

File # SAT-MOD-2006 0901-00093  
 WITH ATTACHED CONDITIONS  
 Call Sign S2663 Grant Date 9/29/2006  
 (or other identifier)

Term Dates  
 Sec Conditions To Sec Cert No. Approved by OMB  
 3060-0678  
*Robert L. Nelson* Division Chief

Date & Time Filed: Sep 1 2006 3:24:44:636PM  
 File Number: SAT-MOD-20060901-00093

FCC APPLICATION FOR SPACE AND EARTH STATION:MOD OR AMD - MAIN FORM	FCC Use Only
FCC 312 MAIN FORM FOR OFFICIAL USE ONLY	

**APPLICANT INFORMATION**

Enter a description of this application to identify it on the main menu:  
 Hughes - 95W Ka-Band Minor Modification (8/2006)

1-8. Legal Name of Applicant

<b>Name:</b>	Hughes Communications, Inc.	<b>Phone Number:</b>	301-601-7226
<b>DBA Name:</b>		<b>Fax Number:</b>	301-428-2802
<b>Street:</b>	11717 Exploration Lane	<b>E-Mail:</b>	jread@hns.com
<b>City:</b>	Germantown	<b>State:</b>	MD
<b>Country:</b>	USA	<b>Zipcode:</b>	20876 -
<b>Attention:</b>	Ms Joslyn Read		

**Hughes Communications, Inc**  
**Attachment**  
**Conditions of Authorization – File No. SAT-MOD-20060901-00093**  
**September 28, 2006**

Hughes Communications, Inc. (“HNS”) modification request, IBFS File No. SAT-MOD-20060901-00093, Call Sign: S2663, to revise the language in condition 8 of the current authorization IS GRANTED.<sup>1</sup> Accordingly, HNS is authorized to construct, launch, and operate its SPACEWAY-3 Ka-band satellite at the 94.95° W.L. orbit location operating in the 19.7-20.2 GHz (space-to-Earth) and 29.5-30.0 GHz (Earth-to-space) frequency bands in accordance with the terms, conditions, and technical specifications set forth in its application, the Commission’s rules, and the conditions below.<sup>2</sup>

1. All conditions of the previous Commission action, SAT-MOD-20050523-00106 (grant stamped June 29, 2006) remain in effect, with the exception of condition 8 which is revised as follows:

Condition 8: HNS’s request for partial waiver of 47 C.F.R. § 25.202(g) of the Commission’s Rules is GRANTED as conditioned.<sup>3</sup> Section 25.202(g) requires applicants to conduct telemetry, transfer, and control (TT&C) functions for U.S. domestic satellites at either or both edges of the allocated band(s) and to select frequencies, polarization, and coding that minimize interference into other satellite networks and within one’s own satellite system. HNS claims they have selected its frequencies, polarizations, and coding in an effort to minimize intersystem and intrasystem interference. HNS has proposed to provide within band TT&C but with two command frequencies approximately 14 megahertz from the band edge and two beacon carrier frequencies approximately 25-35 megahertz from the band edge. In light of the advanced design and construction of the satellite and HNS statement that the TT&C command and beacon signals will be transmitted so as to have an EIRP density less than the levels specified in Section 25.138 of the Commission’s rules, we grant the waiver request.<sup>4</sup> This grant is conditioned, however, on HNS operations of the command and beacon frequencies on a non-interference basis where power levels exceed the EIRP density levels specified in Section 25.138 of the Commission’s rules, and in the

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<sup>1</sup> See Hughes Communications, Inc. SAT-MOD-20050523-00106, *Grant Stamp*, June 29, 2006.

<sup>2</sup> For the sake of clarity, all relevant technical conditions included in the earlier grant are repeated in this grant with the exception of the milestones. The milestones included in the initial authorization remain in effect.

<sup>3</sup> 47 C.F.R. § 25.202(g).

<sup>4</sup> HNS explained that the placement of TT&C frequencies was due, in part, to the SPACEWAY-3 satellite originally being designed as one of a fleet of adjacent Ka-band GSO satellites. As a result of this design, the particular TT&C frequencies were allotted to the SPACEWAY-3 satellite. At the point in time that the satellite was no longer planned as part of a fleet, to change the TT&C would have required a major redesign. See an email from Joslyn Read, AVP Regulatory, Hughes Network Systems, LLC, dated June 29, 2006, to Andrea Kelly, John Martin, Kal Krautkramer, and Robert Nelson, Federal Communications Commission (June 29, 2006 email); Letter from Steven J.L. Doiron, Senior Director, Regulatory Affairs, Hughes Network Systems, LLC, to Kal Krautkramer, Satellite Division, International Bureau, dated June 29, 2006.

absence of relevant coordination agreements. Because HNS's operations at such levels do not conform to our rules, in the absence of relevant coordination agreements, HNS must accept any interference from any non-Federal or Federal station authorized to use these same frequencies. In addition, in the absence of relevant coordination agreements, any HNS operations at EIRP density levels in excess of the applicable Section 25.138 levels shall not cause harmful interference to any authorized non-Federal space station operating in compliance with Section 25.202(g), the Table of Allocations, the Ka-band plan, or authorized Federal FSS GSO or NGSO system, and HNS shall immediately cease such operations or reduce them to or below the applicable Section 25.138 levels upon notification of such harmful interference resulting from its operations. Accordingly, with respect to these TT&C operations, and absent relevant coordination agreements, HNS will operate at its own risk on an unprotected basis.

2. HNS is afforded thirty days from the date of release of this grant and authorization to decline this authorization as conditioned. Failure to respond within this period will constitute formal acceptance of the authorization as conditioned.
3. This grant is issued pursuant to section 0.261 of the Commission's rules on delegated authority, 47 C.F.R. § 0.261, and is effective upon release.

File #	SAT-MOD-20060901-00093
	WITH ATTACHED CONDITIONS
Call Sign	S2663
Grant Date	9/29/2006
Time Dates	see conditions
	see conditions
	Chief Satellite Division
	Robert G. Nelson

9-16. Name of Contact Representative

<b>Name:</b>	Raul R. Rodriguez/Stephen D. Baruch	<b>Phone Number:</b>	202-429-8970
<b>Company:</b>	Leventhal Senter & Lerman PLLC	<b>Fax Number:</b>	202-293-7783
<b>Street:</b>	2000 K Street, N.W. Suite 600	<b>E-Mail:</b>	sbaruch@lsl-law.com
<b>City:</b>	Washington	<b>State:</b>	DC
<b>Country:</b>	USA	<b>Zipcode:</b>	20006-
<b>Attention:</b>	Raul Rodriguez/Stephen Baruch	<b>Relationship:</b>	Legal Counsel

CLASSIFICATION OF FILING

17. Choose the button next to the classification that applies to this filing for both questions a. and b. Choose only one for 17a and only one for 17b.

