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

In the Matter of **ECHOSTAR SATELLITE OPERATING CORPORATION** Request for Modification of Authorization to Move EchoStar 6 to, and Operate It at, 96.2º W.L.	File No. SAT-MOD-_____ Call Sign S2232

APPLICATION FOR MODIFICATION

EchoStar Satellite Operating Corporation ("EchoStar Satellite" and collectively with its affiliates, "EchoStar") hereby requests modification of its authorization for the EchoStar 6[1] Broadcasting-Satellite Service ("BSS") satellite to operate at the 96.2º W.L. orbital location.[2]

I. BACKGROUND

Launched in 2000, EchoStar 6 is a 32-channel Broadcasting-Satellite Service ("BSS") satellite capable of operating across all 32 ITU Region 2 BSS channels. In 2010, the

[1] EchoStar has already filed an application for special temporary authority ("STA") to relocate EchoStar 6 from the 77º W.L. nominal orbital location and operate it at 96.2º W.L. *See* File No. SAT-STA-20130220-00023 (filed Feb. 20, 2013). EchoStar has also applied for STA to operate three of its transmit/receive earth stations to provide the necessary telemetry, tracking, and control ("TT&C") and feeder-link services to EchoStar 6 during its relocation to, and operation at, 96.2º W.L. *See* File Nos. SES-STA-20130222-00207, Call Sign E080120 (filed Feb. 22, 2013); SES-STA-20130222-00206, Call Sign E020306 (filed Feb. 22, 2013); SES-STA-20130222-00208, Call Sign E070273 (filed Feb. 22, 2013).

[2] EchoStar 6 will be maintained within a ±0.05º longitude station-keeping box, although the satellite will be allowed to operate in an inclined orbit within this box.

Commission extended the license term for EchoStar 6 until August 11, 2014.[3] At the time, assumptions for continued station-kept operations projected a satellite end-of-life that was consistent with the term extension. Since then, however, EchoStar has placed EchoStar 6 in an inclined orbit in the North-South direction, and EchoStar anticipates requesting an additional term extension to accommodate the satellite's extended life as a result of the fuel savings inherent from inclined operations.

EchoStar 6 is in good health. All critical systems are functioning with at least one level of redundancy, and all 32 BSS channels are accessible by the communications payload. EchoStar expects to allow the satellite's inclination to increase naturally in the North-South direction through its end-of-life, and life projections for the satellite have been made with this assumption in mind and consistent with the satellite's approved orbital debris mitigation plan.[4] EchoStar 6 has recently been freed up for other uses because of the successful launch and operation of EchoStar 16.

With its original ITU Region 2 BSS Plan network, Bermuda is assigned 16 channels at the nominal 96.2º W.L. orbital location under the International Telecommunication Union ("ITU") Region 2 BSS and associated Feeder Link Plans. Bermuda also has a pending request

[3] *See* Stamp Grant, Application for Renewal of Authority to Operate EchoStar 6, File No. SAT-MOD-20100720-00164 (granted Dec. 2, 2010).

[4] The Commission approved an orbital debris mitigation plan for EchoStar 6 in 2010. *See* Stamp Grant, Application for Authority to Operate EchoStar 6 as an In-Orbit Spare and Activate Its Communications Payload at 61.65º W.L. as Needed, File No. SAT-A/O-20100203-00019 (granted July 7, 2010). In its proposed modification to the EchoStar 6 authorization, filed concurrently with this letter, EchoStar reiterates its commitment to operate EchoStar 6 consistent with that approved plan and incorporates that plan by reference.

for modification of the BSS Plan, which includes all 32 BSS channels, through its BERMUDASAT-1 satellite network filing.[5]

EchoStar is making this request to accommodate the needs of its customer and development partner, SES Satellites (Bermuda) Ltd. ("SES Bermuda" and along with its affiliates, "SES"), which has been authorized to operate a BSS satellite at 96.2° W.L. under the BERMUDASAT-1 filing. SES and EchoStar intend to use EchoStar 6 to evaluate and develop new market opportunities in the Caribbean, Latin American, and North Atlantic markets outside of the United States. These opportunities include the provision of video programming and other services, including international maritime services, to consumers in Bermuda and elsewhere.

While at 96.2º W.L., EchoStar 6 will operate pursuant to the BERMUDASAT-1 filing as discussed below and any associated coordination agreements, but will remain a U.S.-licensed satellite operating under Commission jurisdiction. Attached as Exhibit 1 to this application is a letter from the Bermuda Department of Telecommunications concurring with this approach.[6] EchoStar also submits a Technical Appendix[7] and Schedule S, which together provide the information required pursuant to Section 25.114 of the Commission's rules.[8] Unless coordination with all affected networks is completed prior to the regulatory deadline for BERMUDASAT-1, SES has committed without reservation that it will work with the Bermuda government to ensure that the BERMUDASAT-1 Part B filing will not affect any DIRECTV

[5] *See* BERMUDASAT-1, published in Special Section AP30-30A/E/389 of IFIC 2553 (20 Sept. 2005).

[6] *See* Exhibit 1: Letter from Jeane Nikolai, Acting Director of Telecommunications, Bermuda Department of Telecommunications, to Fern Jarmulnek, Acting Chief, Satellite Division, International Bureau, Federal Communications Commission (Feb. 20, 2013).

[7] *See* Exhibit 2: Technical Appendix.

[8] *See* 47 C.F.R. § 25.114.

USABSS operations under Appendices 30 and 30A.[9] As a result, absent an agreement for higher levels with DIRECTV, the Part B filing for BERMUDASAT-1 will reflect more conservative operational parameters than the original modification submitted to the ITU in April 2005.

