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

In the Matter of	)	
	)	
NEW SKIES SATELLITES B.V.	)	File No. SAT-MPL-_____
	)	Call Sign S2463
Request for Modification of the Terms of	)	
U.S. Market Access for NSS-7	)	

MODIFICATION

New Skies Satellites B.V. (doing business as "SES") hereby respectfully requests that the Commission modify the terms pursuant to which the Netherlands-licensed NSS-7 space station is authorized to serve the U.S. market. Currently, NSS-7 is on the Commission's Permitted Space Station List ("Permitted List") for operations in the conventional C- and Ku-bands at 22° W.L.[1] SES proposes to relocate NSS-7 to 20º W.L., where it will serve as a replacement for the currently operating NSS-5 satellite. Accordingly, SES requests that the Commission: (1) modify the Permitted List to include the NSS-7 conventional C-band payload (3700-4200 MHz downlink; 5925-6425 MHz uplink), a portion of the conventional Ku-band payload (11.95-12.2 GHz downlink), and specified telemetry, tracking and control ("TT&C") frequencies[2] for operations at 20º W.L.; (2) issue a ruling permitting the use of the NSS-7 extended C-band capacity (3625-3700 MHz downlink; 5850-5925 MHz uplink) at 20º W.L. for

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1 *See New Skies Satellites N.V.*, 17 FCC Rcd 10369 (IB 2002) ("*NSS-7 Order*") (adding NSS-7 to the Permitted List for operations at 21.5º W.L.), as modified by File No. SAT-PDR-20020930-00179, grant-stamped May 29, 2003 (updating the Permitted List to reflect relocation of NSS-7 to 22º W.L.).

2 The NSS-7 TT&C frequencies are as follows:
Command: 14496.0 and 14499.0 MHz (vertical polarization; uplink)
Telemetry/Tracking: 11451.0 and 11454.0 MHz (horizontal polarization; downlink)
Tracking Beacon: 4199.5 MHz (vertical polarization; downlink).

international service, subject to earth station-specific licensing; and (3) authorize use of NSS-7 for direct-to-home ("DTH") service within the United States and between the U.S. and the other markets identified herein. Grant of the requested authority is consistent with Commission precedent and will serve the public interest by allowing SES to continue to provide service from 20° W.L. and to respond to customer demand for DTH capacity.

Except for certain specified Ku-band TT&C frequencies on NSS-7, SES is not seeking U.S. market access for the remaining extended and conventional Ku-band frequencies on NSS-7 as part of this petition (10.95-11.2 GHz, 11.45-11.95 GHz and 12.5-12.75 GHz downlink; 14.0-14.5 GHz uplink). As in the case of the NSS-5 satellite currently operating at 20° W.L., these remaining Ku-band frequencies will be operated by Intelsat pursuant to a U.S. license in accordance with an agreement between SES and Intelsat.[3] Intelsat is contemporaneously filing a separate application for a U.S. license for these remaining Ku-band frequencies. The 11.95-12.2 GHz frequencies are not present on either NSS-5 or the Intelsat 603 spacecraft that preceded NSS-5 at the nominal 20° W.L. orbital location, and these frequencies are not covered by the SES-Intelsat agreement. Accordingly, SES is seeking to continue to operate the 11.95-12.2 GHz downlink frequencies on NSS-7 pursuant to Netherlands authority and requests inclusion of those frequencies on the Permitted List.

The table below summarizes the proposed licensing arrangements for NSS-7 as compared with the licensing arrangements for the NSS-5 satellite currently operating at 20° W.L.

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[3] The NSS-5 C-band payload operates pursuant to Netherlands authority and is on the Permitted List for service to U.S. earth stations. Under an agreement between SES and Intelsat, the NSS-5 Ku-band payload is operated by Intelsat pursuant to a U.S. license. *See New Skies Satellites B.V.*, Call Sign S2802, File Nos. SAT-PPL-20091208-00142& SAT-APL-20100219-00034, grant-stamped June 4, 2010; *Intelsat License LLC*, Call Sign S2801, File No. SAT-A/O-20091208-00141, grant-stamped June 4, 2010.

Payload	NSS-5 at 20° W.L. (current)	NSS-7 at 20° W.L. (proposed)
TT&C frequencies	Operated by SES under Netherlands authority. Command: 6173.7 and 6176.3 MHz Telemetry: 3947, 3948, 3952, 3952.5 MHz Tracking Beacons: 11198, 11452, 11701 and 12501 MHz	Operated by SES under Netherlands authority. Command: 14496.0 and 14499.0 MHz Telemetry/Tracking: 11451.0 and 11454.0 MHz Tracking Beacon: 4199.5 MHz
3625-3700 MHz downlink; 5850-5925 MHz uplink (extended C-band)	Operated by SES under Netherlands authority.	Operated by SES under Netherlands authority.
3700-4200 MHz downlink; 5925-6425 MHz uplink (conventional C-band)	Operated by SES under Netherlands authority.	Operated by SES under Netherlands authority.
10.95-11.2 GHz, 11.45-11.95 GHz and 12.5-12.75 GHz downlink; 14.0-14.5 GHz uplink (extended and portion of conventional Ku-band)	Operated by Intelsat under U.S. authority.	Operated by Intelsat under U.S. authority.
11.95-12.2 GHz downlink (portion of conventional Ku-band)	Not on NSS-5.	Operated by SES under Netherlands authority.

A completed FCC Form 312 is attached, and SES incorporates by reference the technical information previously provided in support of NSS-7.[4] In addition, SES is providing information relating to the proposed modification in the attached narrative Technical Appendix and Schedule S.

[4] *See* Call Sign S2463, File Nos. SAT-PDR-20010309-00020 & SAT-PDR-20020930-00179; *see also* Letter from William W. Wiltshire to Magalie Roman Salas dated Jan. 22, 2001.

I. BACKGROUND

NSS-7 is a C/Ku-band hybrid spacecraft operating at 22° W.L. pursuant to a license issued by The Netherlands. In 2002, the Commission added the NSS-7 satellite to the Permitted List to enable the satellite to provide Fixed Satellite Service ("FSS") in the United States using the conventional C- and Ku-bands.[5] Since its launch, the satellite has been successfully providing FSS to enterprise and government customers in the Americas, Europe, Africa, and the Middle East, as well as over the Atlantic Ocean region.

SES is preparing to launch the SES-4 spacecraft in order to replace NSS-7 at 22° W.L.[6] Launch of SES-4 is currently scheduled for mid-February, 2012. Following the launch of SES-4 and the transfer of traffic from NSS-7 to SES-4, SES proposes to drift NSS-7 from 22° W.L. to 20° W.L. SES seeks modification of the existing terms of the NSS-7 U.S. market access to reflect this planned relocation. At 20° W.L., the NSS-7 conventional and extended C-band payloads, a portion of the NSS-7 conventional Ku-band communications payload, and the Ku-band TT&C frequencies specified above will be operating pursuant to authority from The Netherlands and under ITU filings submitted by The Netherlands Administration. SES requests that the Commission update the Permitted List entry for NSS-7 to permit U.S.-licensed earth stations to continue to communicate with the satellite in the conventional C-band, the 11.95-12.2 GHz conventional Ku-band, and the specified Ku-band

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[5] *See NSS-7 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] SES has requested that the Commission add SES-4 to the Permitted List for operations at 22° W.L. *See* Call Sign S2828, File No. SAT-PPL-20110620-00112.

TT&C frequencies subsequent to the satellite's relocation.[7] In addition, SES requests that the Commission issue a ruling allowing U.S.-licensed earth stations to communicate with NSS-7 in the extended C-band, subject to earth station-specific licensing.

NSS-7 was authorized to serve the U.S. pursuant to the market access policies for foreign-licensed satellites adopted by the Commission, which implement U.S. commitments under the World Trade Organization Basic Telecommunications Agreement ("WTO Telecom Agreement").[8] In the *DISCO II* proceeding, the Commission adopted a presumption that, with respect to satellite services covered by the WTO Telecom Agreement, entry into the U.S. market by satellites licensed by WTO-member countries will promote competition in the U.S. market.[9] For services such as DTH that are excluded from the U.S. commitments in the WTO Telecom Agreement, the Commission applies the "ECO-Sat" test, which requires a determination whether U.S.-licensed satellites have "effective competitive opportunities" in the relevant foreign markets to provide analogous services.[10] The Commission's policies are intended to ensure that entry by a foreign-licensed satellite will not distort competition in the U.S.[11]

At the time it sought U.S. market access for NSS-7, SES did not seek DTH authority and accordingly did not make an ECO-Sat showing for the spacecraft. As a result,

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7 SES anticipates that for service continuity reasons certain U.S. earth stations currently communicating with NSS-7 will need to communicate with the satellite during this relocation. Authority for such communications will be sought by the applicable earth station licensees.

8 *See Amendment of the Commission's Policies to Allow Non-U.S. Licensed Space Stations providing Domestic and International Service in the United States,* Report & Order, 12 FCC Rcd 24094, 24096 (1997) ("*DISCO II*").

9 *Id.* at 24112.

10 *Id.* at 24134.

11 *Id.* at 24137.

communications with NSS-7 for the purpose of providing DTH service to, from or within the United States were not authorized under the existing terms of the declaratory ruling adding NSS-7 to the Permitted List.[12]

SES seeks modification of the terms of U.S. market access for NSS-7 to permit the spacecraft to provide DTH service to, from, and within the U.S. and on the route markets described below. SES demonstrates herein that the ECO-Sat test is satisfied with respect to the relevant jurisdictions.

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. Here, grant of the requested modifications will permit SES to provide follow-on service at 20° W.L. and offer additional capacity for DTH service.

A. Relocation of NSS-7 Will Facilitate Service Continuity at 20° W.L.

The Commission has repeatedly observed that its policy is to allow "satellite operators to rearrange satellites in their fleet to reflect business and customer considerations where no public interest factors are adversely affected."[13] 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

[12] *See NSS-7 Order* at ¶ 28.

[13] *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).

> customers. Consequently the Commission will generally grant a licensee's request to modify its system, provided there are no compelling countervailing public interest considerations.[14]

Furthermore, the Commission's replacement expectancy policy for satellite networks is premised on the importance of promoting service continuity.[15] This policy applies to foreign-licensed satellites serving the U.S. market, as well as to U.S. licensees.[16]

Relocating NSS-7 will permit SES to make efficient use of its satellite fleet following replacement of NSS-7 by SES-4 and will facilitate the provision of follow-on services at 20° W.L. Accordingly, grant of the requested modification of the terms on which NSS-7 is authorized to serve the U.S market is consistent with Commission precedent and with the public interest.

B. Grant of DTH Authority Is Consistent with Section 25.137

The *DISCO II* policies for determining whether to permit foreign-licensed satellites to serve the U.S. are codified in Section 25.137 of the Commission's Rules.[17] SES's modification request fully complies with the Commission's market access requirements.

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[14] *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 ("*Space Station Licensing Order*") 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).

[15] *See, e.g., Space Station Licensing Order* at ¶ 250 (the replacement expectancy policy for satellite networks provides "assurance that operators will be able to continue to serve their customers" given the high costs of building and operating space stations).

[16] *See id.* at ¶ 324 ("We afford non-U.S.-licensed satellites the same replacement expectancy as we do U.S.-licensed satellites.").

[17] 47 C.F.R. § 25.137.

As discussed above, the ECO-Sat test applies to this request for authority to provide services not covered by the WTO Telecom Agreement. Under the Commission's rules, the relevant foreign markets for this test are (i) the country in which the non-U.S.-licensed satellite is licensed; and (ii) the countries in which communications with U.S. earth stations will originate or terminate.[18] To assess compliance with the ECO-Sat test, the Commission looks at whether there are *de jure* or *de facto* barriers to entry for U.S. satellite operators seeking to provide comparable services in the relevant foreign jurisdiction.[19]

In this instance, SES is seeking authority to use capacity on NSS-7 to provide DTH services: (1) within the U.S., (2) between the U.S. and the Netherlands, (3) between the U.S. and other European Union member states, (4) between the U.S. and Mexico, and (5) between the U.S. and Brazil, the Netherlands Antilles, Guatemala, Honduras, Nicaragua, and the overseas territories of the United Kingdom located in the Caribbean (Bermuda, the British Virgin Islands, and the Cayman Islands). As demonstrated below, all of these countries satisfy the ECO-Sat test.

The Netherlands. The Netherlands, which is the licensing administration for NSS-7, passes the ECO-Sat test. There are no *de jure* or *de facto* barriers in the Netherlands to U.S. satellite operators wishing to provide capacity for DTH service.[20] The Netherlands' policy

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18 *See* 47 C.F.R. § 25.137(a).

19 *DISCO II*, 12 FCC Rcd at 24128.

20 In support of its request to provide Direct Broadcast Satellite ("DBS") service to the U.S. using Netherlands-licensed satellites, Spectrum Five demonstrated that the "only Dutch regulation applicable to the provision of satellite services (including DBS) requires that a license be obtained from the Radiocommunications Agency Netherlands for the use of frequencies for a satellite earth station," and there are "no restrictions regarding the nationality of the applicant for a license." Petition for Declaratory Ruling of Spectrum Five LLC, File Nos. SAT-LOI-20050312-00062/00063, Narrative at 16. Given this undisputed showing, the International Bureau found no evidence "that suggests the existence of market entry barriers to the

conforms to the European Union ("EU") directive specifying that "Member States shall ensure that any regulatory prohibition or restriction on the offer of space segment capacity to any authorised satellite earth station network operator are abolished."[21] Accordingly, authorizing NSS-7 to offer DTH service within the U.S. and between the U.S. and the Netherlands is consistent with *DISCO II*.

Other EU Member States. Similarly, there are no *de jure* or *de facto* barriers in other EU member states to U.S. satellite operators wishing to provide capacity for DTH service. In addition to the Netherlands, the Commission has previously determined that the ECO-Sat test is satisfied with respect to EU member the United Kingdom and its offshore territory Gibraltar[22] and has applied an analysis similar to the ECO-Sat test with respect to EU member Luxembourg.[23] Further individual analyses are not necessary, however, because pursuant to the EU directive described above, all EU member states are prohibited from imposing any

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Netherlands." *Spectrum Five LLC*, Order and Authorization, DA 06-2439, 21 FCC Rcd 14023 (IB 2006) at ¶ 12; *applications for review denied*, FCC 08-64, 23 FCC Rcd 3252 (2008).

[21] Commission Directive 2002/77/EC, 16 September 2002 on competition in the markets for electronic communications networks and services, OJ L249, Article 7(1) at 21.

[22] *See SES Americom, Inc.*, Call Sign S2676, Consent to Assignment, File No. SAT-ASG-20080609-00120 (grant-stamped Aug. 6, 2008) ("AMC-21 Grant"), Attachment at 3.

[23] Specifically, the Commission considered competitive issues in connection with provision of DTH services by SES Americom using its U.S.-licensed satellites given the ultimate ownership of SES Americom by a Luxembourg entity. *See SES Americom, Inc.*, 18 FCC Rcd 16589 at ¶¶ 16-17 (IB 2003). In that context, the Commission considered whether "a foreign operator could provide services in the United States that a U.S.-owned operator could not provide because it could not obtain authorization to operate in the home market of the foreign operator." *Id*. at ¶ 16. The Commission concluded that "such concerns . . . have not been presented in this case," and that "no competitive concerns [were] presented by SES Global's indirect ownership in the Applicants as providers of DTH service in the United States." *Id*. at ¶ 17.

regulations or restrictions on satellite capacity, including capacity for DTH services. Accordingly, the ECO-Sat test is satisfied for every EU member state.[24]

Mexico. Mexico passes the ECO-Sat test. The U.S. and Mexico have entered into a bilateral agreement pursuant to which Mexico has agreed to permit U.S.-licensed satellites to provide FSS including DTH service to, from, and within Mexico provided that licensing and coordination conditions are met.[25] Accordingly, allowing NSS-7 to provide DTH capacity in Mexico is consistent with *DISCO II*.[26]

Brazil, Netherlands Antilles, Guatemala, Honduras, Nicaragua and U.K. Territories in the Caribbean. The Satellite Division has previously found that the ECO-Sat test is satisfied for DTH with respect to Brazil[27] and with respect to the Netherlands Antilles,

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[24] The twenty-seven current member states of the EU are: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom. *See* http://europa.eu/about-eu/member-countries/index_en.htm.

[25] *See* Protocol Concerning the Transmission and Reception of Signals from Satellites for the Provision of Direct-to-Home Satellite Television Services in the United States of America and the United Mexican States, November 8, 1996.

[26] *See DISCO II*, 12 FCC Rcd at 24157 (there is no need for an inquiry into effective competitive opportunities where a bilateral agreement is in place with respect to the relevant service). *See also EchoStar Satellite LLC*, 21 FCC Rcd 4077, 4080 (Sat. Div. 2006) at ¶ 8 & n.20 (in light of U.S.-Mexico bilateral agreement, "no further market access analysis is required" under *DISCO II* in order to authorize U.S.-licensed earth stations to communicate with satellite operating under Mexican authority for DTH services).

[27] *See Hispamar Satelites, S.A.*, Call Sign S2622, File No. SAT-MOD-20040628-00124 (grant-stamped Aug. 26, 2004) ("Amazonas-1 Modification") (modifying the Permitted Space Station List entry for the Brazilian-licensed Amazonas-1 satellite to permit the provision of DTH service to, from, or within the U.S.); *Hispamar Satelites, S.A.*, Call Sign S2793, File Nos. SAT-PPL-20100506-00093 & SAT-APL-20101209-00257 (grant-stamped Dec. 21, 2010; grant reissued Jan. 7, 2011) (same with respect to Amazonas-2).

Guatemala, Honduras, Nicaragua, Bermuda, British Virgin Islands, and Cayman Islands route markets.[28]

In sum, U.S.-licensed operators have effective competitive opportunities to provide DTH transmission capacity in the Netherlands and other EU member states, Mexico, Brazil, the Netherlands Antilles, Guatemala, Honduras, Nicaragua, and the relevant Caribbean islands. Thus, the ECO-Sat test is satisfied for both the home and route markets for DTH service by NSS-7.

The Commission has previously granted requests to modify the terms of U.S. market access for foreign-licensed satellites when an appropriate ECO-Sat showing has been submitted.[29] In these cases the Commission concluded that expanding the terms of market access will not result in competitive distortions, and that "making additional satellite capacity available to provide DTH services in the United States will result in public interest benefits."[30]

The same conclusion is appropriate here. SES has demonstrated compliance with the terms of the Commission's market access test. Granting the requested authority will allow SES to offer DTH capacity using NSS-7 in competition with U.S.-licensed satellites and other foreign-licensed operators who have made the requisite ECO-Sat showing. Ultimately, U.S. DTH customers will be the beneficiaries of this enhanced competition.

Accordingly, SES respectfully requests that the Commission modify the terms of the Permitted Space Station List entry for NSS-7 to remove the prohibition on the use of the spacecraft to provide DTH services. The Commission should specify that NSS-7 is permitted to

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28 *See* AMC-21 Grant, Attachment at 3.

29 *See, e.g.*, Amazonas-1 Modification; *Horizons Satellite LLC*, Order and Authorization, DA 04-1315, 19 FCC Rcd 20349 (Sat. Div. 2004).

30 *Id.* at 20351.

provide DTH capacity to, from, and within the U.S. and on the route markets addressed herein (the Netherlands and all other EU member states, Mexico, Brazil, the Netherlands Antilles, Guatemala, Honduras, Nicaragua, Bermuda, the British Virgin Islands, and the Cayman Islands).

III. WAIVER REQUESTS

SES seeks limited waivers of the Commission's rules in connection with the requested modification to the NSS-7 market access authority. Grant of these waivers is consistent with Commission policy:

> The Commission may waive a rule for good cause shown. Waiver is appropriate if special circumstances warrant a deviation from the general rule and such deviation would better serve the public interest than would strict adherence to the general rule. Generally, the Commission may grant a waiver of its rules in a particular case if the relief requested would not undermine the policy objective of the rule in question and would otherwise serve the public interest.[31]

Sections 25.210(a)(1) and (3), 25.210(i) and 25.211(a): SES requests continued application of the waivers of Sections 25.210(a)(1) and (3), 25.210(i) and 25.211(a) that were granted in the NSS-7 Order.[32] Sections 25.210(a)(1) and (3) and 25.211(a) specify C-band polarization and polarization switching requirements and impose a frequency plan for C-band analog video.[33] The NSS-7 C-band payload does not conform to these specifications.[34]

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31 *PanAmSat Licensee Corp*., 17 FCC Rcd 10483, 10492 (Sat. Div. 2002) (footnotes omitted).

32 *See NSS-7 Order* at ¶¶ 14-22 & 29 (granting waivers of Sections 25.210(a)(1) and (3), 25.210(i) and 25.211(a) for U.S. earth stations communicating with NSS-7).

33 47 C.F.R. §§ 25.210(a)(1) and (3) and 25.211(a).

34 *See* Technical Appendix, Section 7.

Section 25.210(i) sets a minimum cross-polarization isolation performance in the primary coverage area of a satellite.[35] Certain beams of the NSS-7 satellite do not meet this minimum.[36]

The NSS-7 satellite and frequencies have been authorized by the Netherlands Administration, and the C-band payload has been fully coordinated with U.S. systems. Operations of NSS-7 are not expected to cause any harmful interference. Accordingly, SES requests that the Commission continue to authorize operation of the satellite pursuant to the existing waivers for this spacecraft.

Section 25.114(d)(3): SES requests any necessary waiver of Section 24.114(d)(3) of the Commission's rules, which prescribes the level of detail required for the space station antenna gain contours.[37] As noted in the Technical Appendix, for certain beams some of the contours specified in the rule do not intersect with the earth's surface.[38] As a result, these contours would not supply any information relevant to the Commission or interested third parties and therefore have not been provided.

Sections 25.114(d)(14)(ii) and 25.283(c): These rules address requirements relating to venting stored energy sources at the spacecraft's end of life.[39] NSS-7 is a Lockheed Martin A2100 model spacecraft. As described in more detail in the attached Technical Appendix, the oxidizer tanks on the spacecraft were sealed following completion of the launch phase and

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35 47 C.F.R. § 25.210(i).

36 *See* Technical Appendix, Section 2.3.

37 47 C.F.R. § 25.114(d)(3).

38 *See, e.g.*, Technical Appendix, Figure B-1.

39 Section 25.283(c) contains the substantive venting requirement, and Section 25.114(d)(14)(ii) requires applicants to submit information that addresses "whether stored energy will be removed at the spacecraft's end of life." 47 C.F.R. § 25.114(d)(14)(ii).

will therefore retain residual pressure at end of life. Given the spacecraft design, it is physically impossible for SES to vent the oxidizer tanks in order to comply with Section 25.283(c).

No waiver of Section 25.283(c) appears to be necessary, however, for purposes of this modification because NSS-7 was launched in 2002, before the venting requirement in Section 25.283(c) was adopted or took effect.[40] That rule, therefore, does not apply to NSS-7. To read the rule otherwise would be to impermissibly "increase a party's liability for past conduct."[41] It is impossible at this point to make any changes to the design of a spacecraft that has already launched.

In any event, Section 25.283(c) does not appear to apply to foreign-licensed spacecraft such as NSS-7. By its terms, the rule applies only to "space station licensee[s]," *i.e.*, to spacecraft licensed by the Commission, rather than spacecraft licensed by other Administrations that are seeking U.S. market access. However, out of an abundance of caution, SES respectfully requests a waiver of Section 25.283(c), to the extent one is necessary, due to the impossibility of compliance.

Under Commission precedent, grant of a waiver is warranted. In a number of cases involving various spacecraft models with similar limitations, the Commission has waived Section 25.283(c) to permit launch and operation of spacecraft that do not allow for full venting of pressure vessels at end of life, based on a finding that modifying the space station design at a late stage of construction would pose an undue hardship.[42] In the case of NSS-7, which was

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40 *See Mitigation of Orbital Debris,* Second Report and Order, 19 FCC Rcd 11567 (2004).

41 *See id.* at 11598 (¶ 78), *citing Celotronix Telemetry, Inc. v. FCC*, 272 F.3d 585, 588 (D.C. Cir. 2001).

42 *See, e.g., EchoStar Satellite Operating Corp.*, File No. SAT-LOA-20071221-00183, Call Sign S2746, grant-stamped Mar. 12, 2008, Attachment at ¶ 4 (granting a partial waiver of Section 25.283(c) for AMC-14, a Lockheed Martin A2100 model spacecraft, on grounds that

launched and operational before the venting requirements were adopted, there is no question of bringing the satellite into compliance with the rule. The Commission has expressly recognized this, finding a waiver of Section 25.283(c) to be justified for in-orbit spacecraft that cannot satisfy the rule's requirements. For example, in a decision involving the SES Americom AMC-2 satellite, which like NSS-7 was launched before Section 25.283(c) was adopted, the Commission waived the rule on its own motion, observing that venting the spacecraft's sealed oxidizer tanks "would require direct retrieval of the satellite, which is not currently possible."[43]

The same practical obstacle is present here. Because NSS-7 is already in orbit, SES can do nothing to enable full venting of residual pressure in the oxidizer tanks. Given this reality, if Section 25.283(c) applies here, a waiver is clearly warranted.

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requiring modification of satellite would present an undue hardship); *DIRECTV Enterprises LLC*, File No. SAT-LOA-20090807-00086, Call Sign S2797, grant-stamped Dec. 15, 2009, Attachment at ¶ 4 (same for DIRECTV 12, a Boeing 702 model spacecraft); *PanAmSat Licensee Corp*., File Nos. SAT-MOD-20070207-00027, SAT-AMD-20070716-00102, Call Sign S2237, grant-stamped Oct. 4, 2007, Attachment at ¶ 7 (same for Intelsat 11, an Orbital Sciences Star model spacecraft).

[43] File No. SAT-MOD-20101215-00261, Call Sign S2134, grant-stamped Mar. 8, 2011, Attachment at ¶ 4. *See also XM Radio Inc.*, File No. SAT-MOD-20100722-00165, Call Sign S2616, grant-stamped Oct. 14, 2010, Attachment at ¶ 2 (waiving Section 25.283(c) for XM-4, a Boeing 702 model spacecraft, because "modification of the spacecraft would present an undue hardship, since XM-4 is an in-orbit space station and venting XM-4's helium and xenon tanks would require direct retrieval of the satellite, which is not currently possible").

IV. CONCLUSION

For the foregoing reasons, SES respectfully requests modification of the terms pursuant to which NSS-7 is authorized to serve the U.S. market to permit use of the satellite for operations at 20° W.L. in the C-band, extended C-band, and a portion of the Ku-band and to authorize DTH service within the U.S. and between the U.S. and the route markets identified herein.

Respectfully submitted,

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ATTACHMENT A

TECHNICAL APPENDIX FOR NSS-7

New Skies Satellites B.V. (doing business as "SES") hereby requests a modification of the terms of U.S. market access for NSS-7. NSS-7 is currently on the Commission's Permitted Space Station List ("Permitted List") for operations at 22° W.L.[1] SES proposes to relocate NSS-7 to 20.0º W.L., where it will serve as a replacement for the currently operating NSS-5 satellite. SES requests that the Commission update the Permitted List to reflect the planned relocation of NSS-7to 20.0º W.L. and to authorize continued communications with the NSS-7 conventional C-band payload, a portion of the conventional Ku-band payload (11.95-12.2 GHz), and specified telemetry, tracking and control ("TT&C") frequencies.[2] SES also seeks a ruling permitting the use of the NSS-7 extended C-band capacity at 20.0º W.L. for the provision of service to, from, and within the United States. In addition, SES requests authority to use NSS-7 for direct-to-home ("DTH") service within the United States and between the U.S. and other markets identified in the foregoing legal narrative.

SES is not seeking U.S. market access for the remaining NSS-7 Ku-band frequencies as part of this petition, except for the Ku-band TT&C frequencies, but is including complete information about the Ku-band payload in this Attachment and accompanying Schedule S to describe the entire satellite. As discussed in the legal narrative, SES and Intelsat have entered into an agreement whereby Intelsat will obtain a separate Commission license to operate Ku-band capacity on NSS-7 at 20° W.L. This is a continuation of the arrangement that SES and Intelsat have with respect to the

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[1] *See New Skies Satellites N.V.,* 17 FCC Rcd 10369 (IB 2002) ("NSS-7 Order") (adding NSS-7 to the Permitted List for operations at 21.5º W.L.), as modified by File No. SAT-PDR-20020930-00179, grant-stamped May 29, 2003 (updating the Permitted List to reflect relocation of NSS-7 to 22º W.L.).

[2] The NSS-7 TT&C frequencies are as follows:
Command: 14496.0 and 14499.0 MHz (vertical polarization; uplink)
Telemetry/Tracking: 11451.0and 11454.0 MHz (horizontal polarization; downlink)
Tracking Beacon: 4199.5 MHz (vertical polarization; downlink).

NSS-5 spacecraft currently operating at that orbital location. For convenience, Intelsat's separate application will incorporate by reference this Technical Appendix and associated Schedule S for information regarding the Ku-band frequencies that will be licensed through the Commission.

The table below summarizes the proposed licensing arrangements for NSS-7 as compared with the licensing arrangements for the NSS-5 satellite currently operating at 20° W.L.

Payload	**NSS-5 at 20° W.L. (current)**	**NSS-7 at 20° W.L. (proposed)**
TT&C frequencies	Operated by SES under Netherlands authority. Command: 6173.7 and 6176.3 MHz Telemetry: 3947, 3948, 3952, 3952.5 MHz Tracking Beacons: 11198, 11452, 11701 and 12501 MHz	Operated by SES under Netherlands authority. Command: 14496.0 and 14499.0 MHz Telemetry/Tracking: 11451.0 and 11454.0 MHz Tracking Beacon: 4199.5 MHz
3625-3700 MHz downlink; 5850-5925 MHz uplink (extended C-band)	Operated by SES under Netherlands authority.	Operated by SES under Netherlands authority.
3700-4200 MHz downlink; 5925-6425 MHz uplink (conventional C-band)	Operated by SES under Netherlands authority.	Operated by SES under Netherlands authority.
10.95-11.2 GHz, 11.45-11.95 GHz, and 12.5-12.75 GHz downlink; 14.0-14.5 GHz uplink (extended and portion of conventional Ku-band)	Operated by Intelsat under U.S. authority.	Operated by Intelsat under U.S. authority.
11.95-12.2 GHz downlink (portion of conventional Ku-band)	Not on NSS-5.	Operated by SES under Netherlands authority.

Technical information regarding NSS-7 is already on file with the Commission and is incorporated by reference herein.[3] However, because the original documents submitted to the FCC to describe NSS-7 were filed more than a decade ago, SES is providing for the Commission's convenience a more extensive Technical Attachment and Schedule S than would otherwise be required for a modification application. *See* 47 C.F.R. § 25.117(d)(1) (requiring submission of "only those items of information listed in § 25.114 that change").

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

NSS-7 is a geostationary satellite operating in the C-band and Ku-band that will provide a range of services to users located in various countries in ITU Regions 1 and 2 from the 20º W.L. orbital location. The C-band portion of the communications payload consists of 36 transponders with two sets of 20-for-18 Traveling Wave Tube Amplifiers ("TWTAs"), using both left hand and right hand circular polarization to achieve dual frequency re-use. The satellite features five C-band beams that can be interconnected on a transponder-by-transponder basis: (a) West Hemisphere beam (covering Eastern North America, Central America, and South America), (b) East Hemisphere beam (covering Europe, the Middle East, and Africa), (c) North East Zone beam (covering Europe, North Africa and the Middle East), (d) South East Zone beam (covering Sub-Saharan Africa) and (e) a Global beam. Eight (8) C-band transponders have a bandwidth of 72 MHz, and twenty eight (28) transponders have a bandwidth of 54 MHz.

The Ku-band portion of the communications payload consists of 36 transponders with one group of 22-for-20, and one group of 18-for-16 TWTAs, using both horizontal and vertical polarization to achieve dual frequency re-use. The satellite features six Ku-band beams that can be interconnected on a transponder-by-transponder basis: (a) Europe/Middle East beam (covering

[3] *See* File Nos. SAT-PDR-20010309-00020& SAT-PDR-20020930-00179. *See also* Letter from William W. Wiltshire to Magalie Roman Salas dated Jan. 22, 2001 ("2002 Letter").

Europe, Middle East, Northern Africa and part of Russia), (b) North America beam (covering North America), (c) Southern Cone beam (covering Latin America), (d) Central America beam (covering Central America and northern part of Latin America), (e) South Africa beam (covering southern Africa) and (f) West Africa beam (covering Western Africa). Five (5) Ku-band transponders have a bandwidth of 62 MHz, and thirty one (31) transponders have a bandwidth of 54 MHz.

NSS-7 has a wide range of possible connectivities between the different beams, including the possibility to cross-connect between C-band beams and Ku-band beams.

As specified in Table 2-5 and Appendix C, the TT&C functions will be provided at the edges of the allocated conventional C-band, Ku-band, and extended Ku-band frequencies, consistent with the Commission's rules.[4] The accompanying Schedule S includes information on which antenna beams are connected or switchable to each transponder and TT&C function.

2. Operational Characteristics

2.1 Communications Payload

2.1.1 Channel Filter Response

The predicted worst case channel filter response performance for each of the transponder bandwidths (72 MHz, 62 MHz and 54 MHz), measured between the receive antenna reference interface point and the transmit antenna reference interface point, is shown in Table 2-1a and Table 2-1b.

[4] *See* 47 C.F.R. § 25.202(g); *see also In the Matter of EchoStar KuX Corporation Application for Authority to Construct, Launch and Operate a Geostationary Satellite Using the Extended Ku-band Frequencies in the Fixed-Satellite Service at the 83° W.L. Orbital Location*, 20 FCC Rcd 919, at ¶ 18 (Int'l Bur. 2004).

Parameter	Frequency Offset from Channel Center (F_c)	Gain Relative to Channel Center Frequency
Insertion Loss Variation 54 MHz Channel	±18.9 MHz	$0.6dB_{p-p}$
	±21.6 MHz	$0.8dB_{p-p}$
	±24.3 MHz	$1.1dB_{p-p}$
	±27 MHz	$1.9dB_{p-p}$
Insertion Loss Variation 72 MHz Channel	±25.2 MHz	$0.7dB_{p-p}$
	±28.8 MHz	$0.8dB_{p-p}$
	±32.4 MHz	$1.0dB_{p-p}$
	±36 MHz	$1.5dB_{p-p}$

Table 2-1a. Response Characteristics of Representative NSS-7 C-band Channel Filter

Parameter	Frequency Offset from Channel Center (F_c)	Gain Relative to Channel Center Frequency
Insertion Loss Variation 54 MHz Channel	±18.9 MHz	$0.8dB_{p-p}$
	±21.6 MHz	$0.9dB_{p-p}$
	±24.3 MHz	$1.4dB_{p-p}$
	±27 MHz	$1.9dB_{p-p}$
Insertion Loss Variation 62 MHz Channel	±21.7 MHz	$0.8dB_{p-p}$
	±24.8 MHz	$0.9dB_{p-p}$
	±27.9 MHz	$1.4dB_{p-p}$
	±31.0 MHz	$1.9dB_{p-p}$

Table 2-1b. Response Characteristics of Representative NSS-7 Ku-band Channel Filter

The narrow-band receive and transmit out-of-band response, and the wide-band receive out-of-band response for each of the transponder bandwidths (72 MHz, 62 MHz, and 54 MHz) are shown in Tables 2-2a, 2-2b, 2-3a, 2-3b and 2-4.

Parameter	Frequency Offset from Channel Center (F_c)	Gain Relative to Channel Center Frequency
Insertion Loss Variation 54 MHz Channel	> ±34 MHz	-10 dB
	> ±38 MHz	-40 dB
Insertion Loss Variation 72 MHz Channel	> ±44 MHz	-10 dB
	> ±50 MHz	-40 dB
	> ±94 MHz	-40 dB

Table 2-2a. Narrow-band Receive Out-of-Band Response Characteristics of Representative NSS-7 C-band Channels

Parameter	Frequency Offset from Channel Center (F_c)	Gain Relative to Channel Center Frequency
Insertion Loss Variation 54 MHz Channel	> ±34 MHz	-10 dB
	> ±38 MHz	-40 dB
Insertion Loss Variation 62 MHz Channel	> ±38 MHz	-10 dB
	> ±43 MHz	-40 dB
	> ±81 MHz	-40 dB

Table 2-2b. Narrow-band Receive Out-of-Band Response Characteristics of Representative NSS-7 Ku-band Channels

Parameter	Frequency Offset from Channel Center (F_c)	Gain Relative to Channel Center Frequency
Insertion Loss Variation 54 MHz Channel	> ±34 MHz	-8 dB
	> ±38 MHz	-20 dB
Insertion Loss Variation 72 MHz Channel	> ±44 MHz	-8 dB
	> ±50 MHz	-20 dB
	> ±94 MHz	-20 dB

Table 2-3a. Narrow-band Transmit Out-of-Band Response Characteristics of Representative NSS-7 C-band Channels

Parameter	Frequency Offset from Channel Center (F_c)	Gain Relative to Channel Center Frequency
Insertion Loss Variation 54 MHz Channel	> ±34 MHz	-8 dB
	> ±38 MHz	-20 dB
Insertion Loss Variation 62 MHz Channel	> ±38 MHz	-8 dB
	> ±43 MHz	-20 dB
	> ±81 MHz	-20 dB

Table 2-3b. Narrow-band Transmit Out-of-Band Response Characteristics of Representative NSS-7 Ku-band Channels

Parameter	Frequency Offset from Bands Edges (F_e)	Gain Relative to Channel Center Frequency
Out of Band Rejection All Channels	±160 MHz	-20 dB
	±200 MHz	-30 dB

Table 2-4. Wide-band Receive Out-of-Band Response Characteristics of Representative NSS-7 Channels

The filtered signals will have 15 dB of gain adjustment with a step size of 1 dB for both the C- and Ku-band payload. The Ku-band payload also has an ALC adjustment range of -10 to +3 dB

with respect to saturation, with 0.5dB steps. Each active satellite transmission chain (channel amplifiers and associated TWTAs) can be individually turned on and off by ground telecommand, resulting in cessation of emissions from the satellite, as required.

2.2 TT&C Subsystem

The satellite TT&C subsystem provides redundant telemetry, tracking and command channels for the NSS-7 spacecraft. Normal on-station commands will be received through the earth-facing command horn antenna, and on-station telemetry will be transmitted through the earth-facing telemetry horn antenna, allowing the satellite to be commanded from anywhere on the Earth that is visible from its orbital location. In the case of emergency operations, use will be made of the omnidirectional antennas.

A beacon signal will be continuously transmitted by the satellite and used by earth station operators as a calibrated reference to compensate for rain attenuation and to adjust antenna pointing. This frequency will be transmitted through the earth-facing telemetry horn antenna and will be available anywhere within the satellite's coverage area.

The TT&C frequency and polarization plans for all phases of the mission (including emergency mode) are shown in Table 2-5.

Carrier	Frequency, MHz	Polarization
Telecommand 1	14496.0	V
Telecommand 2	14499.0	V
Telemetry 1	11451.0	H
Telemetry 2	11454.0	H
Ku-band Tracking Beacon 1	11451.0	H
Ku-band Tracking Beacon 1	11454.0	H
C-band Tracking Beacon 1	4199.5	V

Table 2-5. NSS-7 TT&C Frequency and Polarization Plan

The telemetry frequencies can also be used as tracking beacon signals.

The telemetry and command link performance is summarized in the link budget analysis in Appendix C. The receive and transmit antenna beam patterns are given in GXT format in the accompanying Schedule S and shown in Appendix B.

2.3 Cross-polarization Isolation

The cross-polarization isolation performance of the NSS-7 antennas is given in Schedule S. For a number of the beams, the cross-polarization isolation performance is less than the 30 dB required by Section 25.210(i), ranging between 25.8 dB and 29.3 dB. These beams are: the East Hemisphere beam, the West Hemisphere beam, the Europe/Middle East beam, and the North America beam. Such cross-polarization isolation performance levels will have a negligible impact on adjacent satellites. SES respectfully requests a continuation of the waiver of Section 25.210(i)(1) previously granted for NSS-7. *See* Narrative at Section III. Other beams not mentioned in this section are compliant with the required cross-polarization isolation performance.

3. Link Performance Analysis and Earth Station Parameters

3.1 Link Performance

Representative communications link budgets for the NSS-7 satellite are shown in Appendix A as Tables A-1 to A-31. The TT&C link budgets are shown in Appendix C as Tables C-1 to C-4.

As shown in the information provided in the accompanying Schedule S, the beam connectivity options on-board NSS-7 are extensive. In order to keep the number of link calculations manageable, representative link budgets are provided for each beam type and connectivity. Table 3-1 specifies how the beam types are defined for the C-band beams.

Beam type	Representing beam
GLOBAL	Global (A-pole)
	Global (B-pole)
HEMI	West Hemi (A- and B-pole)
	East Hemi (A- and B-pole)
ZONE	North East Zone (B-pole)
	South East Zone (B-pole

Table 3-1. Definitions of beam types used in the link analysis

For the Ku-band, beams have not been generalized in the same way, but the link budgets cover each of the possible downlink beams and each of the possible uplink beams. Table 3-2 shows the abbreviations used for the Ku-band beams.

