5° W.L. in the following frequency bands: 3600-3700 MHz, 3700-4200 MHz and 11750-11950 MHz downlink; 5850-5925 MHz, 5925-6425 MHz, 6425-6650 MHz and 14000-14250 MHz uplink. The earth stations that will be used to communicate with the NSS-806 satellite at 47.5° W.L. will be subject to separate Commission licensing, terrestrial coordination, and coordination with NTIA (as necessary). SES is not seeking market access for frequencies below 3600 MHz but has described the technical characteristics of the space station's capabilities in other bands in the attached Schedule S for informational purposes.

Grant of the requested authority is consistent with Commission precedent and will serve the public interest by allowing SES to make efficient use of its satellite assets to respond to anticipated customer demand. SES will begin relocation of NSS-806 relocation following the successful launch of the SES-6 satellite to 40.5° W.L. and the completion of traffic transfer from NSS-806 to SES-6.[3] SES respectfully requests action on this modification by September 1, 2013.

A completed FCC Form 312 is attached, and SES incorporates by reference the technical information previously provided in support of NSS-806.[4] In addition, SES is providing information relating to the proposed modification in the attached narrative Technical Appendix and Schedule S.

I. BACKGROUND

NSS-806 is a C/Ku-band hybrid spacecraft currently operating at 40.5° W.L. pursuant to the authority of The Netherlands administration. In 2001, the Commission added NSS-806 to the Permitted Space Station List ("Permitted List") to enable the satellite to provide Fixed Satellite Service ("FSS") in the United States using the standard C- and Ku-bands.[5] Last year, the Commission modified the terms of U.S. market access to permit use of NSS-806 for direct-to-home ("DTH") services within the U.S. and between the U.S. and specified foreign countries.[6] Separately, the Commission has granted U.S. market access for NSS-806 in the

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[3] *See New Skies Satellites B.V.*, Call Sign S2870, File No. SAT-PPL-20120717-00117 (accepted for filing public notice Aug. 31, 2012; no comments filed) (requesting U.S. market access for the Netherlands-licensed SES-6 satellite to replace NSS-806 at 40.5° W.L.).

[4] *See* 2011 Modification; *see also* File Nos. SAT-PDR-19991227-00130 & SAT-PDR-20001031-00146.

[5] *See* NSS-806 Order. The "standard" or "conventional" C-band refers to the 3700-4200 MHz and 5925-6425 MHz frequencies. The "standard" or "conventional" Ku-band refers to the 11.7-12.2 GHz and 14.0-14.5 GHz frequencies.

[6] *See* 2011 Modification Grant.

extended C-band through the grant of earth station licenses to communicate with the satellite in those frequencies.[7]

SES now proposes to relocate NSS-806 to 47.5° W.L. to provide service to the United States using the same extended C-band, standard C-band and standard Ku-band frequencies. At 47.5° W.L., NSS-806 will supplement the capacity currently being provided by the NSS-703 spacecraft at 47.05° W.L.[8] SES is implementing these changes in order to provide video distribution, DTH (to the extent permitted) and other services to all countries within the satellite's coverage area, including the U.S.

II. AUTHORIZING THE PROPOSED MODIFICATIONS IS CONSISTENT WITH COMMISSION POLICIES AND THE PUBLIC INTEREST

The Commission has generally permitted satellite operators the flexibility to design and modify their networks in response to customer requirements. The Commission has repeatedly observed that its policy is to allow "satellite operators to rearrange satellites in their

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[7] *See, e.g.*, Call Sign E000152, File No. SES-MOD-20120824-00783 (authorizing use of the following extended C-band frequencies with NSS-806 at 40.5° W.L.: 3625-3700 MHz downlink; 5850-5925 MHz, 5925-6425 MHz, 6491-6650 MHz uplink); Call Sign E000696, File No. SES-RWL-20110128-00068 (authorizing use of 3600-3700 MHz downlink; 5850-5925 MHz, 5925-5950 MHz, 6425.5-6560 MHz and 6600-6639 MHz uplink with NSS-806); Call Sign E980076, File No. SES-MOD-20100615-00701 (authorizing use of 5850-5925 MHz, 6425-6650 MHz with NSS-806); Call Sign KA333, File No. SES-MOD-20101028-01356 (authorizing use of 5854-5925 MHz, 6572 MHz and 6607 MHz with NSS-806). For purposes of this application, the "extended C-band" refers to the 3600-3700 MHz (space-to-Earth), 5850-5925 MHz (Earth-to-space), and 6425-6650 MHz (Earth-to-space) frequency bands.

[8] *See* Call Sign S2818, File Nos. SAT-PPL-20101103-00230 & SAT-APL-20110120-00015, grant-stamped Oct. 13, 2011 ("NSS-703 Grant") (adding NSS-703 to the Permitted List for operations at 47.05° W.L. in the conventional C- and Ku-bands). An affiliate of New Skies, SES Satellites (Gibraltar) Limited, operates NSS-703 at this location pursuant to an authorization issued to SES Satellites (Gibraltar) Limited. *See* NSS-703 Grant, Attachment to Grant at 1 n.2.

fleet to reflect business and customer considerations where no public interest factors are adversely affected."[9] As the International Bureau has explained:

> the Commission attempts, when possible, to leave spacecraft design decisions to the space station licensee because the licensee is in a better position to determine how to tailor its system to meet the particular needs of its customers. Consequently the Commission will generally grant a licensee's request to modify its system, provided there are no compelling countervailing public interest considerations.[10]

Relocating NSS-806 will permit SES to efficiently redeploy its satellite assets to respond to anticipated customer demand, once SES-6 has been successfully launched to replace NSS-806 at 40.5° W.L. There are no compelling countervailing public interest considerations. Accordingly, grant of the requested modification of the terms on which NSS-806 is authorized to serve the U.S market is consistent with Commission precedent and with the public interest.

As described in the Technical Appendix, NSS-806 is equipped with hemispheric C-band beams and a steerable conventional Ku-band spot beam antenna. SES plans to reorient the steerable beam in connection with relocation of NSS-806 to 47.5° W.L. The anticipated initial pointing of the Ku-band is shown in the Technical Appendix and Schedule S. SES also

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9 *SES Americom, Inc.*, Order and Authorization, DA 06-757 (IB rel. Apr. 7, 2006) at 4, ¶ 8, *citing Amendment of the Commission's Space Station Licensing Rules and Policies*, Second Report and Order, 18 FCC Rcd 12507, 12509, ¶ 7 (2003).

10 *AMSC Subsidiary Corp.*, Order and Authorization, DA 98-493, 13 FCC Rcd 12316 (IB 1998) ("*AMSC Modification Order*") at 12318, ¶ 8 (footnote omitted). Although AMSC never implemented the relocation authorized in this case, the Commission has repeatedly reaffirmed its policy of allowing licensees to change their fleet configurations to accommodate customer requirements. *See, e.g., Space Station Licensing Rules and Policies*, First Reconsideration Order and Fifth Report and Order, FCC 04-147, 19 FCC Rcd 12637 at ¶ 39 ("we generally permit licensees to modify their systems to adapt to changing business and customer needs," citing *AMSC Modification Order* and other cases).

seeks the flexibility to adjust the coverage of this antenna in the future, as needed, to better satisfy customer requirements.

As the Technical Appendix demonstrates, the proposed operation of NSS-806 at 47.5° W.L. in the extended C-, standard C- and standard Ku-band frequencies will be consistent with the Commission's two-degree spacing policy, and will be compatible with the adjacent Intelsat satellites located more than two degrees away at 45° W.L. and 50° W.L. SES will abide by any applicable coordination agreements for its proposed operations at 47.5° W.L. In addition, SES will internally coordinate the operations of NSS-806 at 47.5° W.L. and NSS-703 at 47.05° W.L. to ensure compatibility.

III. RULE WAIVERS

Continuation of Existing Waivers: SES proposes to continue to operate NSS-806 consistent with the terms pursuant to which the Commission has already authorized NSS-806 to serve the U.S. market. Specifically, SES seeks continued application of the waivers of Sections 25.202(g), 25.210(a)(1) and (3), and 25.211(a) that were granted in the NSS-806 Order[11] and the waivers of Sections 25.114(d)(14)(ii) and 25.283(c) included in the 2011 Modification Grant.[12] Because the justification for these waivers is not affected by the proposed modification, continuation of the waivers is consistent with Commission precedent.

Request for Waiver of 47 C.F.R. § 25.210(j): Section 25.210(j) specifies that geostationary space stations "must be maintained within 0.05º of their assigned orbital longitude in the east/west direction, unless specifically authorized by the Commission to operate with a

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11 *See NSS-806 Order* at ¶¶ 15-16 & 22 (granting waivers of Sections 25.202(g), 25.210(a)(1) and (3), and 25.211(a) for U.S. earth stations communicating with NSS-806).

12 *See* 2011 Modification Grant, Attachment to Grant at ¶ 5.

different longitudinal tolerance."[13] Here, SES is seeking authority to operate NSS-806 with an east-west stationkeeping of +/- 0.1 degrees. The Commission has previously waived Section 25.210(j) based on a finding that allowing an increased stationkeeping volume would "not adversely affect the operations of other spacecraft, and would conserve fuel for future operations."[14]

The facts here fit squarely within this precedent. The Technical Appendix demonstrates that allowing NSS-806 to be maintained within an increased stationkeeping volume will not harm other operators. NSS-806's stationkeeping volume will not overlap with that of any other satellites. Allowing NSS-806 to be flown with an expanded east-west stationkeeping allowance will help conserve fuel for the spacecraft. Under these circumstances, grant of any necessary waiver of Section 25.210(j) will serve the public interest.

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[13] 47 C.F.R. § 25.210(j).

[14] *See, e.g., SES Americom, Inc. Application for Modification of Satcom SN-4 Fixed Satellite Space Station License*, 20 FCC Rcd 11542, 11545 (Sat. Div. 2005).

IV. CONCLUSION

For the foregoing reasons, SES respectfully requests modification of the terms pursuant to which NSS-806 is authorized to serve the U.S. market to reflect the planned relocation of the satellite to 47.5° W.L. and to permit SES the flexibility to repoint the satellite's steerable conventional Ku-band spot beam. SES requests action on this modification by September 1, 2013.

Respectfully submitted,

NEW SKIES SATELLITES B.V.

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TECHNICAL APPENDIX FOR NSS-806

1. Name, Address, and Telephone Number of Applicant

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3. Type of Authorization Requested

New Skies Satellites B.V. (doing business as "SES") hereby requests a modification to the declaratory ruling adding the Netherlands-licensed NSS-806 spacecraft to the Permitted Space Station List ("Permitted List") for operations in conventional C- and Ku-band spectrum.[1]

[1] *See New Skies Satellites, N.V.*, Order, DA 01-513, 16 FCC Rcd. 7482 (Sat. Div., rel. Mar. 29, 2001) ("*NSS-806 Order*"); modified in File No. SAT-MPL-20110923-00187 (the "2011 Modification"), grant-stamped June 28, 2012. Specifically, SES is seeking modified market access for NSS-806 at 47.5° W.L. in the following frequency bands: 3600-3700 MHz, 3700-4200 MHz and 11750-11950 MHz downlink; 5850-5925 MHz, 5925-6425 MHz, 6425-6650 MHz and 14000-14250 MHz uplink. The earth stations that will be used to communicate with the NSS-806 satellite at 47.5° W.L. will be subject to separate Commission licensing, terrestrial coordination, and coordination with NTIA (as necessary). SES is not seeking market access for frequencies
(footnote continued)

Specifically, SES seeks to reposition the spacecraft from 40.5° W.L. to 47.5° W.L. In connection with relocation of the satellite, SES also will re-point the steerable conventional Ku-band spot beam (14.25-14.5 GHz uplink, 11.7-11.95 GHz downlink) on NSS-806 from its current pointing over South America to cover the United States and the Caribbean. The planned relocation and repointing will allow SES to provide enhanced services (in particular Direct-to-Home service) to major portions of CONUS as well as optimize coverage of the Ku-band beams in order to better accommodate customer demand, particularly over the Caribbean region. SES also seeks authority to repoint the steerable Ku-band spot beam in the future within the parameters described herein, specifically, the spot beam may be repointed anywhere within the visible Earth. Grant of this flexibility will allow SES to respond to changes in customer demand going forward.

The other technical parameters of the satellite remain unchanged. SES provided a complete technical analysis in support of the 2011 Modification, and incorporates that information by reference herein. Pursuant to Section 25.117(d)(1) of the Commission's rules, SES is supplying here "only those items of information listed in § 25.114 that change" due to the satellite relocation and Ku-band beam re-pointing.

4. General Description of Overall System Facilities, Operations and Services

NSS-806 is a geostationary satellite operating in the C- and Ku-bands that currently provides a range of fixed-satellite services ("FSS") to users located in various countries in ITU Regions 1 and 2. Apart from the change in coverage due to relocation of the satellite, no change to the C-band operations is proposed in this application. The Ku-band portion of the

below 3600 MHz but has described the technical characteristics of the space station's capabilities in other bands in the attached Schedule S for informational purposes.

communications payload consists of 3 transponders on a steerable spot beam that can be independently re-oriented toward any point on the Earth's surface. As indicated above, SES initially plans to re-point the steerable Ku-band spot beam over the United States and the Caribbean, as shown in Annex A. In addition, SES seeks authority to re-point the steerable Ku-band beam in the future as described herein.

5. TT&C Subsystem Operational Characteristics:

The TT&C frequency and polarization plan for the NSS-806 satellite is shown in Table 5-1.

Table 5-1. NSS-806 TT&C Frequency and Polarization Plan

Carrier name	Channel ID in Schedule S	Frequency (MHz)	Polarization
Telecommand 1	CMD1	6173.7	LHCP
Telecommand 2	CMD2	6176.3	LHCP
Telemetry 1	TM1	3947.5	RHCP
Telemetry 1 alternative	TM2	3948	RHCP
Telemetry 2	TM3	3952.5	RHCP
Telemetry 2 alternative	TM4	3952	RHCP
Tracking Beacon	BC1	3950	Linear polarization rotated by 45° relative to the equatorial plane
Tracking Beacon	BK1	11701	H

The C-band command and telemetry frequencies for NSS-806 are located near the center of the standard C-band. Coordination has been completed with adjacent satellite operator(s) to operate the TT&C carriers at these frequencies on NSS-703 at the nearby 47.05° W.L. orbit location. SES expects that coordination can similarly be achieved for NSS-806 at 47.5° W.L with the same adjacent satellites, both of which are more than 2° away from NSS-806. The

Commission previously granted a waiver of the FCC's rule requiring TT&C carriers to be located at the band edges for this spacecraft.[2]

As noted above, both NSS-703 at 47.05° W.L and NSS-806 at 47.5° W.L. use the same TT&C frequencies. SES will carefully manage the frequencies used for each satellite to ensure that both are safely maintained. Specifically, SES plans to use one of the command frequencies for each satellite (barring an emergency situation; in an emergency situation, the same command frequency may need to be used, with separate times used for the commands to each satellite) and to use the two regular telemetry frequencies for one satellite, and the alternate telemetry frequencies for the other satellite.

6. Orbital Location

SES proposes to reposition the NSS-806 satellite to 47.5° W.L.

7. Spacecraft Antenna Gain Contours

7.1 Uplink Beams

The receive antenna gain contours for the NSS-806 receive beams are given in GXT format in the accompanying Schedule S. The contours can also be found in Annex A to this Attachment.

7.2 Downlink Beams

The peak transmit gain and the antenna gain contours in GXT format are given in the accompanying Schedule S. The contours can also be found in Annex A to this Attachment.

[2] *See NSS-806 Order* at ¶¶ 15-16 & 22 (granting waiver of Section 25.202(g) for U.S. earth stations communicating with NSS-806, noting that the center-band TT&C frequencies had been fully coordinated with adjacent operations).

7.3 TT&C Beams

Command carriers are received by omni-directional antennas. Telemetry carriers are transmitted using Horn antennas. The receive and transmit antenna beam patterns are given in GXT format in the accompanying Schedule S.

8. Link Performance Analysis and Earth Station Parameters

8.1 Maximum Theoretical Operation Levels

NSS-806 will be operated consistently with coordination agreements with adjacent satellites, or the FCC's two degree spacing rules if no coordination agreement has been reached. In any case, in the Ku band frequencies, the downlink EIRP density of the NSS-806 digital carriers will not exceed -18.9 dBW/Hz; and the input power density of the uplink digital carriers of earth stations operating with NSS-806 will not exceed -47 dBW/Hz. In the C band frequencies, the downlink EIRP density of the NSS-806 digital carriers will not exceed -29.4 dBW/Hz; and the input power density of the uplink digital carriers of earth stations operating with NSS-806 will not exceed -38.7 dBW/Hz.

8.2 Link Performance

Table 8-1 below indicates the different connectivities that are possible on the NSS-806 spacecraft. Representative communications link budgets for the NSS-806 satellite are shown in Annex B as Tables B-1 to B-5 for the steerable Ku-band beam (i.e. SPOT/SPOT, SPOT/HEMI and HEMI/SPOT) and the C-band HEMI beam (i.e., HEMI/HEMI) as Table B-6. The Ku-band beacon link budget is shown in Annex B as Table B-7. C-band TT&C link budgets are shown in Annex B as Table B-8.