- a1. Earth Station
- a2. Space Station

- (N/A) b1. Application for License of New Station
- (N/A) b2. Application for Registration of New Domestic Receive-Only Station
- (N/A) b3. Amendment to a Pending Application
- (N/A) b4. Modification of License or Registration
- b5. Assignment of License or Registration
- b6. Transfer of Control of License or Registration
- (N/A) b7. Notification of Minor Modification
- (N/A) b8. Application for License of New Receive-Only Station Using Non-U.S. Licensed Satellite
- (N/A) b9. Letter of Intent to Use Non-U.S. Licensed Satellite to Provide Service in the United States
- (N/A) b10. Other (Please specify)

<p>17c. Is a fee submitted with this application?</p> <p><input checked="" type="radio"/> If Yes, complete and attach FCC Form 159. If No, indicate reason for fee exemption (see 47 C.F.R. Section 1.1114).</p> <p><input type="radio"/> Governmental Entity    <input type="radio"/> Noncommercial educational licensee</p> <p><input type="radio"/> Other (please explain):</p>	
<p>17d.</p> <p>Fee Classification CWY – Space Station Amendment (Geostationary)</p>	
<p>18. If this filing is in reference to an existing station, enter:</p> <p>(a) Call sign of station: S2663</p>	<p>19. If this filing is an amendment to a pending application enter both fields, if this filing is a modification please enter only the file number:</p> <p>(a) Date pending application was filed:</p> <p>(b) File number: SATMOD2005052300106</p>

TYPE OF SERVICE

20. NATURE OF SERVICE: This filing is for an authorization to provide or use the following type(s) of service(s): Select all that apply:	
<input checked="" type="checkbox"/> a. Fixed Satellite <input type="checkbox"/> b. Mobile Satellite <input type="checkbox"/> c. Radiodetermination Satellite <input type="checkbox"/> d. Earth Exploration Satellite <input type="checkbox"/> e. Direct to Home Fixed Satellite <input type="checkbox"/> f. Digital Audio Radio Service <input type="checkbox"/> g. Other (please specify)	
21. STATUS: Choose the button next to the applicable status. Choose only one. <input type="radio"/> Common Carrier <input checked="" type="radio"/> Non-Common Carrier	22. If earth station applicant, check all that apply. <input type="checkbox"/> Using U.S. licensed satellites <input type="checkbox"/> Using Non-U.S. licensed satellites
23. If applicant is providing INTERNATIONAL COMMON CARRIER service, see instructions regarding Sec. 214 filings. Choose one. Are these facilities: <input type="radio"/> Connected to a Public Switched Network <input type="radio"/> Not connected to a Public Switched Network <input checked="" type="radio"/> N/A	
24. FREQUENCY BAND(S): Place an 'X' in the box(es) next to all applicable frequency band(s). <input type="checkbox"/> a. C-Band (4/6 GHz) <input type="checkbox"/> b. Ku-Band (12/14 GHz) <input checked="" type="checkbox"/> c. Other (Please specify upper and lower frequencies in MHz.) Frequency Lower: 29500      Frequency Upper: 29533      (Please specify additional frequencies in an attachment)	

TYPE OF STATION

25. CLASS OF STATION: Choose the button next to the class of station that applies. Choose only one.

- a. Fixed Earth Station
- b. Temporary-Fixed Earth Station
- c. 12/14 GHz VSAT Network
- d. Mobile Earth Station
- e. Geostationary Space Station
- f. Non-Geostationary Space Station
- g. Other (please specify)

26. TYPE OF EARTH STATION FACILITY:

- Transmit/Receive    Transmit-Only    Receive-Only    N/A

"For Space Station applications, select N/A."

PURPOSE OF MODIFICATION

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

- a -- authorization to add new emission designator and related service
- b -- authorization to change emission designator and related service
- c -- authorization to increase EIRP and EIRP density
- d -- authorization to replace antenna
- e -- authorization to add antenna
- f -- authorization to relocate fixed station
- g -- authorization to change frequency(ies)
- h -- authorization to add frequency
- i -- authorization to add Points of Communication (satellites & countries)
- j -- authorization to change Points of Communication (satellites & countries)
- k -- authorization for facilities for which environmental assessment and radiation hazard reporting is required
- l -- authorization to change orbit location
- m -- authorization to perform fleet management
- n -- authorization to extend milestones
- o -- Other (Please specify)



ENVIRONMENTAL POLICY

28. Would a Commission grant of any proposal in this application or amendment have a significant environmental impact as defined by 47 CFR 1.1307? If YES, submit the statement as required by Sections 1.1308 and 1.1311 of the Commission's rules, 47 C.F.R. 1.1308 and 1.1311, as an exhibit to this application. A Radiation Hazard Study must accompany all applications for new transmitting facilities, major modifications, or major amendments.

Yes  No

ALIEN OWNERSHIP Earth station applicants not proposing to provide broadcast, common carrier, aeronautical en route or aeronautical fixed radio station services are not required to respond to Items 30-34.

29. Is the applicant a foreign government or the representative of any foreign government?

Yes  No

30. Is the applicant an alien or the representative of an alien?

Yes  No  N/A

31. Is the applicant a corporation organized under the laws of any foreign government?

Yes  No  N/A

32. Is the applicant a corporation of which more than one-fifth of the capital stock is owned of record or voted by aliens or their representatives or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?

Yes  No  N/A

33. Is the applicant a corporation directly or indirectly controlled by any other corporation of which more than one-fourth of the capital stock is owned of record or voted by aliens, their representatives, or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?

Yes  No  N/A

34. If any answer to questions 29, 30, 31, 32 and/or 33 is Yes, attach as an exhibit an identification of the aliens or foreign entities, their nationality, their relationship to the applicant, and the percentage of stock they own or vote.

#### BASIC QUALIFICATIONS

35. Does the Applicant request any waivers or exemptions from any of the Commission's Rules?  
If Yes, attach as an exhibit, copies of the requests for waivers or exceptions with supporting documents.

Yes  No

36. Has the applicant or any party to this application or amendment had any FCC station authorization or license revoked or had any application for an initial, modification or renewal of FCC station authorization, license, or construction permit denied by the Commission? If Yes, attach as an exhibit, an explanation of circumstances.

Yes  No

Exhibit 36

37. Has the applicant, or any party to this application or amendment, or any party directly or indirectly controlling the applicant ever been convicted of a felony by any state or federal court? If Yes, attach as an exhibit, an explanation of circumstances.