EchoStar 6 has been operating at the Mexican 77° W.L. BSS cluster since February 2011 when it was moved from 72.5° W.L. pursuant to STA granted by the Commission to provide emergency capacity when a single event upset temporarily affected the EchoStar 8 satellite at that location.[10] The recent arrival of QuetzSat-1 at 77° W.L. has allowed improved performance at this location, from which DISH Network and its affiliates continue to provide millions of U.S. and Mexican customers with innovative video programming packages.[11] As a result, EchoStar 6 has now become available for other potential uses in the EchoStar satellite fleet.

For the reasons set forth herein, the grant of this application is in the public interest, is consistent with past precedent, and will not cause harmful interference to any authorized user of the spectrum.

---

[9] *See* Letter from Pantelis Michalopoulos and Stephanie A. Roy, Counsel for EchoStar Satellite Operating Corporation, and Karis A. Hastings, Counsel for SES S.A., to Marlene H. Dortch, Secretary, Federal Communications Commission, *filed in* File No. SAT-STA-20130220-00023, Call Sign 2232 (filed Feb. 27, 2013).

[10] *See* Stamp Grant, File Nos. SAT-STA-20110207-00026 (granted Feb. 11, 2011); SAT-STA-20110225-00036 (granted Mar. 1, 2011); SAT-STA-20110401-00067 (granted Apr. 7, 2011); SAT-STA-20110608-00104 (granted June 14, 2011); *see also* Letter from Petra A. Vorwig, Counsel for EchoStar Corporation, to Marlene H. Dortch, Secretary, FCC, *filed in* File No. SAT-T/C-20090217-00026, Call Sign S2439 (Feb. 1, 2011).

[11] *See* File No. SES-STA-20130109-00027, Call Sign E970336 (granted Jan. 16, 2013).

II. THIS REQUEST IS IN THE PUBLIC INTEREST AND IS CONSISTENT WITH PAST PRECEDENT

The grant of authority to operate EchoStar 6 at 96.2° W.L. will serve the public interest. It has long been the Commission's policy that the public interest is generally furthered by leaving fleet management decisions to satellite operators. As the International Bureau has stated:

> [T]he Commission attempts, when possible, to leave spacecraft design decisions to the space station licensee because the licensee is in a better position to determine how to tailor its system to meet the particular needs of its customers. Consequently the Commission will generally grant a licensee's request to modify its system, provided there are no compelling countervailing public interest considerations.[12]

As a result, the Commission has routinely authorized "satellite operators to rearrange satellites in their fleet to reflect business and customer considerations where no public interest factors are adversely affected."[13] This includes permitting fleet reconfigurations designed to meet demands for capacity outside the United States.[14] Indeed, only a few months ago, the Commission granted two modification requests to operate U.S.-licensed DBS satellites pursuant to non-U.S. ITU filings and assignments.[15]

---

[12] AMSC Subsidiary Corp., Application for Modification of Mobile Satellite Service License and for Modification of Earth Station Licenses, *Order and Authorization*, 13 FCC Rcd. 12316, 12318 ¶ 8 (1998).

[13] *See* SES Americom, Inc., Application for Modification of the AMC-16 Fixed-Satellite Service Space Station to Temporarily Vacate the 85º W.L. Orbital Location and for Telemetry, Tracking and Control Operations During Drift of the AMC-16 to and from the 118.75º W.L. Orbital Location, *Order and Authorization*, 21 FCC Rcd. 3430, 3433 ¶ 8 (2006) (citing Amendment of the Commission's Space Station Licensing Rules and Policies, *Second Report and Order*, 18 FCC Rcd. 12507, 12509 ¶ 7 (2003)).

[14] *See* Intelsat North America LLC, *Stamp Grant*, File No. SAT-T/C-20100112-00009, Call Sign S2159 (granted July 30, 2010); PanAmSat Licensee Corp., *Stamp Grant*, File No. SAT-MOD-20080225-00051, Call Sign S2253 (granted July 22, 2008).

[15] EchoStar Satellite Operating Corporation, *Stamp Grant*, File No. SAT-MOD-2012-0814-00130 (granted Dec. 13, 2012) (granting authority for EchoStar 15 to operate at the nominal 45° W.L. position under the BSS network filings of Brazil); DIRECTV Enterprises, LLC, *Stamp*

SES intends to use EchoStar 6 to evaluate and develop opportunities in the Caribbean, Latin American, and North Atlantic markets outside of the United States. Such evaluation and development activities will include an assessment of the viability of direct-to-home and other services, including international maritime services, from 96.2° W.L.

III. OPERATION OF ECHOSTAR 6 AT 96.2° W.L.WILL NOT CAUSE HARMFUL INTERFERENCE TO OTHER AUTHORIZED SPECTRUM USERS

EchoStar 6's operations at 96.2° W.L. will not cause harmful interference to any authorized user of the spectrum.[16] As set forth in Exhibit 1, EchoStar will operate the satellite with reduced downlink EIRP so as not to "affect" (as defined in Annex 1 of Appendix 30) other operational BSS satellite networks, the nearest of which is more than 4.5 degrees away in the 101° BSS cluster.[17]

Grant, File Nos. SAT-A/O-20120817-00137, SAT-AMD-20120824-00142, SAT-AMD-2012-0913-00148 (granted Dec. 21, 2012) (granting authority for DIRECTV 1R to operate at 55.8° E.L. under the BSS network filings of Russia). For other similar grants, *see* SES Americom, Inc., *Stamp Grant*, File No. SAT-MOD-20111025-00209, Call Sign S2134 (granted Feb. 24, 2012) (requesting modification of its authorization for AMC-2 to provide service exclusively into Sweden pursuant to a Swedish ITU filing); Intelsat License LLC, *Stamp Grant*, File No. SAT-MOD-20110420-00073, Call Sign S2469 (granted Mar. 3, 2012) (requesting modification of its authorization for the Galaxy 26 satellite to provide service to the Middle East pursuant to a Turkish ITU filing).