Beam type	Representing beam
NA	North America
EU	Europe/Middle East
CA	Central America
WA	West Africa
SC	Southern Cone
SA	South Africa

In the link budgets depicted in Tables A-1 to A-31 it is also indicated to which transponders they relate (under the header "Associated Txr IDs") as they are defined in the accompanying Schedule S. This information would relate to Columns "a" and "b" of Table S13 of Schedule S.

The link budgets assume two adjacent operating satellites at 2 degrees orbital separation each. For the C-band 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. The values used in these link budgets, and the values assumed for the adjacent satellite operations are based on the range of values that were agreed during the coordination with the adjacent operators.

At Ku-band, 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.

3.2 Earth Station Parameters

Earth station characteristics are reflected in the representative link budgets shown in Appendix A as Tables A-1 to A-31 as well as the accompanying Schedule S.

4. Power Flux Density

The allowable PFD levels in the C-band are defined in Section 25.208(a) of the Commission's rules for all conditions, including clear sky, and for all methods of modulation as:

(1) For angles of arrival between 0 and 5 degrees above the horizontal plane: -152 dBW/m^2 in any 4 kHz band;
(2) For angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane: $-152 + (\delta-5)/2$ dBW/m^2 in any 4 kHz band; and
(3) For angles of arrival between 25 and 90 degrees above the horizontal plane: -142 dBW/m^2 in any 4 kHz band.

SES will operate NSS-7 such that all C-band downlink transmissions will comply with these PFD limits.

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 for all conditions, including clear sky, and for all methods of modulation as:

(1) For angles of arrival between 0 and 5 degrees above the horizontal plane: -150 dBW/m^2 in any 4 kHz band;
(2) For angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane: $-150 + (\delta-5)/2$ dBW/m^2 in any 4 kHz band; and
(3) For angles of arrival between 25 and 90 degrees above the horizontal plane: -140 dBW/m^2 in any 4 kHz band.

With respect to the 12.50-12.75 GHz band, the allowable PFD levels are defined in No. 21.16 of the ITU Radio Regulations for all conditions, including clear sky, and for all methods of modulation as:

(1) For angles of arrival between 0 and 5 degrees above the horizontal plane: -148 dBW/m^2 in any 4 kHz band;
(2) For angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane: $-148 + (\delta-5)/2$ dBW/m^2 in any 4 kHz band; and
(3) For angles of arrival between 25 and 90 degrees above the horizontal plane: -138 dBW/m^2 in any 4 kHz band.

With respect to the frequency band 11.70-11.95 GHz, no PFD limits are specified in either the FCC rules or the ITU Radio Regulations.

The NSS-7 payload will be operated such that all Ku-band downlink transmissions will comply with the applicable PFD limits referenced above.

In order to demonstrate such compliance, the carrier with the highest EIRP density in each of the possible beam connectivities, based on the link budgets set forth in Appendix A, is depicted in Table 4-1 and analyzed below. It should be noted that in the Ku-band downlink there are also some transponders with a bandwidth of 62 MHz on-board the spacecraft. However, from the carrier design point of view, and for the maximum PFD value calculations, these transponders are the same as the 54 MHz transponders. The PFD levels associated with the NSS-7 telemetry and beacon carriers are also calculated.

Connectivity	Band	Transponder Bandwidth	EIRP density (dBW/4kHz)	Carrier Type
HEMI/HEMI	C/C	72 MHz	-2.0	72M0G7W
HEMI/HEMI	C/C	54 MHz	-0.9	54M0G7W
NA/HEMI	Ku/C	54 MHz	-0.9	461KG7W
EU/HEMI	Ku/C	54 MHz	-0.9	461KG7W
CA/HEMI	Ku/C	54 MHz	-0.9	461KG7W
WA/HEMI	Ku/C	54 MHz	-1.1	54M0G7W
SC/HEMI	Ku/C	54 MHz	-0.7	461KG7W
SA/HEMI	Ku/C	54 MHz	-0.7	461KG7W
GLOBAL/HEMI	C/C	54 MHz	-1.9	461KG7W
HEMI/GLOBAL	C/C	54 MHz	-4.1	1M84G7W
GLOBAL/GLOBAL	C/C	54 MHz	-4.5	54M0G7W
ZONE/HEMI	C/C	72 MHz	-2.0	72M0G7W
ZONE/HEMI	C/C	54 MHz	-0.9	54M0G7W
HEMI/ZONE	C/C	72 MHz	0.0	72M0G7W
HEMI/ZONE	C/C	54 MHz	0.0	54M0G7W
ZONE/ZONE	C/C	72 MHz	0.0	72M0G7W
ZONE/ZONE	C/C	54 MHz	0.0	54M0G7W
GLOBAL/ZONE	C/C	54 MHz	0.0	54M0G7W
ZONE/GLOBAL	C/C	54 MHz	-4.5	54M0G7W

NA/EU	Ku/Ku	54/62 MHz	10.0	54M0G7W
NA/WA	Ku/Ku	54/62 MHz	10.0	54M0G7W
NA/SA	Ku/Ku	54/62 MHz	10.0	54M0G7W
NA/SC	Ku/Ku	54/62 MHz	9.9	54M0G7W
NA/CA	Ku/Ku	54/62 MHz	9.8	461KG7W
NA/NA	Ku/Ku	54/62 MHz	10.0	54M0G7W
EU/NA	Ku/Ku	54/62 MHz	10.0	54M0G7W
CA/NA	Ku/Ku	54/62 MHz	10.0	346KG7W
WA/NA	Ku/Ku	54/62 MHz	10.0	8M25G7W
SC/NA	Ku/Ku	54/62 MHz	10.0	8M25G7W
SA/NA	Ku/Ku	54/62 MHz	10.0	8M25G7W
HEMI/NA	C/Ku	54 MHz	10.0	346KG7W

Table 4-1. Maximum power density levels for different connectivities

Tables 4-2 to 4-10 below show the worst case PFD levels that will occur at various angles of arrival, for each of the different downlink beams, taking into account the maximum power density levels for each of these beams. Tables 4-11 to 4-13 show the PFD levels associated with the telemetry and beacon carriers. This analysis demonstrates that the levels are compliant with the requirements of Section 25.208(a) and 25.208(b).

Angle of Arrival	Applicable PFD Limit for Angle of Arrival ($dBW/m^2/4$ kHz)	Spreading Loss (dBW/m^2)	Gain Contour (dB)	Worst Case PFD Level at Angle of Arrival ($dBW/m^2/4kHz$)	PFD Margin (dB)
0°	-152.0	-163.4	-3.5	-171.0	19.0
5°	-152.0	-163.3	-3.3	-170.7	18.7
10°	-149.5	-163.2	-3.2	-170.5	21.0
15°	-147.0	-163.0	-3.0	-170.1	23.1
20°	-144.5	-162.9	-2.8	-169.8	25.3
25°	-142.0	-162.8	-2.6	-169.5	27.5
0° (Peak)	-142.0	-162.3	0.0	-166.4	24.4

Table 4-2.Max PFD Levels, GLOBAL Beam, 1M84G7W

Angle of Arrival	Applicable PFD Limit for Angle of Arrival ($dBW/m^2/4$ kHz)	Spreading Loss (dBW/m^2)	Gain Contour (dB)	Worst Case PFD Level at Angle of Arrival ($dBW/m^2/4kHz$)	PFD Margin (dB)
0°	-152.0	-163.4	-2.3	-166.4	14.4
5°	-152.0	-163.3	-2.2	-166.2	14.2
10°	-149.5	-163.2	-1.2	-165.1	15.6
15°	-147.0	-163.0	-1.0	-164.7	17.7
20°	-144.5	-162.9	-0.7	-164.3	19.8
25°	-142.0	-162.8	-0.2	-163.7	21.7
35° (Peak)	-142.0	-162.6	0.0	-163.3	21.3

Table 4-3. Max PFD Levels, HEMI Beam, 461KG7W

Angle of Arrival	Applicable PFD Limit for Angle of Arrival (dBW/m^2/4 kHz)	Spreading Loss (dBW/m^2)	Gain Contour (dB)	Worst Case PFD Level at Angle of Arrival (dBW/m^2/4kHz)	PFD Margin (dB)
0°	-152.0	-163.4	-2.8	-166.2	14.2
5°	-152.0	-163.3	-2.8	-166.1	14.1
10°	-149.5	-163.2	-2.8	-166.0	16.5
15°	-147.0	-163.0	-1.8	-164.8	17.8
20°	-144.5	-162.9	-1.3	-164.2	19.7
25°	-142.0	-162.8	-0.5	-163.3	21.3
30° (Peak)	-142.0	-162.6	0.0	-162.6	20.6

Table 4-4.Max PFD Levels, ZONE Beam, 54M0G7W

Angle of Arrival	Applicable PFD Limit for Angle of Arrival (dBW/m^2/4 kHz)	Spreading Loss (dBW/m^2)	Gain Contour (dB)	Worst Case PFD Level at Angle of Arrival (dBW/m^2/4kHz)	PFD Margin (dB)
0°	-150.0	-163.4	-1.8	-155.2	5.2
5°	-150.0	-163.3	-1.6	-154.9	4.9
10°	-147.5	-163.2	-1.4	-154.6	7.1
15°	-145.0	-163.0	-0.8	-153.8	8.8
20°	-142.5	-162.9	-0.6	-153.5	11.0
25°	-140.0	-162.8	-0.2	-153.0	13.0
28° (Peak)	-140.0	-162.5	0.0	-152.5	12.5

Table 4-5. Max PFD Levels, NA Beam, 54M0G7W

Angle of Arrival	Applicable PFD Limit for Angle of Arrival (dBW/m^2/4 kHz)	Spreading Loss (dBW/m^2)	Gain Contour (dB)	Worst Case PFD Level at Angle of Arrival (dBW/m^2/4kHz)	PFD Margin (dB)
0°	-150.0	-163.4	-1.8	-155.2	5.2
5°	-150.0	-163.3	-1.8	-155.1	5.1
10°	-147.5	-163.2	-1.3	-154.5	7.0
15°	-145.0	-163.0	-0.8	-153.8	8.8
20°	-142.5	-162.9	-1.0	-153.9	11.4
25°	-140.0	-162.8	-1.8	-154.6	14.6
47° (Peak)	-140.0	-162.5	0.0	-152.5	12.5

Table 4-6. Max PFD Levels, EU Beam, 54M0G7W

Angle of Arrival	Applicable PFD Limit for Angle of Arrival (dBW/m^2/4 kHz)	Spreading Loss (dBW/m^2)	Gain Contour (dB)	Worst Case PFD Level at Angle of Arrival (dBW/m^2/4kHz)	PFD Margin (dB)
0°	-150.0	-163.4	-0.5	-154.1	4.1
5°	-150.0	-163.3	-0.3	-153.8	3.8
10°	-147.5	-163.2	-0.1	-153.5	6.0
15°	-145.0	-163.0	-0.5	-153.7	8.7
20°	-142.5	-162.9	-0.7	-153.8	11.3
25°	-140.0	-162.8	-1.2	-154.2	14.2
8° (Peak)	-140.0	-163.3	0.0	-153.5	13.5

Table 4-7. Max PFD Levels, CA Beam, 461KG7W

Angle of Arrival	Applicable PFD Limit for Angle of Arrival (dBW/m^2/4 kHz)	Spreading Loss (dBW/m^2)	Gain Contour (dB)	Worst Case PFD Level at Angle of Arrival (dBW/m^2/4kHz)	PFD Margin (dB)
0°	-150.0	-163.4	-19.0	-172.4	22.4
5°	-150.0	-163.3	-17.0	-170.3	20.3
10°	-147.5	-163.2	-17.0	-170.2	22.7
15°	-145.0	-163.0	-16.0	-169.0	24.0
20°	-142.5	-162.9	-15.0	-167.9	25.4
25°	-140.0	-162.8	-13.0	-165.8	25.8
53° (Peak)	-140.0	-162.5	0.0	-152.5	12.5

Table 4-8. Max PFD Levels, WA Beam, 54M0G7W

Angle of Arrival	Applicable PFD Limit for Angle of Arrival (dBW/m^2/4 kHz)	Spreading Loss (dBW/m^2)	Gain Contour (dB)	Worst Case PFD Level at Angle of Arrival (dBW/m^2/4kHz)	PFD Margin (dB)
0°	-150.0	-163.4	-2.6	-156.1	6.1
5°	-150.0	-163.3	-2.6	-156.0	6.0
10°	-147.5	-163.2	-2.6	-155.9	8.4
15°	-145.0	-163.0	-2.6	-155.7	10.7
20°	-142.5	-162.9	-2.1	-155.1	12.6
25°	-140.0	-162.8	-1.5	-154.4	14.4
52° (Peak)	-140.0	-162.5	0.0	-152.6	12.6

Table 4-9. Max PFD Levels, SC Beam, 54M0G7W

Angle of Arrival	Applicable PFD Limit for Angle of Arrival (dBW/m^2/4 kHz)	Spreading Loss (dBW/m^2)	Gain Contour (dB)	Worst Case PFD Level at Angle of Arrival (dBW/m^2/4kHz)	PFD Margin (dB)
0°	-150.0	-163.4	-2.2	-155.6	5.6
5°	-150.0	-163.3	-2.2	-155.5	5.5
10°	-147.5	-163.2	-2.0	-155.2	7.7
15°	-145.0	-163.0	-1.7	-154.7	9.7
20°	-142.5	-162.9	-1.2	-154.1	11.6
25°	-140.0	-162.8	-1.0	-153.8	13.8
32° (Peak)	-140.0	-162.5	0.0	-152.5	12.5

Table 4-10. Max PFD Levels, SA Beam, 54M0G7W

Angle of Arrival	Applicable PFD Limit for Angle of Arrival (dBW/m^2/4 kHz)	Spreading Loss (dBW/m^2)	Gain Contour (dB)	Worst Case PFD Level at Angle of Arrival (dBW/m^2/4kHz)	PFD Margin (dB)
0°	-150.0	-163.4	-1.0	-176.4	26.4
5°	-150.0	-163.3	-1.0	-176.3	26.3
10°	-147.5	-163.2	-1.0	-176.2	28.7
15°	-145.0	-163.0	-0.9	-176.9	30.9
20°	-142.5	-162.9	-0.8	-176.7	33.2
25°	-140.0	-162.8	-0.8	-176.6	35.6
90° (Peak)	-140.0	-162.1	0.0	-175.1	34.1

Table 4-11. Max. PFD Levels, TLM beam, Telemetry (500KG7D)

Angle of Arrival	Applicable PFD Limit for Angle of Arrival ($dBW/m^2/4$ kHz)	Spreading Loss (dBW/m^2)	Gain Contour (dB)	Worst Case PFD Level at Angle of Arrival ($dBW/m^2/4kHz$)	PFD Margin (dB)
0°	-152.0	-163.4	-1.0	-164.4	12.4
5°	-152.0	-163.3	-1.0	-164.3	12.3
10°	-149.5	-163.2	-1.0	-164.2	14.7
15°	-147.0	-163.0	-0.9	-163.9	16.9
20°	-144.5	-162.9	-0.8	-163.7	19.2
25°	-142.0	-162.8	-0.8	-163.6	21.6
90° (Peak)	-142.0	-162.1	0.0	-162.1	20.1

Table 4-12. Max. PFD Levels, BNC beam, Tracking Beacon (25K0N0N)

Angle of Arrival	Applicable PFD Limit for Angle of Arrival ($dBW/m^2/4$ kHz)	Spreading Loss (dBW/m^2)	Gain Contour (dB)	Worst Case PFD Level at Angle of Arrival ($dBW/m^2/4kHz$)	PFD Margin (dB)
0°	-150.0	-163.4	-1.0	-163.4	13.4
5°	-150.0	-163.3	-1.0	-163.3	13.3
10°	-147.5	-163.2	-1.0	-163.2	14.7
15°	-145.0	-163.0	-0.9	-162.9	27.9
20°	-142.5	-162.9	-0.8	-162.7	20.2
25°	-140.0	-162.8	-0.8	-162.6	22.6
90° (Peak)	-140.0	-162.1	0.0	-161.1	21.1

Table 4-13. Max. PFD Levels, BNK beam, Tracking Beacon (25K0N0N)

5. Arrangement for Tracking, Telemetry, and Control

SES will conduct TT&C operations for NSS-7 using antennas that are located in London, United Kingdom, and Manassas, Virginia. In addition, SES will have remote control capability from its headquarters in The Hague that will, if required by the Dutch Administration, enable satellite operations to be controlled from the territory of The Netherlands.

6. Common Carrier Status

SES intends to market all of the C-band and Ku-band transponders on the NSS-7 satellite on a non-common carrier basis. All customer contracts will be individually negotiated and tailored to the customer's requirements.

7. Polarization Information

The NSS-7 C-band payload operates using circular polarization and is not capable of switching polarization sense upon ground command. SES is requesting a continuation of the waivers of Section 25.210(a) previously granted for the NSS-7 satellite to account for these operational parameters. *See* Narrative at Section III. The NSS-7 Ku-band payload operates using linear polarization.

8. Interference Analysis

At the time of locating NSS-7 at 20.0º W.L., the nearest operational C-band and/or Ku-band satellites to the proposed location for NSS-7 will be SES-4 at 22.0° W.L. and Intelsat-901 at 18.0º W.L. As demonstrated below, NSS-7 substantially complies with the FCC's two-degree spacing policy. Coordination of the C-band payload of NSS-7 with Intelsat-901 is also complete. SES and Intelsat expect that minor exceedances in the 6% delta T/T criteria can be coordinated with the adjacent SES-4 and Intelsat-901 satellites.

The analysis below assesses interference from communication carriers of NSS-7 into the communication carriers of SES-4 at 22.0º W.L. and into the communication carriers of Intelsat-901 at 18.0º W.L. In addition, assessments are provided of the interference of the TT&C carriers of NSS-7 into the TT&C and communication carriers of SES-4 and Intelsat 901.

8.1 Interference analysis of NSS-7 with respect toSES-4

For this case, SES has assumed that the transmission parameters of the SES-4 satellite are the wanted transmissions and the transmission parameters of the NSS-7 satellite are the interfering

transmissions.[5] This analysis is performed for digital signals only in both the NSS-7 and SES-4 networks as analog TV/FM signals are coordinated on a case-by-case basis with nearby spacecraft.

For each of the possible NSS-7 connectivities and transponder bandwidths, the minimum transponder bandwidth available was chosen as this presents the maximum victim transmission parameters within a certain connectivity. Further, as the NSS-7 and SES-4 spacecraft do not have exactly the same coverages, only the scenarios where an actual connectivity and frequency overlap could occur have been studied. The specific NSS-7 beam connectivities that have been taken into account are depicted in Table 4-1. Table 8-1 below depicts the scenarios that are analyzed in this section. The following beam combinations identified in Table 4-1 are not included in Table 8-1: NA/HEMI, CA/HEMI, SC/HEMI, SA/HEMI, SA/NA and HEMI/NA. These combinations are excluded because there is no equivalent connectivity present on the SES-4 spacecraft (and SES-4 also does not have an SA beam as the NSS-7 spacecraft does).

[5] Technical information for SES-4 is available in the technical appendices associated with File No. SAT-PPL-20110620-00112 (on public notice July 8, 2011).

	Interfering	Wanted
Scenario	NSS-7 connectivity	SES-4 connectivity
1	HEMI/HEMI 54 MHz	EH/EH 72 MHz EH/WH 72 MHz WH/EH 72 MHz WH/WH 72 MHz
2	EU/HEMI 54 MHz	EU/WH 54 MHz EU/EH 54 MHz
3	WA/HEMI 54 MHz	WA/WH 54 MHz WA/EH 54 MHz
4	GLB/HEMI 54 MHz	GLB/GLB 36 MHz
5	HEMI/GLB 54 MHz	GLB/GLB 36 MHz
6	GLB/GLB 54 MHz	GLB/GLB 36 MHz
7	ZONE/HEMI 54 MHz	EH/EH 72 MHz EH/WH 72 MHz
8	HEMI/ZONE 54 MHz	EH/EH 72 MHz WH/EH 72 MHz
9	ZONE/ZONE 54 MHz	EH/EH 72 MHz
10	GLB/ZONE 54 MHz	GLB/GLB 36 MHz
11	ZONE/GLB 54 MHz	GLB/GLB 36 MHz
12	NA/EU 54 MHz	NA/EU 54 MHz
13	NA/WA 54 MHz	NA/WA 54 MHz
14	NA/SA 54 MHz	NA/WA 54 MHz
15	NA/SC 54 MHz	NA/SC 54 MHz
16	NA/CA 54 MHz	NA/NA 54 MHz NA/SC 54 MHz
17	NA/NA 54 MHz	NA/NA 54 MHz
18	EU/NA 54 MHz	EU/NA 54 MHz
19	CA/NA 54 MHz	NA/NA 54 MHz SC/NA 54 MHz
20	WA/NA 54 MHz	WA/NA 54 MHz
21	SC/NA 54 MHz	SC/NA 54 MHz

Table 8-1. Overview of interference analysis scenarios between NSS-7 (interfering) and SES-4 (wanted)

For each scenario as described in the table above, the summary of the transmission parameters for NSS-7 (derived from the link budgets in Annex A) and SES-4 will be given together with the results of the interference calculations in terms of the overall C/I margins. For ease of reference and analysis, these tables are provided in a format similar to the output of the commonly-used Sharp Adjacent Satellite Interference Analysis program.

The interference calculations assume a 1 dB advantage for topocentric-to-geocentric conversion, co-polarization of all wanted and interfering carriers, and all earth station antennas

conforming to a sidelobe pattern of 29-25 log(θ), as specified in Section 25.209(a)(1) of the Commission's Rules.

Scenario 1: NSS-7 HEMI/HEMI connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	51.2	49.9	14.8	42.3	18.2	-55.4	-39.3	EH/EH 72 MHz
2	461KG7W	0.341	47.0	52.4	17.2	43.8	21.5	-50.0	-38.1	EH/EH 72 MHz
3	1M84G7W	1.365	54.9	58.6	23.4	43.8	21.5	-57.7	-37.9	EH/EH 72 MHz
4	8M25G7W	6.111	51.2	64.3	29.1	42.3	19.1	-54.8	-38.7	EH/EH 72 MHz
5	72M0G7W	63.330	56.3	78.9	41.7	48.0	24.9	-55.4	-36.3	EH/EH 72 MHz
6	346KG7W	0.256	51.2	50.1	14.4	42.3	18.2	-55.2	-39.7	EH/WH 72 MHz
7	461KG7W	0.341	47.0	52.8	17.2	43.8	21.5	-49.5	-38.1	EH/WH 72 MHz
8	1M84G7W	1.365	54.9	58.8	23.2	43.8	21.5	-57.4	-38.1	EH/WH 72 MHz
9	8M25G7W	6.111	51.2	64.4	28.8	42.3	19.1	-54.7	-39.1	EH/WH 72 MHz
10	72M0G7W	63.33	56.3	77.9	41.2	48	24.9	-56.4	-36.8	EH/WH 72 MHz
11	346KG7W	0.256	51.2	50.2	14.9	42.3	18.2	-55.1	-39.2	WH/EH 72 MHz
12	461KG7W	0.341	47.0	52.4	17.1	43.8	21.5	-49.9	-38.2	WH/EH 72 MHz
13	1M84G7W	1.365	54.9	58.5	23.2	43.8	21.5	-57.8	-38.2	WH/EH 72 MHz
14	8M25G7W	6.111	51.2	64.6	29.3	42.3	19.1	-54.5	-38.6	WH/EH 72 MHz
15	72M0G7W	63.330	56.3	78.9	41.7	48	24.9	-55.4	-36.3	WH/EH 72 MHz
16	346KG7W	0.256	51.2	50.5	14.7	42.3	18.2	-54.8	-39.4	WH/WH 72 MHz
17	461KG7W	0.341	47.0	52.8	17	43.8	21.5	-49.6	-38.4	WH/WH 72 MHz
18	1M84G7W	1.365	54.9	58.8	23	43.8	21.5	-57.5	-38.4	WH/WH 72 MHz
19	8M25G7W	6.111	51.2	64.6	28.8	42.3	19.1	-54.5	-39.1	WH/WH 72 MHz
20	72M0G7W	63.330	56.3	78	41.1	48	24.9	-56.3	-36.9	WH/WH 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	45.7	50.1	13.7	42.1	18.2	-49.7	-40.4	HEMI/HEMI 54MHz
2	461KG7W	0.341	49.3	53.7	17.2	43.6	21.5	-50.9	-38.1	HEMI/HEMI 54MHz
3	1M84G7W	1.365	47.4	59.5	23.0	43.6	21.5	-49.3	-38.4	HEMI/HEMI 54MHz
4	8M25G7W	6.111	45.7	64.6	28.2	42.1	19.1	-49.0	-39.7	HEMI/HEMI 54MHz
5	54M0G7W	45.000	51.5	76.9	38.5	42.1	21.0	-51.1	-38.0	HEMI/HEMI 54MHz

Table 8-2.Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 1

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	2.6	1.4	1.1	1.9	1.4
	2	1.4	0.4	0.0	0.7	0.4
	3	1.6	0.6	0.2	0.9	0.6
	4	2.3	1.1	0.8	1.6	1.0
	5	2.9	2.3	1.7	2.1	2.3
	6	2.4	1.1	0.9	1.7	1.1
	7	1.6	0.6	0.2	0.9	0.5
	8	1.6	0.6	0.2	0.9	0.5
	9	2.1	0.8	0.6	1.4	0.8
	10	2.1	1.6	1.0	1.4	1.7
	11	2.8	1.5	1.3	2.1	1.5
	12	1.4	0.4	0.0	0.7	0.4
	13	1.4	0.4	0.0	0.7	0.4
	14	2.5	1.2	1.0	1.8	1.2
	15	2.9	2.3	1.7	2.2	2.3
	16	2.8	1.4	1.2	2.1	1.4
	17	1.4	0.3	0.0	0.7	0.3
	18	1.4	0.3	0.0	0.7	0.3
	19	2.2	0.8	0.6	1.5	0.8
	20	2.1	1.6	1.0	1.4	1.6

Table 8-3. Summary of Overall C/I Margins for scenario 1 (dB)

As shown in Table 8-3, all C/I margins are positive in this scenario.

Scenario 2: NSS-7 EU/HEMI connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	53.1	52.1	15.0	42.3	18.2	-55.1	-39.1	EU/WH 54 MHz
2	461KG7W	0.341	53.1	54.8	17.7	45.9	21.5	-53.6	-37.6	EU/WH 54 MHz
3	1M84G7W	1.365	53.1	60.8	23.7	45.9	21.5	-53.6	-37.6	EU/WH 54 MHz
4	8M25G7W	6.111	53.1	66.9	29.8	42.3	19.1	-54.1	-38.1	EU/WH 54 MHz
5	54M0G7W	45.000	54.6	80.3	41.2	42.3	19.1	-50.8	-35.3	EU/WH 54 MHz
6	346KG7W	0.256	49	51.5	14.9	42.3	18.2	-51.6	-39.2	EU/EH 54 MHz
7	461KG7W	0.3413	53.1	54.4	17.8	45.9	21.5	-54.1	-37.6	EU/EH 54 MHz
8	1M84G7W	1.3653	53.1	60.4	23.8	45.9	21.5	-54.1	-37.6	EU/EH 54 MHz
9	8M25G7W	6.1113	53.1	66.2	29.6	42.3	19.1	-54.7	-38.2	EU/EH 54 MHz
10	54M0G7W	45	54.6	79.9	41.3	42.3	19.1	-51.2	-35.2	EU/EH 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	52.9	55.1	15.3	42.1	18.2	-51.9	-38.8	EU/HEMI 54MHz
2	461KG7W	0.341	54.6	58.3	18.5	43.6	21.5	-51.7	-36.9	EU/HEMI 54MHz
3	1M84G7W	1.365	52.9	62.6	22.9	45.5	21.5	-51.6	-38.5	EU/HEMI 54MHz
4	8M25G7W	6.111	52.9	68.7	28.9	43.6	19.1	-52.1	-39.0	EU/HEMI 54MHz
5	54M0G7W	45.000	54.6	80.3	39.5	42.1	19.1	-50.8	-37.0	EU/HEMI 54MHz

Table 8-4.Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 2

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	2.7	1.0	2.4	2.9	1.0
	2	3.7	2.2	3.4	3.9	2.1
	3	3.7	2.2	3.4	3.9	2.1
	4	2.7	1.0	2.5	2.9	1.1
	5	5.7	4.0	5.5	5.9	4.0
	6	2.5	0.8	2.2	2.7	0.8
	7	3.6	2.2	3.3	3.8	2.0
	8	3.6	2.2	3.3	3.8	2.0
	9	2.6	0.9	2.3	2.8	0.9
	10	5.8	4.0	5.5	6.0	4.1

Table 8-5. Summary of Overall C/I Margins for scenario 2 (dB)

As shown in Table 8-5, all C/I margins are positive in this scenario.

Scenario 3: NSS-7 WA/HEMI connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	53.1	55.4	15.5	42.3	18.2	-51.7	-38.5	WA/WH 54 MHz
2	461KG7W	0.341	54.6	57.8	17.9	45.9	21.5	-52.1	-37.4	WA/WH 54 MHz
3	1M84G7W	1.365	54.6	63.9	24.0	45.9	21.5	-52.1	-37.4	WA/WH 54 MHz
4	8M25G7W	6.111	53.1	70.2	30.3	42.3	19.1	-50.8	-37.6	WA/WH 54 MHz
5	54M0G7W	45.000	58.7	82.1	41.2	42.3	19.1	-53.1	-35.3	WA/WH 54 MHz
6	346KG7W	0.256	53.1	54.8	15.4	42.3	18.2	-52.4	-38.7	WA/EH 54 MHz
7	461KG7W	0.3413	54.6	57.3	17.9	45.9	21.5	-52.6	-37.4	WA/EH 54 MHz
8	1M84G7W	1.3653	54.6	63.3	23.9	45.9	21.5	-52.6	-37.4	WA/EH 54 MHz
9	8M25G7W	6.1113	54.6	69.5	30.1	42.3	19.1	-52.9	-37.7	WA/EH 54 MHz
10	54M0G7W	45	58.7	82.9	41.5	42.3	19.1	-52.3	-35.0	WA/EH 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	52.9	56.8	15.8	42.1	18.2	-50.2	-38.3	WA/HEMI 54MHz
2	461KG7W	0.341	54.6	58.3	17.3	45.5	21.5	-51.7	-38.1	WA/HEMI 54MHz
3	1M84G7W	1.365	52.9	63.6	22.6	46.5	21.5	-50.7	-38.8	WA/HEMI 54MHz
4	8M25G7W	6.111	52.9	70.4	29.3	43.6	19.1	-50.4	-38.5	WA/HEMI 54MHz
5	54M0G7W	45.000	56.5	82.4	39.4	42.1	19.1	-50.6	-37.1	WA/HEMI 54MHz

Table 8-6.Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 3

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	2.9	2.8	3.4	3.2	1.9
	2	3.8	3.9	4.3	4.1	3.0
	3	3.8	3.9	4.3	4.1	3.0
	4	3.0	2.9	3.5	3.2	2.0
	5	5.3	5.2	5.8	5.5	4.3
	6	2.7	2.6	3.2	2.9	1.7
	7	3.7	3.8	4.2	3.9	2.8
	8	3.7	3.8	4.2	3.9	2.8
	9	2.8	2.7	3.2	3.0	1.8
	10	5.7	5.5	6.1	5.9	4.6

Table 8-7. Summary of Overall C/I Margins for scenario 3 (dB)

As shown in Table 8-7, all C/I margins are positive in this scenario.

Scenario 4: NSS-7 GLB/HEMI connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	51.7	53.6	13.0	42.5	18.2	-52.2	-41.0	GLB/GLB 36 MHz
2	461KG7W	0.341	47.6	57.1	16.6	43.8	21.5	-45.8	-38.8	GLB/GLB 36 MHz
3	1M84G7W	1.365	55.4	63.2	22.6	43.8	21.5	-53.6	-38.8	GLB/GLB 36 MHz
4	8M25G7W	6.111	51.7	68.3	27.8	42.5	19.1	-51.2	-40.1	GLB/GLB 36 MHz
5	36M0G7W	30.000	56.8	79.1	36.6	42.5	19.1	-52.5	-38.2	GLB/GLB 36 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	47.6	53.6	14.4	42.4	18.2	-48.1	-39.7	GLB/HEMI 54MHz
2	461KG7W	0.341	49.5	56.5	17.4	43.9	21.5	-48.3	-37.9	GLB/HEMI 54MHz
3	1M84G7W	1.365	47.6	62.2	23.0	43.9	21.5	-46.8	-38.3	GLB/HEMI 54MHz
4	8M25G7W	6.111	49.5	67.9	28.8	42.4	19.1	-49.5	-39.1	GLB/HEMI 54MHz
5	54M0G7W	45.000	55.4	79.5	38.4	42.4	19.1	-52.4	-38.1	GLB/HEMI 54MHz

Table 8-8.Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 4

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	1.6	0.1	0.2	1.3	0.7
	2	1.6	0.2	0.2	1.4	0.9
	3	1.6	0.2	0.2	1.4	0.9
	4	1.6	0.1	0.3	1.3	0.7
	5	3.8	2.3	2.5	3.5	2.7

Table 8-9. Summary of Overall C/I Margins for scenario 4 (dB)

As shown in Table 8-9, all C/I margins are positive in this scenario.

Scenario 5: NSS-7 HEMI/GLB connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	51.7	53.6	13.0	42.5	18.2	-52.2	-41.0	GLB/GLB 36 MHz
2	461KG7W	0.341	47.6	57.1	16.6	43.8	21.5	-45.8	-38.8	GLB/GLB 36 MHz
3	1M84G7W	1.365	55.4	63.2	22.6	43.8	21.5	-53.6	-38.8	GLB/GLB 36 MHz
4	8M25G7W	6.111	51.7	68.3	27.8	42.5	19.1	-51.2	-40.1	GLB/GLB 36 MHz
5	36M0G7W	30.000	56.8	79.1	36.6	42.5	19.1	-52.5	-38.2	GLB/GLB 36 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	47.6	50.9	13.3	42.4	18.2	-50.8	-40.8	HEMI/GLB 54MHz
2	461KG7W	0.341	50.5	52.8	15.3	45.8	21.5	-53.0	-40.1	HEMI/GLB 54MHz
3	1M84G7W	1.365	49.5	58.8	21.3	45.8	21.5	-52.0	-40.1	HEMI/GLB 54MHz
4	8M25G7W	6.111	49.5	64.4	26.9	43.9	19.1	-52.9	-41.0	HEMI/GLB 54MHz
5	54M0G7W	45.000	55.4	78.6	36.1	42.4	19.1	-53.3	-40.5	HEMI/GLB 54MHz

Table 8-10. Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 5

		Interfering (NSS-7 @20W)				
	Carrier ID	**1**	**2**	**3**	**4**	**5**
Wanted (SES-4 @22W)	**1**	2.9	2.5	2.4	3.4	2.9
	2	3.0	2.7	2.6	3.5	3.1
	3	3.0	2.7	2.6	3.5	3.1
	4	3.0	2.6	2.5	3.4	2.9
	5	5.1	4.6	4.6	5.5	5.0

Table 8-11. Summary of Overall C/I Margins for scenario 5 (dB)

As shown in Table 8-11, all C/I margins are positive in this scenario.

Scenario 6: NSS-7 GLB/GLB connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	51.7	53.6	13.0	42.5	18.2	-52.2	-41.0	GLB/GLB 36 MHz
2	461KG7W	0.341	47.6	57.1	16.6	43.8	21.5	-45.8	-38.8	GLB/GLB 36 MHz
3	1M84G7W	1.365	55.4	63.2	22.6	43.8	21.5	-53.6	-38.8	GLB/GLB 36 MHz
4	8M25G7W	6.111	51.7	68.3	27.8	42.5	19.1	-51.2	-40.1	GLB/GLB 36 MHz
5	36M0G7W	30.000	56.8	79.1	36.6	42.5	19.1	-52.5	-38.2	GLB/GLB 36 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	47.6	54.5	12.4	42.4	18.2	-47.1	-41.7	GLB/GLB 54MHz
2	461KG7W	0.341	50.5	56.2	14.0	45.8	21.5	-49.7	-41.3	GLB/GLB 54MHz
3	1M84G7W	1.365	49.5	62.2	20.0	45.8	21.5	-48.7	-41.3	GLB/GLB 54MHz
4	8M25G7W	6.111	49.5	68.0	25.9	43.9	19.1	-49.4	-42.0	GLB/GLB 54MHz
5	54M0G7W	45.000	55.4	80.2	36.0	42.4	19.1	-51.8	-40.5	GLB/GLB 54MHz

Table 8-12. Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 6

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	2.9	3.2	3.0	3.7	2.8
	2	2.7	3.2	2.9	3.6	2.9
	3	2.7	3.2	2.9	3.6	2.9
	4	2.9	3.2	3.0	3.7	2.8
	5	5.4	5.5	5.3	6.0	4.9

Table 8-13. Summary of Overall C/I Margins for scenario 6 (dB)

As shown in Table 8-13, all C/I margins are positive in this scenario.

Scenario 7: NSS-7 ZONE/HEMI connectivity (54 MHz)

Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
346KG7W	0.256	51.2	49.9	14.8	42.3	18.2	-55.4	-39.3	EH/EH 72 MHz
461KG7W	0.341	47.0	52.4	17.2	43.8	21.5	-50.0	-38.1	EH/EH 72 MHz
1M84G7W	1.365	54.9	58.6	23.4	43.8	21.5	-57.7	-37.9	EH/EH 72 MHz
8M25G7W	6.111	51.2	64.3	29.1	42.3	19.1	-54.8	-38.7	EH/EH 72 MHz
72M0G7W	63.330	56.3	78.9	41.7	48.0	24.9	-55.4	-36.3	EH/EH 72 MHz
346KG7W	0.256	51.2	50.1	14.4	42.3	18.2	-55.2	-39.7	EH/WH 72 MHz
461KG7W	0.341	47.0	52.8	17.2	43.8	21.5	-49.5	-38.1	EH/WH 72 MHz
1M84G7W	1.365	54.9	58.8	23.2	43.8	21.5	-57.4	-38.1	EH/WH 72 MHz
8M25G7W	6.111	51.2	64.4	28.8	42.3	19.1	-54.7	-39.1	EH/WH 72 MHz
72M0G7W	63.33	56.3	77.9	41.2	48	24.9	-56.4	-36.8	EH/WH 72 MHz

Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
346KG7W	0.256	45.7	49.9	15.0	40.1	18.2	-49.8	-39.1	ZONE/HEMI 54MHz
461KG7W	0.341	45.7	51.6	16.7	43.6	21.5	-49.4	-38.6	ZONE/HEMI 54MHz
1M84G7W	1.365	45.7	57.4	22.5	43.6	21.5	-49.6	-38.9	ZONE/HEMI 54MHz
8M25G7W	6.111	45.7	64.4	29.5	40.1	19.1	-49.1	-38.4	ZONE/HEMI 54MHz
54M0G7W	45.000	50.3	76.6	39.7	40.1	19.1	-50.3	-36.9	ZONE/HEMI 54MHz

Table 8-14. Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 7

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	1.8	1.4	1.6	1.1	0.3
	2	0.7	0.3	0.5	0.0	-0.7
	3	0.9	0.5	0.7	0.2	-0.5
	4	1.5	1.0	1.3	0.8	-0.1
	5	2.4	1.9	2.2	1.7	1.3
	6	1.6	1.2	1.4	0.9	0.0
	7	0.9	0.4	0.7	0.2	-0.5
	8	0.9	0.4	0.7	0.2	-0.5
	9	1.3	0.8	1.1	0.6	-0.3
	10	1.6	1.2	1.4	0.9	0.6

Table 8-15. Summary of Overall C/I Margins for scenario 7 (dB)

In Table 8-15, there are some negative C/I margins (with respect to the criteria of 6%). The worst case is represented for Wanted Carrier 2 with respect to Interfering Carrier 5. The deficit with respect to the 6% C/I criterion is 0.7 dB, which is equivalent to an increase of 7% of victim noise temperature. The C/I deficit indicated will lead to an impact on the overall C/N+I of only 0.3 dB. C-band coordination between these two spacecraft has been completed.