Yes  No

38. Has any court finally adjudged the applicant, or any person directly or indirectly controlling the applicant, guilty of unlawfully monopolizing or attempting unlawfully to monopolize radio communication, directly or indirectly, through control of manufacture or sale of radio apparatus, exclusive traffic arrangement or any other means or unfair methods of competition? If Yes, attach as an exhibit, an explanation of circumstances

Yes  No

39. Is the applicant, or any person directly or indirectly controlling the applicant, currently a party in any pending matter referred to in the preceding two items? If yes, attach as an exhibit, an explanation of the circumstances.

Yes  No

40. If the applicant is a corporation and is applying for a space station license, attach as an exhibit the names, address, and citizenship of those stockholders owning a record and/or voting 10 percent or more of the Filer's voting stock and the percentages so held. In the case of fiduciary control, indicate the beneficiary(ies) or class of beneficiaries. Also list the names and addresses of the officers and directors of the Filer.

41. By checking Yes, the undersigned certifies, that neither applicant nor any other party to the application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Act of 1988, 21 U.S.C. Section 862, because of a conviction for possession or distribution of a controlled substance. See 47 CFR 1.2002(b) for the meaning of "party to the application" for these purposes.

Yes  No

42a. Does the applicant intend to use a non-U.S. licensed satellite to provide service in the United States? If Yes, answer 42b and attach an exhibit providing the information specified in 47 C.F.R. 25.137, as appropriate. If No, proceed to question 43.

Yes  No

42b. What administration has licensed or is in the process of licensing the space station? If no license will be issued, what administration has coordinated or is in the process of coordinating the space station?

43. Description. (Summarize the nature of the application and the services to be provided). (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

In this non-technical modification, Hughes seeks to have the FCC revise Condition #8 of its current authorization to make clear that any uplink TT&C emissions that are at or below levels in 25.138(a)(1) of the Rules are not NIB and are protected. Only uncoordinated emissions in excess of 25.138 levels would be on a non-harmful

Narrative Statement

**CERTIFICATION**

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

44. Applicant is a (an): (Choose the button next to applicable response.)

- Individual
- Unincorporated Association
- Partnership
- Corporation
- Governmental Entity
- Other (please specify)

45. Name of Person Signing  
Pradman Kaul

46. Title of Person Signing  
Chief Executive Officer and President

—>

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

**FCC NOTICE REQUIRED BY THE PAPERWORK REDUCTION ACT**

The public reporting for this collection of information is estimated to average 2 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the required data, and completing and reviewing the collection of information. If you have any comments on this burden estimate, or how we can improve the collection and reduce the burden it causes you, please write to the Federal Communications Commission, AMD-PERM, Paperwork Reduction Project (3060-0678), Washington, DC 20554. We will also accept your comments regarding the Paperwork Reduction Act aspects of this collection via the Internet if you send them to [jboley@fcc.gov](mailto:jboley@fcc.gov). PLEASE DO NOT SEND COMPLETED FORMS TO THIS ADDRESS.

Remember – You are not required to respond to a collection of information sponsored by the Federal government, and the government may not conduct or sponsor this collection, unless it displays a currently valid OMB control number or if we fail to provide you with this notice. This collection has been assigned an OMB control number of 3060-0678.

**THE FOREGOING NOTICE IS REQUIRED BY THE PAPERWORK REDUCTION ACT OF 1995, PUBLIC LAW 104-13, OCTOBER 1, 1995, 44 U.S.C. SECTION 3507.**

**43. Description. (Summarize the nature of the application and the services to be provided).**

In this non-technical modification, Hughes seeks to have the FCC revise Condition #8 of its current authorization to make clear that any uplink TT&C emissions that are at or below levels in 25.138(a)(1) of the Rules are not NIB and are protected. Only uncoordinated emissions in excess of 25.138 levels would be on a non-harmful interference/unprotected basis. Details are provided in the attached Narrative Statement.

### Narrative Statement

In this Modification of License application ("Modification Application"), Hughes Communications, Inc. ("Hughes") requests that the Commission modify the provisions of Condition No. 8 to its recently-granted applications in Call Sign S2663, File Nos. SAT-MOD-20050523-00106 and SAT-AMD-20060306-00025 ("June 2006 Grant"). Condition No. 8 of the June 2006 Grant currently specifies that Hughes' command and beacon TT&C uplink operations in the 29.5-29.53 GHz segment of the 29.5-30.0 GHz band are to be conducted entirely on a non-interference and unprotected basis ("NIUB"). In this Modification Application, Hughes requests that the Commission modify Condition 8 to instead specify that Hughes's uplink TT&C operations will be on NIUB only to the extent that they exceed the corresponding off-axis EIRP spectral density values in Section 25.138 of the Commission's Rules, 47 C.F.R. §25.138(a), for the routine licensing of blanket earth stations in the band 29.5-30 GHz, in the absence of coordination agreements with relevant adjacent satellite operators.

Hughes emphasizes at the outset that this Modification Application proposes no changes whatsoever to the technical characteristics it was authorized to establish by the June 2006 Grant. The change requested here is to the language of a condition under which the now-authorized satellite will be operated for the years that follow its anticipated early 2007 launch. Physical operation of the satellite will not be changed. In other words, this is in no way a technical modification.

In support of this Modification Application, Hughes demonstrates that, under normal operations, its TT&C uplinks will comply with the off-axis EIRP spectral density values specified for blanket earth stations in Section 25.138(a) of the Commission's Rules. Specifically, Hughes shows that, under normal operating conditions, its frequency-modulated ("FM") TT&C command carriers will be operated at levels that comply with §25.138(a), even

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under the conservative assumption that all the power of the 1.3 MHz command uplink carrier is concentrated in the center 40 kHz of the channel. Hughes also shows that its TT&C beacon carriers, even assuming that the energy of each is completely contained within a 40 kHz bandwidth, will also operate at off-axis EIRP spectral density levels that comply with Section 25.138(a) during normal operational conditions. Indeed, for on-station operations, and using conservative assumptions, Hughes shows that the SPACEWAY-3 TT&C command carriers meet the FCC's rule requirements with a margin of 23.2 dB (for the co-polarization sense) and 48.2 dB (in the cross-polarization sense), and that its TT&C beacon carriers meet the rule's requirements with a 18.0 dB margin (for the co-polarization sense) and 43 dB (in the cross-polarization sense). The technical demonstration itself is contained in Attachment 1 to this Narrative Statement.

Clearly, if Hughes' uplink TT&C carriers operate within the levels permitted in the rules for routine blanket licensing, as Hughes has now shown that they will do during routine on-station operations, they should be entitled to the same protection to which other Section 25.138-compliant transmissions are entitled. Changing Condition No. 8 to reflect this permission will: (i) allow Hughes to have rights afforded under the Commission's Rules; (ii) provide Hughes with an important measure of regulatory certainty regarding its uplink TT&C authority that was apparently inadvertently omitted from the June 2006 grant where *all* uplink TT&C operations were ordered to be NIUB; (iii) ensure that Hughes is fully able to operate the SPACEWAY-3 satellite in a manner that enables it to comply with whatever directions the Commission may issue under its statutory/regulatory mandate regarding operation of the spacecraft and its payload; and (iv) not cause any increase in interference to adjacent satellites.