[16] During EchoStar 6's operations at 96.2º W.L., EchoStar will follow standard industry practices for coordination of TT&C transmission to ensure that operations do not cause harmful interference to any nearby satellite. As the administration under whose frequency reservation EchoStar 6 will be operating, Bermuda is the responsible administration for coordination of the service frequencies. Co-frequency satellites operating within 9 degrees of the 96.2º W.L. orbital location consist of DIRECTV 4S, DIRECTV 8, and DIRECTV 9S (operated by DIRECTV) at the 101° W.L. nominal orbital location, and Nimiq 1, Nimiq 2, and Nimiq 6 (operated by Telesat Canada) at the nominal 91° W.L. orbital location. EchoStar can find no evidence that other BSS Plan networks or other BSS filings with the ITU and within 9 degrees of EchoStar 6's intended orbit are under construction or progressing towards launch.

[17] EchoStar continues to believe that full power, co-coverage BSS operations by satellites operating with only 4.5° orbital separation present unacceptable interference risks unless coordination is successfully completed. *See* Comments of EchoStar Satellite L.L.C., IB Docket

The Commission has approved the operation of co-coverage BSS satellites at separations of less than 4.6 degrees, which is the closest separation in this case.[18] The Commission has allowed such operations on the condition that they do not exceed the coordination triggers of Annex 1 of Appendices 30 and 30A of the ITU Radio Regulations for the protection of other operational BSS networks serving the United States, unless successfully coordinated with potentially affected operators.[19] In particular, such operations must not cause more than a 0.25 dB degradation in overall equivalent protection margins ("OEPM"s) with respect to the reference situation for such other networks. Appendices 1 and 2 of the attached Technical Appendix demonstrate that the proposed operation of EchoStar 6 at 96.2° W.L. will not exceed the coordination triggers. The proposed operations will therefore expand potential service offerings without affecting other BSS networks.

IV. OPERATIONAL PARAMETERS

While EchoStar 6 is at 96.2º W.L., EchoStar agrees to operate the satellite subject to the conditions typically imposed on Commission satellites operating under a non-U.S. ITU filing, including the following:

1. EchoStar will maintain full operational control of EchoStar 6 at all times;

2. EchoStar will operate pursuant to the BERMUDASAT-1 ITU space network filing as discussed above; and

---

No. 06-160, at 5-9; Reply Comments of EchoStar Satellite L.L.C., IB Docket No. 06-160, at 8-9. Because EchoStar proposes to operate EchoStar 6 at reduced power levels, the coordination triggers of Annex 1 to Appendices 30/30A are not triggered, and coordination is not required with the referenced operational parameters.

[18] *See, e.g.*, SES Americom, Inc. Petition for Declaratory Ruling Regarding Direct Broadcast Satellite Service to the U.S. Market from the 105.5º W.L. Orbital Location, *Order*, 28 FCC Rcd. 236 (2013).

[19] *Id.* at ¶ 13 d.

3. EchoStar will comply with the applicable laws, regulations, rules, and licensing procedures of Bermuda while at 96.2º W.L.

V. WAIVER PURSUANT TO SECTION 304 OF THE ACT

In accordance with Section 304 of the Communications Act of 1934, as amended, 47 U.S.C. § 304, EchoStar Satellite hereby waives any claim to the use of any particular frequency or use 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.

VI. CONCLUSION

For the foregoing reasons, EchoStar Satellite respectfully requests grant of the requested modification, so that EchoStar can move and operate EchoStar 6 at the 96.2° W.L. orbital location pursuant to Bermudan authorization.

Respectfully submitted,

/s/

Pantelis Michalopoulos
Stephanie A. Roy
Steptoe & Johnson LLP
1330 Connecticut Avenue, NW
Washington, D.C. 20036
(202) 429-3000
Counsel for EchoStar Satellite Operating Corporation

February 27, 2013

EXHIBIT 1

Letter

GOVERNMENT OF BERMUDA
Ministry of Economic Development
Department of Telecommunications

DOT REF: **DOT206/201/81**
DATE: **February 20, 2013**

Fern Jarmulnek
Acting Chief, Satellite Division
International Bureau
Federal Communications Commission
445 12th Street S.W.
Washington, D.C. 20554

Re: Satellite Operations at 96.2° W.L.

Dear Ms. Jarmulnek:

I hereby confirm that Bermuda has authorized SES Satellites (Bermuda) Ltd. ("SES") to operate satellites in the Ku-band broadcasting-satellite service ("BSS") frequencies (12.2-12.7 GHz downlink / 17.3-17.8 GHz uplink) at the nominal 96.2° W.L. orbital location. I also confirm that SES has advised Bermuda that it intends to operate the FCC-licensed EchoStar VI Ku-band BSS satellite at that orbital location pursuant to a service agreement with EchoStar Satellite Services L.L.C., either directly or through their respective affiliates.

Bermuda supports the operation of the EchoStar VI satellite at the nominal 96.2° W.L. orbital location based on our understanding:

- that the United States will remain the licensing administration for the EchoStar VI satellite for purposes of space object registration with the United Nations and also for purposes of ITU Radio Regulation No.18.1;

- that the FCC will license operations of the EchoStar VI satellite at the nominal 96.2° W.L. orbital location on the condition of neither claiming protection from nor causing interference to other networks, in accordance with ITU Radio Regulation No.4.4, and contingent on compliance with all applicable laws, regulations, rules, and licensing procedures of Bermuda;

- that the EchoStar VI satellite will operate pursuant to the ITU filings and coordination agreements of the Administration of the United Kingdom on behalf of Bermuda and in accordance with the authorisation granted to SES by Bermuda, while it is operating at the nominal 96.2 W.L. orbital location;

4th Floor, Corner House, 20 Church Street HM 12, Bermuda
P.O. Box HM 101, Hamilton HM AX, Bermuda
Phone: (441)292-4595 Fax : (441)295-1462 Email: gtelecom@gov.bm Website: www.gov.bm

- that the respective roles of the relevant authorities in the United States and in Bermuda are in no way prejudiced by the arrangements described in this letter, in particular with regard to the recognition of the coordination status of satellite networks as filed with the ITU and with regard to matters of market access, and that SES and/or EchoStar shall seek due authorisation for access to such markets should they so desire; and

- that while located at the nominal 96.2 W.L. orbital location, TT&C of the EchoStar VI satellite will be performed by EchoStar from earth stations in the United States under the contractual direction and control of SES.