The link budgets assume two adjacent operating satellites at 2 degrees orbital separation each. For the C-band related digital carrier link budgets, the uplink power density of the

emissions from each of the neighboring satellites was assumed to be -42 dBW/Hz. The downlink EIRP density of the emissions of each of the adjacent satellites was assumed to be -34 dBW/Hz. For the Ku-band related digital carriers, the uplink power density of the emissions from each of the adjacent satellites was assumed to be -50 dBW/Hz, and the maximum downlink EIRP density of the emissions from each of the hypothetical satellites was assumed to be -26 dBW/Hz.

Table 8-1. Definitions of beam types used in the link analysis

Uplink beam type	Downlink beam type
HEMI (C-band)	HEMI (C-band)
HEMI (C-band)	SPOT (Ku-band)
SPOT (Ku-band)	HEMI (C-band)
SPOT (Ku-band)	SPOT (Ku-band)

8.3 Earth Station Parameters

Earth station characteristics are reflected in the representative link budgets shown in Annex B as Tables B-1 to B-6 as well as the accompanying Schedule S.

9. Satellite Orbit Characteristics

The NSS-806 satellite will be maintained in geosynchronous orbit at the 47.5º W.L. orbital location with a maximum N-S drift of ± 0.05° and a maximum E-W drift of ± 0.05°.

10. Power Flux Density

The allowable PFD levels in the C-band are defined in Section 25.208(a) of the Commission's rules, and the allowable PFD levels in the 10.95-11.20 GHz and 11.45-11.70 GHz bands (per 4 kHz) are defined in Section 25.208(b)(1) of the Commission's rules. No PFD limits are specified in either the FCC rules or the ITU Radio Regulations for the frequency band 11.70-11.95 GHz.

The NSS-806 payload will be operated such that all C-band and Ku-band downlink transmissions over U.S. territory will comply with the applicable PFD limits. In order to demonstrate such compliance, the carrier with the highest EIRP density in each of the possible beam connectivities, and based on the link budgets set forth in Annex B, is depicted in Table 10-1a and Table 10-1b (the worst case for digital and analog transmissions is provided separately) and analyzed below.

Table 10-1a. Maximum power density levels for different connectivities

Connectivity	Carrier type	EIRP density (dBW/4 kHz)	Emission Designator
SPOT/HEMI - 36 MHz	Digital	0.9	36M0G7W
	Analog	10.8	36M0F3F
SPOT/HEMI - 72 MHz	Digital	-0.6	72M0G7W
	Analog	10.8	36M0F3F
HEMI/SPOT - 36 MHz	Digital	10	36M0G7W
	Analog	18.2	36M0F3F
HEMI/SPOT - 72 MHz	Digital	9.9	72M0G7W
	Analog	18.2	36M0F3F
SPOT/SPOT - 72 MHz	Digital	9.9	72M0G7W
	Analog	17.6	36M0F3F

Table 10-1b. Maximum power density levels for different connectivities (HEMI/HEMI)

Connectivity	**Carrier type**	**EIRP density (dBW/4kHz)**	**Emission Designator**
HEMI/HEMI – 36 MHz	**Digital**	**0.1**	**36M0G7W**

Tables 10-2 to 10-13 below show the worst case PFD levels that will occur at various angles of arrival, for the different connectivities that relate to the Ku-band steerable beam, to demonstrate that they will comply with the requirements of Section 25.208(a) and 25.208(b).

Table 10-2. Maximum PFD Levels, SPOT/HEMI 36 MHz, Digital Carrier (36M0G7W)

Angle of Arrival	Applicable PFD Limit (dBW/m^2-4 kHz)	Spreading Loss (dB/m^2)	Gain Contour (dB)	Worst Case PFD Level (dBW/m^2-4kHz)	PFD Margin (dB)
5°	-152.0	-163.3	-1.6	-164.0	12.0
10°	-149.5	-163.2	-1.6	-163.9	14.4
15°	-147.0	-163.0	-1.6	-163.8	16.8
20°	-144.5	-162.9	-1.6	-163.7	19.2
25°	-142.0	-162.8	-1.6	-163.5	21.5
Peak	-142.0	-162.1	0.0	-161.2	19.2

Table 10-3. Maximum PFD Levels, SPOT/HEMI 36 MHz, Analog Carrier (36M0F3F)

Angle of Arrival	Applicable PFD Limit (dBW/m^2-4 kHz)	Spreading Loss (dB/m^2)	Gain Contour (dB)	Worst Case PFD Level (dBW/m^2-4kHz)	PFD Margin (dB)
5°	-152.0	-163.3	-1.6	-154.1	2.1
10°	-149.5	-163.2	-1.6	-154.0	4.5
15°	-147.0	-163.0	-1.6	-153.9	6.9
20°	-144.5	-162.9	-1.6	-153.8	9.3
25°	-142.0	-162.8	-1.6	-153.6	11.6
Peak	-142.0	-162.1	0.0	-151.3	9.3

Table 10-4. Maximum PFD Levels, SPOT/HEMI 72 MHz, Digital Carrier (72M0G7W)

Angle of Arrival	Applicable PFD Limit (dBW/m^2-4 kHz)	Spreading Loss (dB/m^2)	Gain Contour (dB)	Worst Case PFD Level (dBW/m^2-4kHz)	PFD Margin (dB)
5°	-152.0	-163.3	-1.6	-165.5	13.5
10°	-149.5	-163.2	-1.6	-165.4	15.9
15°	-147.0	-163.0	-1.6	-165.3	18.3
20°	-144.5	-162.9	-1.6	-165.2	20.7
25°	-142.0	-162.8	-1.6	-165.0	23.0
Peak	-142.0	-162.1	0.0	-162.7	20.7

Table 10-5. Maximum PFD Levels, SPOT/HEMI 72 MHz, Analog Carrier (36M0F3F)

Angle of Arrival	Applicable PFD Limit (dBW/m^2-4 kHz)	Spreading Loss (dB/m^2)	Gain Contour (dB)	Worst Case PFD Level (dBW/m^2-4kHz)	PFD Margin (dB)
5°	-152.0	-163.3	-1.6	-154.1	2.1
10°	-149.5	-163.2	-1.6	-154.0	4.5
15°	-147.0	-163.0	-1.6	-153.9	6.9
20°	-144.5	-162.9	-1.6	-153.8	9.3
25°	-142.0	-162.8	-1.6	-153.6	11.6
Peak	-142.0	-162.1	0.0	-151.3	9.3

Table 10-6. Maximum PFD Levels, HEMI/SPOT 36 MHz, Digital Carrier (36M0G7W)

Angle of Arrival	Applicable PFD Limit (dBW/m^2-4 kHz)	Spreading Loss (dB/m^2)	Gain Contour (dB)	Worst Case PFD Level (dBW/m^2-4kHz)	PFD Margin (dB)
5°	-150.0	-163.3	-10.0	-163.3	13.3
10°	-147.5	-163.2	-8.8	-161.9	14.4
15°	-145.0	-163.0	-7.2	-160.2	15.2
20°	-142.5	-162.9	-5.3	-158.2	15.7
25°	-140.0	-162.8	-3.5	-156.4	16.4
Peak	-140.0	-162.1	0.0	-152.1	12.1

Table 10-7. Maximum PFD Levels, HEMI/SPOT 36 MHz, Analog Carrier (36M0F3F)

Angle of Arrival	Applicable PFD Limit (dBW/m^2-4 kHz)	Spreading Loss (dB/m^2)	Gain Contour (dB)	Worst Case PFD Level (dBW/m^2-4kHz)	PFD Margin (dB)
5°	-150.0	-163.3	-10.0	-155.1	5.1
10°	-147.5	-163.2	-8.8	-153.7	6.2
15°	-145.0	-163.0	-7.2	-152.0	7.0
20°	-142.5	-162.9	-5.3	-150.0	7.5
25°	-140.0	-162.8	-3.5	-148.2	8.2
Peak	-140.0	-162.1	0.0	-143.9	3.9

Table 10-8. Maximum PFD Levels, HEMI/SPOT 72 MHz, Digital Carrier (72M0G7W)

Angle of Arrival	Applicable PFD Limit (dBW/m^2-4 kHz)	Spreading Loss (dB/m^2)	Gain Contour (dB)	Worst Case PFD Level (dBW/m^2-4kHz)	PFD Margin (dB)
5°	-150.0	-163.3	-10.0	-163.4	13.4
10°	-147.5	-163.2	-8.8	-162.0	14.5
15°	-145.0	-163.0	-7.2	-160.3	15.3
20°	-142.5	-162.9	-5.3	-158.3	15.8
25°	-140.0	-162.8	-3.5	-156.5	16.5
Peak	-140.0	-162.1	0.0	-152.2	12.2

Table 10-9. Maximum PFD Levels, HEMI/SPOT 72 MHz, Analog Carrier (36M0F3F)

Angle of Arrival	Applicable PFD Limit (dBW/m^2-4 kHz)	Spreading Loss (dB/m^2)	Gain Contour (dB)	Worst Case PFD Level (dBW/m^2-4kHz)	PFD Margin (dB)
5°	-150.0	-163.3	-10.0	-155.1	5.1
10°	-147.5	-163.2	-8.8	-153.7	6.2
15°	-145.0	-163.0	-7.2	-152.0	7.0
20°	-142.5	-162.9	-5.3	-150.0	7.5
25°	-140.0	-162.8	-3.5	-148.2	8.2
Peak	-140.0	-162.1	0.0	-143.9	3.9

Table 10-10. Max. PFD Levels, SPOT/SPOT 72 MHz, Digital Carrier (72M0G7W)

Angle of Arrival	Applicable PFD Limit (dBW/m^2-4 kHz)	Spreading Loss (dB/m^2)	Gain Contour (dB)	Worst Case PFD Level (dBW/m^2-4kHz)	PFD Margin (dB)
5°	-150.0	-163.3	-10.0	-163.4	13.4
10°	-147.5	-163.2	-8.8	-162.0	14.5
15°	-145.0	-163.0	-7.2	-160.3	15.3
20°	-142.5	-162.9	-5.3	-158.3	15.8
25°	-140.0	-162.8	-3.5	-156.5	16.5
Peak	-140.0	-162.1	0.0	-152.2	12.2

Table 10-11. Max. PFD Levels, SPOT/SPOT 72 MHz, Analog Carrier (36M0F3F)

Angle of Arrival	Applicable PFD Limit (dBW/m^2-4 kHz)	Spreading Loss (dB/m^2)	Gain Contour (dB)	Worst Case PFD Level (dBW/m^2-4kHz)	PFD Margin (dB)
5°	-150.0	-163.3	-10.0	-155.7	5.7
10°	-147.5	-163.2	-8.8	-154.3	6.8
15°	-145.0	-163.0	-7.2	-152.6	7.6
20°	-142.5	-162.9	-5.3	-150.6	8.1
25°	-140.0	-162.8	-3.5	-148.8	8.8
Peak	-140.0	-162.1	0.0	-144.5	4.5

Table 10-12. Maximum PFD Levels for Ku-band beacon (25K0N0N)

Angle of Arrival	Applicable PFD Limit (dBW/m^2-4 kHz)	Spreading Loss (dB/m^2)	Gain Contour (dB)	Worst Case PFD Level (dBW/m^2-4kHz)	PFD Margin (dB)
5°	-150.0	-163.3	-10.0	-172.3	22.3
10°	-147.5	-163.2	-8.8	-170.9	23.4
15°	-145.0	-163.0	-7.2	-169.2	24.2
20°	-142.5	-162.9	-5.3	-167.2	24.7
25°	-140.0	-162.8	-3.5	-165.4	25.4
Peak	-140.0	-162.1	0.0	-161.1	21.1

Table 10-13. Maximum PFD Levels, HEMI/HEMI 36 MHz, Digital Carrier (36M0G7W)

Angle of Arrival	Applicable PFD Limit for Angle of Arrival	Spreading Loss	Gain Contour	Worst Case PFD Level at Angle of Arrival	PFD Margin
	(dBW/m2/4 kHz)	(dBW/m2)	(dB)	(dBW/m2/4kHz)	(dB)
5°	-152.0	-163.3	-1.6	-164.8	12.8
10°	-149.5	-163.2	-1.6	-164.7	15.2
15°	-147.0	-163.0	-1.6	-164.6	17.6
20°	-144.5	-162.9	-1.6	-164.5	20.0
25°	-142.0	-162.8	-1.6	-164.3	22.3
Peak	-142.0	-162.1	0.0	-162.0	20.0

11. Public Interest Considerations

See Narrative, at Section II.

12. Interference Analysis

Annex C to this Technical Appendix provides analysis demonstrating the compatibility of NSS-806 at 47.5° W.L. with neighboring spacecraft spaced 2 degrees or more away, in accordance with Section 25.140(b)(2) of the Commission's rules.

13. Orbital Debris Mitigation

The information for NSS-806 specified under Section 25.114(d)(14) of the Commission's rules is already on file with the Commission,[3] and SES incorporates that information by reference herein. SES hereby submits the following supplemental information regarding orbital debris mitigation:

Safe Flight Profiles

SES has assessed and limited the probability of NSS-806 becoming a source of debris by collisions with large debris or other operational space stations through detailed and conscientious mission planning. SES has reviewed the list of licensed systems and systems that are under consideration by the Commission for the proposed 47.5° W.L. orbital location. In addition, in order to address non-U.S. licensed systems, SES has reviewed the list of satellite networks in the vicinity of 47.5° W.L. for which a request for coordination has been submitted to the ITU. Only those networks that are operating, or are planned to be operating, within ± 0.2° have been taken into account in this review. The analysis shows that there are no current or planned satellites that have or would have an overlap in station-keeping volume with NSS-806 at the 47.5° W.L. orbital location.

[3] *See* 2011 Modification, Technical Attachment, Section 18.

ANNEX A

Space Station Antenna Beam Diagrams

Figure A-1.
Hemi Uplink Beam
Peak G/T = -3.1 dB/K
Peak Beam Gain = 24.4 dBi
Min. Saturation Flux Density = -93 dBW/m^2
Polarization LHCP and RHCP
Schedule S Beam Designators: HAU and HBU

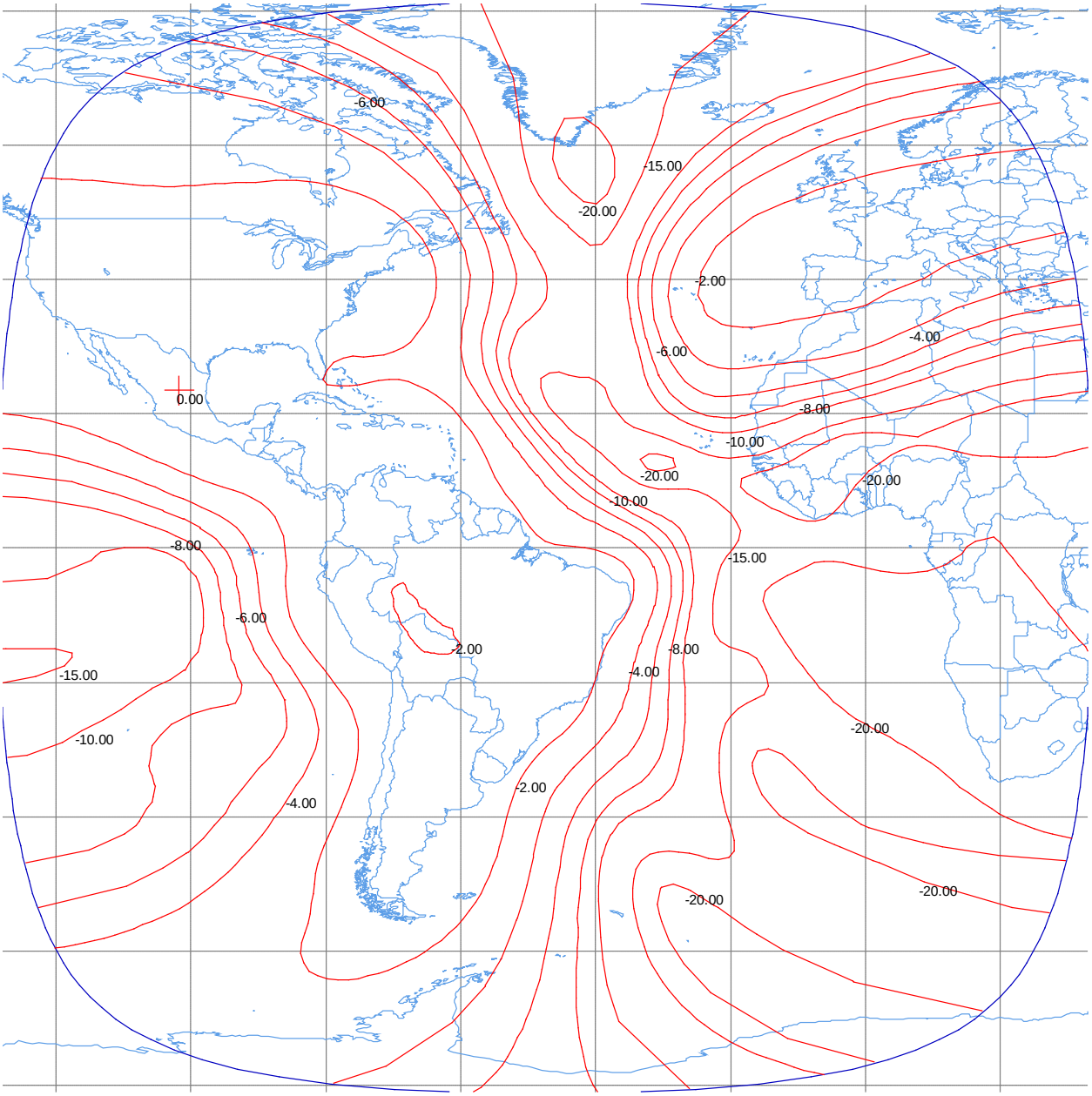

Figure A-2.
Hemi Downlink Beam
Peak EIRP = 41.4 dBW
Peak Beam Gain = 24.9 dBi
Polarization RHCP and LHCP
Schedule S beam designators: HAD and HBD