Scenario 8: NSS-7 HEMI/ZONE connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	51.2	49.9	14.8	42.3	18.2	-55.4	-39.3	EH/EH 72 MHz
2	461KG7W	0.341	47.0	52.4	17.2	43.8	21.5	-50.0	-38.1	EH/EH 72 MHz
3	1M84G7W	1.365	54.9	58.6	23.4	43.8	21.5	-57.7	-37.9	EH/EH 72 MHz
4	8M25G7W	6.111	51.2	64.3	29.1	42.3	19.1	-54.8	-38.7	EH/EH 72 MHz
5	72M0G7W	63.330	56.3	78.9	41.7	48.0	24.9	-55.4	-36.3	EH/EH 72 MHz
6	346KG7W	0.256	51.2	50.1	14.4	42.3	18.2	-55.2	-39.7	EH/WH 72 MHz
7	461KG7W	0.341	47.0	52.8	17.2	43.8	21.5	-49.5	-38.1	EH/WH 72 MHz
8	1M84G7W	1.365	54.9	58.8	23.2	43.8	21.5	-57.4	-38.1	EH/WH 72 MHz
9	8M25G7W	6.111	51.2	64.4	28.8	42.3	19.1	-54.7	-39.1	EH/WH 72 MHz
10	72M0G7W	63.33	56.3	77.9	41.2	48	24.9	-56.4	-36.8	EH/WH 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	45.7	50.8	18.0	40.1	18.2	-49.0	-36.1	HEMI/ZONE 54MHz
2	461KG7W	0.341	45.7	52.1	19.3	43.6	21.5	-48.9	-36.1	HEMI/ZONE 54MHz
3	1M84G7W	1.365	45.7	58.1	25.3	43.6	21.5	-48.9	-36.1	HEMI/ZONE 54MHz
4	8M25G7W	6.111	45.7	64.6	31.8	40.1	19.1	-48.9	-36.1	HEMI/ZONE 54MHz
5	54M0G7W	45.000	49.3	75.2	40.4	40.1	19.1	-50.6	-36.2	HEMI/ZONE 54MHz

Table 8-16. Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 8

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	-0.6	-0.7	-0.7	-0.7	-0.3
	2	-1.6	-1.6	-1.6	-1.6	-1.1
	3	-1.4	-1.4	-1.4	-1.4	-0.9
	4	-1.0	-1.0	-1.0	-1.0	-0.6
	5	0.3	0.3	0.3	0.3	0.9
	6	-0.9	-0.9	-0.9	-0.9	-0.6
	7	-1.5	-1.5	-1.5	-1.5	-1.0
	8	-1.5	-1.5	-1.5	-1.5	-1.0
	9	-1.2	-1.3	-1.3	-1.3	-0.9
	10	-0.4	-0.4	-0.4	-0.4	0.3

Table 8-17. Summary of Overall C/I Margins for scenario 8 (dB)

In Table 8-17, there are some negative C/I margins (with respect to the criteria of 6%). The worst case is represented with respect to Wanted Carrier 2. The deficit with respect to the 6% C/I

criterion is 1.6 dB, which is equivalent to an increase of 8.8% of victim noise temperature. The C/I deficit indicated will lead to an impact on the overall C/N+I of only 0.4 dB. C-band coordination between these two spacecraft has been completed.

Scenario 9: NSS-7 ZONE/ZONE connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	51.2	49.9	14.8	42.3	18.2	-55.4	-39.3	EH/EH 72 MHz
2	461KG7W	0.341	47.0	52.4	17.2	43.8	21.5	-50.0	-38.1	EH/EH 72 MHz
3	1M84G7W	1.365	54.9	58.6	23.4	43.8	21.5	-57.7	-37.9	EH/EH 72 MHz
4	8M25G7W	6.111	51.2	64.3	29.1	42.3	19.1	-54.8	-38.7	EH/EH 72 MHz
5	72M0G7W	63.330	56.3	78.9	41.7	48.0	24.9	-55.4	-36.3	EH/EH 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	45.7	49.4	18.1	40.1	18.2	-50.4	-36.0	ZONE/ZONE 54MHz
2	461KG7W	0.341	45.7	50.6	19.3	43.6	21.5	-50.4	-36.1	ZONE/ZONE 54MHz
3	1M84G7W	1.365	45.7	56.6	25.3	43.6	21.5	-50.4	-36.1	ZONE/ZONE 54MHz
4	8M25G7W	6.111	45.7	63.2	31.9	40.1	19.1	-50.3	-36.0	ZONE/ZONE 54MHz
5	54M0G7W	45.000	47.4	74.8	40.5	40.1	24.9	-49.1	-36.1	ZONE/ZONE 54MHz

Table 8-18. Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 9

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	-0.4	-0.4	-0.4	-0.5	-0.6
	2	-1.3	-1.3	-1.3	-1.3	-1.6
	3	-1.1	-1.1	-1.1	-1.1	-1.4
	4	-0.8	-0.7	-0.7	-0.8	-0.9
	5	0.7	0.8	0.8	0.7	0.4

Table 8-19. Summary of Overall C/I Margins for scenario 9 (dB)

In Table 8-19, there are some negative C/I margins (with respect to the criteria of 6%). The worst case is represented for Wanted Carrier 2 with respect to Interfering Carrier 5. The deficit with respect to the 6% C/I criterion is 1.6 dB, which is equivalent to an increase of 8.8% of victim noise temperature. The C/I deficit indicated will lead to an impact on the overall C/N+I of only 0.4 dB. C-band coordination between these two spacecraft has been completed.

Scenario 10: NSS-7 GLB/ZONE connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	51.7	53.6	13.0	42.5	18.2	-52.2	-41.0	GLB/GLB 36 MHz
2	461KG7W	0.341	47.6	57.1	16.6	43.8	21.5	-45.8	-38.8	GLB/GLB 36 MHz
3	1M84G7W	1.365	55.4	63.2	22.6	43.8	21.5	-53.6	-38.8	GLB/GLB 36 MHz
4	8M25G7W	6.111	51.7	68.3	27.8	42.5	19.1	-51.2	-40.1	GLB/GLB 36 MHz
5	36M0G7W	30.000	56.8	79.1	36.6	42.5	19.1	-52.5	-38.2	GLB/GLB 36 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	45.9	52.1	17.9	40.5	18.2	-47.9	-36.1	GLB/ZONE 54MHz
2	461KG7W	0.341	45.9	53.4	19.3	44.0	21.5	-47.8	-36.0	GLB/ZONE 54MHz
3	1M84G7W	1.365	45.9	59.4	25.3	44.0	21.5	-47.8	-36.0	GLB/ZONE 54MHz
4	8M25G7W	6.111	45.9	65.7	31.5	40.5	19.1	-48.1	-36.3	GLB/ZONE 54MHz
5	54M0G7W	45.000	50.6	76.6	40.5	40.5	19.1	-50.5	-36.1	GLB/ZONE 54MHz

Table 8-20. Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 10

		Interfering (NSS-7 @20W)				
	Carrier ID	**1**	**2**	**3**	**4**	**5**
Wanted (SES-4 @22W)	**1**	-1.5	-1.6	-1.6	-1.3	-1.4
	2	-1.4	-1.5	-1.5	-1.2	-1.2
	3	-1.4	-1.5	-1.5	-1.2	-1.2
	4	-1.5	-1.6	-1.6	-1.3	-1.4
	5	0.6	0.5	0.5	0.8	0.7

Table 8-21. Summary of Overall C/I Margins for scenario 10 (dB)

In Table 8-21, there are some negative C/I margins (with respect to the criteria of 6%). The worst case deficit with respect to the 6% C/I criterion is 1.6 dB, which is equivalent to an increase of 8.8% of victim noise temperature. The C/I deficit indicated will lead to an impact on the overall C/N+I of only 0.4 dB. C-band coordination between these two spacecraft has been completed.

Scenario 11: NSS-7 ZONE/GLB connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	51.7	53.6	13.0	42.5	18.2	-52.2	-41.0	GLB/GLB 36 MHz
2	461KG7W	0.341	47.6	57.1	16.6	43.8	21.5	-45.8	-38.8	GLB/GLB 36 MHz
3	1M84G7W	1.365	55.4	63.2	22.6	43.8	21.5	-53.6	-38.8	GLB/GLB 36 MHz
4	8M25G7W	6.111	51.7	68.3	27.8	42.5	19.1	-51.2	-40.1	GLB/GLB 36 MHz
5	36M0G7W	30.000	56.8	79.1	36.6	42.5	19.1	-52.5	-38.2	GLB/GLB 36 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	50.5	55.6	12.7	42.4	18.2	-49.0	-41.4	ZONE/GLB 54MHz
2	461KG7W	0.341	50.5	57.2	14.2	45.8	21.5	-48.7	-41.1	ZONE/GLB 54MHz
3	1M84G7W	1.365	50.5	63.2	20.3	45.8	21.5	-48.7	-41.1	ZONE/GLB 54MHz
4	8M25G7W	6.111	49.5	69.0	26.1	43.9	19.1	-48.3	-41.8	ZONE/GLB 54MHz
5	54M0G7W	45.000	55.4	81.0	36.0	42.4	19.1	-51.0	-40.5	ZONE/GLB 54MHz

Table 8-22. Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 11

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	3.1	2.8	2.8	3.3	2.7
	2	3.1	2.8	2.8	3.2	2.8
	3	3.1	2.8	2.8	3.2	2.8
	4	3.2	2.9	2.9	3.3	2.8
	5	5.5	5.1	5.1	5.6	4.9

Table 8-23. Summary of Overall C/I Margins for scenario 11 (dB)

As shown in Table 8-23, all C/I margins are positive in this scenario.

Scenario 12: NSS-7 NA/EU connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	54.6	52.4	24.8	51.3	18.2	-56.3	-29.3	NA/EU 54 MHz
2	461KG7W	0.341	54.6	55.1	27.5	54.6	21.5	-54.8	-27.9	NA/EU 54 MHz
3	1M84G7W	1.365	54.6	61.2	33.5	54.6	21.5	-54.8	-27.9	NA/EU 54 MHz
4	8M25G7W	6.111	54.6	67.1	39.5	51.3	19.1	-55.3	-28.4	NA/EU 54 MHz
5	54M0G7W	45.000	54.6	79.6	49.9	49.2	19.1	-51.5	-26.6	NA/EU 54 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	52.9	54.5	28.0	47.1	18.2	-52.5	-26.1	NA/EU 54MHz
2	461KG7W	0.341	54.6	55.9	29.3	52.6	21.5	-54.1	-26.0	NA/EU 54MHz
3	1M84G7W	1.365	52.9	61.1	34.6	54.5	21.5	-53.1	-26.8	NA/EU 54MHz
4	8M25G7W	6.111	52.9	67.9	41.4	49.0	19.1	-52.8	-26.5	NA/EU 54MHz
5	54M0G7W	45.000	52.9	79.0	50.5	44.6	19.1	-50.4	-26.0	NA/EU 54MHz

Table 8-24. Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 12

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	7.5	8.0	8.2	7.9	6.7
	2	7.6	8.3	8.2	7.9	6.3
	3	7.6	8.3	8.2	7.9	6.3
	4	7.6	8.0	8.3	8.0	6.7
	5	8.3	8.4	9.0	8.7	7.8

Table 8-25. Summary of Overall C/I Margins for scenario 11 (dB)

As shown in Table 8-25, all C/I margins are positive in this scenario.

Scenario 13: NSS-7 NA/WA connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	53.1	53.0	26.5	49.2	18.2	-54.1	-27.6	NA/WA 54 MHz
2	461KG7W	0.341	54.6	54.5	28.0	54.6	21.5	-55.4	-27.4	NA/WA 54 MHz
3	1M84G7W	1.365	54.6	60.5	34.0	54.6	21.5	-55.4	-27.4	NA/WA 54 MHz
4	8M25G7W	6.111	53.1	66.4	39.8	51.3	19.1	-54.6	-28.1	NA/WA 54 MHz
5	54M0G7W	45.000	53.1	79.1	50.5	47.3	19.1	-50.5	-26.0	NA/WA 54 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	52.9	57.0	26.8	44.6	18.2	-50.0	-27.2	NA/WA 54MHz
2	461KG7W	0.341	52.9	57.3	27.2	51.1	21.5	-50.9	-28.2	NA/WA 54MHz
3	1M84G7W	1.365	52.9	62.6	32.5	52.6	21.5	-51.6	-28.8	NA/WA 54MHz
4	8M25G7W	6.111	52.9	69.8	39.6	47.1	19.1	-51.0	-28.2	NA/WA 54MHz
5	54M0G7W	45.000	52.9	78.6	50.5	41.1	19.1	-50.8	-26.0	NA/WA 54MHz

Table 8-26. Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 13

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	7.2	8.1	8.8	8.2	6.9
	2	6.1	7.0	7.7	7.1	6.3
	3	6.1	7.0	7.7	7.1	6.3
	4	6.8	7.7	8.4	7.8	6.7
	5	7.5	8.4	9.1	8.5	6.7

Table 8-27. Summary of Overall C/I Margins for scenario 13 (dB)

As shown in Table 8-27, all C/I margins are positive in this scenario.

Scenario 14: NSS-7 NA/SA connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	53.1	53.0	26.5	49.2	18.2	-54.1	-27.6	NA/WA 54 MHz
2	461KG7W	0.341	54.6	54.5	28.0	54.6	21.5	-55.4	-27.4	NA/WA 54 MHz
3	1M84G7W	1.365	54.6	60.5	34.0	54.6	21.5	-55.4	-27.4	NA/WA 54 MHz
4	8M25G7W	6.111	53.1	66.4	39.8	51.3	19.1	-54.6	-28.1	NA/WA 54 MHz
5	54M0G7W	45.000	53.1	79.1	50.5	47.3	19.1	-50.5	-26.0	NA/WA 54 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	54.6	58.1	28.0	41.1	18.2	-50.6	-26.0	NA/SA 54MHz
2	461KG7W	0.341	52.9	57.8	27.8	49.0	21.5	-50.4	-27.5	NA/SA 54MHz
3	1M84G7W	1.365	52.9	63.6	33.6	49.0	21.5	-50.6	-27.7	NA/SA 54MHz
4	8M25G7W	6.111	52.9	70.3	40.2	44.6	19.1	-50.5	-27.6	NA/SA 54MHz
5	54M0G7W	45.000	52.9	78.6	50.5	41.1	19.1	-50.8	-26.0	NA/SA 54MHz

Table 8-28. Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 14

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	6.8	7.5	7.7	7.6	6.9
	2	6.2	6.5	6.7	6.6	6.3
	3	6.2	6.5	6.7	6.6	6.3
	4	6.6	7.1	7.3	7.2	6.7
	5	6.7	7.8	8.0	7.9	6.7

Table 8-29. Summary of Overall C/I Margins for scenario 14 (dB)

As shown in Table 8-29, all C/I margins are positive in this scenario.

Scenario 15: NSS-7 NA/SC connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	53.1	52.4	25.5	49.6	18.2	-54.7	-28.6	NA/SC 54 MHz
2	461KG7W	0.341	54.6	54.2	27.2	55.0	21.5	-55.7	-28.1	NA/SC 54 MHz
3	1M84G7W	1.365	54.6	60.2	33.3	55.0	21.5	-55.7	-28.1	NA/SC 54 MHz
4	8M25G7W	6.111	53.1	65.9	38.9	51.7	19.1	-55.1	-29.0	NA/SC 54 MHz
5	54M0G7W	45.000	53.1	79.5	50.5	47.7	19.1	-50.1	-26.0	NA/SC 54 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	54.6	55.7	27.9	47.7	18.2	-53.0	-26.1	NA/SC 54MHz
2	461KG7W	0.341	52.9	56.5	28.7	53.1	21.5	-51.7	-26.6	NA/SC 54MHz
3	1M84G7W	1.365	52.9	62.5	34.8	53.1	21.5	-51.8	-26.6	NA/SC 54MHz
4	8M25G7W	6.111	52.9	67.4	39.7	51.7	19.1	-53.3	-28.1	NA/SC 54MHz
5	54M0G7W	45.000	57.5	83.1	50.4	47.7	19.1	-50.9	-26.1	NA/SC 54MHz

Table 8-30. Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 15

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	7.1	7.0	7.0	8.5	6.4
	2	7.5	6.8	6.8	8.4	6.1
	3	7.4	6.8	6.8	8.4	6.1
	4	7.2	6.9	6.9	8.5	6.3
	5	7.6	7.8	7.8	9.3	7.3

Table 8-31. Summary of Overall C/I Margins for scenario 15 (dB)

As shown in Table 8-31, all C/I margins are positive in this scenario.

Scenario 16: NSS-7 NA/CA connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	53.1	52.4	25.5	49.6	18.2	-54.7	-28.6	NA/SC 54 MHz
2	461KG7W	0.341	54.6	54.2	27.2	55.0	21.5	-55.7	-28.1	NA/SC 54 MHz
3	1M84G7W	1.365	54.6	60.2	33.3	55.0	21.5	-55.7	-28.1	NA/SC 54 MHz
4	8M25G7W	6.111	53.1	65.9	38.9	51.7	19.1	-55.1	-29.0	NA/SC 54 MHz
5	54M0G7W	45.000	53.1	79.5	50.5	47.7	19.1	-50.1	-26.0	NA/SC 54 MHz
6	346KG7W	0.256	49.1	52.1	27.0	45.2	18.2	-51.1	-27.1	NA/NA 54 MHz
7	461KG7W	0.341	53.1	54.2	29.1	47.6	21.5	-54.3	-26.3	NA/NA 54 MHz
8	1M84G7W	1.365	53.1	60.2	35.1	47.6	21.5	-54.3	-26.3	NA/NA 54 MHz
9	8M25G7W	6.111	49.1	66.8	41.7	45.2	19.1	-50.2	-26.2	NA/NA 54 MHz
10	54M0G7W	45.000	53.1	77.5	50.4	45.2	19.1	-52.1	-26.1	NA/NA 54 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	54.6	55.7	27.9	47.7	18.2	-53.0	-26.1	NA/CA 54MHz
2	461KG7W	0.341	52.9	56.5	28.7	53.1	21.5	-51.7	-26.6	NA/CA 54MHz
3	1M84G7W	1.365	52.9	62.5	34.8	53.1	21.5	-51.8	-26.6	NA/CA 54MHz
4	8M25G7W	6.111	52.9	67.4	39.7	51.7	19.1	-53.3	-28.1	NA/CA 54MHz
5	54M0G7W	45.000	57.5	83.1	50.4	47.7	19.1	-50.9	-26.1	NA/CA 54MHz

Table 8-32. Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 16

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	7.1	7.0	7.0	8.5	6.4
	2	7.5	6.8	6.8	8.4	6.1
	3	7.4	6.8	6.8	8.4	6.1
	4	7.2	6.9	6.9	8.5	6.3
	5	7.6	7.8	7.8	9.3	7.3
	6	4.7	4.8	4.8	6.4	4.3
	7	4.1	4.1	4.1	5.6	3.5
	8	4.1	4.1	4.1	5.6	3.5
	9	4.8	4.9	4.9	6.4	4.3
	10	5.1	5.3	5.3	6.8	4.8

Table 8-33. Summary of Overall C/I Margins for scenario 16 (dB)

As shown in Table 8-33, all C/I margins are positive in this scenario.

Scenario 17: NSS-7 NA/NA connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	49.1	52.1	27.0	45.2	18.2	-51.1	-27.1	NA/NA 54 MHz
2	461KG7W	0.341	53.1	54.2	29.1	47.6	21.5	-54.3	-26.3	NA/NA 54 MHz
3	1M84G7W	1.365	53.1	60.2	35.1	47.6	21.5	-54.3	-26.3	NA/NA 54 MHz
4	8M25G7W	6.111	49.1	66.8	41.7	45.2	19.1	-50.2	-26.2	NA/NA 54 MHz
5	54M0G7W	45.000	53.1	77.5	50.4	45.2	19.1	-52.1	-26.1	NA/NA 54 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	54.6	55.8	27.3	45.2	18.2	-52.8	-26.8	NA/NA 54MHz
2	461KG7W	0.341	52.9	57.1	28.6	49.6	21.5	-51.1	-26.7	NA/NA 54MHz
3	1M84G7W	1.365	52.9	63.1	34.6	49.6	21.5	-51.1	-26.8	NA/NA 54MHz
4	8M25G7W	6.111	52.9	70.4	41.8	45.2	19.1	-50.4	-26.0	NA/NA 54MHz
5	54M0G7W	45.000	54.6	81.0	50.5	43.6	19.1	-50.1	-26.0	NA/NA 54MHz

Table 8-34. Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 17

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	5.2	4.8	4.8	4.1	4.0
	2	4.5	3.9	3.9	3.2	3.1
	3	4.5	3.9	3.9	3.2	3.1
	4	5.2	4.8	4.8	4.1	4.0
	5	5.6	5.3	5.3	4.6	4.5

Table 8-35. Summary of Overall C/I Margins for scenario 17 (dB)

As shown in Table 8-35, all C/I margins are positive in this scenario.

Scenario 18: NSS-7 EU/NA connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	49.1	51.5	27.5	45.2	18.2	-51.6	-26.6	EU/NA 54MHz
2	461KG7W	0.341	53.1	53.3	29.3	49.6	21.5	-55.1	-26.0	EU/NA 54MHz
3	1M84G7W	1.365	53.1	59.4	35.3	49.6	21.5	-55.1	-26.0	EU/NA 54MHz
4	8M25G7W	6.111	49.1	65.9	41.9	45.2	19.1	-51.0	-26.0	EU/NA 54MHz
5	54M0G7W	45.000	53.1	78.5	50.5	45.2	19.1	-51.1	-26.0	EU/NA 54MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	56.5	59.8	28.1	41.6	18.2	-50.8	-26.0	EU/NA 54MHz
2	461KG7W	0.341	54.6	59.4	27.7	47.7	21.5	-50.5	-27.6	EU/NA 54MHz
3	1M84G7W	1.365	54.6	65.6	33.8	47.7	21.5	-50.4	-27.5	EU/NA 54MHz
4	8M25G7W	6.111	56.5	73.5	41.8	43.6	19.1	-50.9	-26.1	EU/NA 54MHz
5	54M0G7W	45.000	56.5	79.2	50.5	43.6	19.1	-53.8	-26.0	EU/NA 54MHz

Table 8-36. Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 18

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	4.4	5.3	5.2	4.5	5.1
	2	4.2	4.7	4.5	4.3	5.6
	3	4.2	4.7	4.5	4.3	5.6
	4	4.1	5.0	4.9	4.2	4.8
	5	4.9	6.2	6.1	5.0	5.3

Table 8-37. Summary of Overall C/I Margins for scenario 18 (dB)

As shown in Table 8-37, all C/I margins are positive in this scenario.

Scenario 19: NSS-7 CA/NA connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	49.1	52.1	27.0	45.2	18.2	-51.1	-27.1	NA/NA 54 MHz
2	461KG7W	0.341	53.1	54.2	29.1	47.6	21.5	-54.3	-26.3	NA/NA 54 MHz
3	1M84G7W	1.365	53.1	60.2	35.1	47.6	21.5	-54.3	-26.3	NA/NA 54 MHz
4	8M25G7W	6.111	49.1	66.8	41.7	45.2	19.1	-50.2	-26.2	NA/NA 54 MHz
5	54M0G7W	45.000	53.1	77.5	50.4	45.2	19.1	-52.1	-26.1	NA/NA 54 MHz
6	346KG7W	0.256	53.1	54.1	27.1	45.2	18.2	-53.0	-27.0	SC/NA 54 MHz
7	461KG7W	0.341	54.6	56.4	29.3	49.6	21.5	-53.6	-26.0	SC/NA 54 MHz
8	1M84G7W	1.365	54.6	62.4	35.3	49.6	21.5	-53.6	-26.0	SC/NA 54 MHz
9	8M25G7W	6.111	53.1	68.9	41.8	45.2	19.1	-52.1	-26.0	SC/NA 54 MHz
10	54M0G7W	45.000	53.1	79.5	50.5	45.2	19.1	-50.1	-26.0	SC/NA 54 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	56.5	60.1	28.1	41.6	18.2	-50.4	-26.0	CA/NA 54MHz
2	461KG7W	0.341	54.6	59.8	27.7	47.7	21.5	-50.2	-27.6	CA/NA 54MHz
3	1M84G7W	1.365	54.6	65.9	33.9	47.7	21.5	-50.0	-27.5	CA/NA 54MHz
4	8M25G7W	6.111	56.5	73.8	41.8	43.6	19.1	-50.5	-26.1	CA/NA 54MHz
5	54M0G7W	45.000	58.7	84.4	50.4	43.6	19.1	-50.8	-26.2	CA/NA 54MHz

Table 8-38. Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 19

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	4.1	5.1	5.0	4.1	4.3
	2	3.2	4.0	3.9	3.3	3.5
	3	3.2	4.0	3.9	3.3	3.5
	4	4.1	5.1	5.0	4.2	4.3
	5	4.6	5.8	5.6	4.7	4.8
	6	4.6	5.8	5.7	4.7	4.8
	7	5.4	6.2	6.1	5.5	5.7
	8	5.4	6.2	6.1	5.5	5.7
	9	4.7	5.9	5.7	4.8	4.9
	10	5.0	6.3	6.2	5.1	5.2

Table 8-39. Summary of Overall C/I Margins for scenario 19 (dB)

As shown in Table 8-39, all C/I margins are positive in this scenario.

Scenario 20: NSS-7 WA/NA connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	49.1	53.2	27.4	45.2	18.2	-50.0	-26.7	WA/NA 54 MHz
2	461KG7W	0.341	53.1	55.2	29.3	49.6	21.5	-53.3	-26.0	WA/NA 54 MHz
3	1M84G7W	1.365	53.1	61.2	35.3	49.6	21.5	-53.3	-26.0	WA/NA 54 MHz
4	8M25G7W	6.111	49.1	67.6	41.8	45.2	19.1	-49.3	-26.1	WA/NA 54 MHz
5	54M0G7W	45.000	53.1	79.2	50.4	45.2	19.1	-50.4	-26.1	WA/NA 54 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	56.5	58.3	28.0	41.6	18.2	-52.3	-26.1	WA/NA 54MHz
2	461KG7W	0.341	54.6	58.2	27.9	47.7	21.5	-51.7	-27.5	WA/NA 54MHz
3	1M84G7W	1.365	54.6	64.3	34.0	47.7	21.5	-51.6	-27.4	WA/NA 54MHz
4	8M25G7W	6.111	56.5	72.2	41.8	43.6	19.1	-52.2	-26.0	WA/NA 54MHz
5	54M0G7W	45.000	56.5	82.7	50.4	43.6	19.1	-50.3	-26.1	WA/NA 54MHz

Table 8-40. Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 20

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	5.1	6.1	6.0	5.1	4.7
	2	5.7	6.3	6.2	5.7	4.9
	3	5.7	6.3	6.2	5.7	4.9
	4	4.8	5.8	5.7	4.8	4.5
	5	5.1	6.3	6.2	5.1	5.0

Table 8-41. Summary of Overall C/I Margins for scenario 20 (dB)

As shown in Table 8-41, all C/I margins are positive in this scenario.

Scenario 21: NSS-7 SC/NA connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	SES-4 Connectivity
1	346KG7W	0.256	53.1	54.1	27.1	45.2	18.2	-53.0	-27.0	SC/NA 54MHz
2	461KG7W	0.341	54.6	56.4	29.3	49.6	21.5	-53.6	-26.0	SC/NA 54MHz
3	1M84G7W	1.365	54.6	62.4	35.3	49.6	21.5	-53.6	-26.0	SC/NA 54MHz
4	8M25G7W	6.111	53.1	68.9	41.8	45.2	19.1	-52.1	-26.0	SC/NA 54MHz
5	54M0G7W	45.000	53.1	79.5	50.5	45.2	19.1	-50.1	-26.0	SC/NA 54MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7 Connectivity
1	346KG7W	0.256	56.5	59.1	28.1	41.6	18.2	-51.5	-26.0	SC/NA 54MHz
2	461KG7W	0.341	54.6	59.0	28.1	47.7	21.5	-50.9	-27.3	SC/NA 54MHz
3	1M84G7W	1.365	54.6	65.1	34.1	47.7	21.5	-50.9	-27.3	SC/NA 54MHz
4	8M25G7W	6.111	56.5	72.7	41.8	43.6	19.1	-51.6	-26.1	SC/NA 54MHz
5	54M0G7W	45.000	54.6	81.1	50.2	43.6	19.1	-50.0	-26.3	SC/NA 54MHz

Table 8-42. Summary of Typical Transmission Parameters for NSS-7 and SES-4 under scenario 21

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (SES-4 @22W)	1	4.8	5.7	5.7	4.9	4.8
	2	5.8	6.4	6.4	5.9	5.5
	3	5.8	6.4	6.4	5.9	5.5
	4	4.8	5.8	5.8	4.9	4.9
	5	5.1	6.1	6.1	5.2	5.2

Table 8-43. Summary of Overall C/I Margins for scenario 21 (dB)

As shown in Table 8-43, all C/I margins are positive in this scenario.

Overview of results

Table 8-44 summarizes all the results for the studied connectivities under this specific interference analysis case. It shows for each scenario the uplink beam and downlink beam for the wanted and interfering satellite, the associated frequency bands, and the worst case observed C/I margin from the calculations. C-band coordination has been completed for these two spacecraft.

	Interfering	Wanted			Worst Case
Scenario	NSS-7 connectivity	SES-4 connectivity	Uplink	Uplink	C/I margin
1	HEMI/HEMI 54 MHz	EH/EH 72 MHz EH/WH 72 MHz WH/EH 72 MHz WH/WH 72 MHz	C	C	0.0
2	EU/HEMI 54 MHz	EU/WH 54 MHz EU/EH 54 MHz	Ku	C	0.8
3	WA/HEMI 54 MHz	WA/WH 54 MHz WA/EH 54 MHz	Ku	C	1.7
4	GLB/HEMI 54 MHz	GLB/GLB 36 MHz	C	C	0.1
5	HEMI/GLB 54 MHz	GLB/GLB 36 MHz	C	C	2.4
6	GLB/GLB 54 MHz	GLB/GLB 36 MHz	C	C	2.7
7	ZONE/HEMI 54 MHz	EH/EH 72 MHz EH/WH 72 MHz	C	C	-0.7
8	HEMI/ZONE 54 MHz	EH/EH 72 MHz WH/EH 72 MHz	C	C	-1.6
9	ZONE/ZONE 54 MHz	EH/EH 72 MHz	C	C	-1.6
10	GLB/ZONE 54 MHz	GLB/GLB 36 MHz	C	C	-1.6
11	ZONE/GLB 54 MHz	GLB/GLB 36 MHz	C	C	2.7
12	NA/EU 54 MHz	NA/EU 54 MHz	Ku	Ku	6.3
13	NA/WA 54 MHz	NA/WA 54 MHz	Ku	Ku	6.1
14	NA/SA 54 MHz	NA/WA 54 MHz	Ku	Ku	6.2
15	NA/SC 54 MHz	NA/SC 54 MHz	Ku	Ku	6.1
16	NA/CA 54 MHz	NA/NA 54 MHz NA/SC 54 MHz	Ku	Ku	3.5
17	NA/NA 54 MHz	NA/NA 54 MHz	Ku	Ku	3.1
18	EU/NA 54 MHz	EU/NA 54 MHz	Ku	Ku	4.1
19	CA/NA 54 MHz	NA/NA 54 MHz SC/NA 54 MHz	Ku	Ku	3.2
20	WA/NA 54 MHz	WA/NA 54 MHz	Ku	Ku	4.5
21	SC/NA 54 MHz	SC/NA 54 MHz	Ku	Ku	4.8

Table 8-44. Summary of all scenarios and C/I Margins

8.2 Interference analysis of NSS-7 with respect to Intelsat 901

For this case, SES has assumed that the transmission parameters of the Intelsat-901 satellite are the wanted transmissions and the transmission parameters of the NSS-7 satellite are the interfering transmissions. This analysis is performed for digital signals only in both the NSS-7 and SES-4 networks as analog TV/FM signals are coordinated on a case-by-case basis with nearby spacecraft.

No Schedule S information was available in the FCC files for the Intelsat-901 spacecraft. Therefore the following approach was taken in order to derive the typical Intelsat-901 carriers to take

into account in this analysis. SES used the carrier designators from the Schedule S filed with the Intelsat 706 application for its move to the orbital location of 72.1° E.L., File No. SAT-MOD-20110428-00081. In order to derive the proper uplink and downlink parameters, the Intelsat 706 link budgets were re-generated and adjusted for the Intelsat-901 performance for the various beams (e.g. Hemi, Zone and Spot beams), and the downlink antenna sizes were adjusted accordingly. SES believes that these derived parameters appropriately represent the typical carrier parameters on the Intelsat-901 spacecraft.

The NSS-7 and Intelsat-901 spacecraft do not have exactly the same coverages, and therefore a number of geographic overlap scenarios were chosen. For each of the possible NSS-7 connectivities and transponder bandwidths, the minimum transponder bandwidth available was chosen as this presents the maximum victim transmission parameters within a certain connectivity. Further, only the scenarios where an actual connectivity and frequency overlap could occur have been studied. The same NSS-7 connectivities depicted in Table 4-1 have been taken into account. Table 8-45 below depicts the scenarios that are analyzed in this section.

	Interfering	Wanted
Scenario	NSS-7 connectivity	IS-901 connectivity
1	HEMI/HEMI 54 MHz	HEMI/HEMI 72 MHz
2	NA/HEMI 54 MHz	SPOT/HEMI 72MHz
3	EU/HEMI 54 MHz	SPOT/HEMI 72MHz
4	CA/HEMI 54 MHz	SPOT/HEMI 72MHz
5	WA/HEMI 54 MHz	SPOT/HEMI 72MHz
6	SC/HEMI 54 MHz	SPOT/HEMI 72MHz
7	SA/HEMI 54 MHz	SPOT/HEMI 72MHz
8	GLB/HEMI 54 MHz	GLB/GLB 36 MHz
9	HEMI/GLB 54 MHz	GLB/GLB 36 MHz
10	GLB/GLB 54 MHz	GLB/GLB 36 MHz
11	ZONE/HEMI 54 MHz	HEMI/HEMI 72 MHz
12	HEMI/ZONE 54 MHz	HEMI/HEMI 72 MHz
13	ZONE/ZONE 54 MHz	HEMI/HEMI 72 MHz
14	GLB/ZONE 54 MHz	GLB/GLB 36 MHz
15	ZONE/GLB 54 MHz	GLB/GLB 36 MHz
16	NA/EU 54 MHz	SPOT/SPOT 72 MHz
17	NA/WA 54 MHz	SPOT/SPOT 72 MHz
18	NA/SA 54 MHz	SPOT/SPOT 72 MHz
19	NA/SC 54 MHz	SPOT/SPOT 72 MHz
20	NA/CA 54 MHz	SPOT/SPOT 72 MHz
21	NA/NA 54 MHz	SPOT/SPOT 72 MHz
22	EU/NA 54 MHz	SPOT/SPOT 72 MHz
23	CA/NA 54 MHz	SPOT/SPOT 72 MHz
24	WA/NA 54 MHz	SPOT/SPOT 72 MHz
25	SC/NA 54 MHz	SPOT/SPOT 72 MHz
26	SA/NA 54 MHz	SPOT/SPOT 72 MHz
27	HEMI/NA 54 MHz	HEMI/SPOT 72 MHz

Table 8-45. Overview of interference analysis scenarios between NSS-7 (interfering) and Intelsat-901 (wanted)

For each scenario as described in the table above, the summary of the transmission parameters for NSS-7 (derived from the link budgets in Annex A) and Intelsat-901 will be given together with the results of the interference calculations in terms of the overall C/I margins. For ease of reference and analysis, these tables are provided in a format similar to the output of the commonly-used Sharp Adjacent Satellite Interference Analysis program.

The interference calculations assume a 1 dB advantage for topocentric-to-geocentric conversion, co-polarization of all wanted and interfering carriers, and all earth station antennas

conforming to a sidelobe pattern of 29-25 log(θ), as specified in section 25.209(a)(1) of the Commission's Rules.

Scenario 1: NSS-7 HEMI/HEMI connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	51.0	75.4	35.6	41.8	15.6	-53.4	-42.2	HEMI/HEMI 72 MHz
2	10M3G7W	6.771	51.0	66.5	25.4	41.8	16.1	-52.8	-42.9	HEMI/HEMI 72 MHz
3	100KG7W	0.075	51.0	46.1	5.0	41.8	15.2	-53.7	-43.8	HEMI/HEMI 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	45.7	50.1	13.7	42.1	18.2	-49.6	-40.4	HEMI/HEMI 54MHz
2	461KG7W	0.341	49.3	53.7	17.2	43.6	21.5	-51.0	-38.1	HEMI/HEMI 54MHz
3	1M84G7W	1.365	47.4	59.5	23.0	43.6	21.5	-49.3	-38.3	HEMI/HEMI 54MHz
4	8M25G7W	6.111	45.7	64.6	28.2	42.1	19.1	-48.9	-39.7	HEMI/HEMI 54MHz
5	54M0G7W	45.000	51.5	76.9	38.5	42.1	19.1	-51.1	-38.0	HEMI/HEMI 54MHz

Table 8-46. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 1

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	3.2	1.3	1.3	2.5	1.3
	2	2.2	0.2	0.3	1.4	0.1
	3	2.2	0.2	0.3	1.5	0.2

Table 8-47. Summary of Overall C/I Margins for scenario 1 (dB)

As shown in Table 8-47, all C/I margins are positive in this scenario.

Scenario 2: NSS-7 NA/HEMI connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	58.1	81.4	35.6	41.8	15.6	-54.5	-42.2	KSPOT/HEMI 72 MHz
2	10M3G7W	6.771	58.1	57.4	25.3	43.5	16.1	-69.0	-43.0	KSPOT/HEMI 72 MHz
3	100KG7W	0.075	58.1	37.2	5.1	43.5	15.2	-69.7	-43.7	KSPOT/HEMI 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	52.9	55.5	15.3	42.1	18.2	-51.5	-38.8	NA/HEMI 54MHz
2	461KG7W	0.341	54.6	58.6	18.4	43.6	21.5	-51.3	-36.9	NA/HEMI 54MHz
3	1M84G7W	1.365	52.9	63.0	22.8	45.5	21.5	-51.3	-38.6	NA/HEMI 54MHz
4	8M25G7W	6.111	52.9	69.1	28.8	43.6	19.1	-51.7	-39.0	NA/HEMI 54MHz
5	54M0G7W	45.000	54.6	80.7	39.5	42.1	19.1	-50.4	-37.0	NA/HEMI 54MHz

Table 8-48. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 2

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.3	0.4	2.0	2.5	0.5
	2	0.3	-0.9	0.1	0.5	-1.2
	3	0.6	-0.7	0.3	0.8	-0.9

Table 8-49. Summary of Overall C/I Margins for scenario 2 (dB)

In Table 8-49, there are some negative C/I margins (with respect to the criteria of 6%). The worst case deficit with respect to the 6% C/I criterion is 1.2 dB, which is equivalent to an increase of 7.9% of victim noise temperature. The C/I deficit indicated will lead to an impact on the overall C/N+I of only 0.3 dB. It is expected that such a C/I level can be coordinated between satellite operators as required.

Scenario 3: NSS-7 EU/HEMI connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	58.1	81.4	35.6	41.8	15.6	-54.5	-42.2	KSPOT/HEMI 72 MHz
2	10M3G7W	6.771	58.1	57.4	25.3	43.5	16.1	-69.0	-43.0	KSPOT/HEMI 72 MHz
3	100KG7W	0.075	58.1	37.2	5.1	43.5	15.2	-69.7	-43.7	KSPOT/HEMI 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	52.9	55.1	15.3	42.1	18.2	-51.9	-38.8	EU/HEMI 54MHz
2	461KG7W	0.341	54.6	58.3	18.5	43.6	21.5	-51.7	-36.9	EU/HEMI 54MHz
3	1M84G7W	1.365	52.9	62.6	22.9	45.5	21.5	-51.6	-38.5	EU/HEMI 54MHz
4	8M25G7W	6.111	52.9	68.7	28.9	43.6	19.1	-52.1	-39.0	EU/HEMI 54MHz
5	54M0G7W	45.000	54.6	80.3	39.5	42.1	19.1	-50.8	-37.0	EU/HEMI 54MHz

Table 8-50. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 3

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.2	0.4	2.0	2.4	0.5
	2	0.5	-0.8	0.2	0.7	-1.0
	3	0.7	-0.6	0.4	0.9	-0.8

Table 8-51. Summary of Overall C/I Margins for scenario 3 (dB)

In Table 8-51, there are some negative C/I margins (with respect to the criteria of 6%). The worst case deficit with respect to the 6% C/I criterion is 1.0 dB, which is equivalent to an increase of 7.6% of victim noise temperature. The C/I deficit indicated will lead to an impact on the overall

C/N+I of only 0.3 dB. It is expected that such a C/I level can be coordinated between satellite operators as required.

Scenario 4: NSS-7 CA/HEMI connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	58.1	81.4	35.6	41.8	15.6	-54.5	-42.2	KSPOT/HEMI 72 MHz
2	10M3G7W	6.771	58.1	57.4	25.3	43.5	16.1	-69.0	-43.0	KSPOT/HEMI 72 MHz
3	100KG7W	0.075	58.1	37.2	5.1	43.5	15.2	-69.7	-43.7	KSPOT/HEMI 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	52.9	56.0	15.3	42.1	18.2	-51.0	-38.8	CA/HEMI 54MHz
2	461KG7W	0.341	54.6	59.2	18.5	43.6	21.5	-50.8	-36.9	CA/HEMI 54MHz
3	1M84G7W	1.365	52.9	63.6	22.8	45.5	21.5	-50.7	-38.5	CA/HEMI 54MHz
4	8M25G7W	6.111	52.9	69.6	28.9	43.6	19.1	-51.2	-39.0	CA/HEMI 54MHz
5	54M0G7W	45.000	56.5	82.2	39.5	42.1	19.1	-50.9	-37.1	CA/HEMI 54MHz

Table 8-52. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 4

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.2	0.4	1.9	2.4	0.6
	2	0.1	-1.1	-0.2	0.3	-1.0
	3	0.3	-0.9	0.0	0.5	-0.7

Table 8-53. Summary of Overall C/I Margins for scenario 4 (dB)

In Table 8-53, there are some negative C/I margins (with respect to the criteria of 6%). The worst case deficit with respect to the 6% C/I criterion is 1.1 dB, which is equivalent to an increase of 7.8% of victim noise temperature. The C/I deficit indicated will lead to an impact on the overall C/N+I of only 0.3 dB. It is expected that such a C/I level can be coordinated between satellite operators as required.