As stated above, during routine, on-station operation of the SPACEWAY-3 satellite, Hughes does not intend to operate its command or beacon TT&C carriers at levels in excess of

the Commission's Section 25.138(a) values permitted for routine licensing of blanket earth stations. However, Hughes may need to operate a command carrier through the lower-gain spacecraft bicone antenna in the highly unlikely event that there is a major satellite emergency resulting in a loss of attitude control or the loss of the command link via the high-gain main receive antenna.<sup>1</sup> To do this, it would need to use off-axis EIRP spectral density levels that are greater than those permitted for routine licensing of blanket earth stations. *See* Attachment, Section 4.0. Hughes recognizes that such emergency-situation command uplink operations would remain NIUB (as they currently are under Condition No. 8 in the June 2006 Grant) to the extent that: (i) time or circumstances have not permitted Hughes to coordinate such emergency operations with the relevant adjacent spacecraft; and (ii) the EIRP levels at which the emergency recovery transmissions are conducted exceed those permitted for routine operations under Section 25.138. In addition, because the beacon carriers cannot be received either through the bicone antenna or the pipes (*see* Attachment at Section 3.2), they will never be increased to off-axis EIRP spectral density levels in excess of the values permitted for routine licensing under the relevant provisions of Section 25.138 of the Commission's Rules.

For these reasons, Hughes requests that the Commission modify Condition No. 8 of the Hughes June 2006 Grant to read as follows:

8. HNS's request for a partial waiver of 47.C.F.R. § 25.202(g)<sup>12</sup> of the Commission's Rules is GRANTED as conditioned. Section 25.202(g) requires applicants to conduct TT&C functions for U.S. domestic satellites at either of both edges of the allocated band(s) and to select frequencies, polarization, and coding that minimizes interference into other satellite networks and within one's own satellite system. HNS claims they have selected its frequencies, polarizations, and coding in an effort to minimize intersystem and intrasystem interference. HNS has proposed to provide within band TT&C but with two command frequencies approximately 14 megahertz from the band

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<sup>1</sup> There may also be a need to operate at higher levels through the bicone antenna during the post-launch injection phase of the satellite – i.e., while the spacecraft is being drifted to its assigned orbital location. As these operations would be the subject of a request for special temporary authority from the responsible earth station operator at or near the time of launch, Hughes does not address this situation in the instant modification application for the license for SPACEWAY-3.

edge and two beacon carriers frequencies approximately 25-35 megahertz from the band edge. HNS states that the internal design of the spacecraft does not allow for the command and beacon carriers at the band edge. In light of the advanced design and construction of the satellite and HNS' statement that the TT&C command and beacon signals will be transmitted so as to have an EIRP density less than the levels specified in Section 25.138 of the Commission's rules, we grant the waiver request.<sup>13</sup> This grant is conditioned, however, on HNS operations of the command and beacon frequencies on a non-interference basis where power levels exceed the EIRP density levels specified in Section 25.138 of the Commission's rules, or in the absence of relevant coordination agreements. Because HNS's operations at such levels do not conform to our rules, in the absence of relevant coordination agreements, HNS must accept any interference from any non-Federal or Federal station authorized to use these same frequencies. In addition, and again in the absence of relevant coordination agreements, any HNS operations at EIRP density levels in excess of the applicable Section 25.138 levels shall not cause harmful interference to any authorized non-Federal space station operating in compliance with Section 25.202(g), the Table of Allocations, the Ka-band plan, or authorized Federal FSS GSO on NGSO system, and HNS shall immediately cease such operations or reduce them to or below the applicable Section 25.138 levels upon notification of such harmful interference resulting from its operations. Accordingly, with respect to these TT&C operations, and absent relevant coordination agreements, HNS will operate at its own risk on an unprotected basis.

<sup>12</sup> Note 12 unchanged from June 2006 Grant.

<sup>13</sup> Note 13 unchanged from June 2006 Grant.

In closing, Hughes requests that the Commission approve the modification that Hughes proposes above to Condition 8 of its June 2006 Grant. Such action will grant Hughes with the same rights – no greater and no lesser – as those of other geostationary satellite operators in the Ka-band, will not increase the interference environment in the Ka-band, and will ensure that both Hughes and the Commission can comply with their national and international obligations.

## ATTACHMENT 1

### SPACEWAY-3 TT&C System Demonstration of Compliance with FCC Rule §25.138(a)

#### 1.0 Background

The following analysis demonstrates that the SPACEWAY-3 command and beacon carriers comply with §25.138(a) of the FCC's Rules under normal operational conditions at adjacent satellites located 2, 4 and 6 degrees away. The beacon carriers will always be operated in a manner compliant with §25.138(a); the command carriers will be fully compliant with the rule during routine on-station operations.

Section 25.138(a)(1) requires that earth stations transmitting in the frequency band 29.500-30.000 GHz do not exceed a co-polarized off-axis EIRP density of:

$$18.5 - 25 \log (\theta) \text{ dBW/40 kHz} \quad (\text{for } 2 \leq \theta \leq 7)$$

Section 25.138(a)(2) requires that earth stations transmitting in the frequency band 29.500-30.000 GHz do not exceed, for angles of greater than 3 degrees from the GSO arc, a co-polarized off-axis EIRP density of:

$$21.5 - 25 \log (\theta) \text{ dBW/40 kHz} \quad (\text{for } 2 \leq \theta \leq 7)$$

Section 25.138(a)(4) requires that earth stations transmitting in the frequency band 29.500-30.000 GHz do not exceed a cross-polarized off-axis EIRP density of:

$$8.5 - 25 \log (\theta) \text{ dBW/40 kHz} \quad (\text{for } 2 \leq \theta \leq 7)$$

where  $\theta$  is the angle between the earth station boresight and an adjacent satellite on the geostationary arc. In the following analysis, the command carriers and the beacon carriers are treated separately.