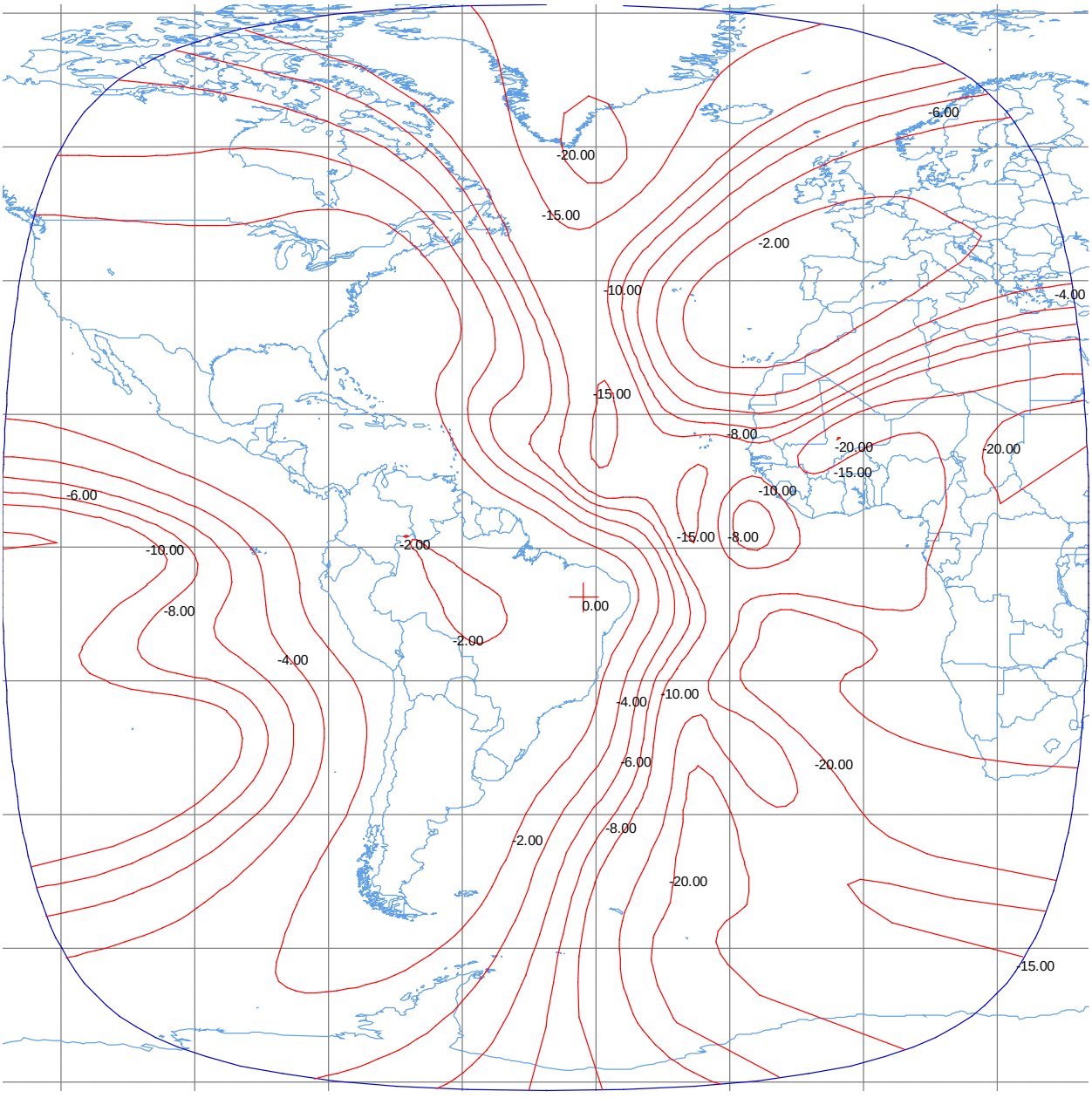

Figure A-3.
Spot Uplink Beam
Peak G/T = 5.1 dB/K
Peak Beam Gain = 33.1 dBi
Min. Saturation Flux Density = -100 dBW/m^2
Polarization V
Schedule S beam designators: S1U

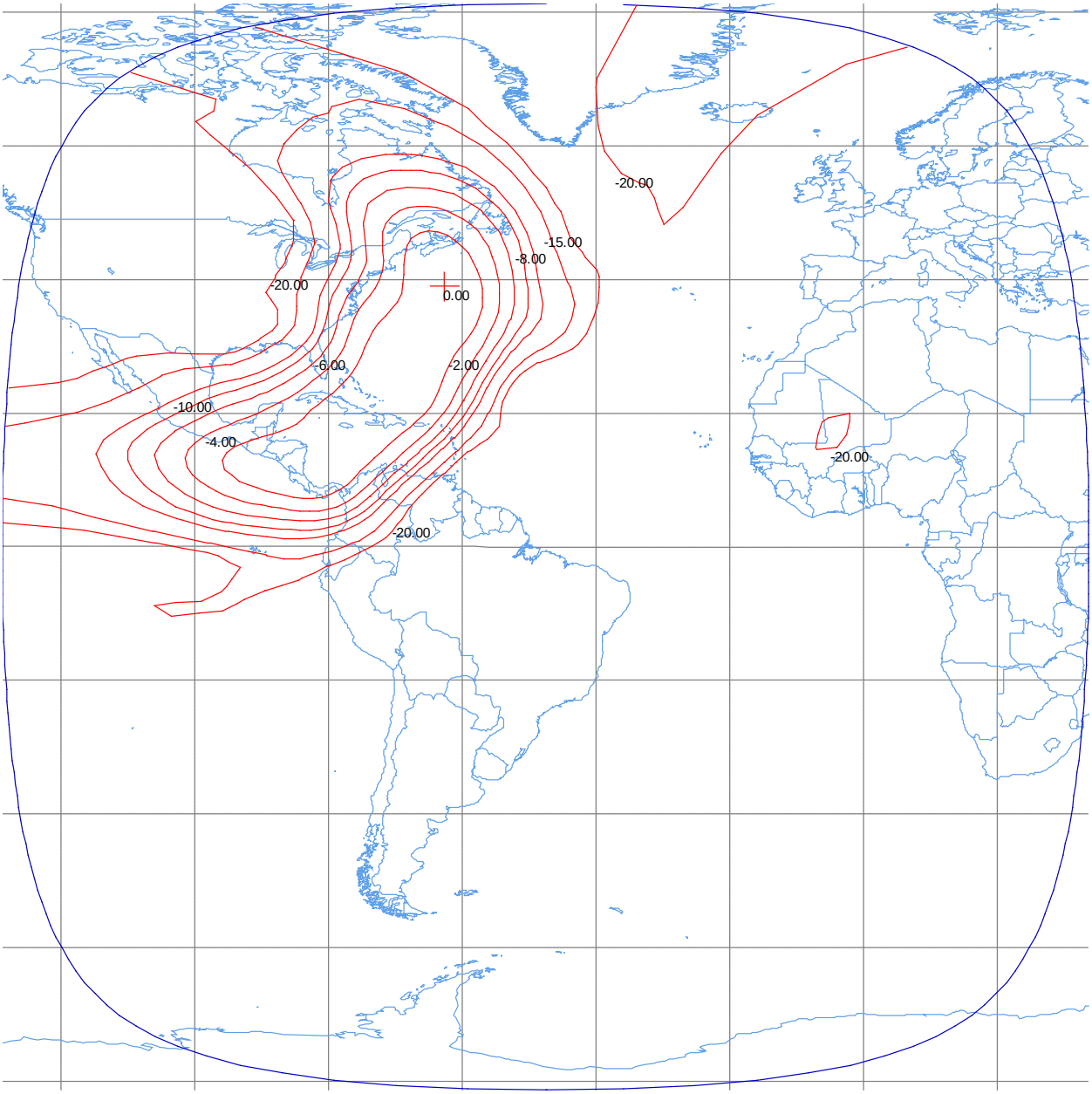

Figure A-4.
Spot Downlink Beam
Peak EIRP = 51.9 dBW
Peak Beam Gain = 32.3 dBi
Polarization H
Schedule S beam designators: S1D

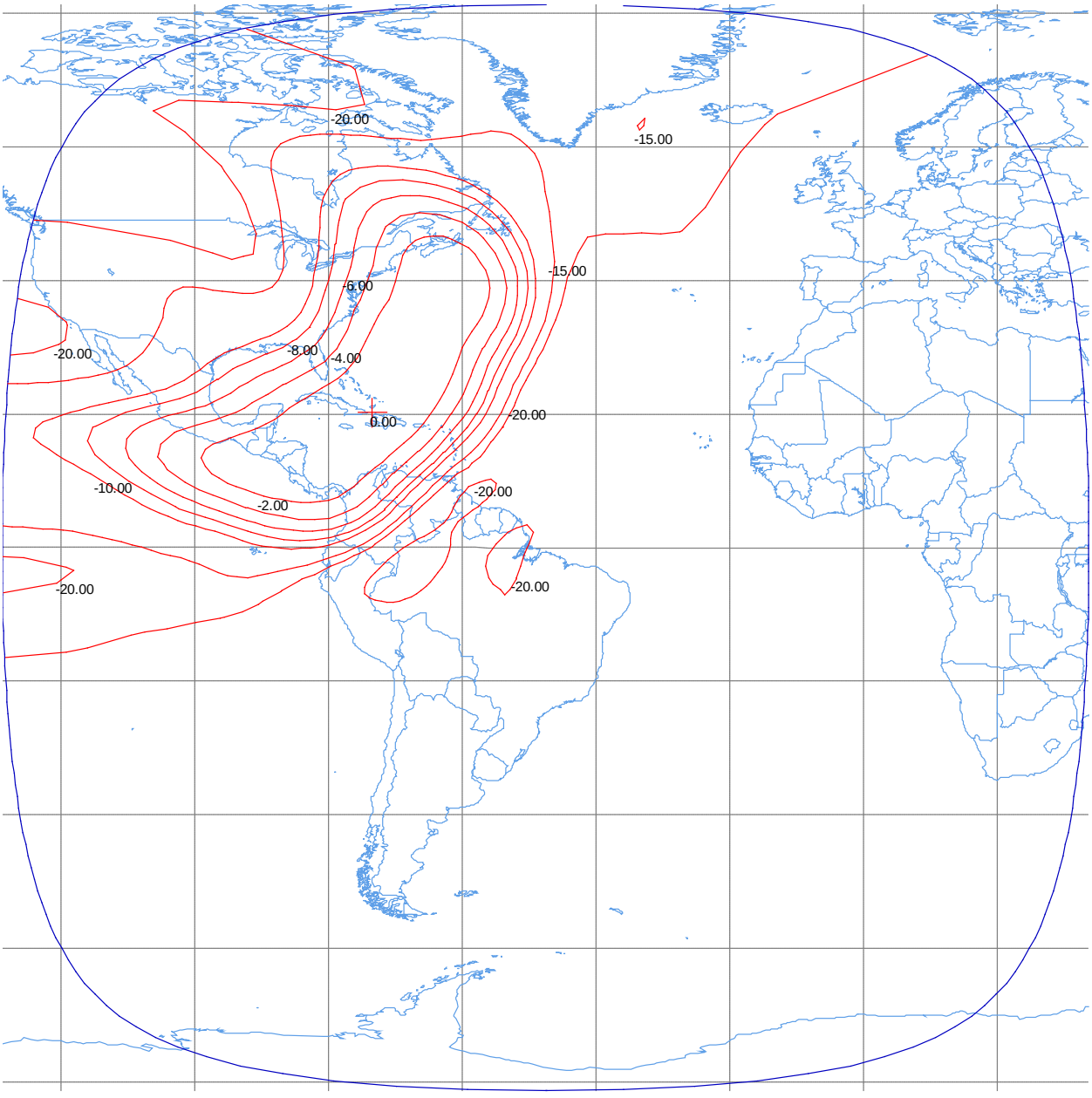

Figure A-5.
Command Carrier Earth Facing Receive Horn[4]
Maximum receive gain = 10.3 dBi
Command Threshold Flux Density = -90 dBW/m^2
Polarization LHCP
Schedule S beam designators: CMD

[4] Additional gain contours, as requested in Section 25.114(d)(3), are not provided because they do not intersect with the Earth's surface

Figure A-6.
Telemetry Carrier Earth Facing Transmit Horn[5]
Maximum EIRP = 10 dBW
Maximum transmit gain = 11.3 dBi
Polarization RHCP
Schedule S beam designators: TLM

[5] Additional gain contours, as requested in Section 25.114(d)(3), are not provided because they do not intersect with the Earth's surface

Figure A-7.
C-band Tracking Beacon Earth Facing Transmit Horn[6]
Maximum EIRP = 11 dBW
Maximum transmit gain = 11.3 dBi
Polarization Vertical Linear
Schedule S beam designators: BNC

[6] Additional gain contours, as requested in Section 25.114(d)(3), are not provided because they do not intersect with the Earth's surface

Figure A-8.
Ku-band Tracking Beacon Antenna
Maximum EIRP = 9 dBW
Maximum transmit gain = 32.3 dBi
Polarization Horizontal Linear
Schedule S beam designators: BNK

ANNEX B

Link Budgets

TABLE B-1. SPOT/HEMI (36 MHZ TRANSPONDER)

		SPOT/HEMI 36 MHz Transponder					
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**36M0G7W**	**36M0F3F**
Uplink Frequency	GHz	14.125	14.125	14.125	14.125	14.125	14.125
Downlink Frequency	GHz	3.843	3.843	3.843	3.843	3.843	3.843
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	36000.0	36000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a	2.0
Uplink:							
Nominal E/S e.i.r.p. per carrier	dBW	54.5	56.3	62.3	68.2	76.9	77.6
Earth Station Diameter	m	3.0	3.7	3.7	3.0	3.7	7.6
Earth Station Gain	dBi	51.0	52.8	52.8	51.0	52.8	59.1
Uplink Input Power per Carrier	dBW	3.5	3.4	9.5	17.2	24.1	18.4
Free Space Loss	dB	207.1	207.1	207.1	207.1	207.1	207.1
G/T Satellite (EOC)	dB/K	1.0	1.0	1.0	1.0	1.0	1.0
C/N Thermal Uplink	dB	22.9	23.4	23.4	22.8	24.6	24.5
C/I XPOL, ACI, IM, ASI	dB	26.4	27.0	27.0	26.4	28.2	28.1
C/(N+I) uplink	dB	21.3	21.8	21.8	21.3	23.0	22.9
Downlink:							
Satellite e.i.r.p. per carrier (-3.9dB contour)	dBW	14.3	16.1	22.1	28.0	35.7	33.9
Maximum e.i.r.p. density	dBW/4kHz	0.1	0.7	0.7	0.1	0.9	10.8
Free Space Loss	dB	196.3	196.3	196.3	196.3	196.3	196.3
Earth Station Diameter	m	3.0	3.8	3.8	3.0	3.0	3.8
Earth Station Gain	dBi	39.8	41.8	41.8	39.8	39.8	41.8
Noise Temperature	K	95.0	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	20.0	22.0	22.0	20.0	20.0	22.0
C/N Thermal Downlink	dB	12.6	15.1	15.1	12.5	13.3	12.7
C/I XPOL, ACI, IM, ASI	dB	13.0	15.6	15.6	13.0	13.8	16.2
C/(N+I) downlink	dB	9.8	12.4	12.4	9.7	10.5	11.1
Adjacent Satellite Interference:							
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34	-37
C/I up (single satellite)	dB	29.4	30.0	30.0	29.4	31.2	31.1
C/I dn (single satellite)	dB	16.0	18.6	18.6	16.0	16.8	19.2
Aggregate C/I up	dB	26.4	27.0	27.0	26.4	28.2	28.1
Aggregate C/I down	dB	13.0	15.6	15.6	13.0	13.8	16.2
Overall:							
C/(N+I) overall	dB	9.5	11.9	11.9	9.5	10.3	10.8
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9	10.0
System Margin	dB	3.5	2.6	2.6	2.5	3.4	0.8

TABLE B-2. SPOT/HEMI (72 MHZ TRANSPONDER)