Scenario 5: NSS-7 WA/HEMI connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	58.1	81.4	35.6	41.8	15.6	-54.5	-42.2	KSPOT/HEMI 72 MHz
2	10M3G7W	6.771	58.1	57.4	25.3	43.5	16.1	-69.0	-43.0	KSPOT/HEMI 72 MHz
3	100KG7W	0.075	58.1	37.2	5.1	43.5	15.2	-69.7	-43.7	KSPOT/HEMI 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	52.9	56.8	15.8	42.1	18.2	-50.2	-38.3	WA/HEMI 54MHz
2	461KG7W	0.341	54.6	58.3	17.3	45.5	21.5	-51.7	-38.1	WA/HEMI 54MHz
3	1M84G7W	1.365	52.9	63.6	22.6	46.5	21.5	-50.7	-38.8	WA/HEMI 54MHz
4	8M25G7W	6.111	52.9	70.4	29.3	43.6	19.1	-50.4	-38.5	WA/HEMI 54MHz
5	54M0G7W	45.000	56.5	82.4	39.4	42.1	19.1	-50.6	-37.1	WA/HEMI 54MHz

Table 8-54. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 5

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	1.7	1.5	2.2	2.0	0.6
	2	-0.5	-0.1	-0.1	-0.3	-1.0
	3	-0.3	0.2	0.2	-0.1	-0.8

Table 8-55. Summary of Overall C/I Margins for scenario 5 (dB)

In Table 8-55, there are some negative C/I margins (with respect to the criteria of 6%). The worst case deficit with respect to the 6% C/I criterion is 1.0 dB, which is equivalent to an increase of 7.6% of victim noise temperature. The C/I deficit indicated will lead to an impact on the overall C/N+I of only 0.3 dB. It is expected that such a C/I level can be coordinated between satellite operators as required.

Scenario 6: NSS-7 SC/HEMI connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	58.1	81.4	35.6	41.8	15.6	-54.5	-42.2	KSPOT/HEMI 72 MHz
2	10M3G7W	6.771	58.1	57.4	25.3	43.5	16.1	-69.0	-43.0	KSPOT/HEMI 72 MHz
3	100KG7W	0.075	58.1	37.2	5.1	43.5	15.2	-69.7	-43.7	KSPOT/HEMI 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	52.9	53.6	15.4	42.1	18.2	-53.4	-38.7	SC/HEMI 54MHz
2	461KG7W	0.341	52.9	56.7	18.6	43.6	21.5	-51.5	-36.7	SC/HEMI 54MHz
3	1M84G7W	1.365	52.9	61.2	23.0	45.5	21.5	-53.1	-38.3	SC/HEMI 54MHz
4	8M25G7W	6.111	52.9	67.2	29.0	43.6	19.1	-53.6	-38.8	SC/HEMI 54MHz
5	54M0G7W	45.000	54.6	80.6	39.5	42.1	19.1	-50.6	-37.1	SC/HEMI 54MHz

Table 8-56. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 6

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.2	0.2	1.8	2.3	0.5
	2	1.0	-1.0	0.6	1.1	-1.1
	3	1.2	-0.7	0.8	1.4	-0.9

Table 8-57. Summary of Overall C/I Margins for scenario 6 (dB)

In Table 8-57, there are some negative C/I margins (with respect to the criteria of 6%). The worst case deficit with respect to the 6% C/I criterion is 1.1 dB, which is equivalent to an increase of 7.8% of victim noise temperature. The C/I deficit indicated will lead to an impact on the overall C/N+I of only 0.3 dB. It is expected that such a C/I level can be coordinated between satellite operators as required.

Scenario 7: NSS-7 SA/HEMI connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	58.1	81.4	35.6	41.8	15.6	-54.5	-42.2	KSPOT/HEMI 72 MHz
2	10M3G7W	6.771	58.1	57.4	25.3	43.5	16.1	-69.0	-43.0	KSPOT/HEMI 72 MHz
3	100KG7W	0.075	58.1	37.2	5.1	43.5	15.2	-69.7	-43.7	KSPOT/HEMI 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	52.9	54.8	15.4	42.1	18.2	-52.2	-38.6	SA/HEMI 54MHz
2	461KG7W	0.341	52.9	58.0	18.6	43.6	21.5	-50.3	-36.7	SA/HEMI 54MHz
3	1M84G7W	1.365	52.9	62.4	23.1	45.5	21.5	-51.8	-38.2	SA/HEMI 54MHz
4	8M25G7W	6.111	52.9	68.4	29.1	43.6	19.1	-52.4	-38.8	SA/HEMI 54MHz
5	54M0G7W	45.000	56.5	81.8	39.5	42.1	19.1	-51.3	-37.1	SA/HEMI 54MHz

Table 8-58. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 7

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.1	0.2	1.7	2.3	0.5
	2	0.5	-1.4	0.1	0.7	-0.8
	3	0.8	-1.2	0.4	0.9	-0.6

Table 8-59. Summary of Overall C/I Margins for scenario 7 (dB)

In Table 8-59, there are some negative C/I margins (with respect to the criteria of 6%). The worst case deficit with respect to the 6% C/I criterion is 1.4 dB, which is equivalent to an increase of 8.4% of victim noise temperature. The C/I deficit indicated will lead to an impact on the overall C/N+I of only 0.3 dB. It is expected that such a C/I level can be coordinated between satellite operators as required.

Scenario 8: NSS-7 GLB/HEMI connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	41M0G7W	34.310	51.0	75.8	30.5	42.5	15.6	-50.6	-44.9	GLB/GLB 36 MHz
2	10M3G7W	6.771	51.0	65.1	22.5	45.4	16.1	-54.2	-45.8	GLB/GLB 36 MHz
3	100KG7W	0.075	51.0	44.7	2.1	45.4	15.2	-55.1	-46.7	GLB/GLB 36 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	47.6	53.6	14.4	42.4	18.2	-48.1	-39.7	GLB/HEMI 54MHz
2	461KG7W	0.341	49.5	56.5	17.4	43.9	21.5	-48.3	-37.9	GLB/HEMI 54MHz
3	1M84G7W	1.365	47.6	62.2	23.0	43.9	21.5	-46.8	-38.3	GLB/HEMI 54MHz
4	8M25G7W	6.111	49.5	67.9	28.8	42.4	19.1	-49.5	-39.1	GLB/HEMI 54MHz
5	54M0G7W	45.000	55.4	79.5	38.4	42.4	19.1	-52.4	-38.1	GLB/HEMI 54MHz

Table 8-60. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 8

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	0.9	-0.7	-0.4	0.5	-0.4
	2	1.6	0.3	0.3	1.4	0.9
	3	1.7	0.3	0.4	1.5	0.9

Table 8-61. Summary of Overall C/I Margins for scenario 8 (dB)

In Table 8-61, there are some negative C/I margins (with respect to the criteria of 6%). The worst case deficit with respect to the 6% C/I criterion is 0.7 dB, which is equivalent to an increase of 7.1% of victim noise temperature. The C/I deficit indicated will lead to an impact on the overall C/N+I of only 0.2 dB. C-band coordination between these two spacecraft has been completed.

Scenario 9: NSS-7 HEMI/GLB connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	41M0G7W	34.310	51.0	75.8	30.5	42.5	15.6	-50.6	-44.9	GLB/GLB 36 MHz
2	10M3G7W	6.771	51.0	65.1	22.5	45.4	16.1	-54.2	-45.8	GLB/GLB 36 MHz
3	100KG7W	0.075	51.0	44.7	2.1	45.4	15.2	-55.1	-46.7	GLB/GLB 36 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	47.6	50.9	13.3	42.4	18.2	-50.8	-40.8	HEMI/GLB 54MHz
2	461KG7W	0.341	50.5	52.8	15.3	45.8	21.5	-53.0	-40.1	HEMI/GLB 54MHz
3	1M84G7W	1.365	49.5	58.8	21.3	45.8	21.5	-52.0	-40.1	HEMI/GLB 54MHz
4	8M25G7W	6.111	49.5	64.4	26.9	43.9	19.1	-52.9	-41.0	HEMI/GLB 54MHz
5	54M0G7W	45.000	55.4	78.6	36.1	42.4	19.1	-53.3	-40.5	HEMI/GLB 54MHz

Table 8-62. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 9

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.1	1.5	1.5	2.4	1.9
	2	3.1	2.7	2.6	3.5	3.1
	3	3.1	2.8	2.7	3.6	3.1

Table 8-63. Summary of Overall C/I Margins for scenario 9 (dB)

As shown in Table 8-63, all C/I margins are positive in this scenario.

Scenario 10: NSS-7 GLB/GLB connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	41M0G7W	34.310	51.0	75.8	30.5	42.5	15.6	-50.6	-44.9	GLB/GLB 36 MHz
2	10M3G7W	6.771	51.0	65.1	22.5	45.4	16.1	-54.2	-45.8	GLB/GLB 36 MHz
3	100KG7W	0.075	51.0	44.7	2.1	45.4	15.2	-55.1	-46.7	GLB/GLB 36 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	47.6	54.5	12.4	42.4	18.2	-47.1	-41.7	GLB/GLB 54MHz
2	461KG7W	0.341	50.5	56.2	14.0	45.8	21.5	-49.7	-41.3	GLB/GLB 54MHz
3	1M84G7W	1.365	49.5	62.2	20.0	45.8	21.5	-48.7	-41.3	GLB/GLB 54MHz
4	8M25G7W	6.111	49.5	68.0	25.9	43.9	19.1	-49.4	-42.0	GLB/GLB 54MHz
5	54M0G7W	45.000	55.4	80.2	36.0	42.4	19.1	-51.8	-40.5	GLB/GLB 54MHz

Table 8-64. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 10

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.7	2.6	2.5	3.2	1.9
	2	2.8	3.3	3.0	3.7	3.0
	3	2.9	3.3	3.1	3.8	3.0

Table 8-65. Summary of Overall C/I Margins for scenario 10 (dB)

As shown in Table 8-65, all C/I margins are positive in this scenario.

Scenario 11: NSS-7 ZONE/HEMI connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	51.0	75.4	35.6	41.8	15.6	-53.4	-42.2	HEMI/HEMI 72 MHz
2	10M3G7W	6.771	51.0	66.5	25.4	41.8	16.1	-52.8	-42.9	HEMI/HEMI 72 MHz
3	100KG7W	0.075	51.0	46.1	5.0	41.8	15.2	-53.7	-43.8	HEMI/HEMI 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	45.7	49.9	15.0	40.1	18.2	-49.8	-39.1	ZONE/HEMI 54MHz
2	461KG7W	0.341	45.7	51.6	16.7	43.6	21.5	-49.4	-38.6	ZONE/HEMI 54MHz
3	1M84G7W	1.365	45.7	57.4	22.5	43.6	21.5	-49.6	-38.9	ZONE/HEMI 54MHz
4	8M25G7W	6.111	45.7	64.4	29.5	40.1	19.1	-49.1	-38.4	ZONE/HEMI 54MHz
5	54M0G7W	45.000	50.3	76.6	39.7	40.1	19.1	-50.3	-36.9	ZONE/HEMI 54MHz

Table 8-66. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 11

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.1	1.6	1.9	1.4	0.1
	2	1.0	0.6	0.8	0.3	-1.0
	3	1.0	0.6	0.8	0.3	-1.0

Table 8-67. Summary of Overall C/I Margins for scenario 11 (dB)

In Table 8-67, there are some negative C/I margins (with respect to the criteria of 6%). The worst case deficit with respect to the 6% C/I criterion is 1.0 dB, which is equivalent to an increase of 7.6% of victim noise temperature. The C/I deficit indicated will lead to an impact on the overall C/N+I of only 0.3 dB. C-band coordination between these two spacecraft has been completed.

Scenario 12: NSS-7 HEMI/ZONE connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	51.0	75.4	35.6	41.8	15.6	-53.4	-42.2	HEMI/HEMI 72 MHz
2	10M3G7W	6.771	51.0	66.5	25.4	41.8	16.1	-52.8	-42.9	HEMI/HEMI 72 MHz
3	100KG7W	0.075	51.0	46.1	5.0	41.8	15.2	-53.7	-43.8	HEMI/HEMI 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	45.7	50.8	18.0	40.1	18.2	-49.0	-36.1	HEMI/ZONE 54MHz
2	461KG7W	0.341	45.7	52.1	19.3	43.6	21.5	-48.9	-36.1	HEMI/ZONE 54MHz
3	1M84G7W	1.365	45.7	58.1	25.3	43.6	21.5	-48.9	-36.1	HEMI/ZONE 54MHz
4	8M25G7W	6.111	45.7	64.6	31.8	40.1	19.1	-48.9	-36.1	HEMI/ZONE 54MHz
5	54M0G7W	45.000	49.3	75.2	40.4	40.1	19.1	-50.6	-36.2	HEMI/ZONE 54MHz

Table 8-68. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 12

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	-0.7	-0.7	-0.7	-0.7	-0.5
	2	-1.8	-1.9	-1.9	-1.9	-1.7
	3	-1.8	-1.8	-1.8	-1.8	-1.6

Table 8-69. Summary of Overall C/I Margins for scenario 12 (dB)

In Table 8-69, the C/I margins are negative (with respect to the criteria of 6%). The worst case deficit with respect to the 6% C/I criterion is 1.9 dB, which is equivalent to an increase of 9.3% of victim noise temperature. The C/I deficit indicated will lead to an impact on the overall C/N+I of only 0.4 dB. C-band coordination between these two spacecraft has been completed.

Scenario 13: NSS-7 ZONE/ZONE connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	51.0	75.4	35.6	41.8	15.6	-53.4	-42.2	HEMI/HEMI 72 MHz
2	10M3G7W	6.771	51.0	66.5	25.4	41.8	16.1	-52.8	-42.9	HEMI/HEMI 72 MHz
3	100KG7W	0.075	51.0	46.1	5.0	41.8	15.2	-53.7	-43.8	HEMI/HEMI 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	45.7	49.4	18.1	40.1	18.2	-50.4	-36.0	ZONE/ZONE 54MHz
2	461KG7W	0.341	45.7	50.6	19.3	43.6	21.5	-50.4	-36.1	ZONE/ZONE 54MHz
3	1M84G7W	1.365	45.7	56.6	25.3	43.6	21.5	-50.4	-36.1	ZONE/ZONE 54MHz
4	8M25G7W	6.111	45.7	63.2	31.9	40.1	19.1	-50.3	-36.0	ZONE/ZONE 54MHz
5	54M0G7W	45.000	47.4	74.8	40.5	40.1	19.1	-49.1	-36.1	ZONE/ZONE 54MHz

Table 8-70. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 13

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	-0.7	-0.6	-0.6	-0.7	-0.7
	2	-1.8	-1.8	-1.8	-1.9	-1.8
	3	-1.8	-1.8	-1.8	-1.8	-1.8

Table 8-71. Summary of Overall C/I Margins for scenario 13 (dB)

In Table 8-71, the C/I margins are negative (with respect to the criteria of 6%). The worst case deficit with respect to the 6% C/I criterion is 1.9 dB, which is equivalent to an increase of 9.3% of victim noise temperature. The C/I deficit indicated will lead to an impact on the overall C/N+I of only 0.4 dB. C-band coordination between these two spacecraft has been completed.

Scenario 14: NSS-7 GLB/ZONE connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	41M0G7W	34.310	51.0	75.8	30.5	42.5	15.6	-50.6	-44.9	GLB/GLB 36 MHz
2	10M3G7W	6.771	51.0	65.1	22.5	45.4	16.1	-54.2	-45.8	GLB/GLB 36 MHz
3	100KG7W	0.075	51.0	44.7	2.1	45.4	15.2	-55.1	-46.7	GLB/GLB 36 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	45.9	52.1	17.9	40.5	18.2	-47.9	-36.1	GLB/ZONE 54MHz
2	461KG7W	0.341	45.9	53.4	19.3	44.0	21.5	-47.8	-36.0	GLB/ZONE 54MHz
3	1M84G7W	1.365	45.9	59.4	25.3	44.0	21.5	-47.8	-36.0	GLB/ZONE 54MHz
4	8M25G7W	6.111	45.9	65.7	31.5	40.5	19.1	-48.1	-36.3	GLB/ZONE 54MHz
5	54M0G7W	45.000	50.6	76.6	40.5	40.5	19.1	-50.5	-36.1	GLB/ZONE 54MHz

Table 8-72. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 14

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	-2.4	-2.5	-2.5	-2.2	-2.4
	2	-1.3	-1.4	-1.4	-1.1	-1.2
	3	-1.3	-1.4	-1.4	-1.1	-1.2

Table 8-73. Summary of Overall C/I Margins for scenario 14 (dB)

In Table 8-73, the C/I margins are negative (with respect to the criteria of 6%). The worst case deficit with respect to the 6% C/I criterion is 2.5 dB, which is equivalent to an increase of 10.8% of victim noise temperature. The C/I deficit indicated will lead to an impact on the overall C/N+I of only 0.4 dB. C-band coordination between these two spacecraft has been completed.

Scenario 15: NSS-7 ZONE/GLB connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	41M0G7W	34.310	51.0	75.8	30.5	42.5	15.6	-50.6	-44.9	GLB/GLB 36 MHz
2	10M3G7W	6.771	51.0	65.1	22.5	45.4	16.1	-54.2	-45.8	GLB/GLB 36 MHz
3	100KG7W	0.075	51.0	44.7	2.1	45.4	15.2	-55.1	-46.7	GLB/GLB 36 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	50.5	55.6	12.7	42.4	18.2	-49.0	-41.4	ZONE/GLB 54MHz
2	461KG7W	0.341	50.5	57.2	14.2	45.8	21.5	-48.7	-41.1	ZONE/GLB 54MHz
3	1M84G7W	1.365	50.5	63.2	20.3	45.8	21.5	-48.7	-41.1	ZONE/GLB 54MHz
4	8M25G7W	6.111	49.5	69.0	26.1	43.9	19.1	-48.3	-41.8	ZONE/GLB 54MHz
5	54M0G7W	45.000	55.4	81.0	36.0	42.4	19.1	-51.0	-40.5	ZONE/GLB 54MHz

Table 8-74. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 15

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.6	2.3	2.3	2.9	1.9
	2	3.2	2.9	2.9	3.3	2.9
	3	3.2	2.9	2.9	3.3	2.9

Table 8-75. Summary of Overall C/I Margins for scenario 15 (dB)

As shown in Table 8-75, all C/I margins are positive in this scenario.

Scenario 16: NSS-7 NA/EU connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	58.1	79.5	48.4	41.7	15.6	-56.4	-29.4	KSPOT/KSPOT 72 MHz
2	10M3G7W	6.771	58.1	58.3	36.0	45.2	16.1	-68.1	-32.3	KSPOT/KSPOT 72 MHz
3	100KG7W	0.075	58.1	38.1	15.7	45.2	15.2	-68.8	-33.1	KSPOT/KSPOT 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	52.9	54.5	28.0	47.1	18.2	-52.5	-26.1	NA/EU 54MHz
2	461KG7W	0.341	54.6	55.9	29.3	52.6	21.5	-54.1	-26.0	NA/EU 54MHz
3	1M84G7W	1.365	52.9	61.1	34.6	54.5	21.5	-53.1	-26.8	NA/EU 54MHz
4	8M25G7W	6.111	52.9	67.9	41.4	49.0	19.1	-52.8	-26.5	NA/EU 54MHz
5	54M0G7W	45.000	52.9	79.0	50.5	44.6	19.1	-50.4	-26.0	NA/EU 54MHz

Table 8-76. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 16

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.2	2.1	2.9	2.6	2.0
	2	0.8	1.1	1.5	1.2	0.0
	3	0.9	1.3	1.6	1.3	0.2

Table 8-77. Summary of Overall C/I Margins for scenario 16 (dB)

As shown in Table 8-77, all C/I margins are positive in this scenario.

Scenario 17: NSS-7 NA/EU connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	58.1	79.5	48.4	41.7	15.6	-56.4	-29.4	KSPOT/KSPOT 72 MHz
2	10M3G7W	6.771	58.1	58.3	36.0	45.2	16.1	-68.1	-32.3	KSPOT/KSPOT 72 MHz
3	100KG7W	0.075	58.1	38.1	15.7	45.2	15.2	-68.8	-33.1	KSPOT/KSPOT 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	52.9	57.0	26.8	44.6	18.2	-50.0	-27.2	NA/WA 54MHz
2	461KG7W	0.341	52.9	57.3	27.2	51.1	21.5	-50.9	-28.2	NA/WA 54MHz
3	1M84G7W	1.365	52.9	62.6	32.5	52.6	21.5	-51.6	-28.8	NA/WA 54MHz
4	8M25G7W	6.111	52.9	69.8	39.6	47.1	19.1	-51.0	-28.2	NA/WA 54MHz
5	54M0G7W	45.000	52.9	78.6	50.5	41.1	19.1	-50.8	-26.0	NA/WA 54MHz

Table 8-78. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 17

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	3.2	4.1	4.8	4.1	2.0
	2	0.5	1.4	2.1	1.4	0.1
	3	0.7	1.6	2.3	1.6	0.3

Table 8-79. Summary of Overall C/I Margins for scenario 17 (dB)

As shown in Table 8-79, all C/I margins are positive in this scenario.

Scenario 18: NSS-7 NA/SA connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	58.1	79.5	48.4	41.7	15.6	-56.4	-29.4	KSPOT/KSPOT 72 MHz
2	10M3G7W	6.771	58.1	58.3	36.0	45.2	16.1	-68.1	-32.3	KSPOT/KSPOT 72 MHz
3	100KG7W	0.075	58.1	38.1	15.7	45.2	15.2	-68.8	-33.1	KSPOT/KSPOT 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	54.6	58.1	28.0	41.1	18.2	-50.6	-26.0	NA/SA 54MHz
2	461KG7W	0.341	52.9	57.8	27.8	49.0	21.5	-50.4	-27.5	NA/SA 54MHz
3	1M84G7W	1.365	52.9	63.6	33.6	49.0	21.5	-50.6	-27.7	NA/SA 54MHz
4	8M25G7W	6.111	52.9	70.3	40.2	44.6	19.1	-50.5	-27.6	NA/SA 54MHz
5	54M0G7W	45.000	52.9	78.6	50.5	41.1	19.1	-50.8	-26.0	NA/SA 54MHz

Table 8-80. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 18

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.1	3.5	3.7	3.6	2.0
	2	0.1	0.8	1.0	0.9	0.1
	3	0.3	1.0	1.2	1.1	0.3

Table 8-81. Summary of Overall C/I Margins for scenario 18 (dB)

As shown in Table 8-81, all C/I margins are positive in this scenario.

Scenario 19: NSS-7 NA/SC connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	58.1	79.5	48.4	41.7	15.6	-56.4	-29.4	KSPOT/KSPOT 72 MHz
2	10M3G7W	6.771	58.1	58.3	36.0	45.2	16.1	-68.1	-32.3	KSPOT/KSPOT 72 MHz
3	100KG7W	0.075	58.1	38.1	15.7	45.2	15.2	-68.8	-33.1	KSPOT/KSPOT 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	54.6	55.7	27.9	47.7	18.2	-53.0	-26.1	NA/SC 54MHz
2	461KG7W	0.341	52.9	56.5	28.7	53.1	21.5	-51.7	-26.6	NA/SC 54MHz
3	1M84G7W	1.365	52.9	62.5	34.8	53.1	21.5	-51.8	-26.6	NA/SC 54MHz
4	8M25G7W	6.111	52.9	67.4	39.7	51.7	19.1	-53.3	-28.1	NA/SC 54MHz
5	54M0G7W	45.000	57.5	83.1	50.4	47.7	19.1	-50.9	-26.1	NA/SC 54MHz

Table 8-82. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 19

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.2	2.6	2.6	4.2	2.1
	2	1.0	0.9	0.9	2.4	0.3
	3	1.2	1.0	1.0	2.6	0.4

Table 8-83. Summary of Overall C/I Margins for scenario 19 (dB)

As shown in Table 8-83, all C/I margins are positive in this scenario.

Scenario 20: NSS-7 NA/CA connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	58.1	79.5	48.4	41.7	15.6	-56.4	-29.4	KSPOT/KSPOT 72 MHz
2	10M3G7W	6.771	58.1	58.3	36.0	45.2	16.1	-68.1	-32.3	KSPOT/KSPOT 72 MHz
3	100KG7W	0.075	58.1	38.1	15.7	45.2	15.2	-68.8	-33.1	KSPOT/KSPOT 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	54.6	55.2	27.6	45.2	18.2	-53.5	-26.5	NA/CA 54MHz
2	461KG7W	0.341	52.9	56.8	29.1	49.6	21.5	-51.4	-26.2	NA/CA 54MHz
3	1M84G7W	1.365	52.9	62.8	35.2	49.6	21.5	-51.4	-26.2	NA/CA 54MHz
4	8M25G7W	6.111	52.9	68.1	40.5	47.7	19.1	-52.7	-27.4	NA/CA 54MHz
5	54M0G7W	45.000	54.6	80.5	49.9	45.2	19.1	-50.6	-26.7	NA/CA 54MHz

Table 8-84. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 20

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.6	2.2	2.2	3.4	2.7
	2	1.4	0.5	0.5	1.7	0.5
	3	1.6	0.7	0.7	1.9	0.7

Table 8-85. Summary of Overall C/I Margins for scenario 20 (dB)

As shown in Table 8-85, all C/I margins are positive in this scenario.

Scenario 21: NSS-7 NA/NA connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	58.1	79.5	48.4	41.7	15.6	-56.4	-29.4	KSPOT/KSPOT 72 MHz
2	10M3G7W	6.771	58.1	58.3	36.0	45.2	16.1	-68.1	-32.3	KSPOT/KSPOT 72 MHz
3	100KG7W	0.075	58.1	38.1	15.7	45.2	15.2	-68.8	-33.1	KSPOT/KSPOT 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	54.6	55.8	27.3	45.2	18.2	-52.8	-26.8	NA/NA 54MHz
2	461KG7W	0.341	52.9	57.1	28.6	49.6	21.5	-51.1	-26.7	NA/NA 54MHz
3	1M84G7W	1.365	52.9	63.1	34.6	49.6	21.5	-51.1	-26.8	NA/NA 54MHz
4	8M25G7W	6.111	52.9	70.4	41.8	45.2	19.1	-50.4	-26.0	NA/NA 54MHz
5	54M0G7W	45.000	54.6	81.0	50.5	43.6	19.1	-50.1	-26.0	NA/NA 54MHz

Table 8-86. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 21

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.8	2.8	2.8	2.0	2.0
	2	1.4	0.7	0.7	0.0	-0.1
	3	1.5	0.9	0.9	0.2	0.0

Table 8-87. Summary of Overall C/I Margins for scenario 21 (dB)

In Table 8-87, the C/I margin for one carrier is negative (with respect to the criteria of 6%). The deficit with respect to the 6% C/I criterion is 0.1 dB, which is equivalent to an increase of 6.2% of victim noise temperature. The C/I deficit indicated will lead to an impact on the overall C/N+I of only 0.3 dB. It is expected that Ku-band coordination between these two satellites can be achieved.

Scenario 22: NSS-7 EU/NA connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	58.1	79.5	48.4	41.7	15.6	-56.4	-29.4	KSPOT/KSPOT 72 MHz
2	10M3G7W	6.771	58.1	58.3	36.0	45.2	16.1	-68.1	-32.3	KSPOT/KSPOT 72 MHz
3	100KG7W	0.075	58.1	38.1	15.7	45.2	15.2	-68.8	-33.1	KSPOT/KSPOT 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	56.5	59.8	28.1	41.6	18.2	-50.8	-26.0	EU/NA 54MHz
2	461KG7W	0.341	54.6	59.4	27.7	47.7	21.5	-50.5	-27.6	EU/NA 54MHz
3	1M84G7W	1.365	54.6	65.6	33.8	47.7	21.5	-50.4	-27.5	EU/NA 54MHz
4	8M25G7W	6.111	56.5	73.5	41.8	43.6	19.1	-50.9	-26.1	EU/NA 54MHz
5	54M0G7W	45.000	56.5	79.2	50.5	43.6	19.1	-53.8	-26.0	EU/NA 54MHz

Table 8-88. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 22

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.0	3.6	3.4	2.1	2.2
	2	0.1	0.9	0.8	0.2	1.1
	3	0.3	1.1	1.0	0.4	1.3

Table 8-89. Summary of Overall C/I Margins for scenario 22 (dB)

As shown in Table 8-89, all C/I margins are positive in this scenario.

Scenario 23: NSS-7 CA/NA connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	58.1	79.5	48.4	41.7	15.6	-56.4	-29.4	KSPOT/KSPOT 72 MHz
2	10M3G7W	6.771	58.1	58.3	36.0	45.2	16.1	-68.1	-32.3	KSPOT/KSPOT 72 MHz
3	100KG7W	0.075	58.1	38.1	15.7	45.2	15.2	-68.8	-33.1	KSPOT/KSPOT 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	56.5	60.1	28.1	41.6	18.2	-50.4	-26.0	CA/NA 54MHz
2	461KG7W	0.341	54.6	59.8	27.7	47.7	21.5	-50.2	-27.6	CA/NA 54MHz
3	1M84G7W	1.365	54.6	65.9	33.9	47.7	21.5	-50.0	-27.5	CA/NA 54MHz
4	8M25G7W	6.111	56.5	73.8	41.8	43.6	19.1	-50.5	-26.1	CA/NA 54MHz
5	54M0G7W	45.000	58.7	84.4	50.4	43.6	19.1	-50.8	-26.2	CA/NA 54MHz

Table 8-90. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 23

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.0	3.5	3.4	2.1	2.2
	2	0.0	0.7	0.6	0.1	0.2
	3	0.2	0.9	0.8	0.3	0.4

Table 8-91. Summary of Overall C/I Margins for scenario 23 (dB)

As shown in Table 8-91, all C/I margins are positive in this scenario.

Scenario 24: NSS-7 WA/NA connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	58.1	79.5	48.4	41.7	15.6	-56.4	-29.4	KSPOT/KSPOT 72 MHz
2	10M3G7W	6.771	58.1	58.3	36.0	45.2	16.1	-68.1	-32.3	KSPOT/KSPOT 72 MHz
3	100KG7W	0.075	58.1	38.1	15.7	45.2	15.2	-68.8	-33.1	KSPOT/KSPOT 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	56.5	58.3	28.0	41.6	18.2	-52.3	-26.1	WA/NA 54MHz
2	461KG7W	0.341	54.6	58.2	27.9	47.7	21.5	-51.7	-27.5	WA/NA 54MHz
3	1M84G7W	1.365	54.6	64.3	34.0	47.7	21.5	-51.6	-27.4	WA/NA 54MHz
4	8M25G7W	6.111	56.5	72.2	41.8	43.6	19.1	-52.2	-26.0	WA/NA 54MHz
5	54M0G7W	45.000	56.5	82.7	50.4	43.6	19.1	-50.3	-26.1	WA/NA 54MHz

Table 8-92. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 24

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.2	3.5	3.4	2.1	2.1
	2	0.7	1.4	1.3	0.7	0.0
	3	0.9	1.6	1.5	0.8	0.2

Table 8-93. Summary of Overall C/I Margins for scenario 24 (dB)

As shown in Table 8-93, all C/I margins are positive in this scenario.

Scenario 25: NSS-7 SC/NA connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	58.1	79.5	48.4	41.7	15.6	-56.4	-29.4	KSPOT/KSPOT 72 MHz
2	10M3G7W	6.771	58.1	58.3	36.0	45.2	16.1	-68.1	-32.3	KSPOT/KSPOT 72 MHz
3	100KG7W	0.075	58.1	38.1	15.7	45.2	15.2	-68.8	-33.1	KSPOT/KSPOT 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	56.5	59.1	28.1	41.6	18.2	-51.5	-26.0	SC/NA 54MHz
2	461KG7W	0.341	54.6	59.0	28.1	47.7	21.5	-50.9	-27.3	SC/NA 54MHz
3	1M84G7W	1.365	54.6	65.1	34.1	47.7	21.5	-50.9	-27.3	SC/NA 54MHz
4	8M25G7W	6.111	56.5	72.7	41.8	43.6	19.1	-51.6	-26.1	SC/NA 54MHz
5	54M0G7W	45.000	54.6	81.1	50.2	43.6	19.1	-50.0	-26.3	SC/NA 54MHz

Table 8-94. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 25

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.0	3.2	3.2	2.1	2.3
	2	0.4	0.9	0.9	0.5	0.0
	3	0.6	1.1	1.1	0.7	0.2

Table 8-95. Summary of Overall C/I Margins for scenario 25 (dB)

As shown in Table 8-95, all C/I margins are positive in this scenario.

Scenario 26: NSS-7 SA/NA connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	60.251	58.1	79.5	48.4	41.7	15.6	-56.4	-29.4	KSPOT/KSPOT 72 MHz
2	10M3G7W	6.771	58.1	58.3	36.0	45.2	16.1	-68.1	-32.3	KSPOT/KSPOT 72 MHz
3	100KG7W	0.075	58.1	38.1	15.7	45.2	15.2	-68.8	-33.1	KSPOT/KSPOT 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	54.6	57.6	28.0	41.6	18.2	-51.0	-26.1	SA/NA 54MHz
2	461KG7W	0.341	52.9	57.6	28.0	47.7	21.5	-50.6	-27.3	SA/NA 54MHz
3	1M84G7W	1.365	52.9	63.8	34.2	47.7	21.5	-50.4	-27.2	SA/NA 54MHz
4	8M25G7W	6.111	56.5	71.5	41.9	43.6	19.1	-52.9	-26.0	SA/NA 54MHz
5	54M0G7W	45.000	54.6	80.0	50.4	43.6	19.1	-51.1	-26.1	SA/NA 54MHz

Table 8-96. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 26

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	2.1	3.3	3.1	2.1	2.1
	2	0.3	0.8	0.6	0.8	0.3
	3	0.5	1.0	0.8	1.0	0.5

Table 8-97. Summary of Overall C/I Margins for scenario 26 (dB)

As shown in Table 8-97, all C/I margins are positive in this scenario.

Scenario 27: NSS-7 HEMI/NA connectivity (54 MHz)

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	IS-901
1	72M0G7W	64.435	51.0	75.4	48.4	41.7	15.6	-53.7	-29.7	HEMI/KSPOT 72 MHz
2	10M3G7W	6.771	51.0	63.2	37.9	43.6	16.1	-56.1	-30.4	HEMI/KSPOT 72 MHz
3	100KG7W	0.075	51.0	42.9	17.6	43.6	15.2	-56.9	-31.2	HEMI/KSPOT 72 MHz

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion	(up density)	(dn density)	NSS-7
1	346KG7W	0.256	47.4	52.9	28.0	41.7	18.2	-48.6	-26.0	HEMI/NA 54MHz
2	461KG7W	0.341	47.4	53.4	28.6	47.7	21.5	-49.3	-26.7	HEMI/NA 54MHz
3	1M84G7W	1.365	47.4	59.6	34.8	47.7	21.5	-49.2	-26.6	HEMI/NA 54MHz
4	8M25G7W	6.111	47.4	66.6	41.8	43.6	19.1	-48.7	-26.1	HEMI/NA 54MHz
5	54M0G7W	45.000	49.3	77.1	50.3	43.6	19.1	-48.8	-26.3	HEMI/NA 54MHz

Table 8-98. Summary of Typical Transmission Parameters for NSS-7 and Intelsat-901 under scenario 27

		Interfering (NSS-7 @20W)				
	Carrier ID	1	2	3	4	5
Wanted (IS-901)	1	1.3	1.9	1.8	1.4	1.5
	2	1.3	1.9	1.8	1.3	1.5
	3	1.4	2.1	2.0	1.5	1.6

Table 8-99. Summary of Overall C/I Margins for scenario 27 (dB)

As shown in Table 8-99, all C/I margins are positive in this scenario.

Overview of results

Table 8-100 summarizes all the results for the studied connectivities under this specific interference analysis case. It shows for each scenario the uplink beam and downlink beam for the wanted and interfering satellite, the associated frequency bands, and the worst case observed C/I margin from the calculations. C-band coordination has been completed for these two spacecraft. It is expected that Ku-band coordination between these two satellites can be achieved.

	Interfering	Wanted			Worst Case
Scenario	NSS-7 connectivity	IS-901 connectivity	Uplink	Downlink	C/I Margin
1	HEMI/HEMI 54 MHz	HEMI/HEMI 72 MHz	C	C	0.1
2	NA/HEMI 54 MHz	SPOT/HEMI 72MHz	Ku	C	-1.2
3	EU/HEMI 54 MHz	SPOT/HEMI 72MHz	Ku	C	-1.0
4	CA/HEMI 54 MHz	SPOT/HEMI 72MHz	Ku	C	-1.1
5	WA/HEMI 54 MHz	SPOT/HEMI 72MHz	Ku	C	-1.0
6	SC/HEMI 54 MHz	SPOT/HEMI 72MHz	Ku	C	-1.1
7	SA/HEMI 54 MHz	SPOT/HEMI 72MHz	Ku	C	-1.4
8	GLB/HEMI 54 MHz	GLB/GLB 36 MHz	C	C	-0.7
9	HEMI/GLB 54 MHz	GLB/GLB 36 MHz	C	C	1.5
10	GLB/GLB 54 MHz	GLB/GLB 36 MHz	C	C	1.9
11	ZONE/HEMI 54 MHz	HEMI/HEMI 72 MHz	C	C	-1.0
12	HEMI/ZONE 54 MHz	HEMI/HEMI 72 MHz	C	C	-1.9
13	ZONE/ZONE 54 MHz	HEMI/HEMI 72 MHz	C	C	-1.9
14	GLB/ZONE 54 MHz	GLB/GLB 36 MHz	C	C	-2.5
15	ZONE/GLB 54 MHz	GLB/GLB 36 MHz	C	C	1.9
16	NA/EU 54 MHz	SPOT/SPOT 72 MHz	Ku	Ku	0.0
17	NA/WA 54 MHz	SPOT/SPOT 72 MHz	Ku	Ku	0.1
18	NA/SA 54 MHz	SPOT/SPOT 72 MHz	Ku	Ku	0.1
19	NA/SC 54 MHz	SPOT/SPOT 72 MHz	Ku	Ku	0.3
20	NA/CA 54 MHz	SPOT/SPOT 72 MHz	Ku	Ku	0.5
21	NA/NA 54 MHz	SPOT/SPOT 72 MHz	Ku	Ku	-0.1
22	EU/NA 54 MHz	SPOT/SPOT 72 MHz	Ku	Ku	0.1
23	CA/NA 54 MHz	SPOT/SPOT 72 MHz	Ku	Ku	0.0
24	WA/NA 54 MHz	SPOT/SPOT 72 MHz	Ku	Ku	0.0
25	SC/NA 54 MHz	SPOT/SPOT 72 MHz	Ku	Ku	0.0
26	SA/NA 54 MHz	SPOT/SPOT 72 MHz	Ku	Ku	0.3
27	HEMI/NA 54 MHz	HEMI/SPOT 72 MHz	C	Ku	1.3

Table 8-100. Summary of all scenarios and C/I Margins

8.3 Analysis of the interference of the NSS-7 TT&C carriers into the SES-4 TT&C carriers

Table 8-101 shows the TT&C carrier frequencies of NSS-7 and SES-4 (derived from the Schedule S information). Also shown are the closest frequency separations of each NSS-7 TT&C carrier from the SES-4 TT&C carriers.

Satellite	Carrier name	Channel ID (from Sched. S)	Frequency (MHz)	Polarisation	BW (kHz)	Frequency separation from closest SES-7 TTC (MHz)
NSS-7	Telecommand 1	CM1	14496.0	V	940	
	Telecommand 2	CM2	14499.0	V	940	
	Telemetry 1	TM1	11451.0	H	500	
	Telemetry 2	TM2	11454.0	H	500	
	Beacon 1	BNK1	11451.0	H	25	
	Beacon 2	BNK2	11454.0	H	25	
	Tracking Beacon	BNC1	4199.50	V	25	
SES-4	Telecommand 1	CM1	14496.0	RHCP	800	0.00
	Telecommand 2	CM2	14499.0	RHCP	800	0.00
	Telemetry 1	TM1	11451.0	RHCP	300	0.00
	Telemetry 2	TM2	11454.0	RHCP	300	0.00
	Telemetry 3	TM3	12500.5	LHCP	300	1046.50
	Telemetry 4	TM4	12502.0	LHCP	300	1048.00
	Beacon 1	BNK1	11451.0	RHCP	25	0.00
	Beacon 2	BNK2	11454.0	RHCP	25	0.00
	Beacon 3	BNK3	12500.5	LHCP	25	1046.50
	Beacon 4	BNK4	12502.0	LHCP	25	1048.00
	Tracking Beacon	BNC1	4199.75	V	25	0.25

Table 8-101. TT&C carrier frequencies of NSS-7 and SES-4and the closest frequency separation of each SES-4 TT&C carrier from the NSS-7 TT&C carriers

As shown in the Table, apart from the SES-4 telemetry and beacons in the 12.5 GHz band, all other TT&C carriers overlap in frequency. Therefore a C/I analysis is provided in Tables 8-102 to 8-105 for the telecommand, telemetry and beacons under a worst case scenario, where it is assumed that the frequencies are co-frequency and operating in the same polarization. The information concerning the TT&C parameters on the SES-4 spacecraft is derived from its Schedule S information.