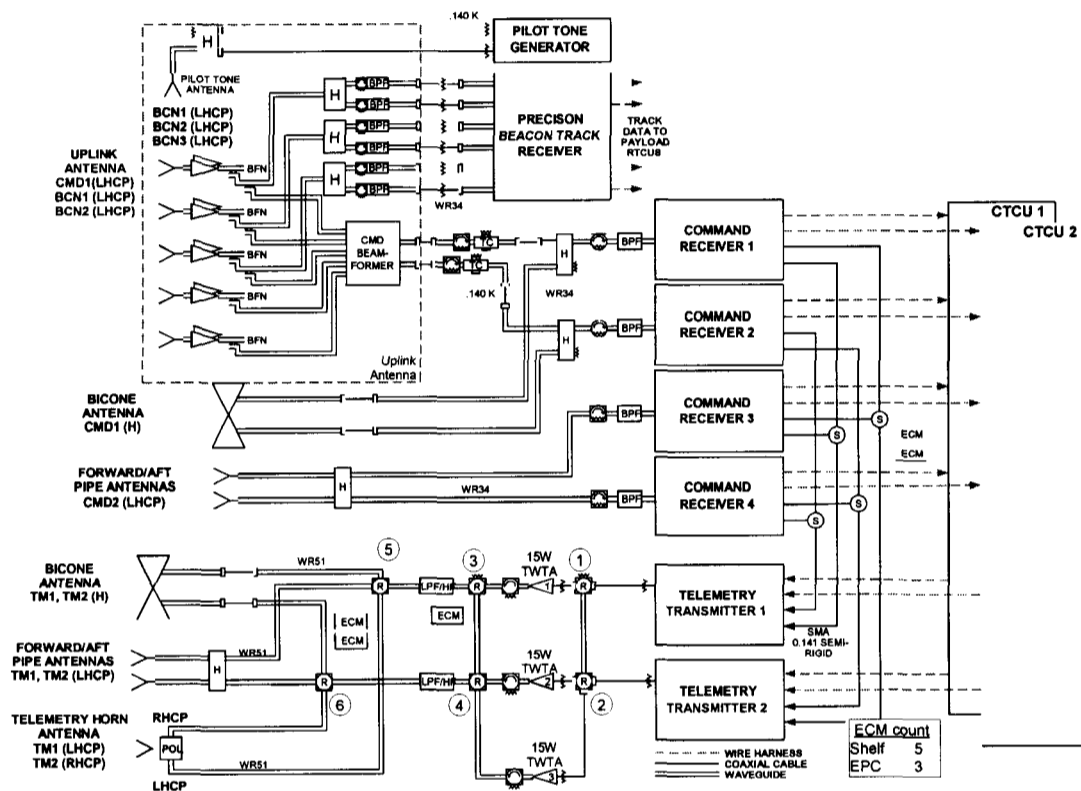
#### 2.0 Command Carriers

Command carriers are used by the spacecraft operator to send commands to the spacecraft that are necessary for its continuing correct operation. Figure 1 below shows a block diagram of how the SPACEWAY-3 spacecraft is designed to receive these carriers. Once the satellite is on-station at 94.95° WL, Hughes intends to command the SPACEWAY-3 spacecraft with a single command carrier operating at approximately 29,506 MHz. In order to optimize spectrum utilization, the command carrier is only received on two beams of the spacecraft receive antenna array. For the other 110 uplink beams on SPACEWAY 3, the frequency used by the command carrier is used for receiving traffic.

As is typical for most spacecraft, frequency modulation (FM) is used to transmit commands. FM has the advantage of a proven spacecraft command receiver design, demonstrated robustness to interference, and use of an existing infrastructure of TT&C stations in the United States and around the world. The SPACEWAY-3 command carriers are represented by the 1M30F9D emission code.

Command carriers will be transmitted from either of two TT&C earth stations (one in each beam) to be located in the western continental United States. Each site will use a VERTEX 9.0 meter Ka band earth station antenna to transmit commands to SPACEWAY-3. This earth station antenna has a transmit gain of 67 dBi and not only meets the antenna off-axis gain mask specified in §25.209, but actually has a performance that is many dB better than this mask in the angular range of interest, which is from 2 to 6 degrees.

**Figure 1 – TT&C Block Diagram**



## 2.1 On-Station Operations: Command Carriers

In the March 2006 Amendment to its modification application to specify the SPACEWAY-3 design (Call Sign S2663), Hughes provided link budgets indicating that a nominal clear-sky EIRP of 45.3 dBW would be used by the command carrier for on-station operations.<sup>1</sup> Given that

<sup>1</sup> S2663 Amendment dated March 6, 2006, Attachment A, Appendix C, Table C-1.1

frequency modulated carriers tend to concentrate power at the center of the carrier, Hughes will assume, for the purpose of this analysis, that all the power of the command carrier is concentrated in the center 40 kHz. While this assumption is particularly conservative, it places an upper bound on the interference that could be generated by the command carrier. It is thus assumed that the command carrier EIRP density is 45.3 dBW/40 kHz.

Now since:

$$\mathbf{EIRP\ density_{on-axis} = G_{TX-Boresight} + P}$$

where:

$\mathbf{G_{TX-Boresight}}$ : TT&C earth station antenna gain (67 dBi)

$\mathbf{P}$ : Power density (in 40 kHz) at the earth station antenna transmit flange

Thus:

$$\begin{aligned} \mathbf{P} &= \mathbf{EIRP\ density_{on-axis} - G_{TX-boresight}} \\ &= [45.3\ \text{dBW}/40\ \text{kHz}] - [67\ \text{dBi}] \\ &= -21.7\ \text{dBW}/40\ \text{kHz}. \end{aligned}$$

## 2.2 Co-Polarization Analysis: Command Carriers

As mentioned above, the SPACEWAY-3 TT&C earth station antenna that will be used with SPACEWAY-3 has an off-axis gain performance that is better than the mask in §25.209(a). From the antenna pattern information provided by Vertex in Figure 2<sup>2</sup>, the co-polarized off-axis gain in the angular range from 2 to 6 degrees is at least 12 dB better than the mask provided in §25.209(a)(1). This means that the antenna performance is equal to or better than:

$$\begin{aligned} \mathbf{G_{TX-off\ axis}} &\leq [29 - 25 \log(\theta) - (12)]\ \text{dBi} && (\text{for } 2 \leq \theta \leq 6) \\ &\leq [17 - 25 \log(\theta)]\ \text{dBi} && (\text{for } 2 \leq \theta \leq 6) \end{aligned}$$

In order to determine the off-axis EIRP density:

$$\begin{aligned} \mathbf{EIRP\ density_{off-axis}} &= \mathbf{G_{TX-off-axis} + P} \\ &\leq [17 - 25 \log(\theta)] + [-21.7\ \text{dBW}/40\ \text{kHz}] \\ &\leq -4.7 - 25 \log(\theta)\ \text{dBW}/40\ \text{kHz} \quad (\text{for } 2 \leq \theta \leq 6) \end{aligned}$$

<sup>2</sup> Vertex 9.0 meter Ka band antenna, Model Number 9.0 KPK.