The satellite will be operating pursuant to the following ITU satellite network filings submitted on behalf of Bermuda: BERMUDASAT-1 published in Special Section AP30-30A/E/389 of IFIC 2553 dated 20 September 2005.

Yours sincerely,

Jeane Nikolai

Jeane Nikolai
Acting Director of Telecommunications

4th Floor, Corner House, 20 Church Street HM 12, Bermuda
P.O. Box HM 101, Hamilton HM AX, Bermuda
Phone: (441)292-4595 Fax : (441)295-1462 Email: gtelecom@gov.bm Website: www.gov.bm

EXHIBIT 2

Technical Appendix

1. SCOPE

This Exhibit contains additional information required by Part 25 of the FCC's rules that cannot be entered into the Schedule S submission concerning the proposed operation of the ECHOSTAR-6 satellite at the 96.2° W.L. orbital location.

2. GENERAL DESCRIPTION

The ECHOSTAR-6 satellite will operate at the nominal 96.2° W.L. orbital location, pursuant to an authorization from the Bermuda Department of Telecommunications. The satellite will provide broadcasting-satellite service ("BSS") and other services to Bermuda and parts of the Caribbean.

The ECHOSTAR-6 satellite was designed to provide 32 channels in medium power mode or 16 channels in high power mode. Full frequency re-use is achieved through the use of dual circular polarization. The satellite's frequency plan is identical to that prescribed in the ITU's Region 2 BSS and associated Feeder link Plans.

3. SATELLITE TRANSMIT PERFORMANCE

The downlink beam coverage of the ECHOSTAR-6 satellite from the 96.2° W.L. location is shown in Figure 3-1.[1] The satellite employs two shaped reflectors, each operating in both right-hand circular polarization ("RHCP") and left-hand circular polarization ("LHCP"). The performance in both polarizations is nominally the same. The cross-polar isolation of the satellite transmit antennas exceeds 30 dB at all transmit frequencies. The peak antenna gain is 35.5 dBi.

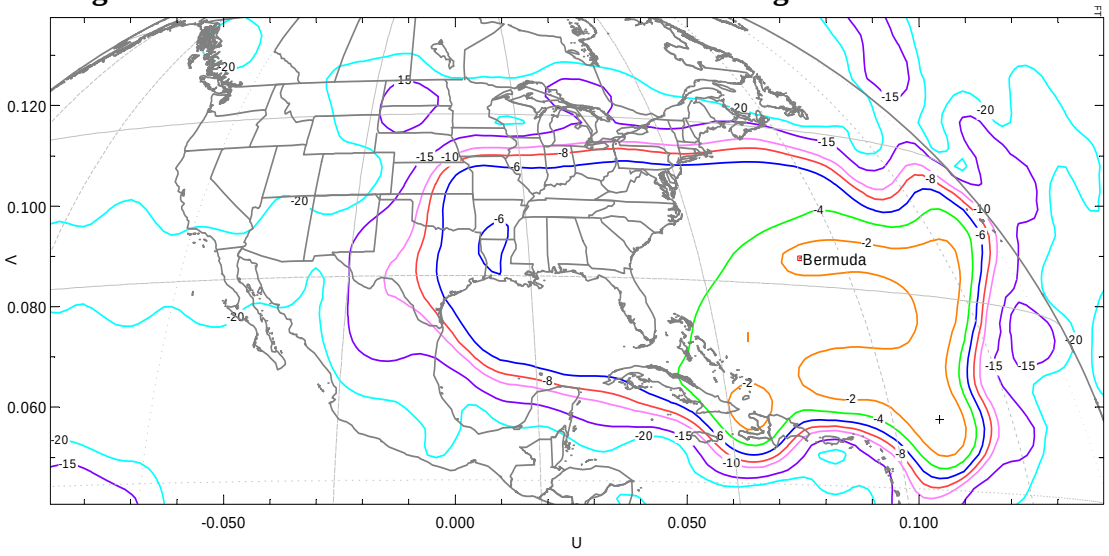
While the satellite was designed to provide 32 channels in medium power mode or 16 channels in high power mode, for operation at 96.2° W.L., the satellite will only be operated in medium power mode. In this mode, the satellite is capable of transmitting with a peak downlink EIRP of 54.7 dBW. However, as explained in section 6 of this Exhibit, the downlink transmissions of

[1] In order to provide service to Bermuda, appropriate pointing bias will be applied to the antennas of the ECHOSTAR-6 satellite.

the ECHOSTAR-6 satellite will be controlled so as to not exceed a peak downlink EIRP of 49.8 dBW in order not to exceed a 0.25 dB change in the overall equivalent protection margin ("OEPM") with respect to any authorized operational adjacent BSS network.

The 0.25 dB of change to the OEPM is one of the coordination criteria in Annex 1 to Appendices 30 and 30A of the ITU Radio Regulations and it is used to determine whether other Region 2 BSS networks are potentially affected and thus whether coordination is required. If the change to the OEPM is less than 0.25 dB with respect to any authorized operational adjacent BSS network, as is the case when the ECHOSTAR-6 satellite is operated as proposed herein, then there is no requirement for coordination. This is also the technical criteria used by the Commission to evaluate DBS applications and determine if coordination is required with any US DBS systems.