		SPOT/HEMI 72 MHz Transponder					
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**72M0G7W**	**36M0F3F**
Uplink Frequency	GHz	14.043	14.043	14.043	14.043	14.043	14.043
Downlink Frequency	GHz	3.743	3.743	3.743	3.743	3.743	3.743
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	72000.0	36000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a	2.0
Uplink:							
Nominal E/S e.i.r.p. per carrier	dBW	53.3	55.9	61.9	67.2	80.7	77.6
Earth Station Diameter	m	3.0	3.7	3.7	3.0	5.6	7.6
Earth Station Gain	dBi	50.9	52.8	52.8	50.9	56.4	59.1
Uplink Input Power per Carrier	dBW	2.4	3.1	9.2	16.3	24.3	18.4
Free Space Loss	dB	207.1	207.1	207.1	207.1	207.1	207.1
G/T Satellite (EOC)	dB/K	1.0	1.0	1.0	1.0	1.0	1.0
C/N Thermal Uplink	dB	21.8	23.1	23.1	21.9	25.2	24.5
C/I XPOL, ACI, IM, ASI	dB	25.3	26.6	26.6	25.4	28.7	28.1
C/(N+I) uplink	dB	20.2	21.5	21.5	20.3	23.6	22.9
Downlink:							
Satellite e.i.r.p. per carrier (-3.9dB contour)	dBW	11.2	13.7	19.8	25.1	37.5	33.9
Maximum e.i.r.p. density	dBW/4kHz	-3.0	-1.7	-1.7	-2.9	-0.6	10.8
Free Space Loss	dB	196.0	196.0	196.0	196.0	196.0	196.3
Earth Station Diameter	m	3.8	5.6	5.6	4.5	7.0	3.8
Earth Station Gain	dBi	41.6	45.0	45.0	43.1	46.9	41.6
Noise Temperature	K	95.0	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	21.8	25.2	25.2	23.3	27.1	21.8
C/N Thermal Downlink	dB	11.5	16.2	16.2	13.1	19.2	12.5
C/I XPOL, ACI, IM, ASI	dB	11.7	16.4	16.4	13.3	19.5	16.0
C/(N+I) downlink	dB	8.6	13.3	13.3	10.2	16.3	10.9
Adjacent Satellite Interference:							
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34	-37
C/I up (single satellite)	dB	28.3	29.6	29.6	28.4	31.7	31.1
C/I dn (single satellite)	dB	14.7	19.4	19.4	16.3	22.5	19.0
Aggregate C/I up	dB	25.3	26.6	26.6	25.4	28.7	28.1
Aggregate C/I down	dB	11.7	16.4	16.4	13.3	19.5	16.0
Overall:							
C/(N+I) overall	dB	8.3	12.7	12.7	9.8	15.6	10.6
C/(N+I) required	dB	6.0	9.3	9.3	6.9	12.7	10.0
System Margin	dB	2.3	3.4	3.4	2.9	2.9	0.6

TABLE B-3. HEMI/SPOT (36 MHZ TRANSPONDER)

		HEMI/SPOT 36 MHz Transponder					
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**36M0G7W**	**36M0F3F**
Uplink Frequency	GHz	6.068	6.068	6.068	6.068	6.068	6.068
Downlink Frequency	GHz	11.830	11.830	11.830	11.830	11.830	11.830
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	36000.0	36000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a	2.0
Uplink:							
Nominal E/S e.i.r.p. per carrier	dBW	53.2	54.6	60.4	67.0	75.9	72.9
Earth Station Diameter	m	3.7	4.5	4.5	3.7	5.6	7.6
Earth Station Gain	dBi	45.5	47.2	47.2	45.5	49.1	51.8
Uplink Input Power per Carrier	dBW	7.7	7.4	13.2	21.5	26.8	21.1
Free Space Loss	dB	200.2	200.2	200.2	200.2	200.2	200.2
G/T Satellite (EOC)	dB/K	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
C/N Thermal Uplink	dB	19.5	19.6	19.4	19.5	21.6	17.7
C/I XPOL, ACI, IM, ASI	dB	17.2	17.3	17.1	17.2	19.2	15.4
C/(N+I) uplink	dB	15.2	15.3	15.1	15.2	17.2	13.4
Downlink:							
Satellite e.i.r.p. per carrier (-3.9dB contour)	dBW	24.1	25.5	31.3	37.9	44.8	41.3
Maximum e.i.r.p. density	dBW/4kHz	10.0	10.0	9.8	10.0	10.0	18.2
Free Space Loss	dB	205.6	205.6	205.6	205.6	205.6	205.6
Earth Station Diameter	m	1.8	2.4	3.0	1.8	1.8	3.0
Earth Station Gain	dBi	45.1	47.6	49.5	45.1	45.1	49.5
Noise Temperature	K	95.0	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	25.3	27.8	29.8	25.3	25.3	29.8
C/N Thermal Downlink	dB	18.4	20.9	22.7	18.4	18.4	18.5
C/I XPOL, ACI, IM, ASI	dB	20.2	22.8	24.5	20.2	20.2	20.3
C/(N+I) downlink	dB	16.2	18.8	20.5	16.2	16.2	16.3
Adjacent Satellite Interference:							
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-42	-42	-42	-42	-42	-42
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	20.2	20.3	20.1	20.2	22.2	18.4
C/I dn (single satellite)	dB	23.2	25.8	27.5	23.2	23.2	23.3
Aggregate C/I up	dB	17.2	17.3	17.1	17.2	19.2	15.4
Aggregate C/I down	dB	20.2	22.8	24.5	20.2	20.2	20.3
Overall:							
C/(N+I) overall	dB	12.6	13.7	14.0	12.7	13.7	11.6
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9	10.0
System Margin	dB	6.6	4.4	4.7	5.8	6.8	1.6

TABLE B-4. HEMI/SPOT (72 MHZ TRANSPONDER)

		HEMI/SPOT 72 MHz Transponder					
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**72M0G7W**	**36M0F3F**
Uplink Frequency	GHz	5.968	5.968	5.968	5.968	5.968	5.968
Downlink Frequency	GHz	11.748	11.748	11.748	11.748	11.748	11.748
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	72000.0	36000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a	2.0
Uplink:							
Nominal E/S e.i.r.p. per carrier	dBW	51.8	53.1	58.1	65.1	80.1	72.9
Earth Station Diameter	m	3.7	4.5	4.5	3.7	11.0	7.6
Earth Station Gain	dBi	45.3	47.1	47.1	45.3	54.9	51.8
Uplink Input Power per Carrier	dBW	6.5	6.1	11.1	19.8	25.2	21.1
Free Space Loss	dB	200.1	200.1	200.1	200.1	200.1	200.2
G/T Satellite (EOC)	dB/K	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
C/N Thermal Uplink	dB	18.3	18.3	17.3	17.8	22.6	17.7
C/I XPOL, ACI, IM, ASI	dB	15.8	15.8	14.8	15.3	20.1	15.4
C/(N+I) uplink	dB	13.8	13.9	12.9	13.4	18.2	13.4
Downlink:							
Satellite e.i.r.p. per carrier (-3.9dB contour)	dBW	22.7	24.0	29.0	36.0	48.0	41.3
Maximum e.i.r.p. density	dBW/4kHz	8.6	8.6	7.6	8.1	9.9	18.2
Free Space Loss	dB	205.5	205.5	205.5	205.5	205.5	205.6
Earth Station Diameter	m	1.8	3.0	3.8	2.4	7.0	3.0
Earth Station Gain	dBi	45.0	49.5	51.5	47.5	56.8	49.5
Noise Temperature	K	95.0	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	25.3	29.7	31.7	27.8	37.1	29.7
C/N Thermal Downlink	dB	17.0	21.4	22.5	19.0	30.1	18.4
C/I XPOL, ACI, IM, ASI	dB	18.7	23.2	24.3	20.7	31.9	20.2
C/(N+I) downlink	dB	14.7	19.2	20.3	16.7	27.9	16.2
Adjacent Satellite Interference:							
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-42	-42	-42	-42	-42	-42
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	18.8	18.8	17.8	18.3	23.1	18.4
C/I dn (single satellite)	dB	21.7	26.2	27.3	23.7	34.9	23.2
Aggregate C/I up	dB	15.8	15.8	14.8	15.3	20.1	15.4
Aggregate C/I down	dB	18.7	23.2	24.3	20.7	31.9	20.2
Overall:							
C/(N+I) overall	dB	11.3	12.8	12.2	11.7	17.8	11.6
C/(N+I) required	dB	6.0	9.3	9.3	6.9	12.7	10.0
System Margin	dB	5.3	3.5	2.9	4.8	5.1	1.6

TABLE B-5. SPOT/SPOT (72 MHZ TRANSPONDER)

		SPOT/SPOT 72 MHz Transponder					
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**72M0G7W**	**36M0F3F**
Uplink Frequency	GHz	14.125	14.125	14.125	14.125	14.125	14.125
Downlink Frequency	GHz	11.830	11.830	11.830	11.830	11.830	11.830
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	72000.0	36000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a	2.0
Uplink:							
Nominal E/S e.i.r.p. per carrier	dBW	52.1	54.4	59.0	66.5	79.6	72.8
Earth Station Diameter	m	3.0	3.7	3.7	3.0	3.7	7.6
Earth Station Gain	dBi	51.0	52.8	52.8	51.0	52.8	59.1
Uplink Input Power per Carrier	dBW	1.1	1.6	6.2	15.5	26.8	13.7
Free Space Loss	dB	207.1	207.1	207.1	207.1	207.1	207.1
G/T Satellite (EOC)	dB/K	1.0	1.0	1.0	1.0	1.0	1.0
C/N Thermal Uplink	dB	20.5	21.6	20.1	21.1	24.1	19.7
C/I XPOL, ACI, IM, ASI	dB	24.0	25.1	23.7	24.7	27.7	23.3
C/(N+I) uplink	dB	18.9	20.0	18.5	19.5	22.5	18.2
Downlink:							
Satellite e.i.r.p. per carrier (-3.9dB contour)	dBW	22.4	24.8	29.3	36.8	48.0	40.6
Maximum e.i.r.p. density	dBW/4kHz	8.2	9.3	7.9	8.9	9.9	17.6
Free Space Loss	dB	205.6	205.6	205.6	205.6	205.6	205.6
Earth Station Diameter	m	1.8	2.4	3.0	1.8	3.7	2.4
Earth Station Gain	dBi	45.1	47.6	49.5	45.1	51.4	47.6
Noise Temperature	K	95.0	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	25.3	27.8	29.8	25.3	31.6	27.8
C/N Thermal Downlink	dB	16.6	20.2	20.7	17.3	24.5	15.9
C/I XPOL, ACI, IM, ASI	dB	18.5	22.1	22.6	19.1	26.4	17.7
C/(N+I) downlink	dB	14.4	18.1	18.5	15.1	22.3	13.7
Adjacent Satellite Interference:							
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	27.0	28.1	26.7	27.7	30.7	26.3
C/I dn (single satellite)	dB	21.5	25.1	25.6	22.1	29.4	20.7
Aggregate C/I up	dB	24.0	25.1	23.7	24.7	27.7	23.3
Aggregate C/I down	dB	18.5	22.1	22.6	19.1	26.4	17.7
Overall:							
C/(N+I) overall	dB	13.1	15.9	15.5	13.8	19.4	12.4
C/(N+I) required	dB	6.0	9.3	9.3	6.9	12.7	10.0
System Margin	dB	7.1	6.6	6.3	6.9	6.7	2.4

TABLE B-6. HEMI/HEMI (36 MHZ TRANSPONDER)

	HEMI/HEMI 36 MHz Transponder		
Parameter	Digital Broadcast 38 Mbps, QPSK 3/	1.365 Mbps, QPSK 1/2	5.631 Mbps, QPSK 1/2
Carrier designation	36M0G7W	2M00G1W	8M00G1W
Allocated bandwidth (MHz)	36.0	2000.0	8000.0
Uplinks:			
Transmit Power (dBW)	32.0	13.5	19.6
Transmit Loss (dB)	-0.2	0.0	0.0
TX earth station antenna diameter (m)	3.7	3.7	3.7
TX earth station antenna gain (dBi)	45.5	45.5	45.5
TX earth station antenna EIRP (dBW)	77.3	58.7	64.9
Uplink Atm. Loss (dB)	-3.9	-3.2	-3.3
Free Space Loss (dB)	-200.0	-200.0	-200.0
Satellite G/T (dB/K)	-4.1	-4.1	-4.1
Boltzmann's Constant (dBW/K-Hz)	-228.6	-228.6	-228.6
C/N uplink (dB)	26.0	20.1	20.1
C/I uplink (dB)	22.5	13.4	13.4
C/N+I uplink (dB)	20.9	12.6	12.6
Downlinks:			
Satellite Carrier EIRP (dBW)	38.5	21.7	27.9
Interference bandwidth (MHz)	27.5	1.5	6.1
Satellite EIRP density (dBW/4KHz)	0.1	-3.9	-3.9
Downlink Atm. Loss (dB)	-0.8	-0.8	-0.8
Free Space Loss (dB)	-195.8	-195.8	-195.8
RX earth station antenna diameter (m)	3.0	3.0	3.0
RX earth station antenna G/T (dB/K)	20.5	18.7	18.7
C/N downlink (dB)	16.1	10.3	10.3
C/I downlink (dB)	22.5	18.0	18.0
C/N+I downlink (dB)	15.2	9.6	9.6
C/N system (dB)	15.6	9.9	9.9
C/I system (dB)	19.5	12.1	12.1
C/N+I system (dB)	14.1	7.8	7.8

TABLE B-7. BEACON CARRIER, 25K0N0N

Link Parameters	**Units**	**25K0N0N**
Downlink Frequency	GHz	11.701
Carrier Allocated Bandwidth	kHz	25.0
Downlink:		
Downlink e.i.r.p. (- 3.9dB contour)	dBW	5.1
Free Space Loss	dB	205.7
Atmospheric and Polarization Losses	dB	1.0
Rain Fade	dB	5.0
Receive E/S Pointing Loss	dB	0.3
Receive E/S G/T	dB/K	38.4
Downlink C/No	dB	60.1
Required C/No	dB	47.0
Margin	dB	13.1

TABLE B-8. C-BAND TT&C

		TT&C	
Link Parameters	**Units**	**300KF9D**	**800KF9D**
Uplink Frequency	GHz		6.176
Downlink Frequency	GHz	3.950	
Carrier Allocated Bandwidth	kHz	300.0	800.0
Energy Dispersal	MHz	n/a	n/a
Uplink:			
Nominal E/S e.i.r.p. per carrier	dBW		72.0
Earth Station Diameter	m		9.0
Earth Station Gain	dBi		54.0
Uplink Input Power per Carrier	dBW		18.0
Free Space Loss	dB		200.2
G/T Satellite (EOC)	dB/K		-18.1
C/N Thermal Uplink	dB		23.2
C/I XPOL, ACI, IM, ASI	dB		36.0
C/(N+I) uplink	dB		23.0
Downlink:			
Satellite e.i.r.p. per carrier	dBW	12.0	
Maximum e.i.r.p. density	dBW/4kHz	-6.8	
Free Space Loss	dB	196.3	
Earth Station Diameter	m	9.0	
Earth Station Gain	dBi	50.0	
Noise Temperature	K	100.0	
Earth Station G/T	dB/K	30.0	
C/N Thermal Downlink	dB	19.6	
C/I XPOL, ACI, IM, ASI	dB	20.3	
C/(N+I) downlink	dB	16.9	
Adjacent Satellite Interference:			
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-47	-47
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-37	-37
C/I up (single satellite)	dB	999.0	39.0
C/I dn (single satellite)	dB	23.3	999.0
Aggregate C/I up	dB	999.0	36.0
Aggregate C/I down	dB	20.3	999.0
Overall:			
C/(N+I) overall	dB	16.9	23.0
C/(N+I) required	dB	9.0	10.0
System Margin	dB	7.9	13.0

ANNEX C

Interference Analysis

Interference Analysis

The interference analysis is divided into two sections. The first estimates interference levels using a generic approach, i.e., the two adjacent systems are assumed to identical and spaced at two degrees. The second section investigates the specific case of interference between NSS-806 and the two adjacent operational systems, INTELSAT-14 and INTELSAT-1R, and one planned adjacent system, DIRECTV KU-45W, using published emission characteristics.

SES notes that it operates NSS-703 0.5º away from 47.5º W.L. This interference analysis does not take into account this satellite, as SES will manage the interference internally by ensuring that co-frequency transponders on these two satellites are not used in the same geographical area simultaneously.

Generic Two Degree Spacing Analysis

This portion of the analysis provides a rough estimate of the interference between two networks with an orbital longitude separation of two degrees. Several simplifying assumptions are made:

- The power densities of the wanted and interfering networks are assumed to be the same.
- Any difference in propagation loss between the wanted and interfering networks is ignored.
- Stationkeeping tolerance and earth station pointing errors are ignored.

Uplink

The uplink C/I ratio is calculated from the following equations:

$$C / N_{UP} = PD_{ES,W} + G_{ES,W}(\theta_W) - PL + G / T_{SS,W} - k$$

$$I / N_{UP} = PD_{ES,I} + G_{ES,I}(\theta_I) - PL + G / T_{SS,I} - k$$

$$C / I_{UP} = C / N_{UP} - I / N_{UP}$$

where:

C/N_{UP} = uplink wanted carrier-to-noise ratio, dB

$PD_{ES,W}$ = power density of wanted earth station emission, dBW/Hz

$G_{ES,W}(\theta_W)$ = gain of wanted earth station in direction of wanted space station, dBi

PL = propagation loss, dB

$G/T_{SS,W}$ = wanted space station G/T in direction of wanted earth station, dB/K

k = Boltzmann constant, dBJ/K

I/N_{UP} = uplink interference-to-noise ratio, dB

$PD_{ES,I}$ = power density of interfering earth station emission, dBW/Hz

$G_{ES,I}(\theta_I)$ = gain of interfering earth station in direction of wanted space station, dBi

$G/T_{SS,I}$ = wanted space station G/T in direction of interfering earth station, dB/K

C/I_{UP} = uplink carrier-to-interference ratio, dB

Assuming that the power densities of the wanted and interfering emissions are the same, and ignoring any difference in propagation loss between the wanted space station and the wanted and interfering earth stations, C and I can be combined to give:

$$C / I_{UP} = G_{ES,W}(\theta_W) - G_{ES,I}(\theta_I) + \Delta G / T$$

with:

$$\Delta G / T = G / T_{SS,W} - G / T_{SS,I}$$

Thus the uplink C/I can be estimated using the gains of the earth stations and an assumption defining the locations of the wanted and interfering earth stations relative to the wanted space station beam boresight (i.e., on which G/T contour the earth stations are located).