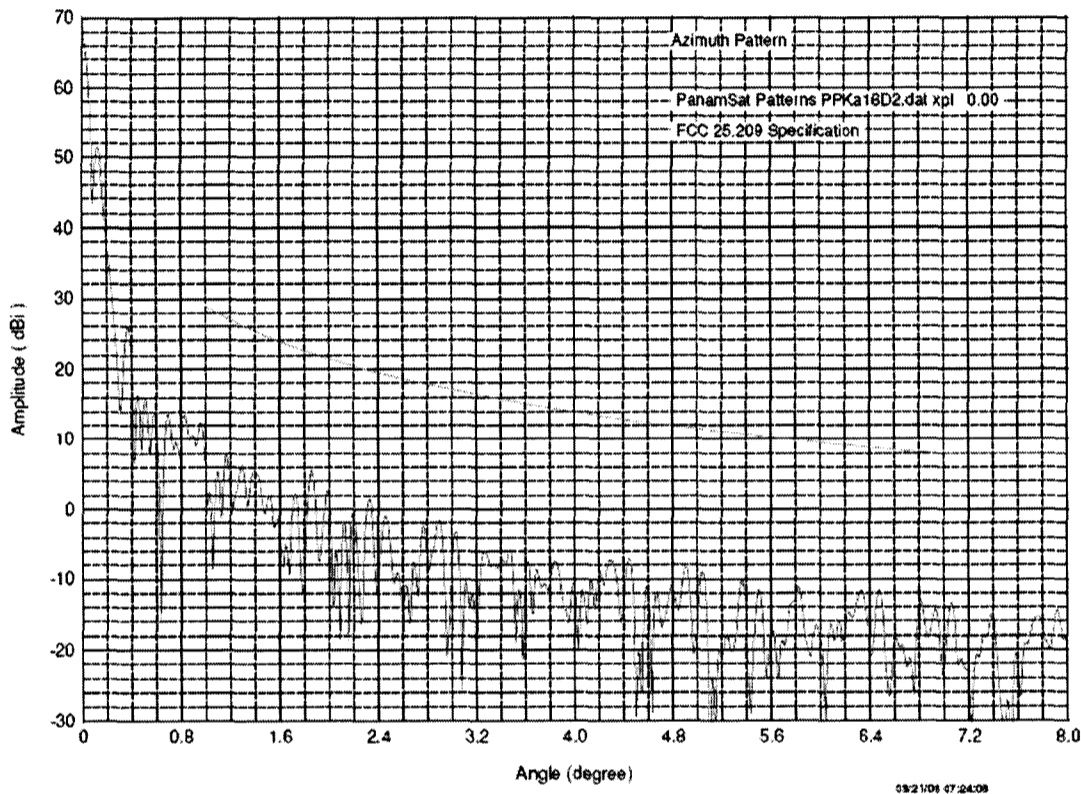
In comparing the expected off-axis EIRP performance with the EIRP density mask of  $18.5 - 25 \log(\theta)$  dBW/40kHz in §25.138(a)(1), it is clear that the SPACEWAY-3 earth station will be operating at least 23.2 dB below the FCC limit for those adjacent satellites operating at 2, 4, and 6 degrees on either side of SPACEWAY-3.

Based on this analysis, Hughes can operate the SPACEWAY-3 command carrier while on-station up to a maximum boresight EIRP of 68.5 dBW<sup>3</sup> and still remain in compliance with the off-axis EIRP limit in §25.138(a)(1).

Furthermore, since the antenna in question is circular, the results derived above are valid in all planes around the boresight. This implies that the more relaxed EIRP density mask in 25.138(a)(2) for angles greater than 3 degrees away from the geostationary arc is also met.

**FIGURE 2 – Co-Polarization**

Predicted Antenna Patterns for VERTEX 8.99 M at 29.500 GHz



<sup>3</sup> The 68.5 dBW maximum boresight e.i.r.p. is derived by adding the nominal EIRP of 45.3 dBW with the margin of 23.2 dB)

### 2.3 Cross-Polarization Analysis: Command Carriers

From the antenna pattern information provided by Vertex in Figure 3, the cross-polarized off-axis gain in the angular range from 2 to 6 degrees is at least 37.0 dB better than the mask provided in §25.209(b). This means that the antenna performance is equal to or better than:

$$\begin{aligned} G_{\text{TX-off-axis}} &\leq [19 - 25 \log(\theta) - (37.0)] \text{ dBi} \quad (\text{for } 2 \leq \theta \leq 6) \\ &\leq [-18.0 - 25 \log(\theta)] \text{ dBi} \quad (\text{for } 2 \leq \theta \leq 6) \end{aligned}$$

In order to determine the off-axis EIRP density:

$$\begin{aligned} \text{EIRP density}_{\text{off-axis}} &= G_{\text{TX-off-axis}} + P \\ &\leq [-18.0 - 25 \log(\theta)] + [-21.7 \text{ dBW/40 kHz}] \\ &\leq -39.7 - 25 \log(\theta) \text{ dBW/40 kHz} \quad (\text{for } 2 \leq \theta \leq 6) \end{aligned}$$

In comparing the expected off-axis EIRP performance with the EIRP density mask of  $8.5 - 25 \log(\theta)$  dBW/40kHz in §25.138(a)(4), it is clear that the SPACEWAY-3 earth station will be operating at least 48.2 dB below the FCC limit for those adjacent satellites operating at 2, 4, and 6 degrees on either side of SPACEWAY-3.

Based on this analysis, Hughes could operate its command carrier for SPACEWAY-3 on station up to a maximum boresight EIRP of 93.5 dBW<sup>4</sup> and still remain in compliance with the off-axis EIRP limit in §25.138(a)(4).