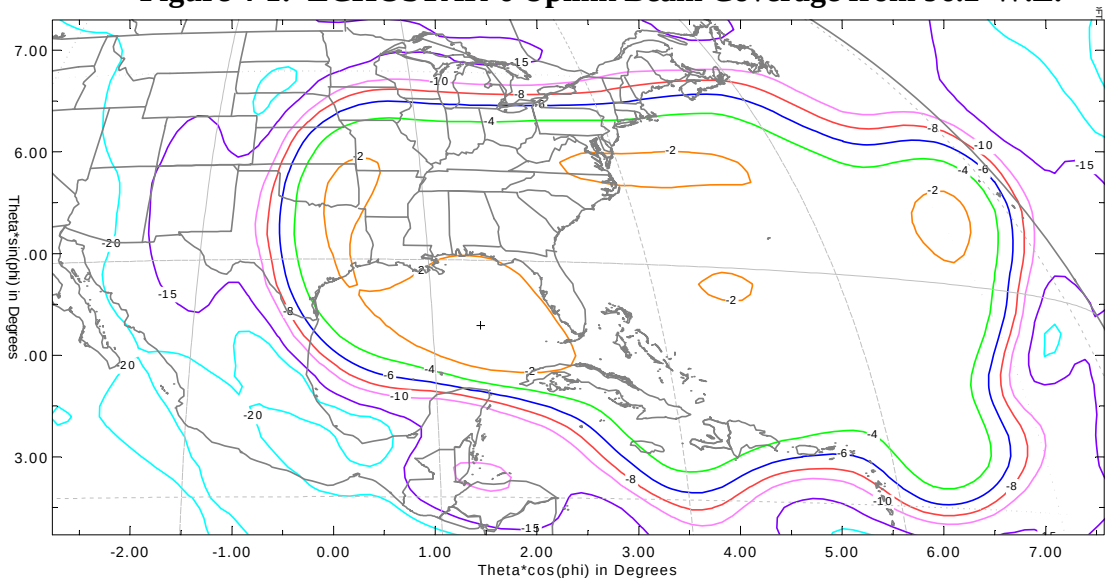
Figure 3-1: ECHOSTAR-6 Downlink Beam Coverage from 96.2°W.L.



4. SATELLITE RECEIVE PERFORMANCE

This uplink beam operates in both RHCP and LHCP. The antenna gain contours of the beam are shown in Figure 4-1. The performance in both polarizations is nominally the same. The peak gain of the beam is 33.8 dBi, with a noise temperature of 590K, for a peak G/T of 6.1 dB/K.

Figure 4-1: ECHOSTAR-6 Uplink Beam Coverage from 96.2°W.L.



5 TELEMETRY, TRACKING AND CONTROL (TT&C)

Details of the telemetry, tracking, and control ("TT&C") subsystem for use during on-station, drifts, and emergencies are given in Table 5-1.

Table 5-1: TT&C Subsystem Details

Parameter	Performance
On-Station Command Frequency	17,305 MHz
Uplink Flux Density	Between -88 and -108 dBW/m^2
Uplink Polarization	LHCP
On-Station Telemetry Frequencies	12,203 MHz 12,204 MHz
Maximum Downlink EIRP	16.0 dBW
Downlink Polarization	LHCP

Spacecraft TT&C functions will take place from EchoStar's TT&C facilities located in Mt. Jackson, VA and Gilbert, AZ.

6. RECEIVER AND TRANSMITTER CHANNEL FILTER RESPONSE CHARACTERISTICS

The typical receiver and transmitter frequency responses of each RF channel, as measured between the receive antenna input and transmit antenna, fall within the limits shown in Table 6-1 below.

In addition, the frequency tolerances of Section 25.202(e) and the out-of-band emission limits of Section 25.202(f) (1), (2) and (3) of the Commission's rules will be met; 47 C.F.R. §§ 25.202(e), (f)(1), (f)(2), (f)(3).

Table 6-1: Typical Receiver and Transmitter Filter Responses

Offset from Channel Center Frequency (MHz)	Receiver Filter Response (dB)	Transmitter Filter Response (dB)
± 5	> -0.5	> -0.4
± 7	> -0.7	> -0.5
±9	> -1.0	> -0.8
± 11	> -1.5	> -1.7
±12	> -2.0	> -3.6
±17.5	< -18	< -8
±20.2	< -38	< -18
±27.2	< -50	< -35

7. CESSATION OF EMISSIONS

Each active satellite transmission chain (channel amplifiers and associated TWTA's) can be individually turned on and off by ground telecommand, thereby causing cessation of emissions from the satellite, as required.

8. LINK BUDGETS

Representative link budgets for the BSS transmissions, which include details of the transmission characteristics, performance objectives, assumed interference environment and earth station characteristics, are provided in the associated Schedule S submission. Link budgets for the TT&C transmissions are also included therein.

9. SPACECRAFT DESCRIPTION

The ECHOSTAR-6 satellite's characteristics, including its physical and electrical characteristics, are described in the associated Schedule S form.

10. ORBITAL DEBRIS MITIGATION PLAN

10.1 Spacecraft Hardware Design

EchoStar incorporates by reference Section 10.1 of the Technical Appendix submitted in File No. SAT-A/O-20100203-00019 (granted July 7, 2010).

10.2 Minimizing Accidental Explosions

EchoStar incorporates by reference Section 10.2 of the Technical Appendix submitted in File No. SAT-A/O-20100203-00019 (granted July 7, 2010).

10.3 Safe Flight Profiles

In considering current and planned satellites that may have a station-keeping volume that overlaps the ECHOSTAR-6 satellite at 96.2° W.L., EchoStar has reviewed the lists of FCC

licensed satellite networks, pending applications and non-UK (Bermuda) networks that have been submitted to the ITU within ±0.15 degrees from 96.2° W.L..

The review shows that there are no Commission-authorized or operational satellites within ±0.15 degrees of 96.2° W.L., there are no pending applications before the Commission seeking authorization for a location within this sub-arc, and there are no non-UK (Bermuda) ITU filings within this sub-arc.