Ignoring pointing errors ($\theta_W = 0$), the wanted earth station gain is just the peak value. For a longitude separation of 2.0 degrees, the topocentric angle is approximately 2.2 degrees. Assuming an antenna gain reference pattern of 29 – 25 * log(φ), the gain of the interfering earth station toward the wanted space station is 29 – 25 * log(2.2) = 20.4 dBi.

Using these values in the expression for C/I_{UP} gives:

$$C / I_{UP} = G_{ES,W}(0) - 20.4 + \Delta G / T$$

This relationship can be used to estimate the uplink C/I for typical earth station antenna gain values with varying levels of G/T contour mismatch between the two satellites:

Table C-1
Uplink C/I at Two Degree Spacing

Uplink			
Parameter		Value	Value
Orbital separation (◦)		2.0	2.0
Topocentric angle (◦)		2.2	2.2
Off-axis gain (dB)		20.4	20.4
Ku-band			
ΔG/T (dB)		-2.0	0.0
Earth station			
Diameter (m)	Gain (dBi)	C/I (dB)	C/I (dB)
1.2	43.2	20.8	22.8
1.8	46.7	24.3	26.3
2.4	49.2	26.8	28.8
4.5	54.7	32.2	34.2
6.0	57.2	34.7	36.7
C-band			
ΔG/T (dB)		-1.0	0.0
Earth station			
Diameter (m)	Gain (dBi)	C/I (dB)	C/I (dB)
3.8	46.0	24.6	25.6
4.5	47.5	26.1	27.1
6.0	50.0	28.6	29.6
7.5	51.9	30.5	31.5
9.0	53.5	32.1	33.1
Worst-case			
C/I (dB)		20.8	22.8
Assumed C/N (dB)		8.0	8.0
I/N (dB)		-12.8	-14.8
ΔT/T (%)		5.3	3.3
Increase in noise temperature (dB)		0.22	0.14

Assuming that the minimum (i.e., threshold) C/N for a digital service is 8 dB, the effect of the worst-case Ku-band C/I (20.8 dB) from the 1.2 m diameter earth station in Table C-1

above would only degrade the C/N by 0.22 dB, equivalent to an increase of 5.3% in the wanted system noise temperature.

For C-band, the worst-case C/I (24.6 dB) into the 3.8 m diameter earth station in Table C-1 above would degrade the C/N by 0.09 dB, equivalent to an increase of 2.2% in the wanted system noise temperature.

These values are less than the ITU coordination trigger criteria; i.e., internationally, if a 6% increase in noise temperature is not exceeded, and then coordination is not needed between the concerned networks.

Downlink

For the downlink, the C/I ratio is estimated based on the wanted and interfering receive power densities:

$$C_{DN} = ED_{SS,W} + GC_{SS,W} - PL + G_{ES,W}(\theta_W)$$

$$I_{DN} = ED_{SS,I} + GC_{SS,I} - PL + G_{ES,W}(\theta_I)$$

$$C/I_{DN} = C_{DN} - I_{DN}$$

where:

C_{DN} = downlink wanted receive power density, dBW/Hz

$ED_{SS,W}$ = peak EIRP density of wanted space station emission, dBW/Hz

$GC_{SS,W}$ = gain contour of wanted space station in direction of wanted earth station (non-positive number), dB

I_{DN} = downlink interfering receive power density, dBW/Hz

$ED_{SS,I}$ = peak EIRP density of interfering space station emission, dBW/Hz

$GC_{SS,I}$ = gain contour of interfering space station in direction of wanted earth station (non-positive number), dB

$G_{ES,W}(\theta_I)$ = gain of wanted earth station in direction of interfering space station, dBi

C/I_{DN} = downlink carrier-to-interference ratio, dB

Again, assuming equal signal power densities and propagation losses between the adjacent networks, the downlink C/I can be expressed as:

$$C / I_{DN} = G_{ES,W}(\theta_W) - G_{ES,W}(\theta_I) + \Delta GC$$

with:

$$\Delta GC = GC_{SS,W} - GC_{SS,I}$$

Thus the downlink C/I can be estimated using the gain of the wanted earth station and an assumption defining the location of the wanted earth station relative to the wanted and interfering space station beam boresights (i.e., on which EIRP contours the earth station is located).

Ignoring the earth station pointing error and using a gain reference pattern of 29 – 25 * log(φ)), the downlink C/I can be reduced to:

$$C / I_{DN} = G_{ES,W}(0) - 20.4 + \Delta GC$$

This relationship can be used to estimate the downlink C/I for typical earth station antenna gain values with varying levels of EIRP (ΔGC) degradation:

Table C-2
Downlink C/I at Two Degree Spacing

Downlink			
Parameter		Value	Value
Orbital separation (◦)		2.0	2.0
Topocentric angle (◦)		2.2	2.2
Off-axis gain (dB)		20.4	20.4
Ku-band			
ΔGC (dB)		-2.0	0.0
Earth station			
Diameter (m)	Gain (dBi)	C/I (dB)	C/I (dB)
1.2	41.7	19.2	21.2
1.8	45.2	22.7	24.7
2.4	47.7	25.2	27.2
4.5	53.1	30.7	32.7
6.0	55.6	33.2	35.2
C-band			
ΔGC (dB)		-1.0	0.0
Earth station			
Diameter (m)	Gain (dBi)	C/I (dB)	C/I (dB)
3.8	42.1	21.6	21.6
4.5	43.5	23.1	23.1
6.1	46.2	25.7	25.7
7.5	48.0	27.5	27.5
Worst-case			
C/I (dB)		19.2	21.2
Assumed C/N (dB)		8.0	8.0
I/N (dB)		-11.2	-13.2
ΔT/T (%)		7.5	4.8
Increase in noise temperature (dB)		0.32	0.20

Assuming that the minimum (i.e., threshold) C/N for a digital service is 8 dB, the effect of the worst-case KU-band C/I (19.2 dB) into the 1.2 m diameter earth station in Table C-2 above would degrade the C/N by 0.32 dB, equivalent to an increase of 7.5% in the wanted system noise temperature. Although this is above the typical criteria of 6%, the wanted system

link degradation is still less than 0.5 dB, which is likely to be significantly less than the link margin.

For C-band, the worst-case C/I (21.6 dB) into the 3.8 m diameter earth station in Table C-2 above would degrade the C/N by 0.18 dB, equivalent to an increase of 4.3% in the wanted system noise temperature, which is within the 6% coordination threshold.

Specific C/I Analysis

For this portion of the analysis, the carrier-to-interference ratio between two adjacent systems is estimated for a set of competing emissions. The analysis methodology consists of defining the emission characteristics for each network and computing the interference levels resulting from co-channel operation. C/I levels are calculated for each combination of overlapping emissions (i.e., the same frequency band and link direction). Results are presented in tables providing the interference levels for combinations of emissions pairs.

The worst-case geometry for the earth and space stations is assumed. That is, the space stations are positioned closer to each other by their respective stationkeeping tolerances and the earth station is mispointed toward the interfering space station by an assumed pointing error.

The equations and parameter definitions presented above can be used to express the uplink and downlink C/I as follows:

$$C/I_{UP} = (PD_{ES,W} - PD_{ES,I}) + (G_{ES,W}(\theta_W) - G_{ES,I}(\theta_I)) + \Delta G/T$$

$$C/I_{DN} = (ED_{SS,W} - ED_{SS,I}) + (G_{ES,W}(\theta_W) - G_{ES,W}(\theta_I)) + \Delta GC$$

Here the uplink C/I is estimated using the emission power densities and gains of the earth stations, and an assumption defining the locations of the wanted and interfering earth stations relative to the wanted space station beam boresight. And the downlink C/I is estimated using the wanted and interfering space station emission EIRP densities, the gain of the wanted earth

station, and an assumption defining the location of the wanted earth station relative to the wanted and interfering space station beam boresights.

The off-axis performance of the earth station antenna is modeled using Section 25.209 of the Commission's rules. According to Section 29.209(c)(1), receiving earth stations are afforded protection to the extent that they meet the 25.209(a) and (b) masks at 1.5 degrees off-axis. Therefore, all receiving earth stations are assumed to meet this mask in the interference analysis contained herein. Note that this antenna pattern does not define gain values for angles less than 1.5 degree. In order to account for earth station pointing errors, a parabolic main beam model is used for gain values at small off-axis angles ($G_{MAX} - 0.0025 * (D/\lambda * \varphi) \wedge 2$).

Earth station topocentric off-axis angles are approximated by adding 10% to the geocentric angular separation, taking into account the satellite stationkeeping tolerance and earth station pointing error.

System characteristics used in the analysis are shown in the following tables. Three networks are considered: NSS-806 and three adjacent systems, INTELSAT-14, INTELSAT-1R, and DIRECTV KU-45W.

Table C-3 provides the space station name and orbital information, and assumed earth station parameters of the networks.

Table C-3
Station Parameters

Parameter	System 1A	System 1B	System 1C	System 2
Space station name	IS 14	INTELSAT 1R	DIRECTV KU-45W	NSS-806
Nominal orbit location (+E, -W)	-45.00	-50.00	-45.20	-47.50
Stationkeeping tolerance (◦)	0.05	0.05	0.05	0.10
Earth station pointing error (◦)	0.10	0.10	0.10	0.10
Earth station antenna efficiency (fraction)	0.65	0.65	0.65	0.65

This analysis considers the digital emissions signals of both networks. Analog TV/FM signals are coordinated on a case-by-case basis with nearby spacecraft, and are therefore not addressed in this analysis. Digital signals are more robust and operate typically down to much lower C/N ratios than analog signals, and therefore more tolerant of interference.

C-band command uplinks are also not considered since the analysis methodology does not take into account 1) the difference in wanted and interfering signal bandwidths and 2) frequency dependent rejection, which greatly overestimates the interference from these command uplinks.

Emission characteristics are derived from the Schedule S filings applicable to the respective systems. In some cases the Schedule S contains a large number of emissions and for these cases the set of considered characteristics is reduced to a subset of emissions that illustrate the range of C/I values.

Tables C-4a through C-4c show the INTELSAT-14, INTELSAT-1R, and DIRECTV KU-45W emission characteristics considered here.

Table C-4a
INTELSAT-14 Typical Emissions

Ku-band							
Uplink				Downlink			
Emission	Frequency (MHz)	ES power density (dBW/Hz)	ES gain (dBi)	Emission	Frequency (MHz)	SS EIRP density (dBW/Hz)	ES gain (dBi)
36M0G7W	14020.0	-50.8	57.2	36M0G7W	11470.0	-25.6	41.4
10M3G7W	14020.0	-51.2	57.2	10M3G7W	11470.0	-26.0	41.7
100KG7W	14020.0	-50.9	57.2	100KG7W	11470.0	-25.7	41.2
1M45G7W	14020.0	-51.2	57.2	1M45G7W	11470.0	-26.0	41.2
400KG7W	14020.0	-51.0	43.1	400KG7W	11470.0	-39.9	55.3
36M0G7W	14020.0	-53.8	57.1	36M0G7W	11470.0	-25.6	43.3
10M3G7W	14020.0	-54.2	57.1	10M3G7W	11470.0	-26.0	43.5
100KG7W	14020.0	-53.9	57.1	100KG7W	11470.0	-25.7	42.7
1M45G7W	14020.0	-54.3	57.1	1M45G7W	11470.0	-26.1	42.7
72M0G7W	14020.0	-53.8	57.1	72M0G7W	11470.0	-25.6	43.1

C-band							
Uplink				Downlink			
Emission	Frequency (MHz)	ES power density (dBW/Hz)	ES gain (dBi)	Emission	Frequency (MHz)	SS EIRP density (dBW/Hz)	ES gain (dBi)
36M0G7W	5960.0	-50.7	49.7	36M0G7W	3735.0	-31.1	39.2
10M3G7W	5960.0	-53.1	49.7	10M3G7W	3735.0	-31.5	40.1
100KG7W	5960.0	-52.8	49.7	100KG7W	3735.0	-31.2	39.5
72M0G7W	5960.0	-54.0	50.0	72M0G7W	3735.0	-34.1	40.8
10M3G7W	5960.0	-56.4	50.0	10M3G7W	3735.0	-34.5	45.3
100KG7W	5960.0	-56.1	50.0	100KG7W	3735.0	-34.2	41.9
36M0G7W	5960.0	-51.1	50.1	36M0G7W	3735.0	-29.2	39.0
10M3G7W	5960.0	-53.5	50.1	10M3G7W	3735.0	-29.6	39.8
100KG7W	5960.0	-53.2	50.1	100KG7W	3735.0	-29.3	39.2
10M3G7W	5960.0	-53.5	49.7	10M3G7W	3735.0	-29.7	39.6
100KG7W	5960.0	-53.2	49.7	100KG7W	3735.0	-29.4	39.0

Source: Intelsat-14 Schedule S

Table C-4b
INTELSAT-1R Typical Emissions

Ku-band							
Uplink				Downlink			
Emission	Frequency (MHz)	ES power density (dBW/Hz)	ES gain (dBi)	Emission	Frequency (MHz)	SS EIRP density (dBW/Hz)	ES gain (dBi)
100KG7W	13770.0	-61.4	56.8	100KG7W	10970.0	-27.0	44.5
100KG7W	14020.0	-55.8	56.8	100KG7W	10970.0	-26.1	47.2
10M3G7W	13770.0	-60.9	56.8	10M3G7W	10970.0	-26.4	44.5
10M3G7W	14020.0	-55.6	56.8	10M3G7W	10970.0	-25.7	47.2
1M45G7W	13770.0	-61.4	56.8	1M45G7W	10970.0	-29.2	47.2
1M45G7W	13770.0	-52.7	56.8	1M45G7W	10970.0	-26.1	47.2
36M0G7W	13770.0	-58.9	56.8	36M0G7W	10970.0	-25.1	44.5
36M0G7W	14020.0	-50.6	56.8	36M0G7W	10970.0	-25.1	47.2
400KG7W	13770.0	-56.5	48.9	400KG7W	10970.0	-34.7	55.3
400KG7W	13770.0	-51.1	48.9	400KG7W	10970.0	-29.9	55.3

C-band							
Uplink				Downlink			
Emission	Frequency (MHz)	ES power density (dBW/Hz)	ES gain (dBi)	Emission	Frequency (MHz)	SS EIRP density (dBW/Hz)	ES gain (dBi)
100KG7W	5960.0	-52.3	49.4	100KG7W	3735.0	-32.6	40.0
100KG7W	6200.0	-41.6	49.4	100KG7W	3735.0	-42.6	44.4
10M3G7W	5960.0	-51.6	49.4	10M3G7W	3735.0	-31.9	40.0
10M3G7W	6200.0	-41.0	49.4	10M3G7W	3735.0	-42.2	44.4
36M0G7W	5960.0	-50.2	49.4	36M0G7W	3735.0	-30.5	40.0
36M0G7W	5960.0	-48.7	58.4	36M0G7W	3735.0	-39.3	41.8

Source: Intelsat-1R Schedule S

Table C-4c
DIRECTV KU-45W Typical Emissions

Ku-band							
Uplink				Downlink			
Emission	Frequency (MHz)	ES power density (dBW/Hz)	ES gain (dBi)	Emission	Frequency (MHz)	SS EIRP density (dBW/Hz)	ES gain (dBi)
36M0G7W	14020.0	-66.9	60.7	36M0G7W	11470.0	-21.8	34.0
				106KG9D	11697.0	-35.4	56.9

Source: DIRECTV KU-45W Schedule S

Table C-5 shows the NSS-806 emission characteristics considered here.