NSS-7 - CM1		
input power	(dBW)	23.1
Off-axis EIRP	(dBW)	44.1
SES-4 - CM1		
uplink EIRP	(dBW)	83.0
required C/N	(dB)	10.0
Required C/I	(dB)	24.0
Interference analysis		
C/I total	(dB)	38.9
Margin	**(dB)**	**14.9**

Table 8-102. Overview of C/I margins (dB) for NSS-7 telecommand interference into SES-4 telecommand

NSS-7 - TM1		
downlink EIRP	(dBW)	6.0
SES-4 - TM1		
Downlink EIRP (EOC)	(dBW)	8.0
Receive earth station size	(m)	9.0
Receive earth station gain	(dBi)	58.8
Receive earth station off-axis	(dBi)	21.0
Required C/N	(dB)	3.0
Required C/I	(dB)	15.2
Interference analysis		
Calculated C/I	(dB)	39.8
Margin	(dB)	**24.6**

Table 8-103. Overview of C/I margins (dB) for NSS-7 telemetry interference into SES-4 telemetry

NSS-7 - BNK1		
downlink EIRP	(dBW)	6.0
SES-4 - BNK1		
Downlink EIRP (EOC)	(dBW)	8.0
Receive earth station size	(m)	2.4
Receive earth station gain	(dBi)	44.8
Receive earth station off-axis	(dBi)	21.0
Required C/N	(dB)	3.0
Required C/I	(dB)	15.2
Interference analysis		
Calculated C/I	(dB)	25.8
Margin	(dB)	**10.6**

Table 8-104. Overview of C/I margins (dB) for NSS-7 beacon interference into SES-4 beacon (Ku-band)

NSS-7 - BNC1		
downlink EIRP	(dBW)	5.0
SES-4 - BNC1		
Downlink EIRP (EOC)	(dBW)	5.0
Receive earth station size	(m)	3.7
Receive earth station gain	(dBi)	41.9
Receive earth station off-axis	(dBi)	21.0
Required C/N	(dB)	3.0
Required C/I	(dB)	15.2
Interference analysis		
Calculated C/I	(dB)	20.9
Margin	(dB)	**5.7**

Table 8-105. Overview of C/I margins (dB) for NSS-7 beacon interference into SES-4 beacon (C-band)

As shown in the above tables, all C/I margins are positive, and there is therefore no interference from the NSS-7 TT&C carriers at 20° W.L. into the SES-4 TT&C carriers at 22° W.L.

8.4 Analysis of the interference of the NSS-7 Communication carriers into the SES-4 TT&C carriers

Table 8-106 shows the TT&C carrier frequencies of SES-4 at 22° W.L. together with an assessment of whether there would be a frequency overlap, and possible interference from NSS-7 communication carriers.

Satellite	Carrier name	Channel ID (from Sched. S)	Frequency (MHz)	Polarisation	BW (kHz)	Overlap with NSS-7 communication carriers
SES-4	Telecommand 1	CM1	14496.0	RHCP	800	No
	Telecommand 2	CM2	14499.0	RHCP	800	No
	Telemetry 1	TM1	11451.0	RHCP	300	No
	Telemetry 2	TM2	11454.0	RHCP	300	No
	Telemetry 3	TM3	12500.5	LHCP	300	No
	Telemetry 4	TM4	12502.0	LHCP	300	No
	Beacon 1	BNK1	11451.0	RHCP	25	No
	Beacon 2	BNK2	11454.0	RHCP	25	No
	Beacon 3	BNK3	12500.5	LHCP	25	No
	Beacon 4	BNK4	12502.0	LHCP	25	No
	Tracking Beacon	BNC1	4199.75	V	25	No

Table 8-106. Overview of the TT&C carrier frequencies of SES-4 at 22° W.L. together with an assessment of whether there would be a frequency overlap, and possible interference from NSS-7 communication carriers at 20° W.L.

As shown in the table above, there is no frequency overlap between the communication carriers of NSS-7 at 20°W.L. and the TT&C carriers of SES-4 at 22°W.L. and there is therefore no interference from the NSS-7 communication carriers at 20° W.L. into the SES-4 TT&C carriers at 22° W.L.

8.5 Analysis of the interference of the NSS-7 TT&C carriers into the SES-4 Communication carriers

Table 8-107 shows the TT&C carrier frequencies of NSS-7 at 20° W.L. together with an assessment of whether there would be a frequency overlap, and possible interference into SES-4 communication carriers.

Satellite	Carrier name	Channel ID (from Sched. S)	Frequency (MHz)	Polarisation	BW (kHz)	Overlap with SES-4 communication carriers
NSS-7	Telecommand 1	CM1	14496.0	V	940	No
	Telecommand 2	CM2	14499.0	V	940	No
	Telemetry 1	TM1	11451.0	H	500	No
	Telemetry 2	TM2	11454.0	H	500	No
	Beacon 1	BNK1	11451.0	H	25	No
	Beacon 2	BNK2	11454.0	H	25	No
	Tracking Beacon	BNC1	4199.50	V	25	No

Table 8-107. Overview of the TT&C carrier frequencies of NSS-7 at 20° W.L. together with an assessment of whether there would be a frequency overlap, and possible interference intoSES-4 communication carriers at 22° W.L.

As shown in the table above, there is no frequency overlap between the TT&C carriers of NSS-7 at 20°W.L. and the communication carriers of SES-4 at 22°W.L. and there is therefore no interference from the NSS-7 TT&C carriers at 20° W.L. into the SES-4 communication carriers at 22° W.L.

8.6 Analysis of the interference of the NSS-7 TT&C carriers into the Intelsat-901 TT&C carriers

Table 8-107 shows the TT&C carrier frequencies of NSS-7 and Intelsat-901 (derived from the Intelsat document “Application for C-band and Ku-band Global Satellite System - Volume II:

Annex 1"). Also shown are the closest frequency separations of each NSS-7 TT&C carrier from the Intelsat-901 TT&C carriers. It should be noted that as there was no public information available on the exact telecommand frequencies used on the Intelsat-901 spacecraft, the CM1 and CM2 frequencies for Intelsat-901 represent the lower and upper boundary of the range indicated for use of the telecommand frequency (see the Intelsat document "Application for C-band and Ku-band Global Satellite System - Volume II: Annex 1").

Satellite	Carrier name	Channel ID (from Sched. S)	Frequency (MHz)	Polarisation	BW (kHz)	Frequency separation from closest NSS-7 TTC (MHz)
NSS-7	Telecommand 1	CM1	14496.0	V	940	
	Telecommand 2	CM2	14499.0	V	940	
	Telemetry 1	TM1	11451.0	H	500	
	Telemetry 2	TM2	11454.0	H	500	
	Beacon 1	BNK1	11451.0	H	25	
	Beacon 2	BNK2	11454.0	H	25	
	Tracking Beacon	BNC1	4199.50	V	25	
IS-901	Telecommand 1	CM1	6173.7	n/a	1000	8322.30
	Telecommand 2	CM2	6176.3	n/a	1000	8319.70
	Telemetry 1	TM1	3947.5	RHCP	300	7503.50
	Telemetry 2	TM2	3948.0	RHCP	300	7503.00
	Telemetry 3	TM3	3952.0	RHCP	300	7499.00
	Telemetry 4	TM4	3952.5	RHCP	300	7498.50
	Beacon 1	BNK1	11198.0	RHCP	25	253.00
	Beacon 2	BNK2	11452.0	RHCP	25	1.00
	Tracking Beacon	BNC1	3950.00	V	25	249.50

Table 8-107. TT&C carrier frequencies of NSS-7 and Intelsat-901 and the closest frequency separation of each Intelsat-901 TT&C carrier from the NSS-7 TT&C carriers

As shown in the above table, there is no frequency overlap between the NSS-7 TT&C carriers and the Intelsat-901 TT&C carriers and there is therefore no interference from the NSS-7 TT&C carriers at 20° W.L. into the Intelsat-901 TT&C carriers at 18° W.L.

8.7 Analysis of the interference of the NSS-7 Communication carriers into the Intelsat-901 TT&C carriers

Table 8-108 shows the TT&C carrier frequencies of Intelsat-901 at 18° W.L. together with an assessment of whether there would be a frequency overlap, and possible interference from NSS-7 communication carriers.

Satellite	Carrier name	Channel ID (from Sched. S)	Frequency (MHz)	Polarisation	BW (kHz)	Overlap with NSS-7 communication carriers
IS-901	Telecommand 1	CM1	6173.7	n/a	1000	Yes (HEMI & ZONE up)
	Telecommand 2	CM2	6176.3	n/a	1000	Yes (HEMI & ZONE up)
	Telemetry 1	TM1	3947.5	RHCP	300	Yes (HEMI down)
	Telemetry 2	TM2	3948.0	RHCP	300	Yes (HEMI down)
	Telemetry 3	TM3	3952.0	RHCP	300	Yes (HEMI down)
	Telemetry 4	TM4	3952.5	RHCP	300	Yes (HEMI down)
	Beacon 1	BNK1	11198.0	RHCP	25	Yes (EU & WA & SA down)
	Beacon 2	BNK2	11452.0	RHCP	25	No
	Tracking Beacon	BNC1	3950.00	V	25	Yes (HEMI down)

Table 8-108. Overview of the TT&C carrier frequencies of Intelsat-901 at 18° W.L. together with an assessment of whether there would be a frequency overlap, and possible interference from NSS-7 communication carriers at 20° W.L.

As shown in the table, there are a number of potential interference cases: (a) potential interference from NSS-7 communication carriers in C-band HEMI and ZONE uplink into Intelsat-901 Telecommand carriers, (b) potential interference from NSS-7 communication carriers in C-band HEMI downlink into Intelsat-901 Telemetry carriers, (c) potential interference from NSS-7 communication carriers in C-band HEMI downlink into Intelsat-901 C-band tracking beacon, and (d) potential interference from NSS-7 communications carriers in Ku-band EU, WA and SA downlink into Intelsat-901 Ku-band beacon.

For the NSS-7 C-band uplink and downlink carriers in the HEMI and ZONE beams the worst case carrier parameters (in terms of potential for interference in the uplink and downlink direction) have been chosen. No details were available on the Intelsat telecommand carrier uplink EIRP, and therefore a conservative value of 60 dBW has been assumed. For the downlink EIRP values of the

telemetry and beacon carriers, a 3 dB reduced value with respect to the peak EIRP values mentioned in (Intelsat document "Application for C-band and Ku-band Global Satellite System - Volume II: Annex 1") were used. Tables 8-109 to 8-112 show the results of the interference analyses.

NSS-7 communication carrier		
input power density	(dBW/Hz)	-48.0
Off-axis EIRP density	(dBW/Hz)	-27.0
Off-axis EIRP over 1000 kHz	(dBW)	33.0
IS-901 - Telecommand crx		
uplink EIRP	(dBW)	60.0
Required C/N	(dB)	10.0
Required C/I	(dB)	24.0
Interference analysis		
Calculated C/I	(dB)	27.0
Margin	(dB)	**3.0**

Table 8-109. Interference assessment of NSS-7 communication carrier into Intelsat-901 Telecommand carrier

NSS-7 - communication carrier		
downlink EIRP density (peak)	(dBW/Hz)	-36.0
downlink EIRP over 300 kHz	(dBW)	18.8
IS-901 - Telemetry carrier		
Downlink EIRP (EOC)	(dBW)	5.0
Receive earth station size	(m)	16.4
Receive earth station gain	(dBi)	55.0
Receive earth station off-axis	(dBi)	21.0
Required C/N	(dB)	6.0
Required C/I	(dB)	18.2
Interference analysis		
Calculated C/I	(dB)	20.2
Margin	(dB)	**2.0**

Table 8-110. Interference assessment of NSS-7 communication carrier into Intelsat-901 Telemetry carrier

No coverage information could readily be found for the IS-901 TT&C beams. For this analysis, we have conservatively assumed that the TT&C global beams are similar to the IS-901 (C-band) global beams, in which the edge of coverage contour is approximately 3 dB below the beam

peak. We have also assumed that the minimum required telemetry C/N is 6 dB, with a required C/I of 18.2 dB. Further, an antenna diameter of 16.4 meters with a maximum gain of 55 dBi has been assumed.

NSS-7 - communication carrier		
downlink EIRP density (peak)	(dBW/Hz)	-36.0
downlink EIRP over 25 kHz	(dBW)	8.0
IS-901 - Beacon carrier (C-band)		
Downlink EIRP (EOC)	(dBW)	5.0
Receive earth station size	(m)	3.7
Receive earth station gain	(dBi)	41.9
Receive earth station off-axis	(dBi)	21.0
Required C/N	(dB)	6.0
Required C/I	(dB)	18.2
Interference analysis		
Calculated C/I	(dB)	17.9
Margin	(dB)	**-0.3**

Table 8-111. Interference assessment of NSS-7 communication carrier into Intelsat-901 C-band Beacon carrier

No coverage information could readily be found for the IS-901 C-band ULPC (beacon) beam. For this analysis, we have conservatively assumed that the C-band ULPC beacon is similar to the IS-901 (C-band) global beams, in which the edge of coverage contour is approximately 3 dB below the beam peak. We have also assumed that the minimum required telemetry C/N is 6 dB. SES expects that a C/I deficit of only 0.3 dB can be resolved during specific coordination.

NSS-7 - communication carrier		
downlink EIRP density (peak)	(dBW/Hz)	-26.0
downlink EIRP over 25 kHz	(dBW)	18.0
IS-901 - Beacon carrier (Ku-band)		
Downlink EIRP (EOC)	(dBW)	8.0
Receive earth station size	(m)	3.7
Receive earth station gain	(dBi)	41.9
Receive earth station off-axis	(dBi)	21.0
Polarisation discrimination	(dB)	3.0
Frequency discrimination	(dB)	3.0
Required C/N	(dB)	4.0
Required C/I	(dB)	16.2
Interference analysis		
Calculated C/I	(dB)	16.9
Margin	(dB)	**0.7**

Table 8-112. Interference assessment of NSS-7 communication carrier into Intelsat-901 Ku-band Beacon carrier

No coverage information could readily be found for the IS-901 Ku-band ULPC (beacon) beams. For this analysis, we have conservatively assumed that the Ku-band ULPC beacons are similar to the IS-901 (C-band) global beams, in which the edge of coverage contour is approximately 3 dB below the beam peak. We have also assumed that the minimum required telemetry C/N threshold is 4dB.

The calculations shown in Table 8-112 include two important mitigating factors. First, there is a polarization advantage due to the fact that the Intelsat-901 beacon operates in circular polarization and the NSS-7 Ku-band transponders operate in linear polarization, for which a 3dB of C/I improvement is assumed. Second, the overlapping transponders of the indicated NSS-7 beams (i.e. EU, WA and SA beams) have the frequency range 11144 – 11198 MHz, which means that the Intelsat-901 beacon carrier is right at the edge of the NSS-7 communication transponder. This factor gives at least 3dB of additional C/I improvement.

Thus, no harmful interference from the NSS-7 communication carriers at 20° W.L. is expected into the Intelsat-901 TT&C carriers at 18° W.L.

8.8 Analysis of the interference of the NSS-7 TT&C carriers into the Intelsat-901 communication carriers

Table 8-113 shows the TT&C carrier frequencies of NSS-7 at 20° W.L., together with an assessment of whether there would be a frequency overlap and possible interference into the Intelsat-901 communication carriers.

Satellite	Carrier name	Channel ID (from Sched. S)	Frequency (MHz)	Polarisation	BW (kHz)	Overlap with IS-901 communication carriers
NSS-7	Telecommand 1	CM1	14496.0	V	940	No
	Telecommand 2	CM2	14499.0	V	940	No
	Telemetry 1	TM1	11451.0	H	500	No
	Telemetry 2	TM2	11454.0	H	500	No
	Beacon 1	BNK1	11451.0	H	25	No
	Beacon 2	BNK2	11454.0	H	25	No
	Tracking Beacon	BNC1	4199.50	V	25	No

Table 8-113. Assessment of overlap between TT&C carrier frequencies of NSS-7with respect to the Intelsat-901communication carriers

As shown in the above table, there is no frequency overlap between the NSS-7 TT&C carriers and the Intelsat-901 communication carriers, and there is therefore no interference from the NSS-7 TT&C carriers at 20° W.L. into the communication carriers of Intelsat-901 at 18° W.L.

9. Orbital Debris Mitigation

Spacecraft Hardware Design

SES has assessed and limited the amount of debris released in a planned manner during normal operations. No debris is generated during normal on-station operations, and the spacecraft will be in a stable configuration. On-station operations require stationkeeping within the +/- 0.05 degree N-S and E-W control box, thereby ensuring adequate collision avoidance distance from other satellites in geosynchronous orbit. In the event that co-location of this and another satellite is required, use of the proven Inclination-Eccentricity (I-E) separation method can be employed. This strategy is presently in use by SES to ensure proper operation and safety of multiple satellites within one orbital box.

SES has also assessed and limited the possibility of NSS-7 becoming a source of debris by collisions with small debris or meteoroids that could cause loss of control of the spacecraft and prevent post-mission disposal. Specifically, the NSS-7 satellite has been designed and constructed in a manner that incorporates redundancy, shielding, separation of components, and other physical characteristics into the satellite's design. For example, omni-directional antennas are mounted on opposite sides of the spacecraft, and either will be sufficient to support orbit raising. The command receivers and decoders, telemetry encoders and transmitters, and the bus control electronics are fully redundant, physically separated, and located within a shielded area to minimize the probability of the spacecraft becoming a source of debris due to a collision.

SES uses the Space Data Center ("SDC") system from the Space Data Association to monitor the risk of close approach of its satellites with other objects. Any close encounters (separation of less than 10 km) are flagged and investigated in more detail. If required, avoidance maneuvers are performed to eliminate the possibility of collisions.

During any relocation, the moving spacecraft is maneuvered such that it is at least 30 km away from the synchronous radius at all times. In most cases, much larger deviation from the synchronous radius is used. In addition, the SDC system is used to ensure no close encounter occurs during the move. When de-orbit of a spacecraft is required, the initial phase is treated as a satellite move, and the same precautions are used to ensure collision avoidance.

Minimizing Accidental Explosions

SES has assessed and limited the probability of accidental explosion during and after completion of mission operations. The key areas reviewed for this purpose included leakage of propellant and mixing of fuel and oxidizer as well as battery pressure vessels. The basic propulsion design (including component and functional redundancy, and the placement of fuel tanks inside a central cylinder which provides a high level of shielding), propulsion subsystem component construction, preflight verification through both proof testing and analysis, and quality standards

have been designed to ensure a very low risk of propellant leakage and fuel and oxidizer mixing that can result in subsequent explosions. During the mission, batteries and various critical areas of the propulsion subsystem will be continually monitored (for both pressure and temperature) to preclude conditions that could result in the remote possibility of explosion and subsequent generation of debris.

After NSS-7 reaches its final disposal orbit, on-board sources of stored energy will be depleted, all residual fuel will be depleted, all fuel line valves will be left "open," and all batteries will be left in a permanent discharge state. The solar cells will also be slewed away from the sun to minimize power generation. As with all Lockheed A2100 series spacecraft, the oxidizer tanks on NSS-7 were sealed using pyrotechnic valves at the end of transfer orbit and therefore cannot be vented at spacecraft end-of-life. This is a design feature of the Lockheed A2100 series spacecraft that cannot now be changed or remedied. Information regarding the residual oxidizer in the tanks is as follows:

Tank	Tank Volume [l]	Pressure [bar]	Temp. [deg C]	Oxidizer Mass [kg]
Ox 1	327.48	258.82	22.05	12.36
Ox 2	327.48	258.82	21.64	12.36

The oxidizer tanks are well shielded, and the residual pressure in the tanks will be well below their maximum rating.

As explained in the main narrative, Section 25.283(c) of the Commission's rules, which requires space station licensees to discharge all stored energy sources on board a satellite at end-of-life, apparently does not apply to the NSS-7 satellite. Out of an abundance of caution, however, SES is requesting a waiver of this rule to the extent one is necessary.

Safe Flight Profiles

SES has assessed and limited the probability of NSS-7 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 nominal 20° W.L. orbital location where NSS-7 will operate. In addition, in order to address non-U.S. licensed systems, SES has reviewed the list of satellite networks in the vicinity of 20° 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.

As a consequence of this review, it has been determined that no other systems have been licensed by the Commission for, and are currently operating at, the nominal 20° W.L. location, except for the NSS-5 satellite. The NSS-5 satellite will be moved to another location once NSS-7 has arrived on station and traffic transfer is complete, at which time NSS-7 will assume the station keeping box currently occupied by NSS-5. During the period in which communication traffic is being transferred from NSS-5 to NSS-7, Intelsat and SES will take all the necessary steps to minimize the risk of collision between the two spacecraft.

With the exception of NSS-5, SES is not aware of any other FCC licensed system, or any other system applied for and under consideration by the FCC, having an overlapping stationkeeping volume with NSS-7. With the exception of the filings made by Intelsat and SES, SES is also not aware of any system with an overlapping stationkeeping volume with NSS-7 that is the subject of an ITU filing and that is either in orbit or progressing towards launch.

SES therefore concludes that physical coordination of NSS-7 with another operator will not be required at the present time, as operation of NSS-7 at the requested location would avoid station-keeping volume overlap with all spacecraft located in the vicinity of the nominal 20° W.L. location, just as is true for the NSS-5 satellite it will replace.

Post-Mission Disposal

At the end of the operational life of the satellite, SES will maneuver NSS-7 into a disposal orbit with an altitude no less than that calculated using the IADC formula:

$$36{,}021 \text{ km} + (1000 \cdot C_R \cdot A/m).$$

The calculated value of $C_R A/m$ in this instance is based on the following parameters:

C_R = Solar Pressure Radiation Coefficient = 1.17

A = Total Solar Pressure Area = 93.6 m^2

M = Dry Mass of Satellite = 2384.8 kg

Using these values in the IADC formula results in a minimum de-orbit altitude of 36067 km, or approximately 281 km above geosynchronous altitude. To provide adequate margin, the nominal disposal orbit will be increased above this calculated value to a value of 300 km. Approximately 25.7 kg of propellant (including fuel reserve and unusable residuals) will be allocated and reserved for final orbit raising maneuvers to this altitude. This value was determined through a detailed propellant budget analysis. In addition, SES has assessed fuel gauging uncertainty, and this budgeted propellant provides an adequate margin of fuel reserve to ensure that the disposal orbit will be achieved despite such uncertainty.

APPENDIX A

Link Budget Analysis

		HEMI/HEMI 72MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**72M0G7W**
Uplink Frequency	GHz	5.966	5.966	5.966	5.966	5.966
Downlink Frequency	GHz	3.741	3.741	3.741	3.741	3.741
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	72000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	50.1	52.0	57.8	64.6	78.6
Earth Station Diameter	m	3.7	3.7	3.7	3.7	9.0
Earth Station Gain	dBi	45.3	45.3	45.3	45.3	53.0
Uplink Input Power per Carrier	dBW	4.8	6.7	12.5	19.3	25.6
Free Space Loss	dB	199.8	199.8	199.8	199.8	199.7
G/T Satellite	dB/K	-5.0	-5.0	-5.0	-5.0	-5.0
C/N Thermal Uplink	dB	19.8	20.4	20.3	20.5	24.5
C/I XPOL, ACI, IM, ASI	dB	14.1	14.7	14.5	14.8	18.6
C/(N+I) uplink	dB	13.1	13.7	13.5	13.8	17.6
Downlink:						
Satellite e.i.r.p. per carrier (-3.1dB contour)	dBW	10.6	12.4	18.3	25.1	37.0
Maximum e.i.r.p. density	dBW/4kHz	-4.4	-3.8	-4.0	-3.7	-1.9
Free Space Loss	dB	195.9	195.9	195.9	195.9	195.7
Earth Station Diameter	m	3.8	5.6	5.6	3.8	7.2
Earth Station Gain	dBi	41.6	45.0	45.0	41.6	47.1
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	21.8	25.2	25.2	21.8	27.4
C/N Thermal Downlink	dB	11.0	15.0	14.8	11.8	19.3
C/I XPOL, ACI, IM, ASI	dB	11.1	15.1	14.9	11.8	19.2
C/(N+I) downlink	dB	8.1	12.1	11.9	8.8	16.2
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-42	-42	-42	-42	-42
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	17.1	17.7	17.5	17.8	21.6
C/I dn (single satellite)	dB	14.1	18.1	17.9	14.8	22.2
Aggregate C/I up	dB	14.1	14.7	14.5	14.8	18.6
Aggregate C/I down	dB	11.1	15.1	14.9	11.8	19.2
Overall:						
C/(N+I) overall	dB	6.9	9.8	9.6	7.6	13.9
C/(N+I) required	dB	6.0	9.3	9.3	6.9	12.7
System Margin	dB	0.9	0.5	0.3	0.7	1.2

Associated Txr IDs	
Start	End
1	4
59	62
109	112
103	112
181	184

TABLE A-1. LINK BUDGET, HEMI/HEMI, 72 MHZ TRANSPONDER

		HEMI/HEMI 54MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	6.216	6.216	6.216	6.216	6.216
Downlink Frequency	GHz	3.991	3.991	3.991	3.991	3.991
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	50.1	53.7	59.5	64.6	76.9
Earth Station Diameter	m	3.7	5.6	4.5	3.7	7.2
Earth Station Gain	dBi	45.7	49.3	47.4	45.7	51.5
Uplink Input Power per Carrier	dBW	4.4	4.4	12.1	18.9	25.4
Free Space Loss	dB	200.2	200.2	200.2	200.2	200.2
G/T Satellite	dB/K	-5.0	-5.0	-5.0	-5.0	-5.0
C/N Thermal Uplink	dB	19.5	21.8	21.6	20.2	23.8
C/I XPOL, ACI, IM, ASI	dB	14.1	16.4	16.2	14.8	18.5
C/(N+I) uplink	dB	13.0	15.3	15.1	13.7	17.4
Downlink:						
Satellite e.i.r.p. per carrier (-3.1dB contour)	dBW	10.6	14.1	19.9	25.1	35.4
Maximum e.i.r.p. density	dBW/4kHz	-4.4	-2.1	-2.3	-3.7	-2.0
Free Space Loss	dB	196.4	196.4	196.4	196.4	196.4
Earth Station Diameter	m	3.8	4.5	4.5	3.8	3.8
Earth Station Gain	dBi	42.1	43.6	43.6	42.1	42.1
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	22.4	23.8	23.8	22.4	22.4
C/N Thermal Downlink	dB	11.1	14.8	14.6	11.8	13.4
C/I XPOL, ACI, IM, ASI	dB	11.7	15.5	15.3	12.4	14.1
C/(N+I) downlink	dB	8.4	12.1	11.9	9.1	10.7
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-42	-42	-42	-42	-42
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	17.1	19.4	19.2	17.8	21.5
C/I dn (single satellite)	dB	14.7	18.5	18.3	15.4	17.1
Aggregate C/I up	dB	14.1	16.4	16.2	14.8	18.5
Aggregate C/I down	dB	11.7	15.5	15.3	12.4	14.1
Overall:						
C/(N+I) overall	dB	7.1	10.4	10.2	7.8	9.9
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	1.1	1.2	1.0	0.9	3.0

Associated Txr IDs	
Start	End
5	12
45	50
63	70
103	108
125	134
165	168
181	184
197	206
237	240

TABLE A-2. LINK BUDGET, HEMI/HEMI, 54 MHZ TRANSPONDER

		NA/HEMI 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	14.281	14.281	14.281	14.281	14.281
Downlink Frequency	GHz	3.991	3.991	3.991	3.991	3.991
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	55.5	58.6	63.0	69.1	80.7
Earth Station Diameter	m	3.7	4.5	3.7	3.7	4.5
Earth Station Gain	dBi	52.9	54.6	52.9	52.9	54.6
Uplink Input Power per Carrier	dBW	2.6	4.0	10.1	16.1	26.1
Free Space Loss	dB	207.6	207.6	207.6	207.6	207.6
G/T Satellite	dB/K	1.0	1.0	1.0	1.0	1.0
C/N Thermal Uplink	dB	23.4	25.3	23.7	23.2	26.2
C/I XPOL, ACI, IM, ASI	dB	27.5	29.3	27.7	27.2	30.2
C/(N+I) uplink	dB	22.0	23.9	22.2	21.8	24.8
Downlink:						
Satellite e.i.r.p. per carrier (-3.1dB contour)	dBW	12.2	15.3	19.7	25.7	36.4
Maximum e.i.r.p. density	dBW/4kHz	-2.8	-0.9	-2.6	-3.0	-1.0
Free Space Loss	dB	196.4	196.4	196.4	196.4	196.4
Earth Station Diameter	m	3.8	4.5	5.6	4.5	3.8
Earth Station Gain	dBi	42.1	43.6	45.5	43.6	42.1
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	22.4	23.8	25.7	23.8	22.4
C/N Thermal Downlink	dB	12.7	16.0	16.3	13.9	14.4
C/I XPOL, ACI, IM, ASI	dB	13.3	16.6	16.9	14.5	15.1
C/(N+I) downlink	dB	10.0	13.3	13.6	11.2	11.7
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	30.5	32.3	30.7	30.2	33.2
C/I dn (single satellite)	dB	16.3	19.6	19.9	17.5	18.1
Aggregate C/I up	dB	27.5	29.3	27.7	27.2	30.2
Aggregate C/I down	dB	13.3	16.6	16.9	14.5	15.1
Overall:						
C/(N+I) overall	dB	9.7	12.9	13.0	10.8	11.5
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	3.7	3.7	3.7	3.9	4.6

Associated Txr IDs	
Start	End
13	20
71	78

TABLE A-3. LINK BUDGET, NA/HEMI, 54 MHZ TRANSPONDER

		EU/HEMI 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	14.281	14.281	14.281	14.281	14.281
Downlink Frequency	GHz	3.991	3.991	3.991	3.991	3.991
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	55.1	58.3	62.6	68.7	80.3
Earth Station Diameter	m	3.7	4.5	3.7	3.7	4.5
Earth Station Gain	dBi	52.9	54.6	52.9	52.9	54.6
Uplink Input Power per Carrier	dBW	2.2	3.6	9.7	15.8	25.7
Free Space Loss	dB	206.8	206.8	206.8	206.8	206.8
G/T Satellite	dB/K	0.0	0.0	0.0	0.0	0.0
C/N Thermal Uplink	dB	22.8	24.7	23.1	22.6	25.6
C/I XPOL, ACI, IM, ASI	dB	27.1	29.0	27.4	26.9	29.9
C/(N+I) uplink	dB	21.4	23.3	21.7	21.2	24.2
Downlink:						
Satellite e.i.r.p. per carrier (-3.1dB contour)	dBW	12.2	15.4	19.8	25.8	36.4
Maximum e.i.r.p. density	dBW/4kHz	-2.7	-0.9	-2.5	-2.9	-1.0
Free Space Loss	dB	196.4	196.4	196.4	196.4	196.4
Earth Station Diameter	m	3.8	4.5	5.6	4.5	3.8
Earth Station Gain	dBi	42.1	43.6	45.5	43.6	42.1
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	22.4	23.8	25.7	23.8	22.4
C/N Thermal Downlink	dB	12.7	16.1	16.3	14.0	14.5
C/I XPOL, ACI, IM, ASI	dB	13.3	16.7	17.0	14.6	15.1
C/(N+I) downlink	dB	10.0	13.4	13.6	11.3	11.8
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	30.1	32.0	30.4	29.9	32.9
C/I dn (single satellite)	dB	16.3	19.7	20.0	17.6	18.1
Aggregate C/I up	dB	27.1	29.0	27.4	26.9	29.9
Aggregate C/I down	dB	13.3	16.7	17.0	14.6	15.1
Overall:						
C/(N+I) overall	dB	9.7	12.9	13.0	10.8	11.5
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	3.7	3.7	3.7	3.9	4.6

Associated Txr IDs	
Start	End
21	28
79	86

TABLE A-4. LINK BUDGET, EU/HEMI, 54 MHZ TRANSPONDER

		CA/HEMI 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	14.281	14.281	14.281	14.281	14.281
Downlink Frequency	GHz	3.991	3.991	3.991	3.991	3.991
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	56.0	59.2	63.6	69.6	82.2
Earth Station Diameter	m	3.7	4.5	3.7	3.7	5.6
Earth Station Gain	dBi	52.9	54.6	52.9	52.9	56.5
Uplink Input Power per Carrier	dBW	3.1	4.6	10.7	16.7	25.7
Free Space Loss	dB	207.3	207.3	207.3	207.3	207.3
G/T Satellite	dB/K	0.0	0.0	0.0	0.0	0.0
C/N Thermal Uplink	dB	23.3	25.2	23.6	23.1	27.0
C/I XPOL, ACI, IM, ASI	dB	28.0	29.9	28.3	27.8	31.7
C/(N+I) uplink	dB	22.0	23.9	22.3	21.8	25.7
Downlink:						
Satellite e.i.r.p. per carrier (-3.1dB contour)	dBW	12.2	15.4	19.7	25.8	36.4
Maximum e.i.r.p. density	dBW/4kHz	-2.8	-0.9	-2.5	-3.0	-1.1
Free Space Loss	dB	196.4	196.4	196.4	196.4	196.4
Earth Station Diameter	m	3.8	4.5	5.6	4.5	3.8
Earth Station Gain	dBi	42.1	43.6	45.5	43.6	42.1
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	22.4	23.8	25.7	23.8	22.4
C/N Thermal Downlink	dB	12.7	16.0	16.3	13.9	14.4
C/I XPOL, ACI, IM, ASI	dB	13.3	16.7	17.0	14.6	15.0
C/(N+I) downlink	dB	10.0	13.3	13.6	11.2	11.7
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	31.0	32.9	31.3	30.8	34.7
C/I dn (single satellite)	dB	16.3	19.7	20.0	17.6	18.0
Aggregate C/I up	dB	28.0	29.9	28.3	27.8	31.7
Aggregate C/I down	dB	13.3	16.7	17.0	14.6	15.0
Overall:						
C/(N+I) overall	dB	9.7	13.0	13.1	10.9	11.5
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	3.7	3.7	3.8	4.0	4.6

Associated Txr IDs	
Start	End
29	32
87	90

TABLE A-5. LINK BUDGET, CA/HEMI, 54 MHZ TRANSPONDER

		WA/HEMI 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	14.281	14.281	14.281	14.281	14.281
Downlink Frequency	GHz	3.991	3.991	3.991	3.991	3.991
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	56.8	58.3	63.6	70.4	82.4
Earth Station Diameter	m	3.7	4.5	3.7	3.7	5.6
Earth Station Gain	dBi	52.9	54.6	52.9	52.9	56.5
Uplink Input Power per Carrier	dBW	3.9	3.7	10.7	17.5	25.9
Free Space Loss	dB	207.0	207.0	207.0	207.0	207.0
G/T Satellite	dB/K	0.0	0.0	0.0	0.0	0.0
C/N Thermal Uplink	dB	24.3	24.6	23.9	24.1	27.5
C/I XPOL, ACI, IM, ASI	dB	28.8	29.0	28.3	28.6	32.0
C/(N+I) uplink	dB	23.0	23.3	22.5	22.8	26.2
Downlink:						
Satellite e.i.r.p. per carrier (-3.1dB contour)	dBW	12.7	14.2	19.5	26.2	36.3
Maximum e.i.r.p. density	dBW/4kHz	-2.3	-2.0	-2.8	-2.5	-1.1
Free Space Loss	dB	196.4	196.4	196.4	196.4	196.4
Earth Station Diameter	m	3.8	5.6	6.3	4.5	3.8
Earth Station Gain	dBi	42.1	45.5	46.5	43.6	42.1
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	22.4	25.7	26.8	23.8	22.4
C/N Thermal Downlink	dB	13.1	16.8	17.1	14.4	14.3
C/I XPOL, ACI, IM, ASI	dB	13.8	17.4	17.7	15.0	15.0
C/(N+I) downlink	dB	10.5	14.1	14.4	11.7	11.6
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	31.8	32.0	31.3	31.6	35.0
C/I dn (single satellite)	dB	16.8	20.4	20.7	18.0	18.0
Aggregate C/I up	dB	28.8	29.0	28.3	28.6	32.0
Aggregate C/I down	dB	13.8	17.4	17.7	15.0	15.0
Overall:						
C/(N+I) overall	dB	10.2	13.6	13.7	11.4	11.5
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	4.2	4.3	4.5	4.5	4.6

Associated Txr IDs	
Start	End
33	36
91	94

TABLE A-6. LINK BUDGET, WA/HEMI, 54 MHZ TRANSPONDER

		SC/HEMI 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	14.281	14.281	14.281	14.281	14.281
Downlink Frequency	GHz	3.991	3.991	3.991	3.991	3.991
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	53.6	56.7	61.2	67.2	80.6
Earth Station Diameter	m	3.7	3.7	3.7	3.7	4.5
Earth Station Gain	dBi	52.9	52.9	52.9	52.9	54.6
Uplink Input Power per Carrier	dBW	0.7	3.8	8.3	14.3	26.0
Free Space Loss	dB	207.3	207.3	207.3	207.3	207.3
G/T Satellite	dB/K	1.0	1.0	1.0	1.0	1.0
C/N Thermal Uplink	dB	21.8	23.7	22.1	21.6	26.4
C/I XPOL, ACI, IM, ASI	dB	25.5	27.5	25.9	25.4	30.1
C/(N+I) uplink	dB	20.3	22.2	20.6	20.1	24.9
Downlink:						
Satellite e.i.r.p. per carrier (-3.1dB contour)	dBW	12.3	15.5	19.9	25.9	36.4
Maximum e.i.r.p. density	dBW/4kHz	-2.6	-0.7	-2.3	-2.8	-1.1
Free Space Loss	dB	196.4	196.4	196.4	196.4	196.4
Earth Station Diameter	m	3.8	4.5	5.6	4.5	3.8
Earth Station Gain	dBi	42.1	43.6	45.5	43.6	42.1
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	22.4	23.8	25.7	23.8	22.4
C/N Thermal Downlink	dB	12.8	16.2	16.5	14.1	14.4
C/I XPOL, ACI, IM, ASI	dB	13.4	16.8	17.2	14.7	15.0
C/(N+I) downlink	dB	10.1	13.5	13.8	11.4	11.7
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	28.5	30.5	28.9	28.4	33.1
C/I dn (single satellite)	dB	16.4	19.8	20.2	17.7	18.0
Aggregate C/I up	dB	25.5	27.5	25.9	25.4	30.1
Aggregate C/I down	dB	13.4	16.8	17.2	14.7	15.0
Overall:						
C/(N+I) overall	dB	9.7	12.9	13.0	10.8	11.5
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	3.7	3.7	3.7	3.9	4.6

Associated Txr IDs	
Start	End
37	40
95	98

TABLE A-7. LINK BUDGET, SC/HEMI, 54 MHZ TRANSPONDER

		SA/HEMI 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	14.281	14.281	14.281	14.281	14.281
Downlink Frequency	GHz	3.991	3.991	3.991	3.991	3.991
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	54.8	58.0	62.4	68.4	81.8
Earth Station Diameter	m	3.7	3.7	3.7	3.7	5.6
Earth Station Gain	dBi	52.9	52.9	52.9	52.9	56.5
Uplink Input Power per Carrier	dBW	1.8	5.0	9.5	15.5	25.2
Free Space Loss	dB	207.5	207.5	207.5	207.5	207.5
G/T Satellite	dB/K	1.0	1.0	1.0	1.0	1.0
C/N Thermal Uplink	dB	22.8	24.8	23.2	22.6	27.4
C/I XPOL, ACI, IM, ASI	dB	26.7	28.7	27.1	26.6	31.3
C/(N+I) uplink	dB	21.3	23.3	21.7	21.2	25.9
Downlink:						
Satellite e.i.r.p. per carrier (-3.1dB contour)	dBW	12.3	15.5	20.0	26.0	36.4
Maximum e.i.r.p. density	dBW/4kHz	-2.6	-0.7	-2.2	-2.8	-1.0
Free Space Loss	dB	196.4	196.4	196.4	196.4	196.4
Earth Station Diameter	m	3.8	4.5	5.6	4.5	3.8
Earth Station Gain	dBi	42.1	43.6	45.5	43.6	42.1
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	22.4	23.8	25.7	23.8	22.4
C/N Thermal Downlink	dB	12.8	16.2	16.6	14.1	14.4
C/I XPOL, ACI, IM, ASI	dB	13.5	16.9	17.2	14.8	15.0
C/(N+I) downlink	dB	10.1	13.5	13.9	11.4	11.7
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	29.7	31.7	30.1	29.6	34.3
C/I dn (single satellite)	dB	16.5	19.9	20.2	17.8	18.0
Aggregate C/I up	dB	26.7	28.7	27.1	26.6	31.3
Aggregate C/I down	dB	13.5	16.9	17.2	14.8	15.0
Overall:						
C/(N+I) overall	dB	9.8	13.1	13.2	11.0	11.5
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	3.8	3.8	4.0	4.1	4.6