Accordingly, there is no requirement for EchoStar to physically coordinate the ECHOSTAR-6 satellite with another satellite operator at the present time.

10.4 Post Mission Disposal

EchoStar incorporates by reference Section 10.4 of the Technical Appendix submitted in File No. SAT-A/O-20100203-00019 (granted July 7, 2010).

11. INTERFERENCE ANALYSES - ANNEX 1 TO APPENDICES 30 AND 30A

The ECHOSTAR-6 satellite at 96.2° W.L. will operate under authority of the UK (Bermuda) administration. The UK administration will be responsible for coordination of the ECHOSTAR-6 satellite under the BERMUDASAT-1 filing following the Appendix 30 and 30A ITU procedures.

Section 25.114(d)(13) of the Commission's rules provides the sharing rules for BSS networks, which require an assessment of the proposed operation vis-a-vis the criteria found in Annex 1 to Appendices 30 and 30A of the ITU Radio Regulations. Annex 1 of these Appendices provides coordination criteria to determine whether an adjacent satellite network is deemed to be affected by a newly proposed satellite network and thus whether coordination would be required. Appendices 1 and 2 to this Exhibit provide the results of the analyses required by Annex 1 to Appendices 30 and 30A using the transmission parameters of the ECHOSTAR-6 satellite network with a peak downlink EIRP of 49.8 dBW. For MSPACE purposes, the uplink was assumed to originate from EchoStar's Mt. Jackson, VA facility and with a maximum uplink EIRP of 85 dBW. Also, the MSPACE analysis assumed that all assignments in the BSS and feeder link Plan (i.e., all 32 BSS channels) were implemented via the ECHOSTAR-6.

Annex 1 to Appendix 1 shows the results of the MSPACE analysis. These results are discussed below:

- The most significant result is that no USA or Canadian networks are affected (nor is any other operational BSS network). DirecTV operates satellites within the 101° W.L. cluster and Telesat Canada operates satellites within the 91° W.L. cluster. The MSPACE results demonstrate that these immediately adjacent authorized satellite networks will not receive interference in excess of the coordination criteria in Annex 1 to Appendices 30 and 30A of the ITU Radio Regulations when the ECHOSTAR-6 satellite is operated as described herein. Specifically, the analysis demonstrates that these adjacent networks will not experience an increase of more than 0.25 dB to their OEPM. These results arise because of the reduced downlink EIRP of the ECHOSTAR-6 satellite (i.e., 54.7 dBW reduced to 49.8 dBW), coupled with a downlink beam roll-off of approximately 5 dB towards virtually all of CONUS and an approximately 10 dB roll-off towards virtually all of Canada. Note that the satellite would be operated with higher downlink EIRP levels in the event that successful coordination with the adjacent operators allowed for an increase.

- Jamaica's three Plan networks at the nominal 92.5°W.L. location are deemed to be affected. However, there is no discernible evidence that any of these networks are under construction or progressing towards launch. In the event any of these networks were to be launched, and in the absence of a coordination agreement with Jamaica, the downlink emissions from the ECHOSTAR-6 satellite would be reduced so as to meet the criteria of Appendices 30 and 30A.

The preceding demonstrates that the ECHOSTAR-6 satellite, when operated as proposed, does not exceed the allowable change to the OEPM of any adjacent operational BSS satellite network. Appendices 1 and 2 to this Exhibit show that all other criteria of Annex 1 to Appendices 30 and 30A are also met.

CERTIFICATION OF PERSON RESPONSIBLE FOR PREPARING ENGINEERING INFORMATION

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in this application, that I am familiar with Part 25 of the Commission's rules, that I have either prepared or reviewed the engineering information submitted in this application and that it is complete and accurate to the best of my knowledge and belief.

/s/

Kimberly Baum
VP, Spectrum Management
& Development Americas
SES Americom, Inc.
Washington, DC, USA
(202) 478-7120

/s/

Jaime Londono
VP, Advanced Programs
& Spectrum Management
EchoStar Satellite Services L.L.C.
Englewood, CO, USA
(303) 706-4650

Appendix 1

Analysis of Annex 1 of Appendix 30

1 Limits for the interference into frequency assignments in conformity with the Regions 1 and 3 Plan or with the Regions 1 and 3 List or into new or modified assignments in the Regions 1 and 3 List

Not Applicable to Region 2.

2 Limits to the change in the overall equivalent protection margin for frequency assignments in conformity with the Region 2 plan

With respect to § 4.2.3 c) of Article 4, an administration in Region 2 is considered as being affected if the overall equivalent protection margin corresponding to a test point of its entry in the Region 2 Plan, including the cumulative effect of any previous modification to that Plan or any previous agreement, falls more than 0.25 dB below 0 dB, or, if already negative, more than 0.25 dB below the value resulting from:

- *the Region 2 Plan as established by the 1983 Conference; or*
- *a modification of the assignment in accordance with this Appendix; or*
- *a new entry in the Region 2 Plan under Article 4; or*
- *any agreement reached in accordance with this Appendix. (WRC-03)*

Annex 1 to this Appendix shows the MSPACE results using the technical characteristics of the ECHOSTAR-6 satellite, as proposed, and using IFIC 2734.