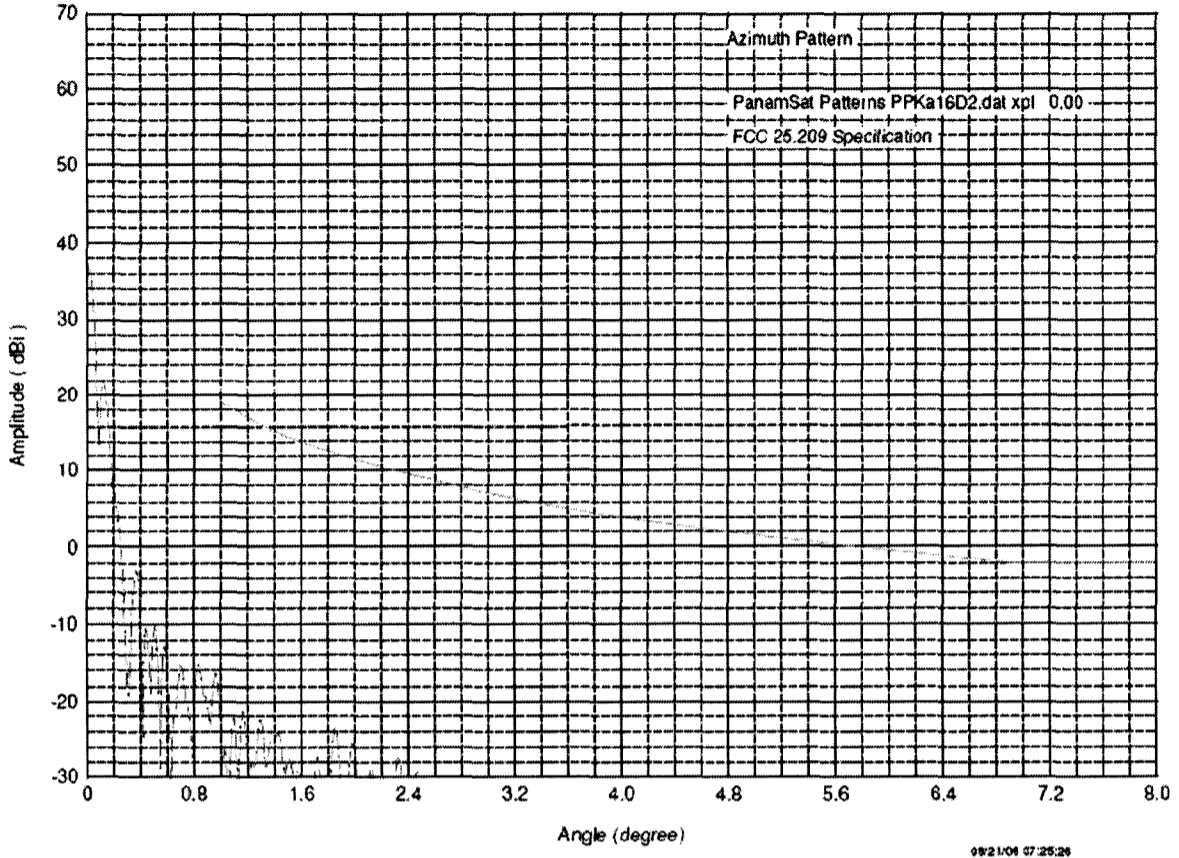
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<sup>4</sup> The 93.5 dBW maximum boresight EIRP is derived by adding the nominal EIRP of 45.3 dBW with the margin of 48.2 dB.



**FIGURE 3 – Cross Polarization**

Predicted Antenna Patterns for VERTEX 8.99 M at 29.500 GHz



**3.0 Beacon Carriers**

The beacon carriers are used by the TT&C sub-system to provide a fine adjustment to the radiation pattern produced by the SPACEWAY-3 phased array. The SPACEWAY-3 beacon carriers are represented by the 25K0N0N emission code. The block diagram in Figure 1 shows how the SPACEWAY-3 spacecraft is designed to receive the beacon carriers.

The beacon carriers will only be transmitted from the primary TT&C earth station which will be located in the western continental United States. This site will also use a VERTEX 9.0 meter Ka band earth station antenna in order to transmit the beacon carrier to the SPACEWAY-3 spacecraft. This earth station antenna has a transmit gain of 67 dBi and not only meets the antenna off-axis gain mask specified in §25.209, but actually has a performance that is many dB below this mask in the angular range of interest, which is from 2 to 6 degrees.

### 3.1 On-Station Operations: Beacon Carriers

The beacon system on the SPACEWAY-3 spacecraft requires a nominal clear-sky EIRP of 50.5 dBW. As for the command carrier analysis in Section 2 above, the energy of the beacon carrier is assumed to be completely contained in a 40 kHz bandwidth.

As a consequence, it is thus assumed that the beacon carrier EIRP density is 50.5 dBW/40 kHz. Since:

$$\text{EIRP density}_{\text{on-axis}} = G_{\text{TX-Boresight}} + P$$

where:

$G_{\text{TX-Boresight}}$ : TT&C earth station antenna gain (67 dBi)

$P$ : Power density (in 40 kHz) at the earth station antenna transmit flange

Thus:

$$\begin{aligned} P &= \text{EIRP density}_{\text{on-axis}} - G_{\text{TX-boresight}} \\ &= [50.5 \text{ dBW}/40 \text{ kHz}] - [67 \text{ dBi}] \\ &= -16.5 \text{ dBW}/40 \text{ kHz}. \end{aligned}$$

### 3.2 Co-Polarization Analysis: Beacon Carriers

As mentioned above, the TT&C earth station antenna has an off-axis performance that is at least 12 dB better than the mask provided in §25.209(a). This implies that the antenna performance is equal to or better than:

$$\begin{aligned} G_{\text{TX-off axis}} &\leq [29 - 25 \log(\theta) - 12] \text{ dBi} && (\text{for } 2 \leq \theta \leq 6) \\ &\leq [17 - 25 \log(\theta)] \text{ dBi} && (\text{for } 2 \leq \theta \leq 6) \end{aligned}$$

In order to find the off-axis EIRP density:

$$\begin{aligned} \text{EIRP density}_{\text{off-axis}} &= G_{\text{TX-off-axis}} + P \\ &\leq [17 - 25 \log(\theta)] + [-16.5 \text{ dBW}/40 \text{ kHz}] \\ &\leq 0.5 - 25 \log(\theta) \text{ dBW}/40 \text{ kHz} \quad (\text{for } 2 \leq \theta \leq 6) \end{aligned}$$

In comparing the expected off-axis EIRP performance with the EIRP density mask of  $18.5 - 25 \log(\theta)$  dBW/40kHz in §25.138(a)(1), it can be seen that the SPACEWAY-3 earth station will be

operating at least 18.0 dB below the FCC limit for those adjacent satellites operating at 2, 4, and 6 degrees on either side of SPACEWAY-3.

Based on this analysis, Hughes can operate the SPACEWAY-3 beacon carriers while on-station up to a maximum boresight EIRP of 68.5 dBW<sup>5</sup> and still remain in compliance with the off-axis EIRP limit in §25.138(a)(1).

Furthermore, since the antenna in question is circular, the results derived above are valid in all planes around the boresight. This implies that the more relaxed EIRP density mask in §25.138(a)(2) for angles greater than 3 degrees away from the geostationary arc is also met.