Associated Txr IDs	
Start	End
41	44
99	102

TABLE A-8. LINK BUDGET, SA/HEMI, 54 MHZ TRANSPONDER

		GLB/HEMI 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	6.336	6.336	6.336	6.336	6.336
Downlink Frequency	GHz	4.111	4.111	4.111	4.111	4.111
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	53.6	56.5	62.2	67.9	79.5
Earth Station Diameter	m	4.5	5.6	4.5	5.6	11.0
Earth Station Gain	dBi	47.6	49.5	47.6	49.5	55.4
Uplink Input Power per Carrier	dBW	6.0	7.1	14.6	18.4	24.1
Free Space Loss	dB	200.7	200.7	200.7	200.7	200.7
G/T Satellite	dB/K	-9.3	-9.3	-9.3	-9.3	-9.3
C/N Thermal Uplink	dB	18.1	19.8	19.4	18.6	21.6
C/I XPOL, ACI, IM, ASI	dB	17.5	19.3	18.9	18.1	21.1
C/(N+I) uplink	dB	14.8	16.5	16.1	15.3	18.3
Downlink:						
Satellite e.i.r.p. per carrier (-3.1dB contour)	dBW	11.3	14.3	19.9	25.7	35.3
Maximum e.i.r.p. density	dBW/4kHz	-3.6	-1.9	-2.3	-3.1	-2.1
Free Space Loss	dB	196.7	196.7	196.7	196.7	196.7
Earth Station Diameter	m	3.8	4.5	4.5	3.8	3.8
Earth Station Gain	dBi	42.4	43.9	43.9	42.4	42.4
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	22.6	24.1	24.1	22.6	22.6
C/N Thermal Downlink	dB	11.8	15.0	14.6	12.3	13.3
C/I XPOL, ACI, IM, ASI	dB	12.7	15.9	15.5	13.3	14.2
C/(N+I) downlink	dB	9.2	12.4	12.0	9.8	10.7
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-42	-42	-42	-42	-42
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	20.5	22.3	21.9	21.1	24.1
C/I dn (single satellite)	dB	15.7	18.9	18.5	16.3	17.2
Aggregate C/I up	dB	17.5	19.3	18.9	18.1	21.1
Aggregate C/I down	dB	12.7	15.9	15.5	13.3	14.2
Overall:						
C/(N+I) overall	dB	8.2	11.0	10.6	8.7	10.0
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	2.2	1.7	1.3	1.8	3.1

Associated Txr IDs	
Start	End
51	52
245	246

TABLE A-9. LINK BUDGET, GLB/HEMI, 54 MHZ TRANSPONDER

		HEMI/GLB 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	6.336	6.336	6.336	6.336	6.336
Downlink Frequency	GHz	4.111	4.111	4.111	4.111	4.111
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	50.9	52.8	58.8	64.4	78.6
Earth Station Diameter	m	4.5	6.3	5.6	5.6	11.0
Earth Station Gain	dBi	47.6	50.5	49.5	49.5	55.4
Uplink Input Power per Carrier	dBW	3.3	2.3	9.3	14.9	23.2
Free Space Loss	dB	200.4	200.4	200.4	200.4	200.4
G/T Satellite	dB/K	-5.0	-5.0	-5.0	-5.0	-5.0
C/N Thermal Uplink	dB	20.0	20.6	20.6	19.7	25.3
C/I XPOL, ACI, IM, ASI	dB	14.8	15.5	15.5	14.6	20.1
C/(N+I) uplink	dB	13.7	14.4	14.4	13.4	19.0
Downlink:						
Satellite e.i.r.p. per carrier (-3dB contour)	dBW	10.3	12.3	18.3	23.9	33.1
Maximum e.i.r.p. density	dBW/4kHz	-4.7	-4.1	-4.1	-5.0	-4.4
Free Space Loss	dB	197.0	197.0	197.0	197.0	197.0
Earth Station Diameter	m	3.8	5.6	5.6	4.5	3.8
Earth Station Gain	dBi	42.4	45.8	45.8	43.9	42.4
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	22.6	26.0	26.0	24.1	22.6
C/N Thermal Downlink	dB	10.5	14.6	14.6	11.7	10.8
C/I XPOL, ACI, IM, ASI	dB	11.7	15.7	15.7	12.9	12.0
C/(N+I) downlink	dB	8.0	12.1	12.1	9.3	8.3
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-42	-42	-42	-42	-42
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	17.8	18.5	18.5	17.6	23.1
C/I dn (single satellite)	dB	14.7	18.7	18.7	15.9	15.0
Aggregate C/I up	dB	14.8	15.5	15.5	14.6	20.1
Aggregate C/I down	dB	11.7	15.7	15.7	12.9	12.0
Overall:						
C/(N+I) overall	dB	7.0	10.1	10.1	7.9	8.0
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	1.0	0.8	0.8	1.0	1.1

Associated Txr IDs	
Start	End
53	56
257	260

TABLE A-10. LINK BUDGET, HEMI/GLB, 54 MHZ TRANSPONDER

		GLB/GLB 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	6.336	6.336	6.336	6.336	6.336
Downlink Frequency	GHz	4.111	4.111	4.111	4.111	4.111
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	54.5	56.2	62.2	68.0	80.2
Earth Station Diameter	m	4.5	6.3	5.6	5.6	11.0
Earth Station Gain	dBi	47.6	50.5	49.5	49.5	55.4
Uplink Input Power per Carrier	dBW	7.0	5.6	12.7	18.5	24.8
Free Space Loss	dB	200.7	200.7	200.7	200.7	200.7
G/T Satellite	dB/K	-9.3	-9.3	-9.3	-9.3	-9.3
C/N Thermal Uplink	dB	19.0	19.4	19.4	18.7	22.2
C/I XPOL, ACI, IM, ASI	dB	18.5	18.9	18.9	18.2	21.7
C/(N+I) uplink	dB	15.7	16.1	16.1	15.4	18.9
Downlink:						
Satellite e.i.r.p. per carrier (-3dB contour)	dBW	9.4	11.0	17.0	22.9	33.0
Maximum e.i.r.p. density	dBW/4kHz	-5.7	-5.3	-5.3	-6.0	-4.5
Free Space Loss	dB	196.8	196.8	196.8	196.8	196.8
Earth Station Diameter	m	3.8	5.6	5.6	4.5	3.8
Earth Station Gain	dBi	42.4	45.8	45.8	43.9	42.4
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	22.6	26.0	26.0	24.1	22.6
C/N Thermal Downlink	dB	9.7	13.5	13.5	10.9	10.9
C/I XPOL, ACI, IM, ASI	dB	10.8	14.5	14.5	11.9	12.0
C/(N+I) downlink	dB	7.2	11.0	11.0	8.4	8.4
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-42	-42	-42	-42	-42
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	21.5	21.9	21.9	21.2	24.7
C/I dn (single satellite)	dB	13.8	17.5	17.5	14.9	15.0
Aggregate C/I up	dB	18.5	18.9	18.9	18.2	21.7
Aggregate C/I down	dB	10.8	14.5	14.5	11.9	12.0
Overall:						
C/(N+I) overall	dB	6.6	9.8	9.8	7.6	8.0
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	0.6	0.5	0.5	0.7	1.1

Associated Txr IDs	
Start	End
57	58
265	266

TABLE A-11. LINK BUDGET, GLB/GLB, 54 MHZ TRANSPONDER

		ZONE/HEMI 72MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**72M0G7W**
Uplink Frequency	GHz	5.966	5.966	5.966	5.966	5.966
Downlink Frequency	GHz	3.741	3.741	3.741	3.741	3.741
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	72000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	48.5	50.5	56.6	63.0	78.9
Earth Station Diameter	m	3.7	3.7	3.7	3.7	7.2
Earth Station Gain	dBi	45.3	45.3	45.3	45.3	51.2
Uplink Input Power per Carrier	dBW	3.2	5.2	11.2	17.7	27.8
Free Space Loss	dB	200.2	200.2	200.2	200.2	200.2
G/T Satellite	dB/K	0.0	0.0	0.0	0.0	0.0
C/N Thermal Uplink	dB	22.8	23.6	23.6	23.6	29.3
C/I XPOL, ACI, IM, ASI	dB	12.5	13.3	13.3	13.2	19.0
C/(N+I) uplink	dB	12.1	12.9	12.9	12.8	18.6
Downlink:						
Satellite e.i.r.p. per carrier (-3.1dB contour)	dBW	10.5	12.5	18.5	25.0	36.9
Maximum e.i.r.p. density	dBW/4kHz	-4.5	-3.7	-3.7	-3.7	-2.0
Free Space Loss	dB	195.9	195.9	195.9	195.9	195.9
Earth Station Diameter	m	3.8	5.6	5.6	3.8	6.3
Earth Station Gain	dBi	41.6	45.0	45.0	41.6	46.0
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	21.8	25.2	25.2	21.8	26.2
C/N Thermal Downlink	dB	11.0	15.1	15.1	11.7	17.8
C/I XPOL, ACI, IM, ASI	dB	11.0	15.2	15.2	11.8	17.9
C/(N+I) downlink	dB	8.0	12.1	12.1	8.7	14.9
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-42	-42	-42	-42	-42
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	15.5	16.3	16.3	16.2	22.0
C/I dn (single satellite)	dB	14.0	18.2	18.2	14.8	20.9
Aggregate C/I up	dB	12.5	13.3	13.3	13.2	19.0
Aggregate C/I down	dB	11.0	15.2	15.2	11.8	17.9
Overall:						
C/(N+I) overall	dB	6.6	9.5	9.5	7.3	13.3
C/(N+I) required	dB	6.0	9.3	9.3	6.9	12.7
System Margin	dB	0.6	0.2	0.2	0.4	0.6

Associated Txr IDs	
Start	End
113	116
185	188

TABLE A-12. LINK BUDGET, ZONE/HEMI, 72 MHZ TRANSPONDER

		ZONE/HEMI 54MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	6.216	6.216	6.216	6.216	6.216
Downlink Frequency	GHz	3.991	3.991	3.991	3.991	3.991
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	49.9	51.6	57.4	64.4	76.6
Earth Station Diameter	m	3.7	3.7	3.7	3.7	6.3
Earth Station Gain	dBi	45.7	45.7	45.7	45.7	50.3
Uplink Input Power per Carrier	dBW	4.2	5.9	11.7	18.7	26.2
Free Space Loss	dB	200.5	200.5	200.5	200.5	200.5
G/T Satellite	dB/K	0.0	0.0	0.0	0.0	0.0
C/N Thermal Uplink	dB	23.9	24.3	24.1	24.6	28.1
C/I XPOL, ACI, IM, ASI	dB	13.9	14.3	14.1	14.6	18.1
C/(N+I) uplink	dB	13.5	13.9	13.7	14.2	17.7
Downlink:						
Satellite e.i.r.p. per carrier (-3.1dB contour)	dBW	11.9	13.6	19.4	26.4	36.6
Maximum e.i.r.p. density	dBW/4kHz	-3.1	-2.6	-2.8	-2.4	-0.9
Free Space Loss	dB	196.4	196.4	196.4	196.4	196.4
Earth Station Diameter	m	3.0	4.5	4.5	3.0	3.0
Earth Station Gain	dBi	40.1	43.6	43.6	40.1	40.1
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	20.3	23.8	23.8	20.3	20.3
C/N Thermal Downlink	dB	10.3	14.3	14.1	11.0	12.5
C/I XPOL, ACI, IM, ASI	dB	11.0	14.9	14.7	11.7	13.2
C/(N+I) downlink	dB	7.6	11.6	11.4	8.3	9.8
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-42	-42	-42	-42	-42
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	16.9	17.3	17.1	17.6	21.1
C/I dn (single satellite)	dB	14.0	17.9	17.7	14.7	16.2
Aggregate C/I up	dB	13.9	14.3	14.1	14.6	18.1
Aggregate C/I down	dB	11.0	14.9	14.7	11.7	13.2
Overall:						
C/(N+I) overall	dB	6.6	9.6	9.4	7.3	9.2
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	0.6	0.3	0.1	0.4	2.3

Associated Txr IDs	
Start	End
135	144
169	172
207	216
241	244

TABLE A-13. LINK BUDGET, ZONE/HEMI, 54 MHZ TRANSPONDER

		HEMI/ZONE 72MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**72M0G7W**
Uplink Frequency	GHz	5.966	5.966	5.966	5.966	5.966
Downlink Frequency	GHz	3.741	3.741	3.741	3.741	3.741
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	72000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	50.8	52.1	58.1	64.6	77.8
Earth Station Diameter	m	3.7	3.7	3.7	3.7	5.6
Earth Station Gain	dBi	45.3	45.3	45.3	45.3	49.0
Uplink Input Power per Carrier	dBW	5.5	6.7	12.8	19.3	28.9
Free Space Loss	dB	199.9	199.9	199.9	199.9	199.9
G/T Satellite	dB/K	-5.0	-5.0	-5.0	-5.0	-5.0
C/N Thermal Uplink	dB	20.4	20.4	20.4	20.4	23.5
C/I XPOL, ACI, IM, ASI	dB	14.8	14.8	14.8	14.8	17.9
C/(N+I) uplink	dB	13.7	13.8	13.8	13.8	16.8
Downlink:						
Satellite e.i.r.p. per carrier (-4.8dB contour)	dBW	13.2	14.4	20.5	27.0	37.2
Maximum e.i.r.p. density	dBW/4kHz	-0.1	-0.1	-0.1	-0.1	0.0
Free Space Loss	dB	196.1	196.1	196.1	196.1	196.1
Earth Station Diameter	m	3.0	4.5	4.5	3.0	6.3
Earth Station Gain	dBi	39.5	43.1	43.1	39.5	46.0
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	19.8	23.3	23.3	19.8	26.2
C/N Thermal Downlink	dB	11.3	14.8	14.8	11.3	17.8
C/I XPOL, ACI, IM, ASI	dB	11.7	15.2	15.2	11.7	18.2
C/(N+I) downlink	dB	8.5	12.0	12.0	8.5	15.0
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-42	-42	-42	-42	-42
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	17.8	17.8	17.8	17.8	20.9
C/I dn (single satellite)	dB	14.7	18.2	18.2	14.7	21.2
Aggregate C/I up	dB	14.8	14.8	14.8	14.8	17.9
Aggregate C/I down	dB	11.7	15.2	15.2	11.7	18.2
Overall:						
C/(N+I) overall	dB	7.3	9.8	9.8	7.4	12.8
C/(N+I) required	dB	6.0	9.3	9.3	6.9	12.7
System Margin	dB	1.3	0.5	0.5	0.5	0.1

Associated Txr IDs	
Start	End
117	120
189	192

TABLE A-14. LINK BUDGET, HEMI/ZONE, 72 MHZ TRANSPONDER

		HEMI/ZONE 54MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	6.216	6.216	6.216	6.216	6.216
Downlink Frequency	GHz	3.991	3.991	3.991	3.991	3.991
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	50.8	52.1	58.1	64.6	75.2
Earth Station Diameter	m	3.7	3.7	3.7	3.7	5.6
Earth Station Gain	dBi	45.7	45.7	45.7	45.7	49.3
Uplink Input Power per Carrier	dBW	5.1	6.4	12.5	18.9	25.9
Free Space Loss	dB	200.3	200.3	200.3	200.3	200.3
G/T Satellite	dB/K	-5.0	-5.0	-5.0	-5.0	-5.0
C/N Thermal Uplink	dB	20.1	20.1	20.1	20.1	22.0
C/I XPOL, ACI, IM, ASI	dB	14.8	14.8	14.8	14.8	16.7
C/(N+I) uplink	dB	13.7	13.7	13.7	13.7	15.6
Downlink:						
Satellite e.i.r.p. per carrier (-4.8dB contour)	dBW	13.2	14.5	20.5	27.0	35.6
Maximum e.i.r.p. density	dBW/4kHz	-0.1	0.0	0.0	0.0	-0.1
Free Space Loss	dB	196.7	196.7	196.7	196.7	196.7
Earth Station Diameter	m	3.0	4.5	4.5	3.0	3.0
Earth Station Gain	dBi	40.1	43.6	43.6	40.1	40.1
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	20.3	23.8	23.8	20.3	20.3
C/N Thermal Downlink	dB	11.3	14.9	14.9	11.4	11.3
C/I XPOL, ACI, IM, ASI	dB	12.2	15.8	15.8	12.3	12.2
C/(N+I) downlink	dB	8.7	12.3	12.3	8.8	8.7
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-42	-42	-42	-42	-42
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	17.8	17.8	17.8	17.8	19.7
C/I dn (single satellite)	dB	15.2	18.8	18.8	15.3	15.2
Aggregate C/I up	dB	14.8	14.8	14.8	14.8	16.7
Aggregate C/I down	dB	12.2	15.8	15.8	12.3	12.2
Overall:						
C/(N+I) overall	dB	7.5	10.0	10.0	7.6	7.9
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	1.5	0.7	0.7	0.7	1.0

Associated Txr IDs	
Start	End
145	154
173	176
217	226
247	250

TABLE A-15. LINK BUDGET, HEMI/ZONE, 54 MHZ TRANSPONDER

		ZONE/ZONE 72MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**72M0G7W**
Uplink Frequency	GHz	5.966	5.966	5.966	5.966	5.966
Downlink Frequency	GHz	3.741	3.741	3.741	3.741	3.741
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	72000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	49.4	50.6	56.6	63.2	76.4
Earth Station Diameter	m	3.7	3.7	3.7	3.7	4.5
Earth Station Gain	dBi	45.3	45.3	45.3	45.3	47.0
Uplink Input Power per Carrier	dBW	4.1	5.3	11.3	17.9	29.3
Free Space Loss	dB	199.3	199.3	199.3	199.3	199.3
G/T Satellite	dB/K	0.0	0.0	0.0	0.0	0.0
C/N Thermal Uplink	dB	24.6	24.6	24.6	24.6	27.7
C/I XPOL, ACI, IM, ASI	dB	13.4	13.3	13.3	13.4	17.4
C/(N+I) uplink	dB	13.0	13.0	13.0	13.1	17.0
Downlink:						
Satellite e.i.r.p. per carrier (-4.8dB contour)	dBW	13.3	14.5	20.5	27.1	37.2
Maximum e.i.r.p. density	dBW/4kHz	0.0	0.0	0.0	0.0	0.0
Free Space Loss	dB	196.1	196.1	196.1	196.1	196.1
Earth Station Diameter	m	3.0	4.5	4.5	3.0	6.3
Earth Station Gain	dBi	39.5	43.1	43.1	39.5	46.0
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	19.8	23.3	23.3	19.8	26.2
C/N Thermal Downlink	dB	11.4	14.9	14.9	11.4	17.9
C/I XPOL, ACI, IM, ASI	dB	11.8	15.2	15.2	11.8	18.3
C/(N+I) downlink	dB	8.6	12.0	12.0	8.6	15.1
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-42	-42	-42	-42	-43
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	16.4	16.3	16.3	16.4	20.4
C/I dn (single satellite)	dB	14.8	18.2	18.2	14.8	21.3
Aggregate C/I up	dB	13.4	13.3	13.3	13.4	17.4
Aggregate C/I down	dB	11.8	15.2	15.2	11.8	18.3
Overall:						
C/(N+I) overall	dB	7.2	9.5	9.5	7.3	12.9
C/(N+I) required	dB	6.0	9.3	9.3	6.9	12.7
System Margin	dB	1.2	0.2	0.2	0.4	0.2

Associated Txr IDs	
Start	End
121	124
193	196

TABLE A-16. LINK BUDGET, ZONE/ZONE, 72 MHZ TRANSPONDER

		ZONE/ZONE 54MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	6.216	6.216	6.216	6.216	6.216
Downlink Frequency	GHz	3.991	3.991	3.991	3.991	3.991
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	49.4	50.6	56.6	63.2	74.8
Earth Station Diameter	m	3.7	3.7	3.7	3.7	4.5
Earth Station Gain	dBi	45.7	45.7	45.7	45.7	47.4
Uplink Input Power per Carrier	dBW	3.7	4.9	10.9	17.5	27.4
Free Space Loss	dB	199.7	199.7	199.7	199.7	199.7
G/T Satellite	dB/K	0.0	0.0	0.0	0.0	0.0
C/N Thermal Uplink	dB	24.3	24.2	24.2	24.3	27.2
C/I XPOL, ACI, IM, ASI	dB	13.4	13.3	13.3	13.4	16.3
C/(N+I) uplink	dB	13.0	13.0	13.0	13.1	16.0
Downlink:						
Satellite e.i.r.p. per carrier (-4.8dB contour)	dBW	13.3	14.5	20.5	27.1	35.7
Maximum e.i.r.p. density	dBW/4kHz	0.0	0.0	0.0	0.0	0.0
Free Space Loss	dB	196.7	196.7	196.7	196.7	196.7
Earth Station Diameter	m	3.0	4.5	4.5	3.0	3.0
Earth Station Gain	dBi	40.1	43.6	43.6	40.1	40.1
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	20.3	23.8	23.8	20.3	20.3
C/N Thermal Downlink	dB	11.4	14.9	14.9	11.4	11.4
C/I XPOL, ACI, IM, ASI	dB	12.3	15.8	15.8	12.4	12.3
C/(N+I) downlink	dB	8.8	12.3	12.3	8.9	8.8
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-42	-42	-42	-42	-42
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	16.4	16.3	16.3	16.4	19.3
C/I dn (single satellite)	dB	15.3	18.8	18.8	15.4	15.3
Aggregate C/I up	dB	13.4	13.3	13.3	13.4	16.3
Aggregate C/I down	dB	12.3	15.8	15.8	12.4	12.3
Overall:						
C/(N+I) overall	dB	7.4	9.6	9.6	7.5	8.0
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	1.4	0.4	0.4	0.6	1.1

Associated Txr IDs	
Start	End
155	164
177	180
227	236
251	254

TABLE A-17. LINK BUDGET, ZONE/ZONE, 54 MHZ TRANSPONDER

		GLB/ZONE 54MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	6.396	6.396	6.396	6.396	6.396
Downlink Frequency	GHz	4.171	4.171	4.171	4.171	4.171
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	52.1	53.4	59.4	65.7	76.6
Earth Station Diameter	m	3.7	3.7	3.7	3.7	6.3
Earth Station Gain	dBi	45.9	45.9	45.9	45.9	50.6
Uplink Input Power per Carrier	dBW	6.1	7.5	13.5	19.7	26.0
Free Space Loss	dB	200.5	200.5	200.5	200.5	200.5
G/T Satellite	dB/K	-9.3	-9.3	-9.3	-9.3	-9.3
C/N Thermal Uplink	dB	16.8	16.9	16.9	16.6	18.9
C/I XPOL, ACI, IM, ASI	dB	16.1	16.2	16.2	15.9	18.1
C/(N+I) uplink	dB	13.4	13.5	13.5	13.2	15.5
Downlink:						
Satellite e.i.r.p. per carrier (-4.8dB contour)	dBW	13.1	14.5	20.5	26.7	35.7
Maximum e.i.r.p. density	dBW/4kHz	-0.1	0.0	0.0	-0.3	0.0
Free Space Loss	dB	197.1	197.1	197.1	197.1	197.1
Earth Station Diameter	m	3.0	4.5	4.5	3.0	3.0
Earth Station Gain	dBi	40.5	44.0	44.0	40.5	40.5
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	20.7	24.2	24.2	20.7	20.7
C/N Thermal Downlink	dB	11.3	14.9	14.9	11.1	11.4
C/I XPOL, ACI, IM, ASI	dB	12.6	16.2	16.2	12.4	12.7
C/(N+I) downlink	dB	8.9	12.5	12.5	8.7	9.0
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-42	-42	-42	-42	-42
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	19.1	19.2	19.2	18.9	21.1
C/I dn (single satellite)	dB	15.6	19.2	19.2	15.4	15.7
Aggregate C/I up	dB	16.1	16.2	16.2	15.9	18.1
Aggregate C/I down	dB	12.6	16.2	16.2	12.4	12.7
Overall:						
C/(N+I) overall	dB	7.6	10.0	10.0	7.4	8.1
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	1.6	0.7	0.7	0.5	1.2

Associated Txr IDs	
Start	End
255	256

TABLE A-18. LINK BUDGET, GLB/ZONE, 54 MHZ TRANSPONDER

		ZONE/GLB 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	6.336	6.336	6.336	6.336	6.336
Downlink Frequency	GHz	4.111	4.111	4.111	4.111	4.111
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	55.6	57.2	63.2	69.0	81.0
Earth Station Diameter	m	6.3	6.3	6.3	5.6	11.0
Earth Station Gain	dBi	50.5	50.5	50.5	49.5	55.4
Uplink Input Power per Carrier	dBW	5.1	6.7	12.7	19.5	25.6
Free Space Loss	dB	200.7	200.7	200.7	200.7	200.7
G/T Satellite	dB/K	0.0	0.0	0.0	0.0	0.0
C/N Thermal Uplink	dB	29.4	29.7	29.7	29.1	32.3
C/I XPOL, ACI, IM, ASI	dB	19.6	19.9	19.9	19.2	22.5
C/(N+I) uplink	dB	19.2	19.5	19.5	18.8	22.1
Downlink:						
Satellite e.i.r.p. per carrier (-3dB contour)	dBW	9.7	11.2	17.3	23.1	33.0
Maximum e.i.r.p. density	dBW/4kHz	-5.4	-5.1	-5.1	-5.7	-4.5
Free Space Loss	dB	197.0	197.0	197.0	197.0	197.0
Earth Station Diameter	m	3.8	5.6	5.6	4.5	3.8
Earth Station Gain	dBi	42.4	45.8	45.8	43.9	42.4
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	22.6	26.0	26.0	24.1	22.6
C/N Thermal Downlink	dB	9.9	13.5	13.5	11.0	10.8
C/I XPOL, ACI, IM, ASI	dB	11.1	14.7	14.7	12.2	12.0
C/(N+I) downlink	dB	7.4	11.1	11.1	8.5	8.3
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-42	-42	-42	-42	-42
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34
C/I up (single satellite)	dB	22.6	22.9	22.9	22.2	25.5
C/I dn (single satellite)	dB	14.1	17.7	17.7	15.2	15.0
Aggregate C/I up	dB	19.6	19.9	19.9	19.2	22.5
Aggregate C/I down	dB	11.1	14.7	14.7	12.2	12.0
Overall:						
C/(N+I) overall	dB	7.1	10.5	10.5	8.1	8.1
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	1.1	1.2	1.2	1.2	1.2

Associated Txr IDs	
Start	End
261	264

TABLE A-19. LINK BUDGET, ZONE/GLB, 54 MHZ TRANSPONDER

		NA/EU 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	14.221	14.221	14.221	14.221	14.221
Downlink Frequency	GHz	11.171	11.171	11.171	11.171	11.171
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	54.5	55.9	61.1	67.9	79.0
Earth Station Diameter	m	3.7	4.5	3.7	3.7	3.7
Earth Station Gain	dBi	52.9	54.6	52.9	52.9	52.9
Uplink Input Power per Carrier	dBW	1.6	1.3	8.2	15.0	26.2
Free Space Loss	dB	207.5	207.5	207.5	207.5	207.5
G/T Satellite	dB/K	1.0	1.0	1.0	1.0	1.0
C/N Thermal Uplink	dB	22.5	22.6	21.8	22.1	24.6
C/I XPOL, ACI, IM, ASI	dB	26.5	26.6	25.8	26.1	28.6
C/(N+I) uplink	dB	21.0	21.1	20.4	20.6	23.1
Downlink:						
Satellite e.i.r.p. per carrier (-5.8dB contour)	dBW	22.2	23.5	28.8	35.6	44.7
Maximum e.i.r.p. density	dBW/4kHz	9.9	10.0	9.2	9.5	10.0
Free Space Loss	dB	205.5	205.5	205.5	205.5	205.5
Earth Station Diameter	m	2.4	4.5	5.6	3.0	1.8
Earth Station Gain	dBi	47.1	52.6	54.5	49.0	44.6
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	27.3	32.8	34.7	29.3	24.8
C/N Thermal Downlink	dB	18.5	24.1	25.2	20.1	16.1
C/I XPOL, ACI, IM, ASI	dB	17.3	22.8	23.9	18.8	14.8
C/(N+I) downlink	dB	14.8	20.4	21.5	16.4	12.4
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	29.5	29.6	28.8	29.1	31.6
C/I dn (single satellite)	dB	20.3	25.8	26.9	21.8	17.8
Aggregate C/I up	dB	26.5	26.6	25.8	26.1	28.6
Aggregate C/I down	dB	17.3	22.8	23.9	18.8	14.8
Overall:						
C/(N+I) overall	dB	13.9	17.7	17.9	15.0	12.1
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	7.9	8.5	8.6	8.1	5.2

Associated Txr IDs	
Start	End
267	268
276	283
320	325
347	348
365	370

TABLE A-20. LINK BUDGET, NA/EU, 62/54 MHZ TRANSPONDER

		NA/WA 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	14.221	14.221	14.221	14.221	14.221
Downlink Frequency	GHz	11.171	11.171	11.171	11.171	11.171
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	57.0	57.3	62.6	69.8	78.6
Earth Station Diameter	m	3.7	3.7	3.7	3.7	3.7
Earth Station Gain	dBi	52.9	52.9	52.9	52.9	52.9
Uplink Input Power per Carrier	dBW	4.1	4.4	9.7	16.9	25.8
Free Space Loss	dB	207.5	207.5	207.5	207.5	207.5
G/T Satellite	dB/K	1.0	1.0	1.0	1.0	1.0
C/N Thermal Uplink	dB	25.0	24.0	23.3	24.0	24.2
C/I XPOL, ACI, IM, ASI	dB	28.9	28.0	27.3	28.0	28.2
C/(N+I) uplink	dB	23.5	22.6	21.9	22.5	22.7
Downlink:						
Satellite e.i.r.p. per carrier (-3.2dB contour)	dBW	23.6	24.0	29.3	36.4	47.3
Maximum e.i.r.p. density	dBW/4kHz	8.8	7.9	7.2	7.8	10.0
Free Space Loss	dB	204.9	204.9	204.9	204.9	204.9
Earth Station Diameter	m	1.8	3.8	4.5	2.4	1.2
Earth Station Gain	dBi	44.6	51.1	52.6	47.1	41.1
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	24.8	31.3	32.8	27.3	21.3
C/N Thermal Downlink	dB	18.1	23.7	24.5	19.6	15.8
C/I XPOL, ACI, IM, ASI	dB	16.2	21.8	22.6	17.7	13.9
C/(N+I) downlink	dB	14.1	19.6	20.4	15.6	11.8
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	31.9	31.0	30.3	31.0	31.2
C/I dn (single satellite)	dB	19.2	24.8	25.6	20.7	16.9
Aggregate C/I up	dB	28.9	28.0	27.3	28.0	28.2
Aggregate C/I down	dB	16.2	21.8	22.6	17.7	13.9
Overall:						
C/(N+I) overall	dB	13.6	17.8	18.1	14.8	11.4
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	7.6	8.6	8.8	7.9	4.5

Associated Txr IDs	
Start	End
13	20
356	357
392	397
455	462
500	501
536	541

TABLE A-21. LINK BUDGET, NA/WA, 62/54 MHZ TRANSPONDER

		NA/SA 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	14.221	14.221	14.221	14.221	14.221
Downlink Frequency	GHz	11.171	11.171	11.171	11.171	11.171
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	58.1	57.8	63.6	70.3	78.6
Earth Station Diameter	m	4.5	3.7	3.7	3.7	3.7
Earth Station Gain	dBi	54.6	52.9	52.9	52.9	52.9
Uplink Input Power per Carrier	dBW	3.5	4.9	10.8	17.4	25.8
Free Space Loss	dB	207.5	207.5	207.5	207.5	207.5
G/T Satellite	dB/K	1.0	1.0	1.0	1.0	1.0
C/N Thermal Uplink	dB	26.0	24.6	24.4	24.5	24.2
C/I XPOL, ACI, IM, ASI	dB	30.0	28.5	28.4	28.4	28.2
C/(N+I) uplink	dB	24.6	23.1	22.9	23.0	22.7
Downlink:						
Satellite e.i.r.p. per carrier (-2.3dB contour)	dBW	25.7	25.5	31.3	37.9	47.3
Maximum e.i.r.p. density	dBW/4kHz	10.0	8.5	8.3	8.4	10.0
Free Space Loss	dB	205.3	205.3	205.3	205.3	204.9
Earth Station Diameter	m	1.2	3.0	3.0	1.8	1.2
Earth Station Gain	dBi	41.1	49.0	49.0	44.6	41.1
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	21.3	29.3	29.3	24.8	21.3
C/N Thermal Downlink	dB	16.2	22.7	22.5	18.2	15.8
C/I XPOL, ACI, IM, ASI	dB	14.8	21.3	21.1	16.7	13.9
C/(N+I) downlink	dB	12.4	18.9	18.7	14.4	11.8
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	33.0	31.5	31.4	31.4	31.2
C/I dn (single satellite)	dB	17.8	24.3	24.1	19.7	16.9
Aggregate C/I up	dB	30.0	28.5	28.4	28.4	28.2
Aggregate C/I down	dB	14.8	21.3	21.1	16.7	13.9
Overall:						
C/(N+I) overall	dB	12.2	17.5	17.3	13.8	11.4
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	6.2	8.3	8.1	6.9	4.5

Associated Txr IDs	
Start	End
419	426
491	492
509	514

TABLE A-22. LINK BUDGET, NA/SA, 62/54 MHZ TRANSPONDER

		NA/SC 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	14.221	14.221	14.221	14.221	14.221
Downlink Frequency	GHz	11.921	11.921	11.921	11.921	11.921
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	55.7	56.5	62.5	67.4	83.1
Earth Station Diameter	m	4.5	3.7	3.7	3.7	6.3
Earth Station Gain	dBi	54.6	52.9	52.9	52.9	57.5
Uplink Input Power per Carrier	dBW	1.1	3.6	9.6	14.6	25.6
Free Space Loss	dB	207.5	207.5	207.5	207.5	207.5
G/T Satellite	dB/K	1.0	1.0	1.0	1.0	1.0
C/N Thermal Uplink	dB	23.6	23.2	23.2	21.7	28.7
C/I XPOL, ACI, IM, ASI	dB	27.6	27.2	27.2	25.6	32.7
C/(N+I) uplink	dB	22.2	21.7	21.7	20.2	27.2
Downlink:						
Satellite e.i.r.p. per carrier (-7.6dB contour)	dBW	20.3	21.1	27.2	32.1	42.8
Maximum e.i.r.p. density	dBW/4kHz	9.9	9.4	9.4	7.9	9.9
Free Space Loss	dB	205.8	205.8	205.8	205.8	205.8
Earth Station Diameter	m	2.4	4.5	4.5	3.8	2.4
Earth Station Gain	dBi	47.7	53.1	53.1	51.7	47.7
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	27.9	33.3	33.3	31.9	27.9
C/N Thermal Downlink	dB	16.9	21.9	21.9	18.9	17.0
C/I XPOL, ACI, IM, ASI	dB	16.0	21.0	21.0	18.0	16.0
C/(N+I) downlink	dB	13.4	18.4	18.4	15.4	13.4
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	30.6	30.2	30.2	28.6	35.7
C/I dn (single satellite)	dB	19.0	24.0	24.0	21.0	19.0
Aggregate C/I up	dB	27.6	27.2	27.2	25.6	32.7
Aggregate C/I down	dB	16.0	21.0	21.0	18.0	16.0
Overall:						
C/(N+I) overall	dB	12.9	16.8	16.8	14.2	13.3
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	6.9	7.5	7.5	7.3	6.4

Associated Txr IDs	
Start	End
563	564
581	586
635	642

TABLE A-23. LINK BUDGET, NA/SC, 62/54 MHZ TRANSPONDER

		NA/CA 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	14.221	14.221	14.221	14.221	14.221
Downlink Frequency	GHz	11.921	11.921	11.921	11.921	11.921
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	55.2	56.8	62.8	68.1	80.5
Earth Station Diameter	m	4.5	3.7	3.7	3.7	4.5
Earth Station Gain	dBi	54.6	52.9	52.9	52.9	54.6
Uplink Input Power per Carrier	dBW	0.6	3.9	9.9	15.2	25.9
Free Space Loss	dB	207.5	207.5	207.5	207.5	207.5
G/T Satellite	dB/K	1.0	1.0	1.0	1.0	1.0
C/N Thermal Uplink	dB	23.2	23.5	23.5	22.3	26.0
C/I XPOL, ACI, IM, ASI	dB	27.1	27.5	27.5	26.3	30.0
C/(N+I) uplink	dB	21.7	22.0	22.0	20.8	24.6
Downlink:						
Satellite e.i.r.p. per carrier (-4.7dB contour)	dBW	22.9	24.4	30.5	35.8	45.2
Maximum e.i.r.p. density	dBW/4kHz	9.5	9.8	9.8	8.6	9.4
Free Space Loss	dB	205.7	205.7	205.7	205.7	205.7
Earth Station Diameter	m	1.8	3.0	3.0	2.4	1.8
Earth Station Gain	dBi	45.2	49.6	49.6	47.7	45.2
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	25.4	29.8	29.8	27.9	25.4
C/N Thermal Downlink	dB	17.0	21.8	21.8	18.6	16.9
C/I XPOL, ACI, IM, ASI	dB	16.0	20.8	20.8	17.6	15.8
C/(N+I) downlink	dB	13.5	18.2	18.2	15.1	13.3
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	30.1	30.5	30.5	29.3	33.0
C/I dn (single satellite)	dB	19.0	23.8	23.8	20.6	18.8
Aggregate C/I up	dB	27.1	27.5	27.5	26.3	30.0
Aggregate C/I down	dB	16.0	20.8	20.8	17.6	15.8
Overall:						
C/(N+I) overall	dB	12.9	16.7	16.7	14.1	13.0
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	6.9	7.5	7.5	7.2	6.1

Associated Txr IDs	
Start	End
572	573
608	613
671	678

TABLE A-24. LINK BUDGET, NA/CA, 62/54 MHZ TRANSPONDER

		NA/NA 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	14.221	14.221	14.221	14.221	14.221
Downlink Frequency	GHz	11.921	11.921	11.921	11.921	11.921
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	55.8	57.1	63.1	70.4	81.0
Earth Station Diameter	m	4.5	3.7	3.7	3.7	4.5
Earth Station Gain	dBi	54.6	52.9	52.9	52.9	54.6
Uplink Input Power per Carrier	dBW	1.2	4.2	10.2	17.5	26.4
Free Space Loss	dB	207.5	207.5	207.5	207.5	207.5
G/T Satellite	dB/K	1.0	1.0	1.0	1.0	1.0
C/N Thermal Uplink	dB	23.8	23.8	23.8	24.6	26.6
C/I XPOL, ACI, IM, ASI	dB	27.8	27.8	27.8	28.6	30.6
C/(N+I) uplink	dB	22.4	22.4	22.4	23.1	25.1
Downlink:						
Satellite e.i.r.p. per carrier (-3.8dB contour)	dBW	23.5	24.8	30.8	38.0	46.7
Maximum e.i.r.p. density	dBW/4kHz	9.3	9.3	9.3	10.0	10.0
Free Space Loss	dB	206.1	206.1	206.1	206.1	206.1
Earth Station Diameter	m	1.8	3.0	3.0	1.8	1.5
Earth Station Gain	dBi	45.2	49.6	49.6	45.2	43.6
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	25.4	29.8	29.8	25.4	23.8
C/N Thermal Downlink	dB	17.3	21.7	21.7	18.0	16.4
C/I XPOL, ACI, IM, ASI	dB	16.7	21.1	21.1	17.4	15.8
C/(N+I) downlink	dB	13.9	18.4	18.4	14.7	13.1
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	30.8	30.8	30.8	31.6	33.6
C/I dn (single satellite)	dB	19.7	24.1	24.1	20.4	18.8
Aggregate C/I up	dB	27.8	27.8	27.8	28.6	30.6
Aggregate C/I down	dB	16.7	21.1	21.1	17.4	15.8
Overall:						
C/(N+I) overall	dB	13.4	16.9	16.9	14.1	12.8
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	7.4	7.7	7.7	7.2	5.9

Associated Txr IDs	
Start	End
707	708
716	723
760	765

TABLE A-25. LINK BUDGET, NA/NA, 62/54 MHZ TRANSPONDER

		EU/NA 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	14.221	14.221	14.221	14.221	14.221
Downlink Frequency	GHz	11.921	11.921	11.921	11.921	11.921
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	59.8	59.4	65.6	73.5	79.2
Earth Station Diameter	m	5.6	4.5	4.5	5.6	5.6
Earth Station Gain	dBi	56.5	54.6	54.6	56.5	56.5
Uplink Input Power per Carrier	dBW	3.3	4.8	11.0	17.0	22.7
Free Space Loss	dB	207.4	207.4	207.4	207.4	207.4
G/T Satellite	dB/K	0.0	0.0	0.0	0.0	0.0
C/N Thermal Uplink	dB	26.9	25.3	25.4	26.8	23.8
C/I XPOL, ACI, IM, ASI	dB	31.8	30.1	30.3	31.7	28.7
C/(N+I) uplink	dB	25.7	24.0	24.2	25.6	22.6
Downlink:						
Satellite e.i.r.p. per carrier (-3.8dB contour)	dBW	24.3	23.9	30.0	38.0	46.7
Maximum e.i.r.p. density	dBW/4kHz	10.0	8.4	8.5	9.9	10.0
Free Space Loss	dB	206.1	206.1	206.1	206.1	206.1
Earth Station Diameter	m	1.2	2.4	2.4	1.5	1.5
Earth Station Gain	dBi	41.6	47.7	47.7	43.6	43.6
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	21.9	27.9	27.9	23.8	23.8
C/N Thermal Downlink	dB	14.5	18.9	19.0	16.4	16.4
C/I XPOL, ACI, IM, ASI	dB	13.9	18.3	18.4	15.7	15.8
C/(N+I) downlink	dB	11.2	15.6	15.7	13.0	13.1
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	34.8	33.1	33.3	34.7	31.7
C/I dn (single satellite)	dB	16.9	21.3	21.4	18.7	18.8
Aggregate C/I up	dB	31.8	30.1	30.3	31.7	28.7
Aggregate C/I down	dB	13.9	18.3	18.4	15.7	15.8
Overall:						
C/(N+I) overall	dB	11.0	15.0	15.1	12.8	12.6
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	5.0	5.7	5.9	5.9	5.7