Table C-5
NSS-806 Typical Emissions

Ku-band							
Uplink				Downlink			
Emission	Frequency (MHz)	ES power density (dBW/Hz)	ES gain (dBi)	Emission	Frequency (MHz)	SS EIRP density (dBW/Hz)	ES gain (dBi)
346KG7W	14042.5	-53.0	51.0	346KG7W	11747.5	-27.5	45.1
461KG7W	14042.5	-53.7	52.8	461KG7W	11747.5	-27.4	49.5
1M85G7W	14042.5	-55.2	52.8	1M85G7W	11747.5	-28.5	51.5
8M25G7W	14042.5	-52.4	51.0	8M25G7W	11747.5	-28.0	47.6
72M2G7W	14042.5	-51.2	52.8	72M2G7W	11747.5	-26.1	51.4
346KG7W	14125.0	-50.6	51.0	346KG7W	11830.0	-26.1	45.1
461KG7W	14125.0	-51.9	52.8	461KG7W	11830.0	-25.9	47.6
1M85G7W	14125.0	-51.9	52.8	1M85G7W	11830.0	-26.2	49.6
8M25G7W	14125.0	-50.7	51.0	8M25G7W	11830.0	-26.1	45.1
72M2G7W	14042.5	-53.7	56.4	72M2G7W	11747.5	-26.1	56.9
36M0G7W	14125.0	-50.7	52.8	36M0G7W	11830.0	-26.1	45.1
				25K0N0N	11701.0	-35.0	58.2

C-band							
Uplink				Downlink			
Emission	Frequency (MHz)	ES power density (dBW/Hz)	ES gain (dBi)	Emission	Frequency (MHz)	SS EIRP density (dBW/Hz)	ES gain (dBi)
346KG7W	5968.0	-47.6	45.3	346KG7W	3743.0	-39.0	41.6
461KG7W	5968.0	-49.2	47.1	461KG7W	3743.0	-37.7	45.0
1M85G7W	5968.0	-50.3	47.1	1M85G7W	3743.0	-37.7	45.0
8M25G7W	5968.0	-48.1	45.3	8M25G7W	3743.0	-38.9	43.1
72M2G7W	5968.0	-52.8	54.9	72M2G7W	3743.0	-36.6	46.9
346KG7W	6068.0	-46.4	45.5	346KG7W	3843.0	-35.9	39.8
461KG7W	6068.0	-47.9	47.2	461KG7W	3843.0	-35.3	41.8
1M85G7W	6068.0	-48.2	47.2	1M85G7W	3843.0	-35.4	41.8
8M25G7W	6068.0	-46.4	45.5	8M25G7W	3843.0	-36.0	39.8
36M0G7W	6068.0	-48.0	49.1	36M0G7W	3843.0	-35.2	39.8
				300KF9D	3947.5	-42.8	50.0

Source: NSS-806 Schedule S

Applying the methodology present above to the emission characteristics shown in Tables C-4 and C-5 results in the C/I levels shown in Appendix 1 to this Annex (Tables A1-1 through

A1-4 for INTELSAT-14/NSS-806, Tables A1-5 through A1-8 for INTELSAT-1R/NSS-806, and Tables A1-9 and A1-10 for DIRECTV KU-45W). A separate table is provided for each frequency band/link direction that shows the C/I level for each emission pair.

The worst-case C/I levels extracted from the tables in Appendix 1 to this Annex for each band and link direction are summarized in Table C-6. This table also shows the resulting impact to the wanted links assuming a threshold C/N of 8 dB.

Table C-6
Worst-Case C/I and Impact to Wanted Links

Worst-case interference NSS-806 into IS 14					
Link	Worst-case C/I (dB)	C/N (dB)	I/N (dB)	ΔT/T (%)	Inc. in Noise (dB)
Ku-band uplink	23.5	8.0	-15.5	2.8	0.12
Ku-band downlink	20.9	8.0	-12.9	5.1	0.22
C-band uplink	20.4	8.0	-12.4	5.7	0.24
C-band downlink	22.7	8.0	-14.7	3.4	0.15

Worst-case interference IS 14 into NSS-806					
Link	Worst-case C/I (dB)	C/N (dB)	I/N (dB)	ΔT/T (%)	Inc. in Noise (dB)
Ku-band uplink	28.6	8.0	-20.6	0.9	0.04
Ku-band downlink	24.0	8.0	-16.0	2.5	0.11
C-band uplink	28.3	8.0	-20.3	0.9	0.04
C-band downlink	12.7	8.0	-4.7	34.2	1.28

Worst-case interference NSS-806 into INTELSAT 1R					
Link	Worst-case C/I (dB)	C/N (dB)	I/N (dB)	ΔT/T (%)	Inc. in Noise (dB)
Ku-band uplink	23.6	8.0	-15.6	2.8	0.12
Ku-band downlink	24.2	8.0	-16.2	2.4	0.10
C-band uplink	24.0	8.0	-16.0	2.5	0.11
C-band downlink	17.8	8.0	-9.8	10.5	0.44

Worst-case interference INTELSAT 1R into NSS-806					
Link	Worst-case C/I (dB)	C/N (dB)	I/N (dB)	ΔT/T (%)	Inc. in Noise (dB)
Ku-band uplink	28.4	8.0	-20.4	0.9	0.04
Ku-band downlink	23.5	8.0	-15.5	2.8	0.12
C-band uplink	18.5	8.0	-10.5	8.9	0.37
C-band downlink	13.9	8.0	-5.9	25.5	0.99

Worst-case interference NSS-806 into DIRECTV KU-45W					
Link	Worst-case C/I (dB)	C/N (dB)	I/N (dB)	ΔT/T (%)	Inc. in Noise (dB)
Ku-band uplink	32.5	8.0	-24.5	0.4	0.02
Ku-band downlink	44.3	8.0	-36.3	0.0	0.00

Worst-case interference DIRECTV KU-45W into NSS-806					
Link	Worst-case C/I (dB)	C/N (dB)	I/N (dB)	ΔT/T (%)	Inc. in Noise (dB)
Ku-band uplink	60.4	8.0	-52.4	0.0	0.00
Ku-band downlink	21.2	8.0	-13.2	4.8	0.20

A C/I level of 20.2 dB corresponds to a 0.25 dB C/N degradation for a wanted link with a threshold C/N of 8 dB, or, equivalently, an increase in noise temperature of 6%.

The C/I levels into Intelsat-14 exceed 20.4 dB (0.24 dB C/N degradation for C/N = 8 dB). The corresponding increase in noise temperature is not more than 5.7%, which is within the coordination threshold level of 6%.

The C/I levels into the Intelsat-1R C-band downlinks reach as low as 17.8 dB. This is due to the relatively lower EIRP density of some of the Intelsat-1R emissions compared to those of NSS-806. Although the worst-case C/I (17.8 dB) results in a 10.5% increase in wanted system noise temperature (for C/N = 8 dB), the wanted system link degradation is still less than 0.5 dB, which is likely to be significantly less than the link margin. Increasing the combination of space station transmit power or receive earth station gain by 2.4 dB would increase the C/I in this link to 20.2 dB, resulting in a just under a 6% increase in noise temperature, with essentially no impact on the interference into NSS-806.

All other Intelsat-1R links show C/I levels in excess of 23.6 dB (0.12 dB C/N degradation for C/N = 8 dB). The corresponding increase in noise temperature is not more than 2.8%, which is within the coordination threshold level of 6%.

The interference into DIRECTV KU-45W is well below the 6% coordination threshold. This is essentially due to the isolation between the adjacent networks' space station beams. The adjacent networks serve divergent geographic regions, which provides at least 20 dB of isolation (a conservative assumption of 17 dB is used in the analysis). Even if the NSS-806 steerable spot beam were steered over the same geographic area as DIRECTV KU-45W plans to serve, the minimum C/I into DIRECTV KU-45W would still be 27.3 dB.

The worst-case C/I into the NSS-806 C-band uplinks is 18.5 dB (8.9% increase in noise temperature). This results from a significant difference in earth station power densities of some emissions between the adjacent systems. Although the interference exceeds the 6% coordination threshold, the degradation to C/N is less than 0.4 dB, which is significantly less than the link margin.

The NSS-806 C-band downlinks show several sensitive emissions, with C/I levels as low as 12.7 dB. These cases are due to lower EIRP density of some of the NSS-806 emissions compared to those of the adjacent system. More balanced EIRP density levels would improve this situation.

All other NSS-806 links show C/I levels in excess of 23.5 dB (0.12 dB C/N degradation for C/N = 8 dB). The corresponding increase in noise temperature is not more than 2.8%, which is within the coordination threshold level of 6%.

APPENDIX 1

C/I CALCULATIONS

Table A1-1: INTELSAT-14/NSS-806 Ku-Band Uplink C/I

Ku-band Uplink C/I	System 1	System 2
Space station name	IS 14	NSS-806
Nominal orbit location (+E, -W)	-45.00	-47.50
Stationkeeping tolerance (◦)	0.05	0.10
Assumed orbit location (+E, -W)	-45.05	-47.40
Longitude separation (◦)	2.35	2.35
Earth station pointing error (◦)	0.10	0.10
Earth station antenna efficiency (fraction)	0.65	0.65
Earth station angle toward wanted space station(◦)	2.49	2.49
Difference in wanted space station G/T toward wanted and interfering earth stations (dB)	0.0	0.0

NSS-806 into IS 14												
Wanted IS 14 Emisssions				Interfering NSS-806 Emisssions								
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	36M0G7W
	Frequency (MHz)			14042.5	14042.5	14042.5	14042.5	14042.5	14125.0	14125.0	14125.0	14125.0	14042.5	14125.0
		ES power density (dBW/Hz)		-53.0	-53.7	-55.2	-52.4	-51.2	-50.6	-51.9	-51.9	-50.7	-53.7	-50.7
			ES gain (dBi)	51.0	52.8	52.8	51.0	52.8	51.0	52.8	52.8	51.0	56.4	52.8
72M0G7W	14020.0	-53.8	57.1	35.1	35.9	37.3	34.5	33.4	32.7	34.1	34.0	32.8	35.9	32.8
36M0G7W	14020.0	-53.8	57.1	35.1	35.9	37.3	34.5	33.4	32.7	34.1	34.0	32.8	35.9	32.8
10M3G7W	14020.0	-54.2	57.1	34.8	35.5	36.9	34.1	33.0	32.4	33.7	33.6	32.4	35.5	32.4
100KG7W	14020.0	-53.9	57.1	35.1	35.8	37.3	34.5	33.3	32.7	34.0	34.0	32.8	35.8	32.8
1M45G7W	14020.0	-54.3	57.1	34.7	35.4	36.8	34.0	32.9	32.3	33.6	33.5	32.3	35.4	32.4
400KG7W	14020.0	-51.0	43.1	25.9	26.7	28.1	25.3	24.1	23.5	24.9	24.8	23.6	26.6	23.6
36M0G7W	14020.0	-50.8	57.2	38.2	38.9	40.4	37.6	36.4	35.8	37.1	37.1	35.9	38.9	35.9
10M3G7W	14020.0	-51.2	57.2	37.8	38.6	40.0	37.2	36.0	35.4	36.8	36.7	35.5	38.5	35.5
100KG7W	14020.0	-50.9	57.2	38.1	38.9	40.3	37.5	36.4	35.7	37.1	37.0	35.8	38.9	35.8
1M45G7W	14020.0	-51.2	57.2	37.8	38.6	40.0	37.2	36.1	35.4	36.8	36.7	35.5	38.6	35.5
400KG7W	14020.0	-54.2	44.5	24.1	24.8	26.3	23.5	22.3	21.7	23.0	23.0	21.8	24.8	21.8

IS 14 into NSS-806												
Interfering IS 14 Emisssions				Wanted NSS-806 Emisssions								
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	36M0G7W
	Frequency (MHz)			14042.5	14042.5	14042.5	14042.5	14042.5	14125.0	14125.0	14125.0	14125.0	14042.5	14125.0
		ES power density (dBW/Hz)		-53.0	-53.7	-55.2	-52.4	-51.2	-50.6	-51.9	-51.9	-50.7	-53.7	-50.7
			ES gain (dBi)	51.0	52.8	52.8	51.0	52.8	51.0	52.8	52.8	51.0	56.4	52.8
72M0G7W	14020.0	-53.8	57.1	32.3	33.1	31.6	32.9	35.6	34.7	34.9	34.9	34.6	35.7	36.1
36M0G7W	14020.0	-53.8	57.1	32.2	33.0	31.6	32.9	35.6	34.6	34.8	34.9	34.6	35.7	36.1
10M3G7W	14020.0	-54.2	57.1	32.6	33.4	32.0	33.2	35.9	35.0	35.2	35.3	34.9	36.1	36.5
100KG7W	14020.0	-53.9	57.1	32.3	33.1	31.7	32.9	35.6	34.7	34.9	35.0	34.6	35.7	36.2
1M45G7W	14020.0	-54.3	57.1	32.7	33.5	32.1	33.3	36.0	35.1	35.3	35.4	35.0	36.2	36.6
400KG7W	14020.0	-51.0	43.1	29.4	30.2	28.8	30.0	32.7	31.8	32.0	32.1	31.7	32.8	33.2
36M0G7W	14020.0	-50.8	57.2	29.2	30.0	28.6	29.9	32.6	31.6	31.8	31.9	31.6	32.7	33.1
10M3G7W	14020.0	-51.2	57.2	29.6	30.4	29.0	30.2	32.9	32.0	32.2	32.3	31.9	33.1	33.5
100KG7W	14020.0	-50.9	57.2	29.3	30.1	28.7	29.9	32.6	31.7	31.9	32.0	31.6	32.7	33.2
1M45G7W	14020.0	-51.2	57.2	29.6	30.4	29.0	30.2	32.9	32.0	32.2	32.3	31.9	33.1	33.5
400KG7W	14020.0	-54.2	44.5	32.6	33.4	32.0	33.2	35.9	35.0	35.2	35.3	34.9	36.0	36.4

Table A1-2: INTELSAT-14/NSS-806 Ku-Band Downlink C/I

Ku-band Downlink C/I	System 1	System 2
Space station name	IS 14	NSS-806
Nominal orbit location (+E, -W)	-45.00	-47.50
Stationkeeping tolerance (◦)	0.05	0.10
Assumed orbit location (+E, -W)	-45.05	-47.40
Longitude separation (◦)	2.35	2.35
Earth station pointing error (◦)	0.10	0.10
Earth station antenna efficiency (fraction)	0.65	0.65
Earth station angle toward interfering space station (◦)	2.49	2.49
Difference in wanted and interfering space station gain toward wanted earth station (dB)	0.0	0.0

NSS-806 into IS 14													
Wanted IS 14 Emisssions				Interfering NSS-806 Emisssions									
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	36M0G7W	25K0N0N
	Frequency (MHz)			11747.5	11747.5	11747.5	11747.5	11747.5	11830.0	11830.0	11830.0	11830.0	11747.5	11830.0	11701.0
		SS EIRP density (dBW/Hz)		-27.5	-27.4	-28.5	-28.0	-26.1	-26.1	-25.9	-26.2	-26.1	-26.1	-26.1	-35.0
			ES gain (dBi)	45.1	49.5	51.5	47.6	51.4	45.1	47.6	49.6	45.1	56.9	45.1	58.2
72M0G7W	11470.0	-25.6	43.1	25.7	25.7	26.7	26.2	24.3	24.3	24.2	24.4	24.3	24.3	24.3	33.2
36M0G7W	11470.0	-25.6	41.4	24.0	24.0	25.0	24.5	22.7	22.6	22.5	22.7	22.6	22.7	22.6	31.5
10M3G7W	11470.0	-26.0	41.7	24.0	23.9	24.9	24.4	22.6	22.6	22.4	22.6	22.5	22.6	22.5	31.5
100KG7W	11470.0	-25.7	41.2	23.8	23.7	24.8	24.3	22.4	22.4	22.2	22.5	22.4	22.4	22.4	31.3
1M45G7W	11470.0	-26.0	41.2	23.5	23.4	24.5	24.0	22.1	22.1	21.9	22.2	22.1	22.1	22.1	31.0
400KG7W	11470.0	-38.3	48.2	18.0	17.9	19.0	18.5	16.6	16.6	16.4	16.7	16.6	16.6	16.6	25.5
36M0G7W	11470.0	-25.6	43.3	25.9	25.9	26.9	26.4	24.5	24.5	24.4	24.6	24.5	24.5	24.5	33.4
10M3G7W	11470.0	-26.0	43.5	25.7	25.7	26.7	26.2	24.4	24.3	24.2	24.4	24.3	24.4	24.3	33.2
100KG7W	11470.0	-25.7	42.7	25.3	25.2	26.2	25.8	23.9	23.9	23.7	23.9	23.9	23.9	23.9	32.8
1M45G7W	11470.0	-26.1	42.7	24.9	24.8	25.8	25.3	23.5	23.5	23.3	23.5	23.4	23.5	23.4	32.4
400KG7W	11470.0	-39.9	55.3	22.4	22.4	23.4	22.9	21.1	21.0	20.9	21.1	21.0	21.1	21.0	29.9

IS 14 into NSS-806													
Interfering IS 14 Emisssions				Wanted NSS-806 Emisssions									
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	36M0G7W	25K0N0N
	Frequency (MHz)			11747.5	11747.5	11747.5	11747.5	11747.5	11830.0	11830.0	11830.0	11830.0	11747.5	11830.0	11701.0
		SS EIRP density (dBW/Hz)		-27.5	-27.4	-28.5	-28.0	-26.1	-26.1	-25.9	-26.2	-26.1	-26.1	-26.1	-35.0
			ES gain (dBi)	45.1	49.5	51.5	47.6	51.4	45.1	47.6	49.6	45.1	56.9	45.1	58.2
72M0G7W	11470.0	-25.6	43.1	24.0	28.2	29.0	25.9	31.3	25.4	28.0	29.6	25.4	35.4	25.4	27.2
36M0G7W	11470.0	-25.6	41.4	24.0	28.2	29.0	25.9	31.2	25.4	27.9	29.6	25.4	35.4	25.4	27.2
10M3G7W	11470.0	-26.0	41.7	24.4	28.6	29.4	26.3	31.6	25.8	28.3	30.0	25.8	35.8	25.8	27.5
100KG7W	11470.0	-25.7	41.2	24.0	28.3	29.0	26.0	31.3	25.4	28.0	29.6	25.5	35.4	25.4	27.2
1M45G7W	11470.0	-26.0	41.2	24.3	28.6	29.4	26.3	31.6	25.7	28.3	29.9	25.8	35.7	25.8	27.5
400KG7W	11470.0	-38.3	48.2	36.6	40.9	41.6	38.6	43.9	38.0	40.6	42.2	38.1	48.0	38.0	39.8
36M0G7W	11470.0	-25.6	43.3	24.0	28.2	29.0	25.9	31.2	25.4	27.9	29.6	25.4	35.4	25.4	27.2
10M3G7W	11470.0	-26.0	43.5	24.4	28.6	29.4	26.3	31.6	25.8	28.3	30.0	25.8	35.8	25.8	27.5
100KG7W	11470.0	-25.7	42.7	24.0	28.3	29.0	26.0	31.3	25.4	28.0	29.6	25.5	35.4	25.4	27.2
1M45G7W	11470.0	-26.1	42.7	24.4	28.7	29.5	26.4	31.7	25.8	28.4	30.0	25.9	35.8	25.9	27.6
400KG7W	11470.0	-39.9	55.3	38.2	42.5	43.2	40.2	45.5	39.6	42.2	43.8	39.7	49.6	39.6	41.4