3 Limits to the change in the power flux-density to protect the broadcasting-satellite service in Regions 1 and 2 in the band 12.2-12.5 GHz and in Region 3 in the band 12.5-12.7 GHz

With respect to § 4.2.3 a), 4.2.3 b) or 4.2.3 f) of Article 4, as appropriate, an administration in Region 1 or 3 is considered as being affected if the proposed modification to the Region 2 Plan would result in exceeding the following power flux-density values, at any test point in the service area of its overlapping frequency assignments:

-147 dB(W/(m^2 · 27 MHz))	for $0° \le \theta < 0.23°$
$-135.7 + 17.74 \log \theta$ dB(W/(m^2 · 27 MHz))	for $0.23° \le \theta < 2.0°$
$-136.7 + 1.66\ \theta^2$ dB(W/(m^2 · 27 MHz))	for $2.0° \le \theta < 3.59°$
$-129.2 + 25 \log \theta$ dB(W/(m^2 · 27 MHz))	for $3.59° \le \theta < 10.57°$
-103.6 dB(W/(m^2 · 27 MHz))	for $10.57° \le \theta$

where θ is the minimum geocentric orbital separation in degrees between the wanted and interfering space stations, taking into account the respective East-West station-keeping accuracies. (WRC-03)

The closest Regions 1 and 3 BSS network is greater than 10.57 degrees from the 96.2°W.L. location, therefore the –103.6 dB(W/(m^2 . 27 MHz)) PFD level applies. The GIMS Appendix 30 PFD tool was used to assess compliance with this Section. Using the antenna gain contours and power levels of the ECHOSTAR-6 satellite, the GIMS PFD tool showed that no administrations are affected (and with a minimum 9 dB margin). Therefore the ECHOSTAR-6 satellite network is compliant with this Section.

4 Limits to the power flux-density to protect the terrestrial services of other administrations

With respect to § 4.1.1 d) of Article 4, an administration in Region 1, 2 or 3 is considered as being affected if the consequence of the proposed modified assignment in the Regions 1 and 3 List is to increase the power flux-density arriving on any part of the territory of that administration by more than 0.25 dB over that resulting from that frequency assignment in the Plan or List for Regions 1 and 3 as established by WRC-2000. The same administration is considered as not being affected if the value of the power flux-density anywhere in its territory does not exceed the limits expressed below.

With respect to § 4.2.3 d) of Article 4, an administration in Region 1, 2 or 3 is considered as being affected if the consequence of the proposed modification to an existing assignment in the Region 2 Plan is to increase the power flux-density arriving on any part of the territory of that administration by more than 0.25 dB over that resulting from that frequency assignment in the Region 2 Plan at the time of entry into force of the Final Acts of the 1985 Conference. The same administration is considered as not being affected if the value of the power flux-density anywhere in its territory does not exceed the limits expressed below.

With respect to § 4.1.1 d) or § 4.2.3 d) of Article 4, an administration in Region 1, 2 or 3 is considered as being affected if the proposed new assignment in the Regions 1 and 3 List, or if the proposed new frequency assignment in the Region 2 Plan, would result in exceeding a power flux-density, for any angle of arrival, at any point on its territory, of:

$$\begin{aligned} &-148 \quad dB(W/(m^2 \cdot 4\ kHz)) && \text{for} \quad \theta \le 5^\circ \\ &-148 + 0.5\,(\theta - 5) \quad dB(W(m^2 \cdot 4\ kHz) && \text{for} \quad 5^\circ < \theta \le 25^\circ \\ &-138 \quad dB(W/(m^2 \cdot 4\ kHz)) && \text{for} \quad 25^\circ < \theta \le 90^\circ \end{aligned}$$

where θ represents the angle of arrival. (WRC-03)

The GIMS PFD tool was used to determine that the ECHOSTAR-6 satellite network complies with the above PFD limits and with a minimum 12 dB margin.

5 Limits to the change in the power flux-density of assignments in the Regions 1 and 3 Plan or List to protect the fixed-satellite service (space-to-Earth) in the band 11.7-12.2 GHz in Region 2 or in the band 12.2-12.5 GHz in Region 3, and of assignments in the Region 2 Plan to protect the fixed-satellite service (space-to-Earth) in the band 12.5-12.7 GHz in Region 1 and in the band 12.2-12.7 GHz in Region 3

With respect to § 4.1.1 e) of Article 4, an administration is considered as being affected if the proposed new or modified assignment in the Regions 1 and 3 List would result in an increase in the power flux-density over any portion of the service area of its overlapping frequency assignments in the fixed-satellite service in Region 2 or Region 3 of 0.25 dB or more above that resulting from the frequency assignments in the Plan or List for Regions 1 and 3 as established by WRC-2000.

With respect to § 4.2.3 e), an administration is considered as being affected if the proposed modification to the Region 2 Plan would result in an increase in the power flux-density over any portion of the service area of its overlapping frequency assignments in the fixed-satellite service in Region 1 or 3 of 0.25 dB or more above that resulting from the frequency assignments in the Region 2 Plan at the time of entry into force of the Final Acts of the 1985 Conference.

With respect to § 4.1.1 e) or 4.2.3 e) of Article 4, with the exception of cases covered by Note 1 below, an administration is considered as not being affected if the proposed new or modified assignment in the Regions 1 and 3 List, or if a proposed modification to the Region 2 Plan, gives a power flux-density anywhere over any portion of the service area of its overlapping frequency assignments in the fixed-satellite service in Region 1, 2 or 3 of less than:

-186.5 dB(W/(m^2 · 40 kHz))	for $0° \le \theta < 0.054°$
$-164.0 + 17.74 \log \theta$ dB(W/(m^2 · 40 kHz))	for $0.054° \le \theta < 2.0°$
$-165.0 + 1.66\ \theta^2$ dB(W/(m^2 · 40 kHz))	for $2.0° \le \theta < 3.59°$
$-157.5 + 25 \log \theta$ dB(W/(m^2 · 40 kHz))	for $3.59° \le \theta < 10.57°$
-131.9 dB(W/(m^2 · 40 kHz))	for $10.57° \le \theta$

where θ is the minimum geocentric orbital separation in degrees between the wanted and interfering space stations, taking into account the respective East-West station-keeping accuracies.

The GIMS PFD tool was used to verify compliance with this Section. All Regions 1 and 3 FSS satellites are greater than 10.57° from the 96.2° W.L. location, therefore the –131.9 dB (W/(m^2 . 40 kHz)) level applies. The result of the GIMS PFD analysis shows that no administrations are affected and with a minimum 8.9 dB margin. Therefore the ECHOSTAR-6 satellite network is compliant with this Section.