Associated Txr IDs	
Start	End
709	710
724	731
766	771

TABLE A-26. LINK BUDGET, EU/NA, 62/54 MHZ TRANSPONDER

		CA/NA 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	14.221	14.221	14.221	14.221	14.221
Downlink Frequency	GHz	11.921	11.921	11.921	11.921	11.921
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	60.1	59.8	65.9	73.8	84.4
Earth Station Diameter	m	5.6	4.5	4.5	5.6	7.2
Earth Station Gain	dBi	56.5	54.6	54.6	56.5	58.7
Uplink Input Power per Carrier	dBW	3.6	5.2	11.3	17.3	25.7
Free Space Loss	dB	207.3	207.3	207.3	207.3	207.3
G/T Satellite	dB/K	0.0	0.0	0.0	0.0	0.0
C/N Thermal Uplink	dB	27.4	25.8	25.9	27.3	29.2
C/I XPOL, ACI, IM, ASI	dB	32.1	30.5	30.6	32.0	33.9
C/(N+I) uplink	dB	26.1	24.5	24.6	26.1	28.0
Downlink:						
Satellite e.i.r.p. per carrier (-3.8dB contour)	dBW	24.3	23.9	30.1	38.0	46.6
Maximum e.i.r.p. density	dBW/4kHz	10.0	8.4	8.5	9.9	9.9
Free Space Loss	dB	206.1	206.1	206.1	206.1	206.1
Earth Station Diameter	m	1.2	2.4	2.4	1.5	1.5
Earth Station Gain	dBi	41.6	47.7	47.7	43.6	43.6
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	21.9	27.9	27.9	23.8	23.8
C/N Thermal Downlink	dB	14.5	18.9	19.1	16.4	16.3
C/I XPOL, ACI, IM, ASI	dB	13.9	18.3	18.4	15.8	15.7
C/(N+I) downlink	dB	11.2	15.6	15.7	13.0	13.0
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	35.1	33.5	33.6	35.0	36.9
C/I dn (single satellite)	dB	16.9	21.3	21.4	18.8	18.7
Aggregate C/I up	dB	32.1	30.5	30.6	32.0	33.9
Aggregate C/I down	dB	13.9	18.3	18.4	15.8	15.7
Overall:						
C/(N+I) overall	dB	11.1	15.1	15.2	12.8	12.8
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	5.1	5.8	5.9	5.9	5.9

Associated Txr IDs	
Start	End
711	711
732	735
772	774

TABLE A-27. LINK BUDGET, CA/NA, 62/54 MHZ TRANSPONDER

		WA/NA 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	14.221	14.221	14.221	14.221	14.221
Downlink Frequency	GHz	11.921	11.921	11.921	11.921	11.921
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	58.3	58.2	64.3	72.2	82.7
Earth Station Diameter	m	5.6	4.5	4.5	5.6	5.6
Earth Station Gain	dBi	56.5	54.6	54.6	56.5	56.5
Uplink Input Power per Carrier	dBW	1.8	3.6	9.7	15.7	26.2
Free Space Loss	dB	206.9	206.9	206.9	206.9	206.9
G/T Satellite	dB/K	0.0	0.0	0.0	0.0	0.0
C/N Thermal Uplink	dB	25.9	24.5	24.6	26.0	27.9
C/I XPOL, ACI, IM, ASI	dB	30.3	28.9	29.0	30.4	32.3
C/(N+I) uplink	dB	24.6	23.2	23.3	24.6	26.5
Downlink:						
Satellite e.i.r.p. per carrier (-3.8dB contour)	dBW	24.2	24.1	30.2	38.0	46.6
Maximum e.i.r.p. density	dBW/4kHz	9.9	8.5	8.7	10.0	9.9
Free Space Loss	dB	206.1	206.1	206.1	206.1	206.1
Earth Station Diameter	m	1.2	2.4	2.4	1.5	1.5
Earth Station Gain	dBi	41.6	47.7	47.7	43.6	43.6
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	21.9	27.9	27.9	23.8	23.8
C/N Thermal Downlink	dB	14.4	19.1	19.2	16.4	16.3
C/I XPOL, ACI, IM, ASI	dB	13.8	18.4	18.6	15.8	15.7
C/(N+I) downlink	dB	11.1	15.7	15.9	13.1	13.0
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	33.3	31.9	32.0	33.4	35.3
C/I dn (single satellite)	dB	16.8	21.4	21.6	18.8	18.7
Aggregate C/I up	dB	30.3	28.9	29.0	30.4	32.3
Aggregate C/I down	dB	13.8	18.4	18.6	15.8	15.7
Overall:						
C/(N+I) overall	dB	10.9	15.0	15.1	12.8	12.8
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	4.9	5.7	5.9	5.9	5.9

Associated Txr IDs	
Start	End
712	712
736	739
775	777

TABLE A-28. LINK BUDGET, WA/NA, 62/54 MHZ TRANSPONDER

		SC/NA 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	14.221	14.221	14.221	14.221	14.221
Downlink Frequency	GHz	11.921	11.921	11.921	11.921	11.921
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	59.1	59.0	65.1	72.7	81.1
Earth Station Diameter	m	5.6	4.5	4.5	5.6	4.5
Earth Station Gain	dBi	56.5	54.6	54.6	56.5	54.6
Uplink Input Power per Carrier	dBW	2.6	4.4	10.5	16.2	26.6
Free Space Loss	dB	206.8	206.8	206.8	206.8	206.8
G/T Satellite	dB/K	-1.0	-1.0	-1.0	-1.0	-1.0
C/N Thermal Uplink	dB	25.8	24.5	24.5	25.7	25.4
C/I XPOL, ACI, IM, ASI	dB	31.0	29.8	29.8	30.9	30.7
C/(N+I) uplink	dB	24.7	23.4	23.4	24.6	24.3
Downlink:						
Satellite e.i.r.p. per carrier (-3.8dB contour)	dBW	24.3	24.3	30.3	38.0	46.4
Maximum e.i.r.p. density	dBW/4kHz	10.0	8.8	8.8	10.0	9.7
Free Space Loss	dB	206.1	206.1	206.1	206.1	206.1
Earth Station Diameter	m	1.2	2.4	2.4	1.5	1.5
Earth Station Gain	dBi	41.6	47.7	47.7	43.6	43.6
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	21.9	27.9	27.9	23.8	23.8
C/N Thermal Downlink	dB	14.5	19.3	19.3	16.4	16.1
C/I XPOL, ACI, IM, ASI	dB	13.9	18.7	18.7	15.8	15.5
C/(N+I) downlink	dB	11.2	16.0	16.0	13.1	12.8
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	34.0	32.8	32.8	33.9	33.7
C/I dn (single satellite)	dB	16.9	21.7	21.7	18.8	18.5
Aggregate C/I up	dB	31.0	29.8	29.8	30.9	30.7
Aggregate C/I down	dB	13.9	18.7	18.7	15.8	15.5
Overall:						
C/(N+I) overall	dB	11.0	15.2	15.2	12.8	12.5
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	5.0	6.0	6.0	5.9	5.6

Associated Txr IDs	
Start	End
713	713
740	743
778	780

TABLE A-29. LINK BUDGET, SC/NA, 62/54 MHZ TRANSPONDER

		SA/NA 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	14.221	14.221	14.221	14.221	14.221
Downlink Frequency	GHz	11.921	11.921	11.921	11.921	11.921
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	57.6	57.6	63.8	71.5	80.0
Earth Station Diameter	m	4.5	3.7	3.7	5.6	4.5
Earth Station Gain	dBi	54.6	52.9	52.9	56.5	54.6
Uplink Input Power per Carrier	dBW	3.0	4.8	10.9	15.0	25.5
Free Space Loss	dB	207.4	207.4	207.4	207.4	207.4
G/T Satellite	dB/K	1.0	1.0	1.0	1.0	1.0
C/N Thermal Uplink	dB	25.7	24.5	24.6	25.8	25.7
C/I XPOL, ACI, IM, ASI	dB	29.6	28.4	28.5	29.7	29.6
C/(N+I) uplink	dB	24.2	23.0	23.1	24.3	24.2
Downlink:						
Satellite e.i.r.p. per carrier (-3.8dB contour)	dBW	24.2	24.2	30.4	38.1	46.6
Maximum e.i.r.p. density	dBW/4kHz	10.0	8.7	8.9	10.0	9.9
Free Space Loss	dB	206.1	206.1	206.1	206.1	206.1
Earth Station Diameter	m	1.2	2.4	2.4	1.5	1.5
Earth Station Gain	dBi	41.6	47.7	47.7	43.6	43.6
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	21.9	27.9	27.9	23.8	23.8
C/N Thermal Downlink	dB	14.5	19.2	19.4	16.5	16.4
C/I XPOL, ACI, IM, ASI	dB	13.8	18.6	18.7	15.8	15.7
C/(N+I) downlink	dB	11.1	15.9	16.0	13.1	13.0
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	32.6	31.4	31.5	32.7	32.6
C/I dn (single satellite)	dB	16.8	21.6	21.7	18.8	18.7
Aggregate C/I up	dB	29.6	28.4	28.5	29.7	29.6
Aggregate C/I down	dB	13.8	18.6	18.7	15.8	15.7
Overall:						
C/(N+I) overall	dB	10.9	15.1	15.3	12.8	12.7
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	4.9	5.9	6.0	5.9	5.8

Associated Txr IDs	
Start	End
714	714
744	747
781	783

TABLE A-30. LINK BUDGET, SA/NA, 62/54 MHZ TRANSPONDER

		HEMI/NA 54 MHz Transponder				
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**54M0G7W**
Uplink Frequency	GHz	6.216	6.216	6.216	6.216	6.216
Downlink Frequency	GHz	11.981	11.981	11.981	11.981	11.981
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	54000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
Uplink:						
Nominal E/S e.i.r.p. per carrier	dBW	52.9	53.4	59.6	66.6	77.1
Earth Station Diameter	m	4.5	4.5	4.5	4.5	5.6
Earth Station Gain	dBi	47.4	47.4	47.4	47.4	49.3
Uplink Input Power per Carrier	dBW	5.5	6.0	12.2	19.2	27.8
Free Space Loss	dB	200.2	200.2	200.2	200.2	200.2
G/T Satellite	dB/K	-5.0	-5.0	-5.0	-5.0	-5.0
C/N Thermal Uplink	dB	22.1	21.5	21.6	22.1	23.9
C/I XPOL, ACI, IM, ASI	dB	16.8	16.2	16.3	16.8	18.6
C/(N+I) uplink	dB	15.7	15.0	15.2	15.6	17.5
Downlink:						
Satellite e.i.r.p. per carrier (-3.8dB contour)	dBW	24.2	24.8	31.0	38.0	46.5
Maximum e.i.r.p. density	dBW/4kHz	10.0	9.3	9.4	9.9	9.7
Free Space Loss	dB	206.2	206.2	206.2	206.2	206.2
Earth Station Diameter	m	1.2	2.4	2.4	1.5	1.5
Earth Station Gain	dBi	41.7	47.7	47.7	43.6	43.6
Noise Temperature	kHz	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	21.9	27.9	27.9	23.8	23.8
C/N Thermal Downlink	dB	14.5	19.8	20.0	16.4	16.2
C/I XPOL, ACI, IM, ASI	dB	13.9	19.3	19.4	15.8	15.6
C/(N+I) downlink	dB	11.2	16.5	16.6	13.0	12.9
Adjacent Satellite Interference:						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-42	-42	-42	-42	-42
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	19.8	19.2	19.3	19.8	21.6
C/I dn (single satellite)	dB	16.9	22.3	22.4	18.8	18.6
Aggregate C/I up	dB	16.8	16.2	16.3	16.8	18.6
Aggregate C/I down	dB	13.9	19.3	19.4	15.8	15.6
Overall:						
C/(N+I) overall	dB	9.9	12.7	12.8	11.1	11.6
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9
System Margin	dB	3.9	3.4	3.6	4.2	4.7

Associated Txr IDs	
Start	End
752	759

TABLE A-31. LINK BUDGET, HEMI/NA, 54 MHZ TRANSPONDER

APPENDIX B

Antenna Beam Diagrams

Figure B-1.
Global Uplink Beam
Peak G/T = -6.3 dB/K
Peak Beam Gain = 21.1dBi
Min. Saturation Flux Density = -94dBW/m^2
Polarization LHCP and RHCP
Schedule S beam designators: GBAU and GBBU[6]

[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. SES requests a waiver of this rule to the extent necessary.

Figure B-2.
Global Downlink Beam
Peak EIRP = 36.1dBW
Peak Beam Gain = 20.8dBi
Polarization RHCP and LHCP
Schedule S beam designators: GBAD and GBBD[7]

[7] Additional gain contours, as requested in Section 25.114(d)(3), are not provided because they do not intersect with the Earth's surface. SES requests a waiver of this rule to the extent necessary.

Figure B-3.
West Hemi Uplink Beam
Peak G/T = -2.3 dB/K
Peak Beam Gain = 25.8dBi
Min. Saturation Flux Density = -96dBW/m^2
Polarization LHCP and RHCP
Schedule S beam designator: WHAU and WHBU

Figure B-4.
West Hemi Downlink Beam
Peak EIRP = 40.1 dBW
Peak Beam Gain = 25.9 dBi
Polarization LHCP and RHCP
Schedule S beam designator: WHAD and WHBD

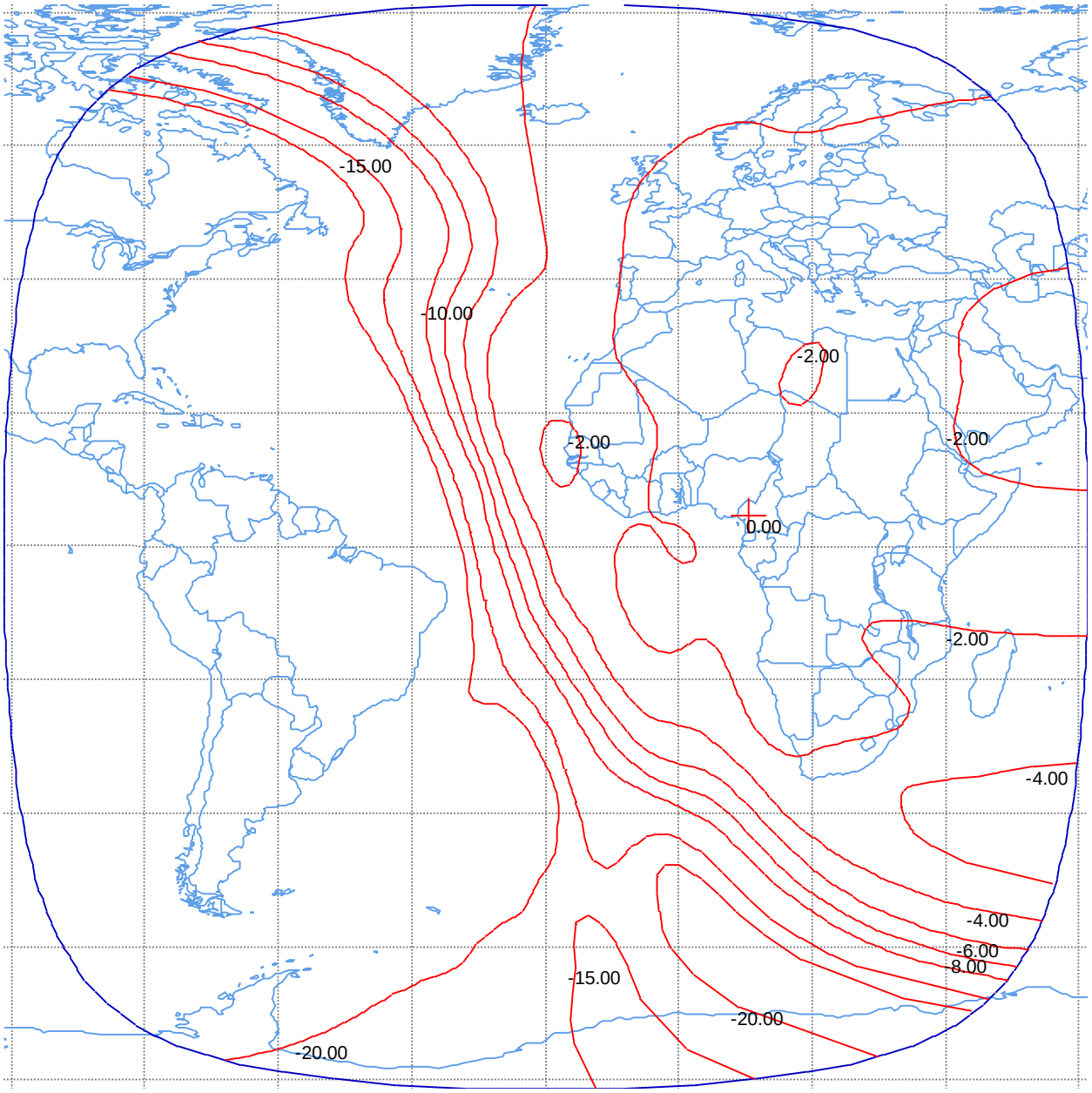

Figure B-5.
East Hemi Uplink Beam
Peak G/T = -2.1 dB/K
Peak Beam Gain = 25.9 dBi
Min. Saturation Flux Density = -96 dBW/m^2
Polarization LHCP and RHCP
Schedule S beam designator: EHAU and EHBU

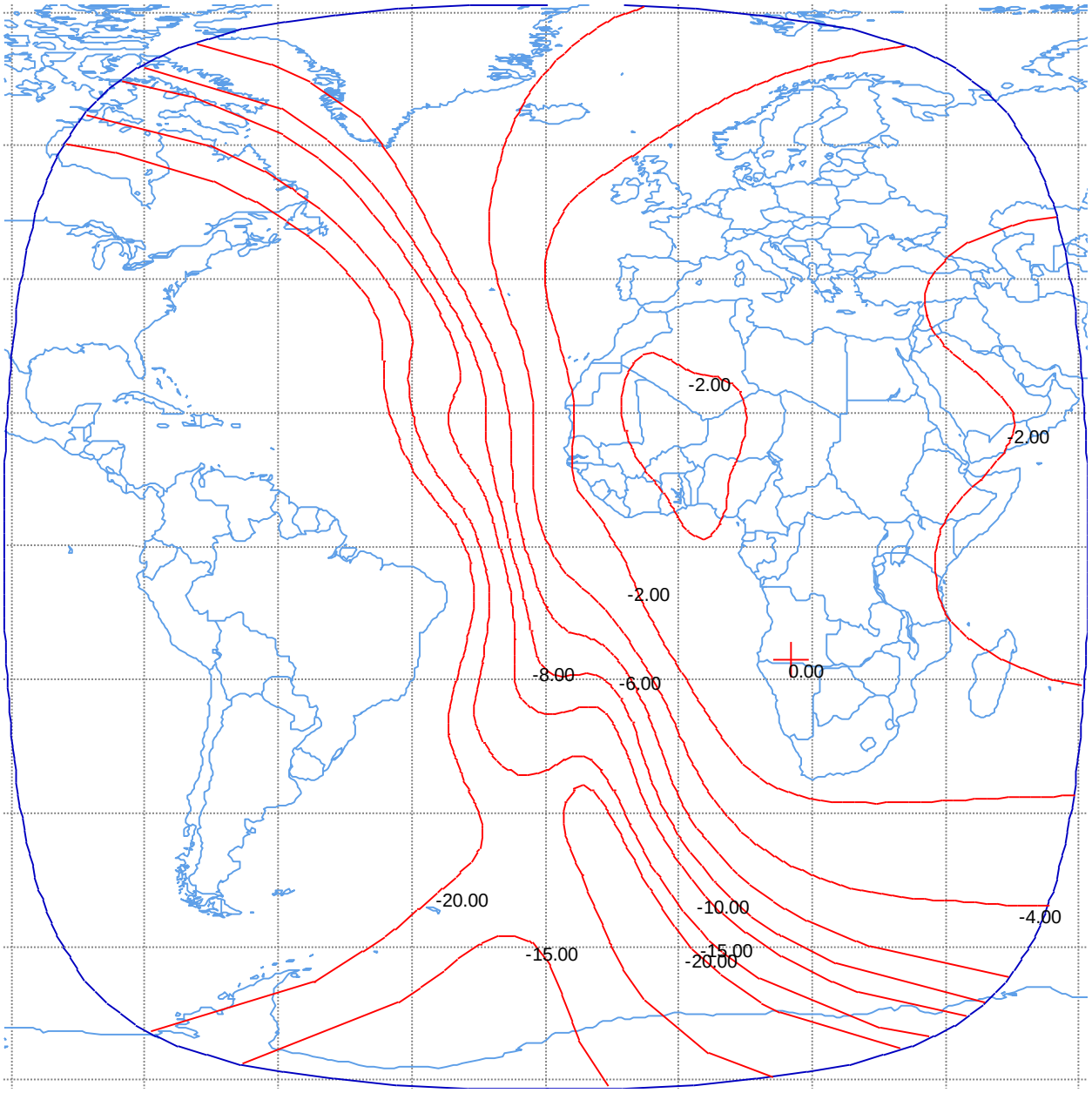

Figure B-6.
East Hemi Downlink Beam
Peak EIRP = 40.0 dBW
Peak Beam Gain = 25.4 dBi
Polarization LHCP and RHCP
Schedule S beam designator: EHAD and EHBD

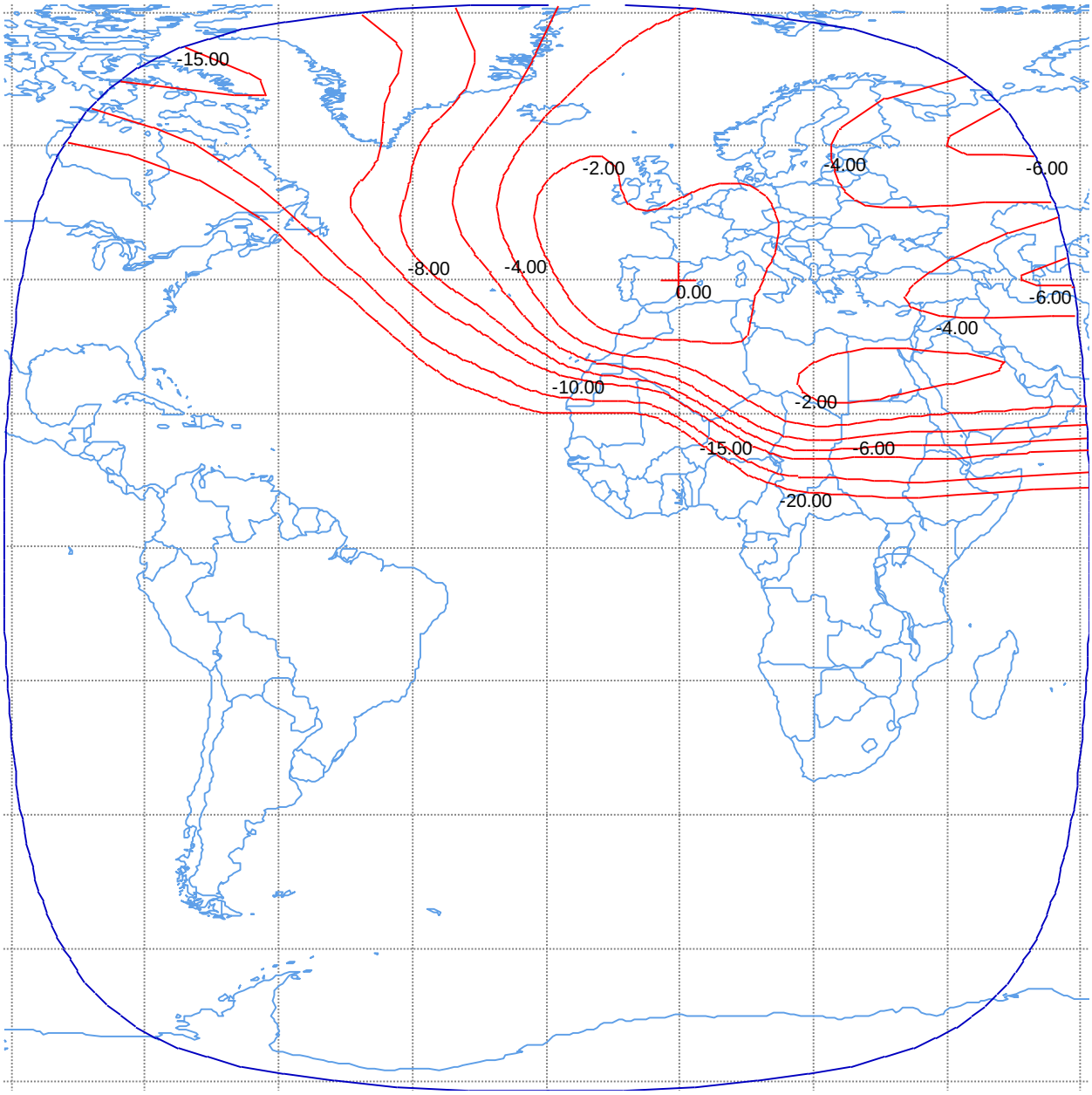

Figure B-7.
North East Zone Uplink Beam
Peak G/T = 3.8 dB/K
Peak Beam Gain = 31.8 dBi
Min. Saturation Flux Density = -102 dBW/m^2
Polarization RHCP
Schedule S beam designator: NEAU

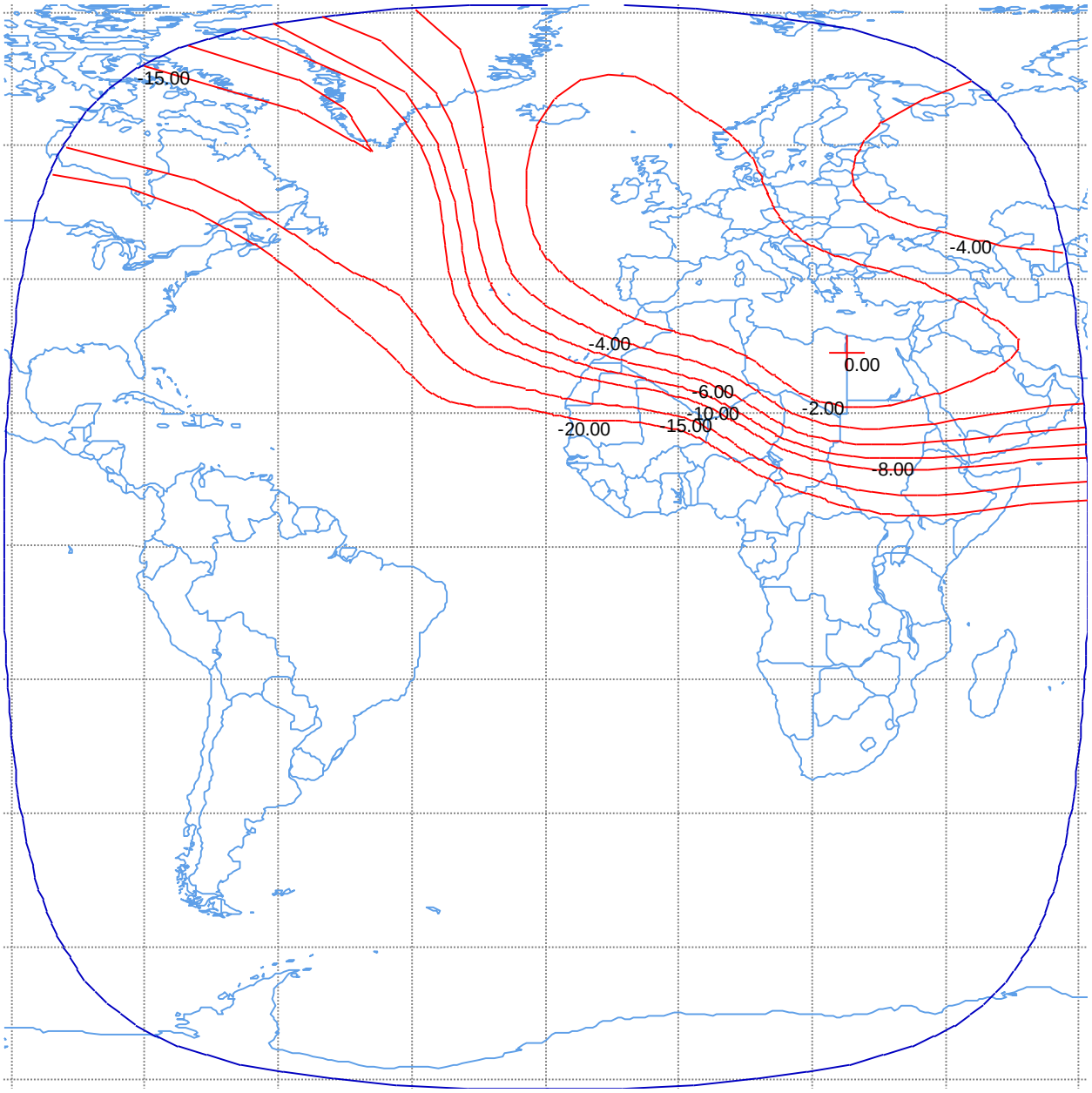

Figure B-8.
North East Zone Downlink Beam
Peak EIRP = 45.5 dBW
Peak Beam Gain = 31.2 dBi
Polarization LHCP
Schedule S beam designator: NEAD

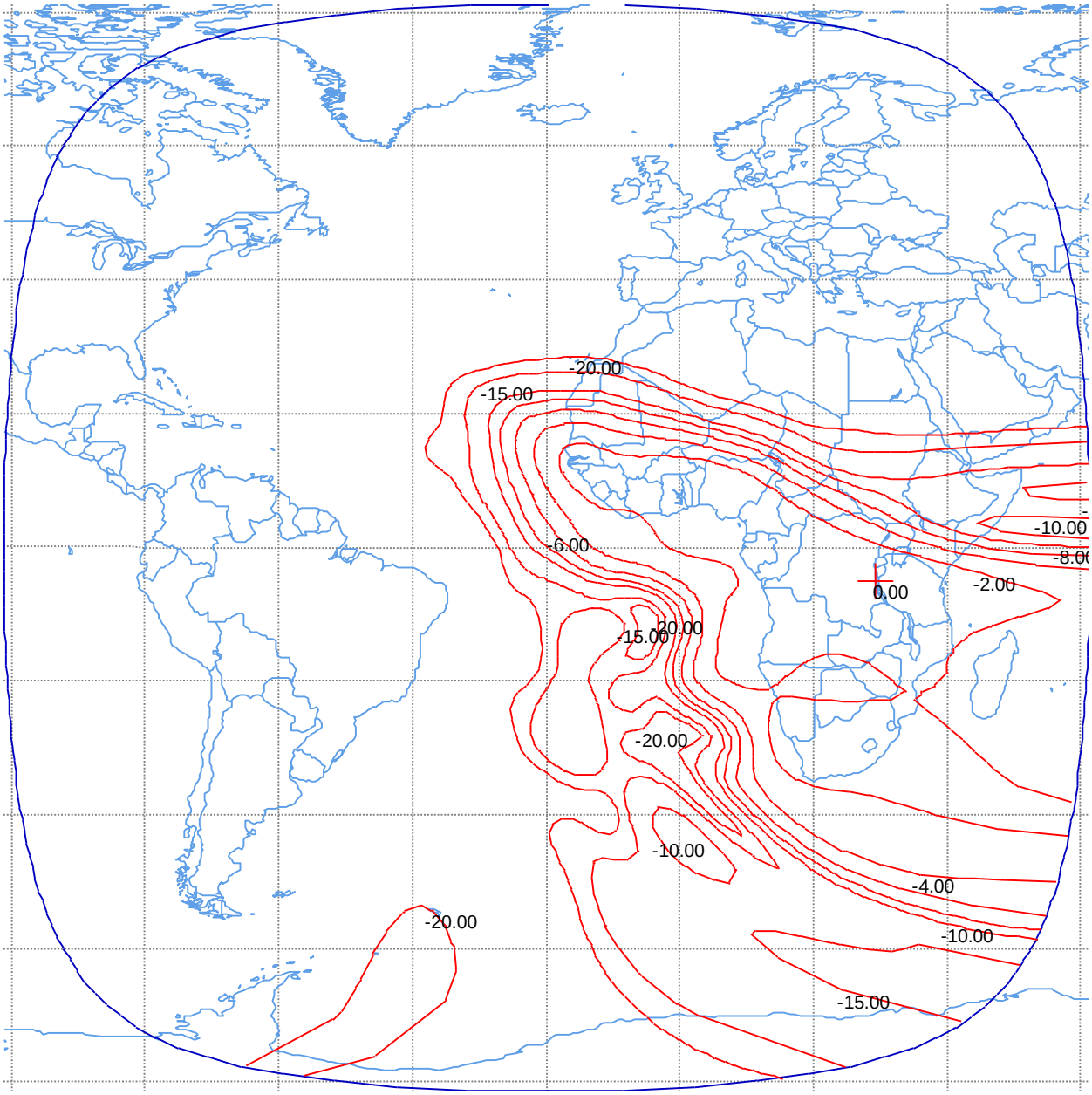

Figure B-9.
South East Zone Uplink Beam
Peak G/T = 1.7 dB/K
Peak Beam Gain = 29.7 dBi
Min. Saturation Flux Density = -100 dBW/m^2
Polarization RHCP
Schedule S beam designator: SEAU

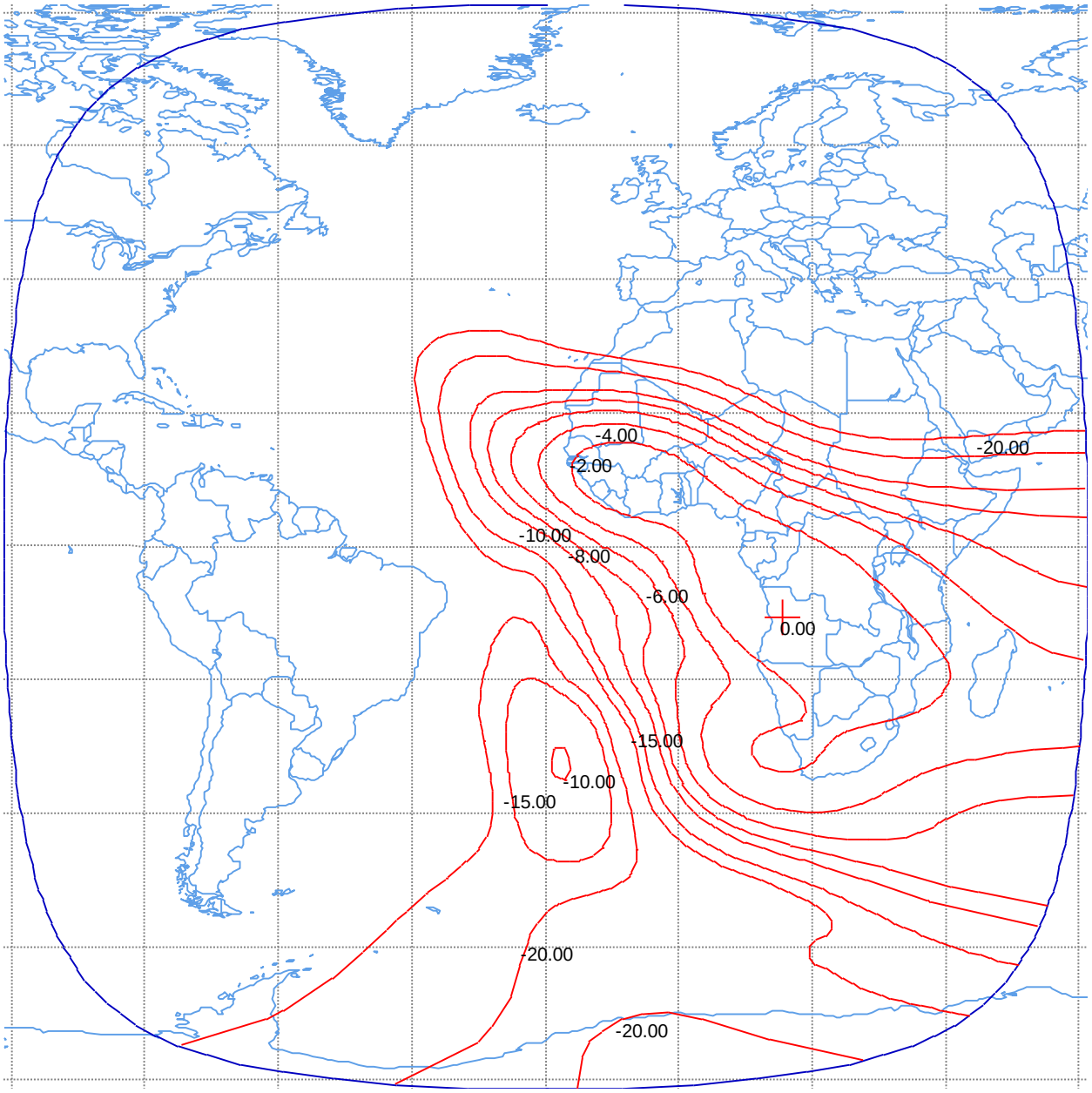

Figure B-10.
South East Zone Downlink Beam
Peak EIRP = 44.3 dBW
Peak Beam Gain = 29.9 dBi
Polarization LHCP
Schedule S beam designator: SEAD

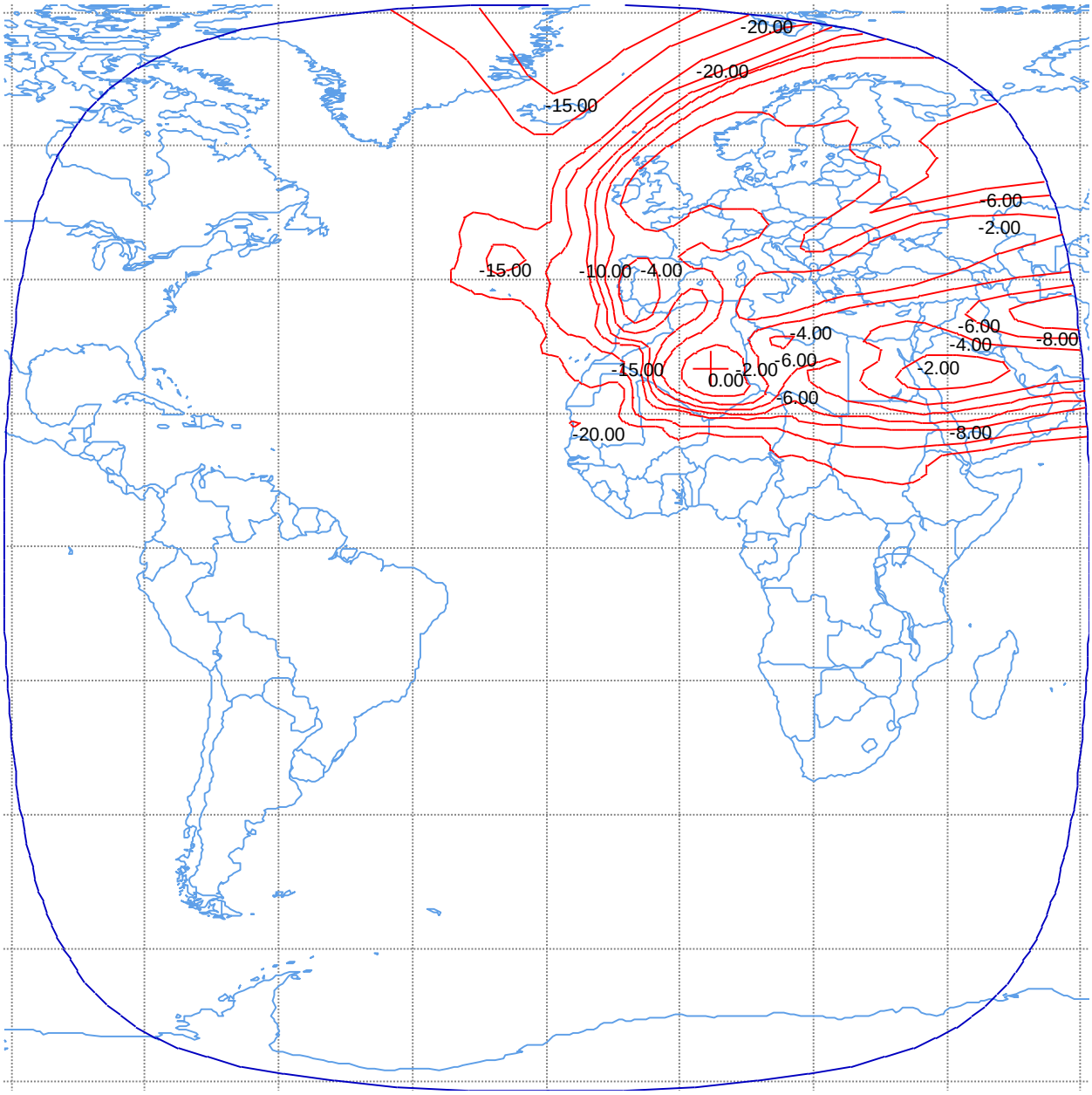

Figure B-11.
Europe/Middle East Uplink Beam
Peak G/T = 6.6 dB/K
Peak Beam Gain = 34.7 dBi
Min. Saturation Flux Density = -98 dBW/m^2
Polarization Vertical and Horizontal Linear
Schedule S beam designators: EUAU and EUBU