### 3.3 Cross-Polarization Analysis: Beacon Carriers

From the antenna pattern information provided by Vertex in Figure 3, the cross-polarized off-axis gain in the angular range from 2 to 6 degrees is at least 37.0 dB better than the mask provided in §25.209(b). This implies that the antenna performance is equal to or better than:

$$\begin{aligned} G_{\text{TX-off-axis}} &\leq [19 - 25 \log(\theta) - (37)] \text{ dBi} && (\text{for } 2 \leq \theta \leq 6) \\ &\leq [-18 - 25 \log(\theta)] \text{ dBi} && (\text{for } 2 \leq \theta \leq 6) \end{aligned}$$

In order to find the off-axis EIRP density:

$$\begin{aligned} \text{EIRP density}_{\text{off-axis}} &= G_{\text{TX-off-axis}} + P \\ &\leq [-18 - 25 \log(\theta)] + [-16.5 \text{ dBW}/40 \text{ kHz}] \\ &\leq -34.5 - 25 \log(\theta) \text{ dBW}/40 \text{ kHz} && (\text{for } 2 \leq \theta \leq 6) \end{aligned}$$

In comparing the expected off-axis EIRP performance with the EIRP density mask of  $8.5 - 25 \log(\theta)$  dBW/40kHz in §25.138(a)(4), it can be seen that the SPACEWAY-3 earth station will be operating the beacon carrier at least 43 dB below the FCC limit for those adjacent satellites operating at 2, 4, and 6 degrees on either side of SPACEWAY-3.

Based on this analysis, Hughes can operate the SPACEWAY-3 beacon carrier while on-station up to a maximum boresight EIRP of 93.5 dBW<sup>6</sup> and still remain in compliance with the off-axis EIRP limit in §25.138(a)(4).

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<sup>5</sup> The 68.5 dBW maximum boresight EIRP is derived by adding the nominal EIRP of 50.5 dBW with the margin of 18.0 dB.

<sup>6</sup> The 93.5 dBW maximum boresight EIRP is derived by adding the nominal EIRP of 50.5 dBW with the margin of 43 dB.

#### **4.0 Emergency Operations and In-Orbit Testing**

Once SPACEWAY-3 has been brought on station and tested,<sup>7</sup> Hughes will use the nominal EIRP on the command link that is described in Section 2.1 above, and for the beacon carrier, the link that is described in 3.1 above. Hughes intends to maintain these power levels for the life of the spacecraft. Only in the event of a major satellite emergency resulting in a loss of attitude control or in the loss of the command link via the main receive antenna would Hughes consider increasing the power up to a level that allows communication with the spacecraft through the bicone antenna.<sup>8</sup>

Furthermore, as can be seen in the block diagram of the TT&C system in Figure 1, the beacon carriers can not be received through either the bicone antenna or the pipes. For this reason, there would be no reason for increasing the power of these carriers during an emergency.

Emergencies that might require these operations are very rare. In fact, it is unusual to experience even one such event during the lifetime of a satellite. It is Hughes' intention to conclude coordination agreements with adjacent satellite operators for such potential emergency maneuvers.

#### **5.0 Conclusion**

The calculations provided above demonstrate that the SPACEWAY 3 command carrier, while operating at a nominal EIRP level, will meet the off-axis EIRP density limits set in §25.138(a) with a margin of 23.2 dB for the co-polarization sense, and of 48.2 dB in the cross-polarization sense. For the SPACEWAY 3 beacon carrier, the calculation above found that, at the nominal EIRP, the off-axis EIRP density limits set in §25.138(a) was met with a margin of 18.0 dB for the co-polarization sense and, of 43 dB in the cross-polarization sense.

Through this analysis, Hughes has demonstrated that the command and the beacon carrier can be operated up to an EIRP of 68.5 dBW without exceeding the FCC's off-axis EIRP limits already permitted for Ka-band earth station service links. The beacon carriers can not and will not be

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<sup>7</sup> To the extent that power levels higher than those described herein for routine on-station operations may be required during transfer-orbit operations, such operations are not the subject of the instant space station authorization. SPACEWAY-3 transfer-orbit operations will be handled in the same way technically as the emergency operations that are described in Section 4.0. Commission authority for transfer-orbit operations will be separately requested.

<sup>8</sup> In situations where the main receive antenna is not available to allow the satellite to receive commands, the commands are received either via a bicone antenna or via the pipes. Since the gain of these antennas is significantly lower than the gain of the main receive antenna, much more power needs to be transmitted by the earth station in order for the commands to be successfully received through this routing. In its application, Hughes indicated that a maximum boresight EIRP of 92.7 dBW would be required for this type of operation. See Hughes Amendment, File No. SAT-AMD-20060306-00025, Attachment A, Appendix C, Table C-1.1. The boresight EIRP level for operations through the bicone antenna is 47.4 dB higher than for on-station operations. The off-axis EIRP levels will also rise by the same amount. Thus, while on-station operations are 23.2 dB below the off-axis levels specified in §25.138(a)(1), the level for orbit transfer operations would be as much as 24.2 dB above the off-axis limits. Hughes notes, however, that it would operate only with the power required by the situation, and only for as long as it took to recover the spacecraft and return it to regular operation.

operated at levels that exceed the limits set in §25.138(a) of the FCC's rules at any point during the life of the spacecraft.

**TECHNICAL CERTIFICATE**

I, Steve Doiron, hereby certify, under penalty of perjury, that I am the technically qualified person responsible for the preparation of the technical material contained in the foregoing Modification of License Application of Hughes Communications, Inc. (FCC File No. SAT-MOD-20050523-00106), and that this information is true and correct to the best of my knowledge and belief.

September 1, 2006

By:

  
Steve Doiron

**Explanation of Circumstances of License Revocation**

On August 11, 2006, two earth station licenses issued to HNS Licensee Sub, LLC, Call Signs E030007 and E030008, were declared null and void by action of the Commission.<sup>1</sup> HNS Licensee Sub, LLC is a wholly-owned subsidiary of Hughes Network Systems, LLC, which is, in turn, a wholly-owned subsidiary of Hughes Communications, Inc. ("Hughes"). In the August 11th letter, the Commission also denied companion HNS Licensee Sub, LLC applications to modify the two earth station licenses by extending the construction milestone deadlines.<sup>2</sup> Both modification of license applications had specified the unlaunched status of the Hughes SPACEWAY 3 spacecraft as a reason for the requested extension. The Commission noted that HNS Licensee Sub, LLC had not included the SPACEWAY 3 satellite at 95°W.L. as a point of communication for the earth stations, and found no adequate justification for the extension of the construction milestone relating to the satellites that were included on the two licenses as authorized points of communication.<sup>3</sup>

HNS Licensee Sub, LLC has the full right and opportunity to file a new application for authority to access Hughes' SPACEWAY 3 satellite, for which a license modification was just granted in June 2006. HNS Licensee Sub, LLC intends to submit such an application in due course.

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<sup>1</sup> See Letter dated Aug. 11, 2006, from Scott A. Kotler, Chief, Systems Analysis Branch, International Bureau, to Raymond G. Bender, counsel for HNS, DA 06-1626 ("August 11 Letter").

<sup>2</sup> File Nos. SES-MOD-20060404-00561 and -00562

<sup>3</sup> August 11 Letter, DA-06-1626 at 1-2.