6 Limits to the change in equivalent noise temperature to protect the fixed-satellite service (Earth-to-space) in Region 1 from modifications to the Region 2 Plan in the band 12.5-12.7 GHz

With respect to § 4.2.3 e) of Article 4, an administration of Region 1 is considered as being affected if the proposed modification to the Region 2 Plan would result in:

- *the value of ΔT / T resulting from the proposed modification is greater than the value of ΔT / T resulting from the assignment in the Region 2 Plan as of the date of entry into force of the Final Acts of the 1985 Conference; and*
- *the value of ΔT / T resulting from the proposed modification exceeds 6%, using the method of Appendix **8** (Case II). (WRC-03)*

From a review of the available ITU space network databases there are no assignments registered in the Earth-to-space direction in the frequency band 12.5-12.7 GHz. Therefore no Region 1 space stations can be affected and hence the ECHOSTAR-6 satellite network is compliant with this Section.

Annex 1 to Appendix 1

ECHOSTAR-6 MSPACE Results

Admin	Orbital Position (°W)	Network	Max. OEPM Degradation (dB)
JMC	**92.3**	**CRBBAH01**	**0.666**
JMC	**92.3**	**CRBBER01**	**0.788**
JMC	**92.7**	**JMC00002**	**0.434**

Appendix 2

Analysis of Annex 1 of Appendix 30A

1 Limits to the change in the overall equivalent protection margin with respect to frequency assignments in conformity with the Region 2 feeder-link Plan (WRC-2000)

*With respect to the modification to the Region 2 feeder-link Plan and when it is necessary under this Appendix to seek the agreement of any other administration of Region 2, except in cases covered by Resolution **42 (Rev.WRC-03)**, an administration is considered as being affected if the overall equivalent protection margin corresponding to a test point of its entry in that Plan, including the cumulative effect of any previous modification to that Plan or any previous agreement, falls more than 0.25 dB below 0 dB, or, if already negative, more than 0.25 dB below the value resulting from:*

- *the feeder-link Plan as established by the 1983 Conference; or*
- *a modification of the assignment in accordance with this Appendix; or*
- *a new entry in the feeder-link Plan under Article 4; or*
- *any agreement reached in accordance with this Appendix except for Resolution **42 (Rev.WRC-03)**. (WRC-03)*

See the results shown in Annex 1 to Appendix 1 (MSPACE results).

2 Limits to the interference into frequency assignments in conformity with the Regions 1 and 3 feeder-link Plan or with the Regions 1 and 3 feeder-link List or proposed new or modified assignments in the Regions 1 and 3 feeder-link List (WRC-03)

Not Applicable to Region 2.

3 Limits applicable to protect a frequency assignment in the bands 17.3-18.1 GHz (Regions 1 and 3) and 17.3-17.8 GHz (Region 2) to a receiving space station in the fixed-satellite service (Earth-to-space)

*An administration in Region 1 or 3 is considered as being affected by a proposed modification in Region 2, with respect to § 4.2.2 a) or 4.2.2 b) of Article 4, or an administration in Region 2 is considered as being affected by a proposed new or modified assignment in the Regions 1 and 3 feeder-link List, with respect to § 4.1.1 c) of Article 4, when the power flux-density arriving at the receiving space station of a broadcasting-satellite feeder-link would cause an increase in the noise temperature of the feeder-link space station which exceeds the threshold value of Δ T / T corresponding to 6%, where Δ T / T is calculated in accordance with the method given in Appendix **8**, except that the maximum power densities per hertz averaged over the worst 1 MHz are replaced by power densities per hertz averaged over the necessary bandwidth of the feeder-link carriers. (WRC-03)*

The following table shows the results of Δ T/T calculations for the closest Regions 1 and 3 feeder link space stations, based on the Region 1 and 3 Plan and List. As shown the Δ T/T's are well below the allowed 6% level. Therefore the ECHOSTAR-6 satellite network is in compliance with this Section.

Closest Region 1 or 3 Feeder Link Space Station			E/S Lat (°N)	E/S Long (°E)	Range (km)	E/S Gain towards Victim Satellite (dBi)	Victim Satellite Rx System Noise Temp (K)	Calculated ΔT/T (%)
Network Name	Orbital Position (°E)	Peak Receive Antenna Gain (dBi)						
IRL21100	-37.2	48.08	38.8	-78.6	38788	-10	600	0.31%
NGR11500	-37.2	38.47	38.8	-78.6	38788	-10	600	0.34%
AND34100	-37	48.88	38.8	-78.6	38788	-10	600	0.03%
GMB30200	-37	47.69	38.8	-78.6	38800	-10	600	0.41%
GUI19200	-37	42.29	38.8	-78.6	38800	-10	600	0.09%
POR__100	-37	47.17	38.8	-78.6	38800	-10	600	0.28%
MTN__100	-36.8	37.55	38.8	-78.6	38813	-10	600	0.03%
SMR31100	-36.8	48.88	38.8	-78.6	38813	-10	600	0.41%

4 Limits applicable to protect a frequency assignment in the band 17.8-18.1 GHz (Region 2) to a receiving feeder-link space station in the fixed-satellite service (Earth-to-space) (WRC-03)

*With respect to § 4.1.1 d) of Article 4, an administration is considered affected by a proposed new or modified assignment in the Regions 1 and 3 feeder-link List when the power flux-density arriving at the receiving space station of a broadcasting-satellite feeder-link in Region 2 of that administration would cause an increase in the noise temperature of the receiving feeder-link space station which exceeds the threshold value of ΔT/T corresponding to 6%, where ΔT/T is calculated in accordance with the method given in Appendix **8**, except that the maximum power densities per hertz averaged over the worst 1 MHz are replaced by power densities per hertz averaged over the necessary bandwidth of the feeder-link carriers. (WRC-03)*

Not Applicable to Region 2.