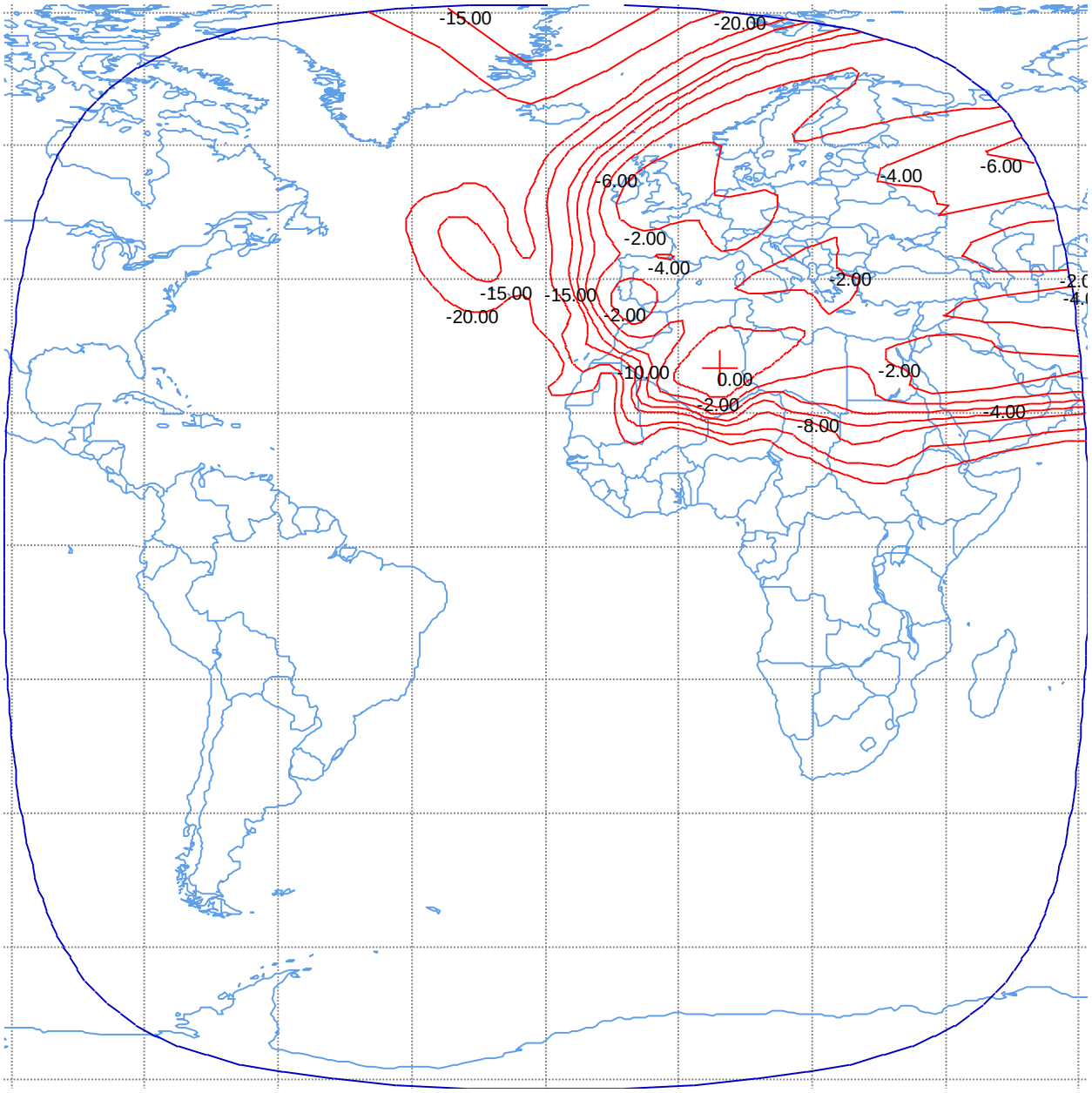

Figure B-12.
Europe/Middle East Downlink Beam
Peak EIRP = 51.8 dBW
Peak Beam Gain = 33.5 dBi
Polarization Horizontal Linear
Schedule S beam designators: EUBD

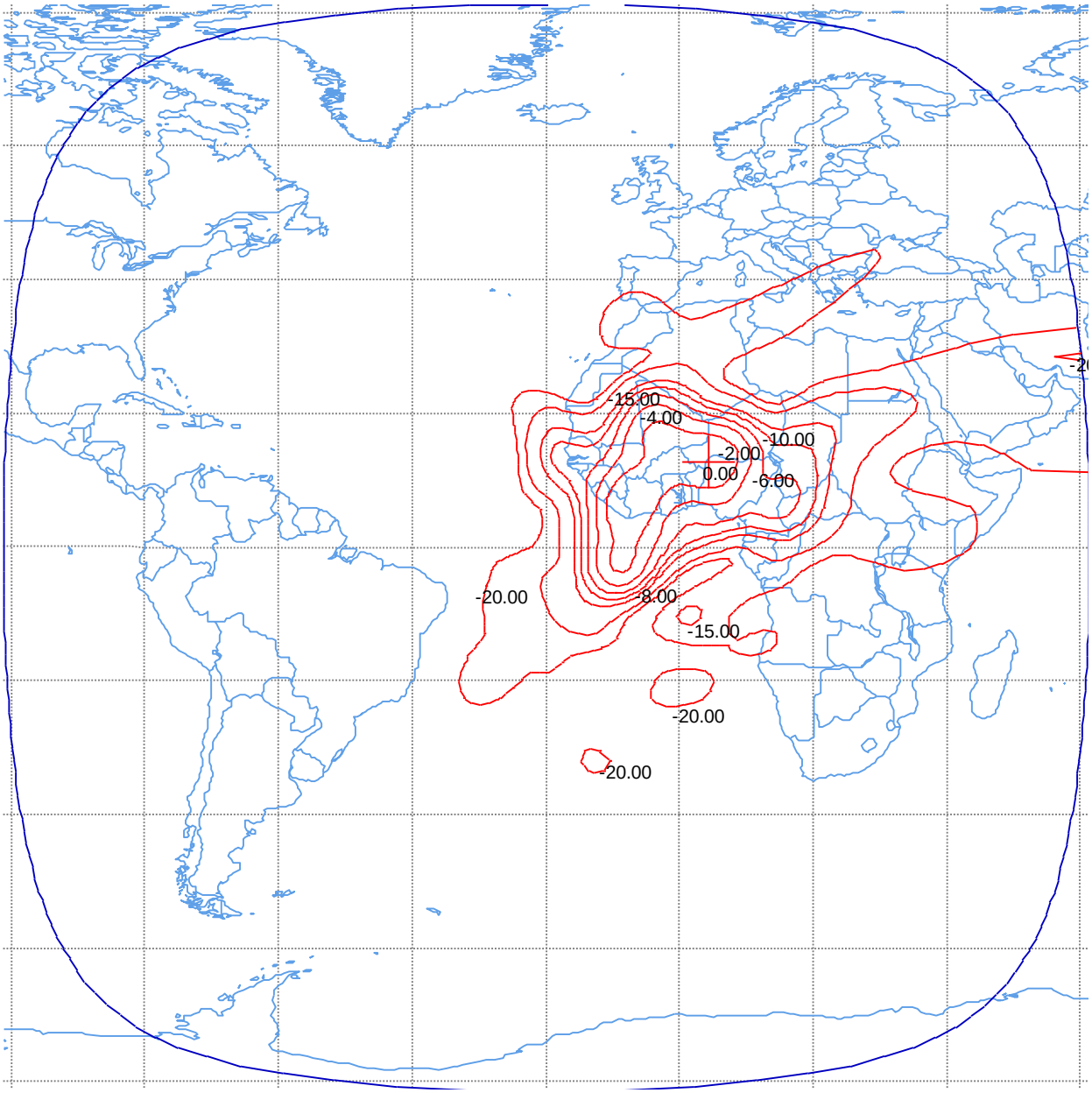

Figure B-13.
West Africa Uplink Beam
Peak G/T = 7.7 dB/K
Peak Beam Gain = 35.7 dBi
Min. Saturation Flux Density = -99 dBW/m^2
Polarization Horizontal Linear
Schedule S beam designators: WAAU

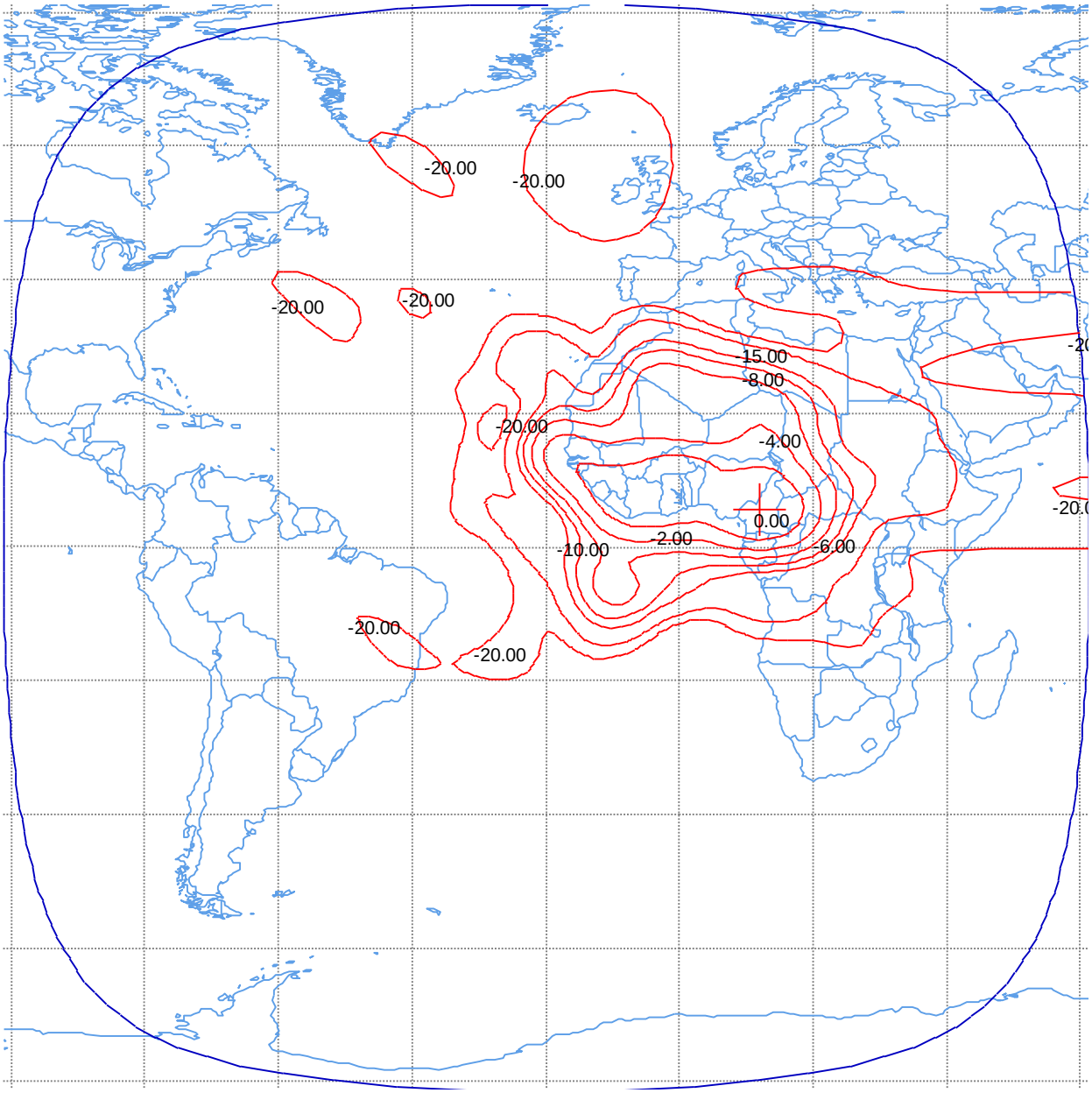

Figure B-14.
West Africa Downlink Beam
Peak EIRP = 51.2 dBW
Peak Beam Gain = 33.6 dBi
Polarization Vertical Linear
Schedule S beam designators: WAAD

Figure B-15.
South Africa Uplink Beam
Peak G/T = 7.5 dB/K
Peak Beam Gain = 35.9 dBi
Min. Saturation Flux Density = -99 dBW/m^2
Polarization Vertical Linear
Schedule S beam designators: SAAU

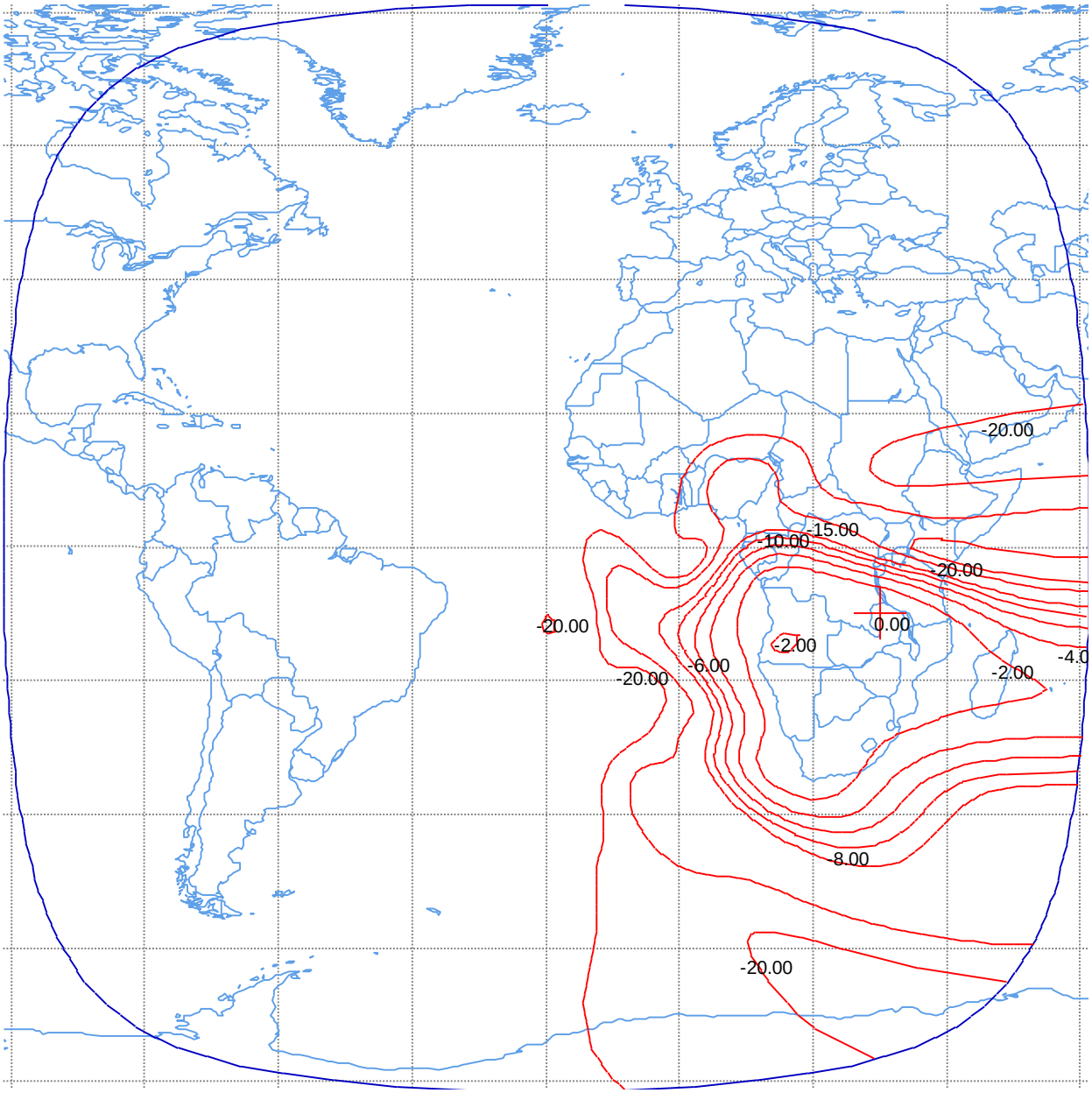

Figure B-16.
South Africa Downlink Beam
Peak EIRP = 50.6 dBW
Peak Beam Gain = 33.1 dBi
Polarization Horizontal Linear
Schedule S beam designators: SAAD

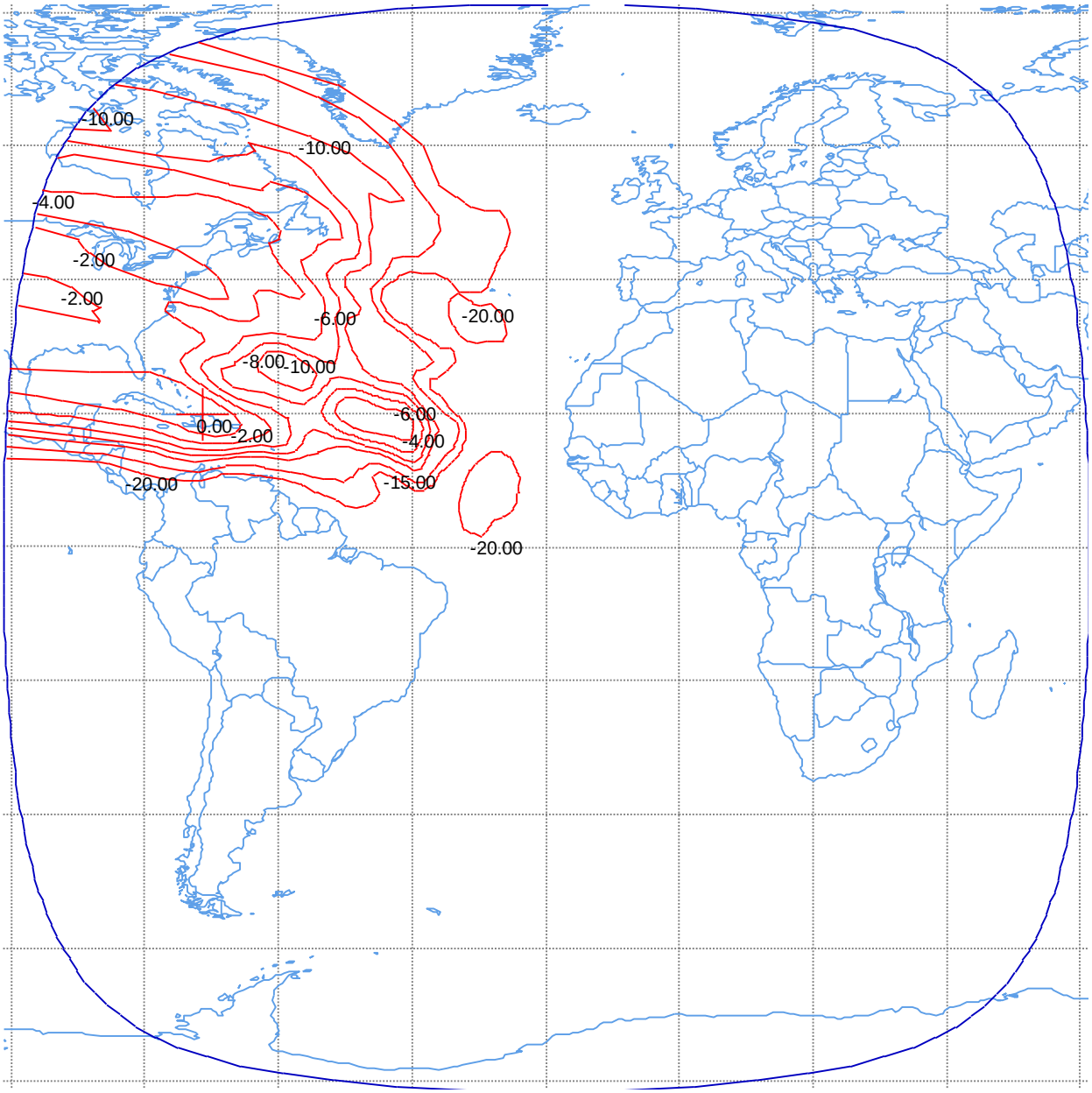

Figure B-17.
North America Uplink Beam
Peak G/T = 6.3 dB/K
Peak Beam Gain = 34.4 dBi
Min. Saturation Flux Density = -97 dBW/m^2
Polarization Horizontal and Vertical Linear
Schedule S beam designators: NAAU and NABU

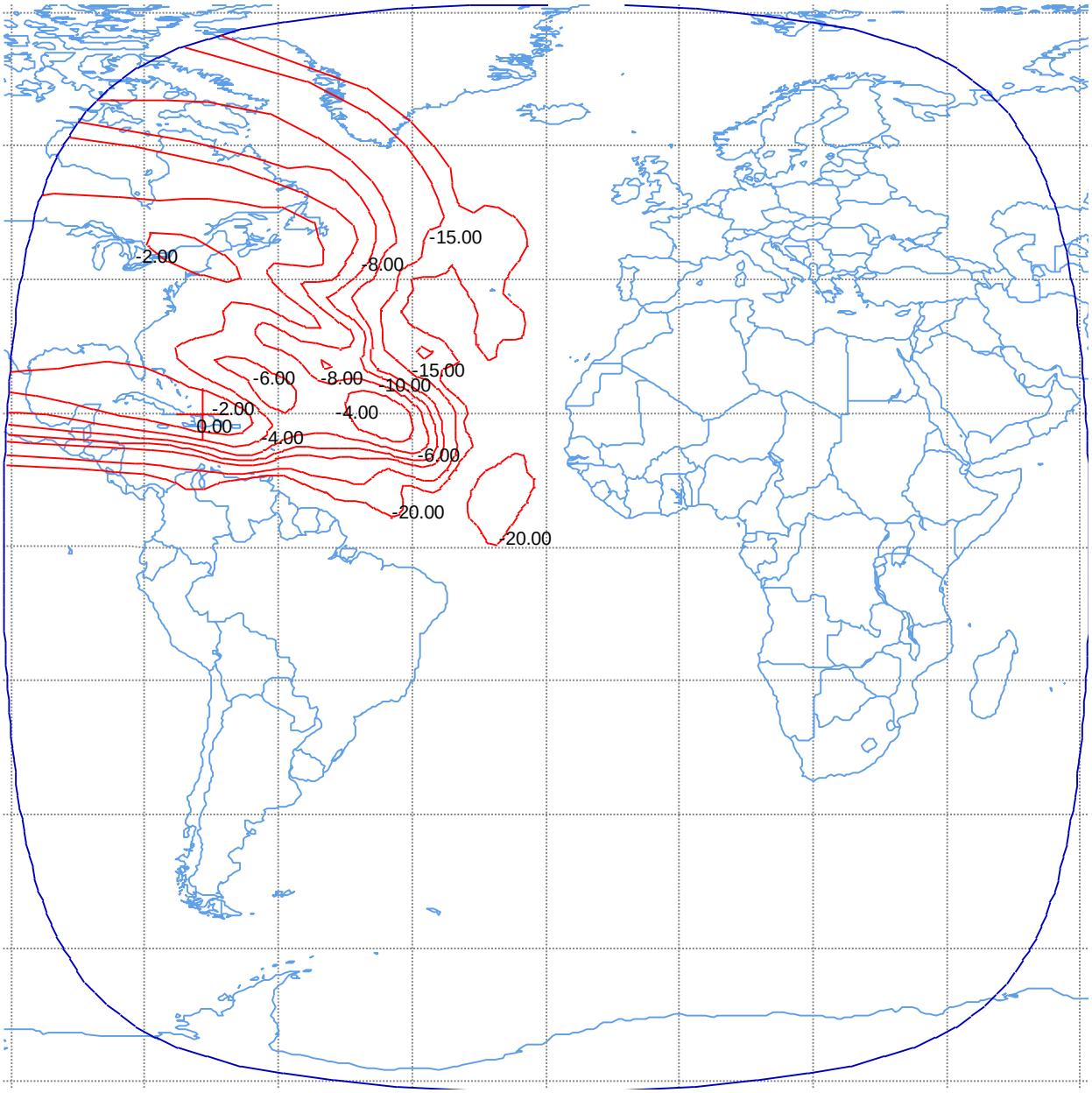

Figure B-18.
North America Downlink Beam
Peak EIRP = 51.8 dBW
Peak Beam Gain = 33.9 dBi
Polarization Horizontal Linear
Schedule S beam designators: NABD

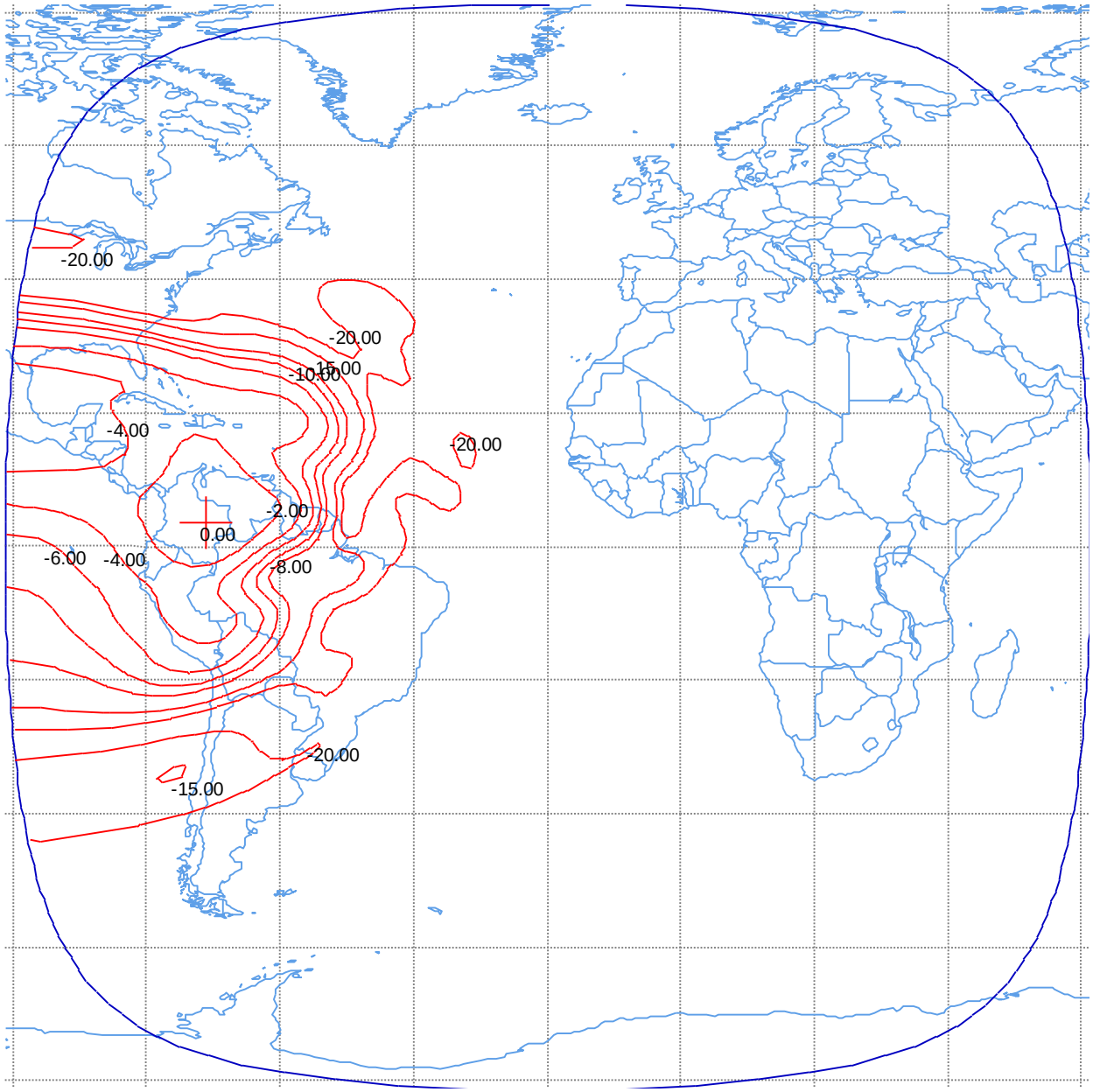

Figure B-19.
Central America Uplink Beam
Peak G/T = 7.1 dB/K
Peak Beam Gain = 35.1 dBi
Min. Saturation Flux Density = -98 dBW/m^2
Polarization Horizontal Linear
Schedule S beam designators: CAAU

Figure B-20.
Central America Downlink Beam
Peak EIRP = 50.7 dBW
Peak Beam Gain = 33.1 dBi
Polarization Vertical Linear
Schedule S beam designators: CAAD

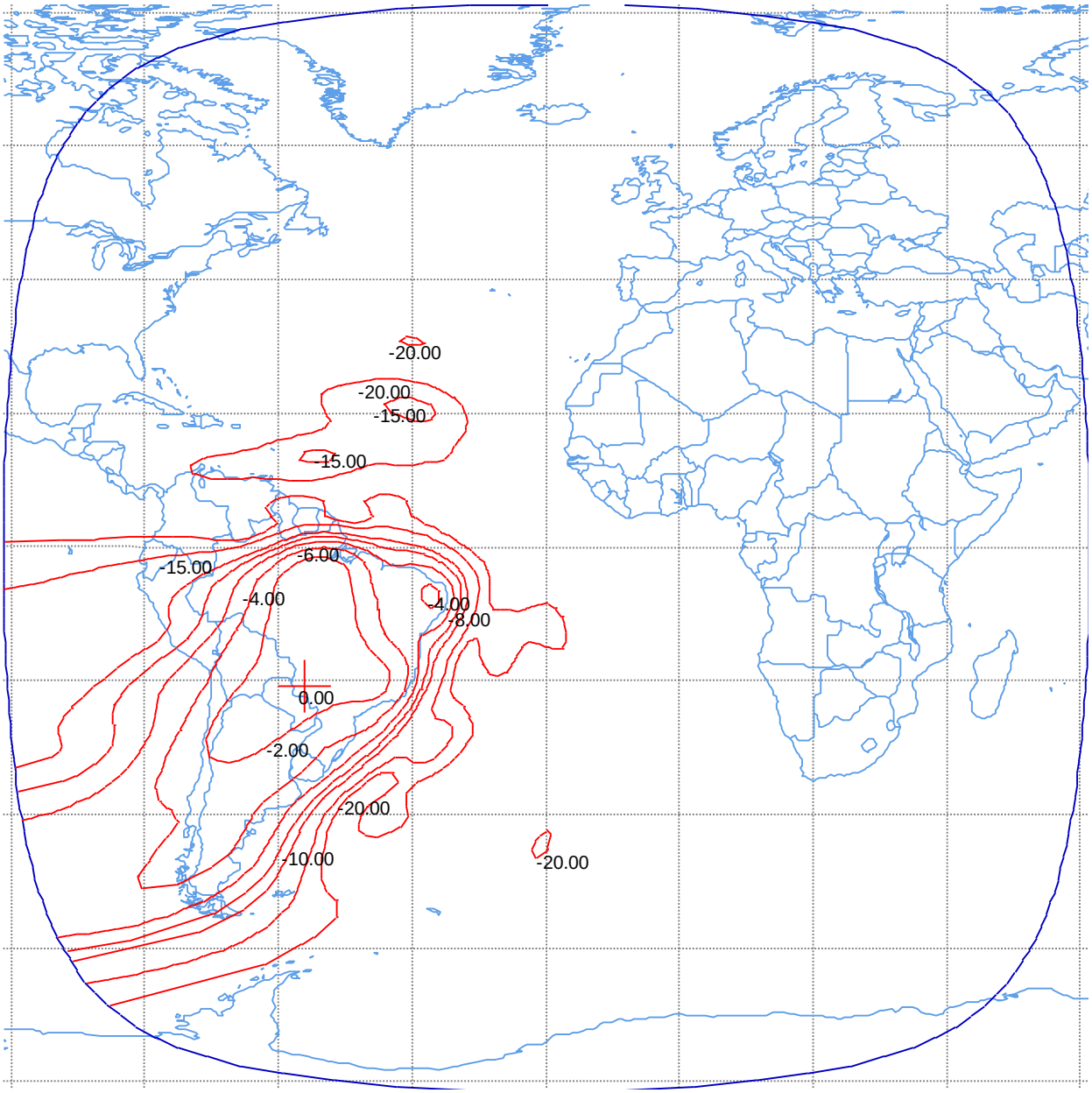

Figure B-21.
Southern Cone Beam
Peak G/T = 5.5 dB/K
Peak Beam Gain = 33.9 dBi
Min. Saturation Flux Density = -97 dBW/m^2
Polarization Vertical Linear
Schedule S beam designators: SCAU

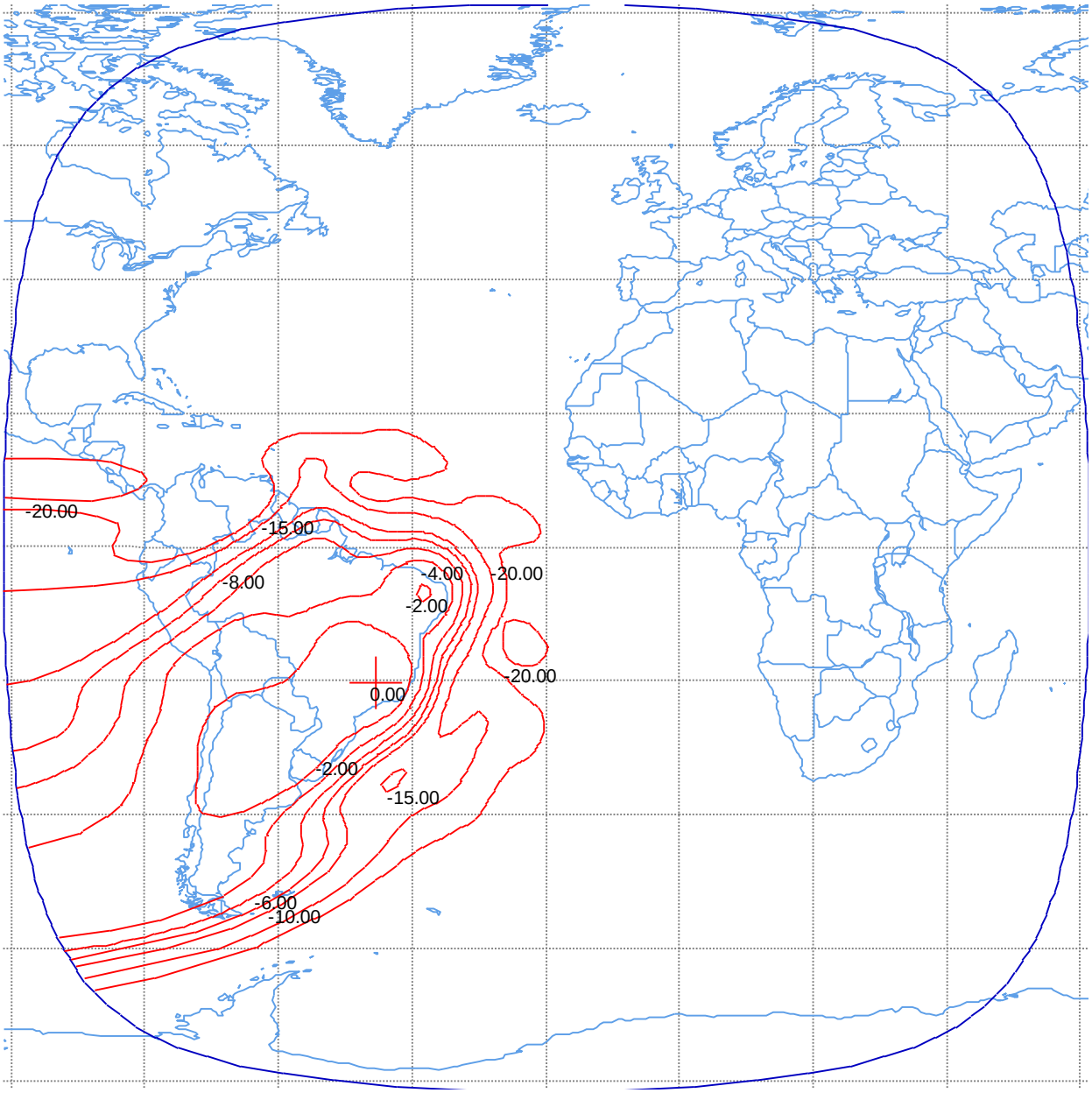

Figure B-22.
Southern Cone Downlink Beam
Peak EIRP = 50.6 dBW
Peak Beam Gain = 33.1 dBi
Polarization Horizontal Linear
Schedule S beam designators: SCAD

Figure B-23.
Command Carrier Earth Facing Receive Horn[8]
Maximum receive gain = 11dBi
Command Threshold Flux Density = -89dBW/m^2
Polarization Vertical Linear
Schedule S beam designator: CMD

[8] Additional gain contours, as requested in Section 25.114(d)(3), are not provided because they do not intersect with the Earth's surface. SES requests a waiver of this rule to the extent necessary.

Figure B-24.
Telemetry Carrier Earth Facing Transmit Horn[9]
Maximum EIRP = 9dBW
Maximum transmit gain = 11dBi
Polarization Horizontal Linear
Schedule S beam designator: TLM

[9] Additional gain contours, as requested in Section 25.114(d)(3), are not provided because they do not intersect with the Earth's surface. SES requests a waiver of this rule to the extent necessary.

Figure B-25.
C-band Tracking Beacon Earth Facing Transmit Horn[10]
Maximum EIRP = 8 dBW
Maximum transmit gain = 11dBi
Polarization Vertical Linear
Schedule S beam designator: BNC

[10] Additional gain contours, as requested in Section 25.114(d)(3), are not provided because they do not intersect with the Earth's surface. SES requests a waiver of this rule to the extent necessary.

Figure B-26.
Ku-band Tracking Beacon Earth Facing Transmit Horn[11]
Maximum EIRP = 9dBW
Maximum transmit gain = 11dBi
Polarization Horizontal Linear
Schedule S beam designator: BNK

[11] Additional gain contours, as requested in Section 25.114(d)(3), are not provided because they do not intersect with the Earth's surface. SES requests a waiver of this rule to the extent necessary.

APPENDIX C

TT&C Link Budgets

Link Parameters	Units	940KF1D
Uplink Frequency	GHz	14.496
Carrier Allocated Bandwidth	kHz	940.0
Uplink:		
Nominal E/S e.i.r.p. per carrier	dBW	83.0
Earth Station Diameter	m	8.1
Earth Station Gain	dBi	59.9
Uplink Input Power per Carrier	dBW	23.1
Spreading Loss	dB	163.0
Rain Margin	dB	7.0
Other Losses	dB	1.7
SFD at satellite	dBW/m2	-88.7
CMD subsystem SFD Threshold	dBW/m2	-89.0
Margin	dB	0.3

TABLE C-1. LINK BUDGET, TELECOMMAND CARRIER, 940KF1D[12]

[12] The link budget for the telecommand carrier at frequency 14499.0 MHz would be identical and is therefore not displayed separately.

Link Parameters	Units	500KG7D
Downlink Frequency	GHz	11.454
Carrier Allocated Bandwidth	kHz	500.0
Downlink:		
Downlink e.i.r.p. (EOC)*	dBW	5.0
Free Space Loss	dB	205.6
Atmospheric and Polarization Losses	dB	1.4
Rain Fade	dB	8.0
Receive E/S Pointing Loss	dB	0.3
Receive E/S G/T	dB/K	34.3
Downlink C/No	dB	52.6
Modulation Loss	dB	4.8
1/Bit Rate	dBHz	-33.1
Implementation Loss	dB	1.0
Eb/No	dB	13.7
Required Eb/No	dB	10.5
Margin	dB	3.2

* This is the specified minimum e.i.r.p. at the edge of Earth

TABLE C-2. LINK BUDGET, TELEMETRY CARRIER, 500KG7D (11 GHZ)[13]

[13] The link budget for the telemetry carrier at frequency 11451.0 MHz would be identical and is therefore not displayed separately.

Link Parameters	Units	25K0N0N
Downlink Frequency	GHz	4199.500
Carrier Allocated Bandwidth	kHz	25.0
Downlink:		
Downlink e.i.r.p. (EOC)*	dBW	4.0
Free Space Loss	dB	197.0
Atmospheric and Polarization Losses	dB	0.4
Rain Fade	dB	0.2
Receive E/S Pointing Loss	dB	0.1
Receive E/S G/T	dB/K	27.1
Downlink C/No	dB	62.0
Required C/No	dB	47.0
Margin	dB	15.0

* This is the specified minimum e.i.r.p. at the edge of Earth

TABLE C-3. TRACKING BEACON BUDGET, BNC BEAM, 25K0N0N

Link Parameters	Units	25K0N0N
Downlink Frequency	GHz	11.454
Carrier Allocated Bandwidth	kHz	25.0
Downlink:		
Downlink e.i.r.p. (EOC)*	dBW	5.0
Free Space Loss	dB	205.6
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

* This is the specified minimum e.i.r.p. at the edge of Earth

TABLE C-4. TRACKING BEACON BUDGET, BNK BEAM, 25K0N0N[14]

[14] The link budget for the beacon carrier at frequency 11451.0 MHz would be identical and is therefore not displayed separately.

DECLARATION

I, Patrick van Niftrik, 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/ Patrick van Niftrik

Senior Manager, Spectrum Development

New Skies Satellites B.V.

Dated: February 15, 2012