Table A1-3: INTELSAT-14/NSS-806 C-Band Uplink C/I

C-band Uplink C/I	System 1	System 2
Space station name	IS 14	NSS-806
Nominal orbit location (+E, -W)	-45.00	-47.50
Stationkeeping tolerance (◦)	0.05	0.10
Assumed orbit location (+E, -W)	-45.05	-47.40
Longitude separation (◦)	2.35	2.35
Earth station pointing error (◦)	0.10	0.10
Earth station antenna efficiency (fraction)	0.65	0.65
Earth station angle toward wanted space station(◦)	2.49	2.49
Difference in wanted space station G/T toward wanted and interfering earth stations (dB)	0.0	0.0

NSS-806 into IS 14											
Wanted IS 14 Emisssions				Interfering NSS-806 Emisssions										
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	36M0G7W
	Frequency (MHz)			5968.0	5968.0	5968.0	5968.0	5968.0	6068.0	6068.0	6068.0	6068.0	6068.0
		ES power density (dBW/Hz)		-47.6	-49.2	-50.3	-48.1	-52.8	-46.4	-47.9	-48.2	-46.4	-48.0
			ES gain (dBi)	45.3	47.1	47.1	45.3	54.9	45.5	47.2	47.2	45.5	49.1
72M0G7W	5960.0	-54.0	50.0	24.0	25.7	26.7	24.5	29.3	22.8	24.4	24.6	22.8	24.4
36M0G7W	5960.0	-50.7	49.7	27.1	28.7	29.7	27.5	32.3	25.9	27.4	27.6	25.8	27.4
10M3G7W	5960.0	-53.1	49.7	24.7	26.3	27.4	25.2	29.9	23.5	25.0	25.3	23.5	25.1
100KG7W	5960.0	-52.8	49.7	25.0	26.7	27.7	25.5	30.3	23.8	25.4	25.6	23.8	25.4
10M3G7W	5960.0	-53.5	49.7	24.3	25.9	27.0	24.8	29.5	23.1	24.6	24.9	23.1	24.7
100KG7W	5960.0	-53.2	49.7	24.6	26.3	27.3	25.1	29.9	23.4	25.0	25.2	23.4	25.0
36M0G7W	5960.0	-51.1	50.1	27.0	28.7	29.7	27.5	32.3	25.8	27.4	27.6	25.8	27.4
10M3G7W	5960.0	-53.5	50.1	24.7	26.3	27.3	25.1	29.9	23.5	25.0	25.2	23.4	25.0
100KG7W	5960.0	-53.2	50.1	25.0	26.6	27.7	25.5	30.2	23.8	25.3	25.6	23.8	25.4
10M3G7W	5960.0	-56.4	50.0	21.7	23.3	24.3	22.1	26.9	20.5	22.0	22.2	20.4	22.1
100KG7W	5960.0	-56.1	50.0	22.0	23.6	24.7	22.5	27.2	20.8	22.3	22.6	20.8	22.4

IS 14 into NSS-806											
Interfering IS 14 Emisssions				Wanted NSS-806 Emisssions										
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	36M0G7W
	Frequency (MHz)			5968.0	5968.0	5968.0	5968.0	5968.0	6068.0	6068.0	6068.0	6068.0	6068.0
		ES power density (dBW/Hz)		-47.6	-49.2	-50.3	-48.1	-52.8	-46.4	-47.9	-48.2	-46.4	-48.0
			ES gain (dBi)	45.3	47.1	47.1	45.3	54.9	45.5	47.2	47.2	45.5	49.1
72M0G7W	5960.0	-54.0	50.0	32.5	32.6	31.6	32.0	35.8	33.9	34.0	33.8	33.9	35.7
36M0G7W	5960.0	-50.7	49.7	29.2	29.3	28.3	28.7	32.5	30.6	30.7	30.5	30.6	32.4
10M3G7W	5960.0	-53.1	49.7	31.6	31.7	30.6	31.1	34.9	33.0	33.1	32.8	33.0	34.8
100KG7W	5960.0	-52.8	49.7	31.2	31.3	30.3	30.8	34.5	32.6	32.7	32.5	32.7	34.5
10M3G7W	5960.0	-53.5	49.7	32.0	32.1	31.0	31.5	35.3	33.4	33.5	33.2	33.4	35.2
100KG7W	5960.0	-53.2	49.7	31.6	31.7	30.7	31.2	34.9	33.0	33.1	32.9	33.1	34.9
36M0G7W	5960.0	-51.1	50.1	29.6	29.7	28.7	29.1	32.9	31.0	31.1	30.9	31.0	32.8
10M3G7W	5960.0	-53.5	50.1	32.0	32.1	31.0	31.5	35.3	33.4	33.5	33.2	33.4	35.2
100KG7W	5960.0	-53.2	50.1	31.6	31.7	30.7	31.2	34.9	33.0	33.1	32.9	33.1	34.9
10M3G7W	5960.0	-56.4	50.0	34.9	35.0	33.9	34.4	38.2	36.3	36.4	36.1	36.3	38.1
100KG7W	5960.0	-56.1	50.0	34.5	34.6	33.6	34.1	37.8	35.9	36.0	35.8	36.0	37.8

Table A1-4: INTELSAT-14/NSS-806 C-Band Downlink C/I

C-band Downlink C/I	System 1	System 2
Space station name	IS 14	NSS-806
Nominal orbit location (+E, -W)	-45.00	-47.50
Stationkeeping tolerance (◦)	0.05	0.10
Assumed orbit location (+E, -W)	-45.05	-47.40
Longitude separation (◦)	2.35	2.35
Earth station pointing error (◦)	0.10	0.10
Earth station antenna efficiency (fraction)	0.65	0.65
Earth station angle toward interfering space station (◦)	2.49	2.49
Difference in wanted and interfering space station gain toward wanted earth station (dB)	0.0	0.0

NSS-806 into IS 14												
Wanted IS 14 Emisssions				Interfering NSS-806 Emisssions								
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	36M0G7W	300KF9D
	Frequency (MHz)			3743.0	3743.0	3743.0	3743.0	3743.0	3843.0	3843.0	3843.0	3843.0	3843.0	3947.5
		SS EIRP density (dBW/Hz)		-39.0	-37.7	-37.7	-38.9	-36.6	-35.9	-35.3	-35.4	-36.0	-35.2	-42.8
			ES gain (dBi)	41.6	45.0	45.0	43.1	46.9	39.8	41.8	41.8	39.8	39.8	50.0
36M0G7W	3735.0	-31.1	39.2	27.9	26.6	26.6	27.8	25.5	24.8	24.2	24.3	24.9	24.1	31.7
10M3G7W	3735.0	-31.5	40.1	28.4	27.2	27.1	28.3	26.1	25.3	24.8	24.8	25.4	24.6	32.2
100KG7W	3735.0	-31.2	39.5	28.2	26.9	26.8	28.0	25.8	25.1	24.5	24.5	25.1	24.3	31.9
72M0G7W	3735.0	-34.1	40.8	26.5	25.2	25.1	26.3	24.1	23.4	22.8	22.8	23.4	22.7	30.3
10M3G7W	3735.0	-34.5	45.3	30.5	29.3	29.2	30.4	28.2	27.4	26.9	26.9	27.5	26.7	34.3
100KG7W	3735.0	-34.2	41.9	27.5	26.3	26.2	27.4	25.2	24.4	23.9	23.9	24.5	23.7	31.3
36M0G7W	3735.0	-29.2	39.0	29.6	28.3	28.3	29.5	27.2	26.5	25.9	26.0	26.6	25.8	33.4
10M3G7W	3735.0	-29.6	39.8	30.0	28.8	28.7	29.9	27.7	26.9	26.4	26.4	27.0	26.2	33.8
100KG7W	3735.0	-29.3	39.2	29.8	28.5	28.4	29.6	27.4	26.7	26.1	26.1	26.7	25.9	33.5
10M3G7W	3735.0	-29.7	39.6	29.7	28.5	28.4	29.6	27.4	26.6	26.1	26.1	26.7	25.9	33.5
100KG7W	3735.0	-29.4	39.0	29.5	28.2	28.1	29.3	27.1	26.4	25.8	25.8	26.4	25.6	33.2

IS 14 into NSS-806												
Interfering IS 14 Emisssions				Wanted NSS-806 Emisssions								
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	36M0G7W	300KF9D
	Frequency (MHz)			3743.0	3743.0	3743.0	3743.0	3743.0	3843.0	3843.0	3843.0	3843.0	3843.0	3947.5
		SS EIRP density (dBW/Hz)		-39.0	-37.7	-37.7	-38.9	-36.6	-35.9	-35.3	-35.4	-36.0	-35.2	-42.8
			ES gain (dBi)	41.6	45.0	45.0	43.1	46.9	39.8	41.8	41.8	39.8	39.8	50.0
36M0G7W	3735.0	-31.1	39.2	14.6	19.1	19.2	16.2	22.1	15.9	18.4	18.4	15.8	16.6	18.9
10M3G7W	3735.0	-31.5	40.1	14.9	19.5	19.6	16.5	22.5	16.2	18.8	18.8	16.2	17.0	19.2
100KG7W	3735.0	-31.2	39.5	14.6	19.2	19.3	16.2	22.1	15.9	18.4	18.4	15.8	16.6	18.9
72M0G7W	3735.0	-34.1	40.8	17.6	22.2	22.2	19.2	25.1	18.9	21.4	21.4	18.8	19.6	21.9
10M3G7W	3735.0	-34.5	45.3	17.9	22.5	22.6	19.5	25.5	19.2	21.8	21.8	19.2	20.0	22.2
100KG7W	3735.0	-34.2	41.9	17.6	22.2	22.3	19.2	25.1	18.9	21.4	21.4	18.8	19.6	21.9
36M0G7W	3735.0	-29.2	39.0	12.7	17.2	17.3	14.3	20.2	14.0	16.5	16.5	13.9	14.7	17.0
10M3G7W	3735.0	-29.6	39.8	13.0	17.6	17.7	14.6	20.6	14.3	16.9	16.9	14.3	15.1	17.3
100KG7W	3735.0	-29.3	39.2	12.7	17.3	17.4	14.3	20.2	14.0	16.5	16.5	13.9	14.7	17.0
10M3G7W	3735.0	-29.7	39.6	13.1	17.7	17.8	14.7	20.7	14.4	17.0	17.0	14.4	15.2	17.4
100KG7W	3735.0	-29.4	39.0	12.8	17.4	17.5	14.4	20.3	14.1	16.6	16.6	14.0	14.8	17.1

Table A1-5: INTELSAT-1R/NSS-806 Ku-Band Uplink C/I

Ku-band Uplink C/I	System 1	System 2
Space station name	INTELSAT 1R	NSS-806
Nominal orbit location (+E, -W)	-50.00	-47.50
Stationkeeping tolerance (◦)	0.05	0.10
Assumed orbit location (+E, -W)	-49.95	-47.60
Longitude separation (◦)	2.35	2.35
Earth station pointing error (◦)	0.10	0.10
Earth station antenna efficiency (fraction)	0.65	0.65
Earth station angle toward wanted space station(◦)	2.49	2.49
Difference in wanted space station G/T toward wanted and interfering earth stations (dB)	0.0	0.0

NSS-806 into INTELSAT 1R													
Wanted INTELSAT 1R Emisssions				Interfering NSS-806 Emisssions									
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	36M0G7W
	Frequency (MHz)			14042.5	14042.5	14042.5	14042.5	14042.5	14125.0	14125.0	14125.0	14125.0	14042.5	14125.0
		ES power density (dBW/Hz)		-53.0	-53.7	-55.2	-52.4	-51.2	-50.6	-51.9	-51.9	-50.7	-53.7	-50.7
			ES gain (dBi)	51.0	52.8	52.8	51.0	52.8	51.0	52.8	52.8	51.0	56.4	52.8
100KG7W	13770.0	-61.4	56.8	27.4	28.2	29.6	26.8	25.7	25.0	26.4	26.3	25.1	28.2	25.1
100KG7W	14020.0	-55.8	56.8	33.0	33.8	35.2	32.4	31.3	30.6	32.0	31.9	30.7	33.8	30.7
10M3G7W	13770.0	-60.9	56.8	27.9	28.7	30.1	27.3	26.2	25.5	26.9	26.8	25.6	28.7	25.6
10M3G7W	14020.0	-55.6	56.8	33.2	34.0	35.4	32.6	31.5	30.8	32.2	32.1	30.9	34.0	30.9
1M45G7W	13770.0	-61.4	56.8	27.4	28.1	29.6	26.8	25.6	25.0	26.3	26.3	25.1	28.1	25.1
1M45G7W	13770.0	-52.7	56.8	36.1	36.8	38.3	35.5	34.3	33.7	35.0	35.0	33.8	36.8	33.8
36M0G7W	13770.0	-58.9	56.8	29.9	30.6	32.1	29.3	28.1	27.5	28.8	28.8	27.6	30.6	27.6
36M0G7W	14020.0	-50.6	56.8	38.2	38.9	40.4	37.6	36.4	35.8	37.1	37.1	35.9	38.9	35.9
400KG7W	13770.0	-56.5	48.9	26.0	26.7	28.2	25.4	24.2	23.6	24.9	24.9	23.7	26.7	23.7
400KG7W	13770.0	-51.1	48.9	31.4	32.1	33.6	30.8	29.6	29.0	30.3	30.3	29.1	32.1	29.1

INTELSAT 1R into NSS-806													
Interfering INTELSAT 1R Emisssions				Wanted NSS-806 Emisssions									
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	36M0G7W
	Frequency (MHz)			14042.5	14042.5	14042.5	14042.5	14042.5	14125.0	14125.0	14125.0	14125.0	14042.5	14125.0
		ES power density (dBW/Hz)		-53.0	-53.7	-55.2	-52.4	-51.2	-50.6	-51.9	-51.9	-50.7	-53.7	-50.7
			ES gain (dBi)	51.0	52.8	52.8	51.0	52.8	51.0	52.8	52.8	51.0	56.4	52.8
100KG7W	13770.0	-61.4	56.8	39.8	40.6	39.2	40.4	43.1	42.2	42.4	42.5	42.1	43.2	43.6
100KG7W	14020.0	-55.8	56.8	34.2	35.0	33.6	34.8	37.5	36.6	36.8	36.9	36.5	37.6	38.0
10M3G7W	13770.0	-60.9	56.8	39.3	40.1	38.7	39.9	42.6	41.7	41.9	42.0	41.6	42.7	43.2
10M3G7W	14020.0	-55.6	56.8	34.0	34.8	33.4	34.6	37.3	36.4	36.6	36.7	36.3	37.4	37.9
1M45G7W	13770.0	-61.4	56.8	39.8	40.6	39.2	40.4	43.1	42.2	42.4	42.5	42.1	43.3	43.7
1M45G7W	13770.0	-52.7	56.8	31.1	31.9	30.5	31.7	34.4	33.5	33.7	33.8	33.4	34.6	35.0
36M0G7W	13770.0	-58.9	56.8	37.3	38.1	36.7	37.9	40.6	39.7	39.9	40.0	39.6	40.8	41.2
36M0G7W	14020.0	-50.6	56.8	29.0	29.8	28.4	29.6	32.3	31.4	31.6	31.7	31.3	32.5	32.9
400KG7W	13770.0	-56.5	48.9	34.9	35.7	34.3	35.5	38.2	37.3	37.5	37.6	37.2	38.3	38.8
400KG7W	13770.0	-51.1	48.9	29.5	30.3	28.9	30.1	32.8	31.9	32.1	32.2	31.8	32.9	33.4

Table A1-6: INTELSAT-1R/NSS-806 Ku-Band Downlink C/I

Ku-band Downlink C/I	System 1	System 2
Space station name	INTELSAT 1R	NSS-806
Nominal orbit location (+E, -W)	-50.00	-47.50
Stationkeeping tolerance (◦)	0.05	0.10
Assumed orbit location (+E, -W)	-49.95	-47.60
Longitude separation (◦)	2.35	2.35
Earth station pointing error (◦)	0.10	0.10
Earth station antenna efficiency (fraction)	0.65	0.65
Earth station angle toward interfering space station (◦)	2.49	2.49
Difference in wanted and interfering space station gain toward wanted earth station (dB)	0.0	0.0

NSS-806 into INTELSAT 1R													
Wanted INTELSAT 1R Emisssions				Interfering NSS-806 Emisssions									
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	36M0G7W	25K0N0N
	Frequency (MHz)			11747.5	11747.5	11747.5	11747.5	11747.5	11830.0	11830.0	11830.0	11830.0	11747.5	11830.0	11701.0
		SS EIRP density (dBW/Hz)		-27.5	-27.4	-28.5	-28.0	-26.1	-26.1	-25.9	-26.2	-26.1	-26.1	-26.1	-35.0
			ES gain (dBi)	45.1	49.5	51.5	47.6	51.4	45.1	47.6	49.6	45.1	56.9	45.1	58.2
100KG7W	10970.0	-27.0	44.5	25.7	25.7	26.7	26.2	24.4	24.3	24.2	24.4	24.3	24.4	24.3	33.2
100KG7W	10970.0	-26.1	47.2	29.3	29.2	30.2	29.7	27.9	27.9	27.7	27.9	27.8	27.9	27.8	36.8
10M3G7W	10970.0	-26.4	44.5	26.3	26.3	27.3	26.8	25.0	24.9	24.8	25.0	24.9	25.0	24.9	33.8
10M3G7W	10970.0	-25.7	47.2	29.6	29.6	30.6	30.1	28.3	28.2	28.1	28.3	28.2	28.3	28.2	37.1
1M45G7W	10970.0	-29.2	47.2	26.1	26.1	27.1	26.6	24.7	24.7	24.6	24.8	24.7	24.7	24.7	33.6
1M45G7W	10970.0	-26.1	47.2	29.2	29.2	30.2	29.7	27.8	27.8	27.7	27.9	27.8	27.8	27.8	36.7
36M0G7W	10970.0	-25.1	44.5	27.6	27.6	28.6	28.1	26.2	26.2	26.1	26.3	26.2	26.2	26.2	35.1
36M0G7W	10970.0	-25.1	47.2	30.2	30.2	31.2	30.7	28.8	28.8	28.7	28.9	28.8	28.8	28.8	37.7
400KG7W	10970.0	-34.7	55.3	27.6	27.6	28.6	28.1	26.3	26.2	26.1	26.3	26.2	26.3	26.2	35.1
400KG7W	10970.0	-29.9	55.3	32.4	32.4	33.4	32.9	31.1	31.0	30.9	31.1	31.0	31.1	31.0	39.9

INTELSAT 1R into NSS-806													
Interfering INTELSAT 1R Emisssions				Wanted NSS-806 Emisssions									
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	36M0G7W	25K0N0N
	Frequency (MHz)			11747.5	11747.5	11747.5	11747.5	11747.5	11830.0	11830.0	11830.0	11830.0	11747.5	11830.0	11701.0
		SS EIRP density (dBW/Hz)		-27.5	-27.4	-28.5	-28.0	-26.1	-26.1	-25.9	-26.2	-26.1	-26.1	-26.1	-35.0
			ES gain (dBi)	45.1	49.5	51.5	47.6	51.4	45.1	47.6	49.6	45.1	56.9	45.1	58.2
100KG7W	10970.0	-27.0	44.5	25.3	29.5	30.3	27.2	32.6	26.7	29.3	30.9	26.7	36.7	26.7	28.5
100KG7W	10970.0	-26.1	47.2	24.4	28.6	29.4	26.3	31.7	25.8	28.4	30.0	25.8	35.8	25.8	27.6
10M3G7W	10970.0	-26.4	44.5	24.7	29.0	29.7	26.7	32.0	26.1	28.7	30.3	26.2	36.1	26.2	27.9
10M3G7W	10970.0	-25.7	47.2	24.0	28.3	29.0	26.0	31.3	25.4	28.0	29.6	25.5	35.4	25.5	27.2
1M45G7W	10970.0	-29.2	47.2	27.6	31.8	32.6	29.5	34.8	29.0	31.5	33.2	29.0	38.9	29.0	30.7
1M45G7W	10970.0	-26.1	47.2	24.5	28.7	29.5	26.4	31.7	25.9	28.4	30.1	25.9	35.8	25.9	27.6
36M0G7W	10970.0	-25.1	44.5	23.5	27.7	28.5	25.4	30.7	24.9	27.4	29.1	24.9	34.9	24.9	26.6
36M0G7W	10970.0	-25.1	47.2	23.5	27.7	28.5	25.4	30.7	24.9	27.4	29.1	24.9	34.9	24.9	26.6
400KG7W	10970.0	-34.7	55.3	33.0	37.3	38.0	35.0	40.3	34.4	37.0	38.6	34.5	44.4	34.5	36.2
400KG7W	10970.0	-29.9	55.3	28.2	32.5	33.2	30.2	35.5	29.6	32.2	33.8	29.7	39.6	29.7	31.4

Table A1-7: INTELSAT-1R/NSS-806 C-Band Uplink C/I

C-band Uplink C/I	System 1	System 2
Space station name	INTELSAT 1R	NSS-806
Nominal orbit location (+E, -W)	-50.00	-47.50
Stationkeeping tolerance (◦)	0.05	0.10
Assumed orbit location (+E, -W)	-49.95	-47.60
Longitude separation (◦)	2.35	2.35
Earth station pointing error (◦)	0.10	0.10
Earth station antenna efficiency (fraction)	0.65	0.65
Earth station angle toward wanted space station(◦)	2.49	2.49
Difference in wanted space station G/T toward wanted and interfering earth stations (dB)	0.0	0.0

NSS-806 into INTELSAT 1R											
Wanted INTELSAT 1R Emisssions				Interfering NSS-806 Emisssions									
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	36M0G7W
	Frequency (MHz)			5968.0	5968.0	5968.0	5968.0	5968.0	6068.0	6068.0	6068.0	6068.0	6068.0
		ES power density (dBW/Hz)		-47.6	-49.2	-50.3	-48.1	-52.8	-46.4	-47.9	-48.2	-46.4	-48.0
			ES gain (dBi)	45.3	47.1	47.1	45.3	54.9	45.5	47.2	47.2	45.5	49.1
100KG7W	5960.0	-52.3	49.4	25.3	26.9	27.9	25.7	30.5	24.1	25.6	25.8	24.0	25.6
100KG7W	6200.0	-41.6	49.4	36.0	37.6	38.6	36.4	41.2	34.8	36.3	36.5	34.7	36.3
10M3G7W	5960.0	-51.6	49.4	25.9	27.6	28.6	26.4	31.2	24.7	26.3	26.5	24.7	26.3
10M3G7W	6200.0	-41.0	49.4	36.5	38.2	39.2	37.0	41.8	35.3	36.9	37.1	35.3	36.9
36M0G7W	5960.0	-50.2	49.4	27.3	29.0	30.0	27.8	32.6	26.1	27.7	27.9	26.1	27.7
36M0G7W	5960.0	-48.7	58.4	35.5	37.1	38.1	35.9	40.7	34.3	35.8	36.0	34.2	35.8

INTELSAT 1R into NSS-806											
Interfering INTELSAT 1R Emisssions				Wanted NSS-806 Emisssions									
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	36M0G7W
	Frequency (MHz)			5968.0	5968.0	5968.0	5968.0	5968.0	6068.0	6068.0	6068.0	6068.0	6068.0
		ES power density (dBW/Hz)		-47.6	-49.2	-50.3	-48.1	-52.8	-46.4	-47.9	-48.2	-46.4	-48.0
			ES gain (dBi)	45.3	47.1	47.1	45.3	54.9	45.5	47.2	47.2	45.5	49.1
100KG7W	5960.0	-52.3	49.4	30.7	30.8	29.8	30.3	34.0	32.1	32.2	32.0	32.2	34.0
100KG7W	6200.0	-41.6	49.4	20.0	20.1	19.1	19.6	23.3	21.4	21.5	21.3	21.5	23.3
10M3G7W	5960.0	-51.6	49.4	30.1	30.1	29.1	29.6	33.3	31.4	31.5	31.3	31.5	33.3
10M3G7W	6200.0	-41.0	49.4	19.5	19.5	18.5	19.0	22.7	20.8	20.9	20.7	20.9	22.7
36M0G7W	5960.0	-50.2	49.4	28.7	28.8	27.7	28.2	32.0	30.1	30.2	29.9	30.1	31.9
36M0G7W	5960.0	-48.7	58.4	27.2	27.3	26.2	26.7	30.5	28.6	28.7	28.4	28.6	30.4

Table A1-8: INTELSAT-1R/NSS-806 C-Band Downlink C/I

C-band Downlink C/I	System 1	System 2
Space station name	INTELSAT 1R	NSS-806
Nominal orbit location (+E, -W)	-50.00	-47.50
Stationkeeping tolerance (◦)	0.05	0.10
Assumed orbit location (+E, -W)	-49.95	-47.60
Longitude separation (◦)	2.35	2.35
Earth station pointing error (◦)	0.10	0.10
Earth station antenna efficiency (fraction)	0.65	0.65
Earth station angle toward interfering space station (◦)	2.49	2.49
Difference in wanted and interfering space station gain toward wanted earth station (dB)	0.0	0.0

NSS-806 into INTELSAT 1R												
Wanted INTELSAT 1R Emisssions				Interfering NSS-806 Emisssions										
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	36M0G7W	300KF9D
	Frequency (MHz)			3743.0	3743.0	3743.0	3743.0	3743.0	3843.0	3843.0	3843.0	3843.0	3843.0	3947.5
		SS EIRP density (dBW/Hz)		-39.0	-37.7	-37.7	-38.9	-36.6	-35.9	-35.3	-35.4	-36.0	-35.2	-42.8
			ES gain (dBi)	41.6	45.0	45.0	43.1	46.9	39.8	41.8	41.8	39.8	39.8	50.0
100KG7W	3735.0	-32.6	40.0	27.3	26.0	25.9	27.1	24.9	24.2	23.6	23.6	24.2	23.4	31.0
100KG7W	3735.0	-42.6	44.4	21.6	20.3	20.3	21.5	19.2	18.5	17.9	18.0	18.6	17.8	25.4
10M3G7W	3735.0	-31.9	40.0	27.9	26.7	26.6	27.8	25.6	24.8	24.3	24.3	24.9	24.1	31.7
10M3G7W	3735.0	-42.2	44.4	22.0	20.7	20.6	21.8	19.6	18.9	18.3	18.3	18.9	18.2	25.8
36M0G7W	3735.0	-30.5	40.0	29.3	28.1	28.0	29.2	26.9	26.2	25.7	25.7	26.3	25.5	33.1
36M0G7W	3735.0	-39.3	41.8	22.3	21.0	21.0	22.2	19.9	19.2	18.6	18.7	19.3	18.5	26.1

INTELSAT 1R into NSS-806												
Interfering INTELSAT 1R Emisssions				Wanted NSS-806 Emisssions										
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	36M0G7W	300KF9D
	Frequency (MHz)			3743.0	3743.0	3743.0	3743.0	3743.0	3843.0	3843.0	3843.0	3843.0	3843.0	3947.5
		SS EIRP density (dBW/Hz)		-39.0	-37.7	-37.7	-38.9	-36.6	-35.9	-35.3	-35.4	-36.0	-35.2	-42.8
			ES gain (dBi)	41.6	45.0	45.0	43.1	46.9	39.8	41.8	41.8	39.8	39.8	50.0
100KG7W	3735.0	-32.6	40.0	16.0	20.6	20.6	17.6	23.5	17.3	19.8	19.8	17.2	18.0	20.3
100KG7W	3735.0	-42.6	44.4	26.0	30.6	30.6	27.6	33.5	27.3	29.8	29.8	27.2	28.0	30.3
10M3G7W	3735.0	-31.9	40.0	15.3	19.9	20.0	16.9	22.8	16.6	19.2	19.1	16.5	17.3	19.6
10M3G7W	3735.0	-42.2	44.4	25.6	30.2	30.3	27.2	33.1	26.9	29.5	29.4	26.8	27.6	29.9
36M0G7W	3735.0	-30.5	40.0	13.9	18.5	18.6	15.5	21.5	15.2	17.8	17.8	15.2	16.0	18.2
36M0G7W	3735.0	-39.3	41.8	22.7	27.3	27.4	24.3	30.3	24.0	26.6	26.6	24.0	24.8	27.0

Table A1-9: DIRECTV KU-45W/NSS-806 Ku-Band Uplink C/I

Ku-band Uplink C/I	System 1	System 2
Space station name	DIRECTV KU-45W	NSS-806
Nominal orbit location (+E, -W)	-45.20	-47.50
Stationkeeping tolerance (◦)	0.05	0.10
Assumed orbit location (+E, -W)	-45.25	-47.40
Longitude separation (◦)	2.15	2.15
Earth station pointing error (◦)	0.10	0.10
Earth station antenna efficiency (fraction)	0.65	0.65
Earth station angle toward wanted space station(◦)	2.27	2.27
Difference in wanted space station G/T toward wanted and interfering earth stations (dB)	17.0	17.0

NSS-806 into DIRECTV KU-45W											
Wanted DIRECTV KU-45W Emisssions				Interfering NSS-806 Emisssions										
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	36M0G7W
	Frequency (MHz)			5968.0	5968.0	5968.0	5968.0	5968.0	6068.0	6068.0	6068.0	6068.0	6068.0
		ES power density (dBW/Hz)		-47.6	-49.2	-50.3	-48.1	-52.8	-46.4	-47.9	-48.2	-46.4	-48.0
			ES gain (dBi)	45.3	47.1	47.1	45.3	54.9	45.5	47.2	47.2	45.5	49.1
36M0G7W	14020.0	-66.9	60.7	33.7	35.4	36.4	34.2	38.9	32.5	34.1	34.3	32.5	34.1

DIRECTV KU-45W into NSS-806											
Interfering DIRECTV KU-45W Emisssions				Wanted NSS-806 Emisssions										
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	36M0G7W
	Frequency (MHz)			5968.0	5968.0	5968.0	5968.0	5968.0	6068.0	6068.0	6068.0	6068.0	6068.0
		ES power density (dBW/Hz)		-47.6	-49.2	-50.3	-48.1	-52.8	-46.4	-47.9	-48.2	-46.4	-48.0
			ES gain (dBi)	45.3	47.1	47.1	45.3	54.9	45.5	47.2	47.2	45.5	49.1
36M0G7W	14020.0	-66.9	60.7	61.3	61.4	60.4	60.9	64.6	62.7	62.8	62.6	62.8	64.6

Table A1-10: DIRECTV KU-45W/NSS-806 Ku-Band Downlink C/I

Ku-band Downlink C/I	System 1	System 2
Space station name	DIRECTV KU-45W	NSS-806
Nominal orbit location (+E, -W)	-45.20	-47.50
Stationkeeping tolerance (◦)	0.05	0.10
Assumed orbit location (+E, -W)	-45.25	-47.40
Longitude separation (◦)	2.15	2.15
Earth station pointing error (◦)	0.10	0.10
Earth station antenna efficiency (fraction)	0.65	0.65
Earth station angle toward interfering space station (◦)	2.27	2.27
Difference in wanted and interfering space station gain toward wanted earth station (dB)	17.0	17.0

NSS-806 into DIRECTV KU-45W												
Wanted DIRECTV KU-45W Emisssions				Interfering NSS-806 Emisssions								
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	36M0G7W	300KF9D
	Frequency (MHz)			3743.0	3743.0	3743.0	3743.0	3743.0	3843.0	3843.0	3843.0	3843.0	3843.0	3947.5
		SS EIRP density (dBW/Hz)		-39.0	-37.7	-37.7	-38.9	-36.6	-35.9	-35.3	-35.4	-36.0	-35.2	-43.0
			ES gain (dBi)	41.6	45.0	45.0	43.1	46.9	39.8	41.8	41.8	39.8	39.8	48.8
36M0G7W	11470.0	-21.8	34.0	48.1	46.8	46.7	48.0	45.7	45.0	44.4	44.4	45.1	44.3	52.1
106KG9D	11697.0	-35.4	56.9	55.5	54.2	54.2	55.4	53.1	52.4	51.8	51.9	52.5	51.7	59.5

DIRECTV KU-45W into NSS-806												
Interfering DIRECTV KU-45W Emisssions				Wanted NSS-806 Emisssions								
Emission				346KG7W	461KG7W	1M85G7W	8M25G7W	72M2G7W	346KG7W	461KG7W	1M85G7W	8M25G7W	36M0G7W	300KF9D
	Frequency (MHz)			3743.0	3743.0	3743.0	3743.0	3743.0	3843.0	3843.0	3843.0	3843.0	3843.0	3947.5
		SS EIRP density (dBW/Hz)		-39.0	-37.7	-37.7	-38.9	-36.6	-35.9	-35.3	-35.4	-36.0	-35.2	-43.0
			ES gain (dBi)	41.6	45.0	45.0	43.1	46.9	39.8	41.8	41.8	39.8	39.8	48.8
36M0G7W	11470.0	-21.8	34.0	21.2	25.8	25.9	22.8	28.7	22.5	25.0	25.0	22.4	23.2	24.2
106KG9D	11697.0	-35.4	56.9	34.8	39.4	39.4	36.4	42.3	36.1	38.6	38.6	36.0	36.8	37.7

DECLARATION

I, Roger LeClair, hereby certify under penalty of perjury that I am the technically qualified person responsible for preparation of the technical information contained in the foregoing exhibit; that I am familiar with the technical requirements of Part 25; and that I either prepared or reviewed the technical information contained in the exhibit and that it is complete and accurate to the best of my knowledge, information and belief.

/s/_____

Roger LeClair

President

LeClair Telecom

Dated: May 28, 2013