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

In the Matter of **EchoStar Satellite Operating Corporation** Application for Authority to Launch and Operate the ECHO-45W Satellite at 45.1º W.L.	File No. SAT-LOA-2012____-____

APPLICATION FOR LAUNCH AND OPERATING AUTHORITY

Pursuant to Sections 308, 309, and 319 of the Communications Act of 1934, as amended,[1] and Part 25 of the Commission's rules,[2] EchoStar Satellite Operating Corporation ("ESOC," and collectively with its affiliates, "EchoStar") hereby requests authority to launch and operate a Fixed-Satellite Service ("FSS") satellite using frequencies allotted under Appendix 30B of the International Telecommunication Union ("ITU") Radio Regulations at the nominal 45º W.L. orbital location ("ECHO-45W").[3] The satellite will be used to more fully develop the nominal 45º W.L. orbital location across a number of bands. Specifically, EchoStar's affiliate was the high bidder at an auction held by the Brazilian administration for the right to provide Broadcasting-Satellite Service ("BSS") to Brazilian consumers from the nominal 45º W.L. orbital location. EchoStar seeks to complement and support its affiliate's BSS operations at the nominal 45º W.L. orbital location with Ku-band capabilities as described herein.

[1] 47 U.S.C. §§ 308, 309, 319.

[2] 47 C.F.R. Part 25.

[3] ECHO-45W will operate at the 45.1º W.L. orbital location with a 0.05º station-keeping margin.

The proposed U.S.-licensed Appendix 30B satellite will be used to provide international service complementing the BSS that will be provided by EchoStar's affiliate pursuant to a Brazilian license. ECHO-45W will primarily receive uplinks from the United States for transmission to programming centers in Brazil, ultimately for distribution to Brazilian customers using the Brazilian-licensed BSS satellite.[4] Secondarily, ECHO-45W may be used for backhaul service for EchoStar affiliates or for third parties and for the provision of direct-to-home ("DTH") service in Brazil (subject to the approval of such services by the Brazilian administration). In both cases, the satellite will expand the offerings of a U.S. satellite service provider and cater to the demand of the Brazilian consuming public for U.S.-originated programming.

I. INTRODUCTION AND BACKGROUND

EchoStar is a leading satellite services provider. EchoStar uses its seven owned or leased in-orbit satellites to provide Direct-Broadcast Satellite ("DBS"), BSS, and FSS capacity to its customers, including DISH Network L.L.C. ("DISH Network"), which is the operator of the DISH Network television service, the nation's third-largest subscription television service with over 14 million subscribers. Recently, EchoStar acquired Hughes Network Systems, Inc. ("Hughes"), the leading direct-to-home ("DTH") service provider in North America with over 620,000 consumer and small business subscribers. Through Hughes's wholly owned Brazilian

[4] The nominal 45º W.L. slot is allocated to Brazil for BSS under the Appendix 30 (but not 30B) plan. The current Brazilian request for modification of the plan contemplates use of the 44.9º W.L. orbital location. EchoStar is exploring the possibility of instead locating the BSS satellite, too, at 45.1º W.L. (which is fully within the Brazilian orbital cluster). Should this become authorized by the Brazilian Administration, EchoStar may consider an amendment to this application to move some or all of the frequencies requested to a hybrid BSS/FSS Ku-band satellite. *See, e.g.*, Lockheed Martin, *Order and Authorization*, 20 FCC Rcd. 14558 ¶ 11 (2005); Intelsat North America LLC, *Stamp Grant*, File No. SAT-A/O-20091208-00141 (granted June 4, 2010).

subsidiary, HNS Americas Comunicações Ltda. ("HNSA"), EchoStar has obtained authority to provide BSS services into Brazil from the nominal 45º W.L. orbital location from Agência Nacional de Telecomunicações ("Anatel"), the sole telecommunications regulator in Brazil. Consistent with Anatel's requirements, EchoStar is planning to build and launch a state-of-the-art BSS satellite to the nominal 45º W.L. orbital location. To support these BSS operations, and to take fuller advantage of the nominal 45º W.L. orbital location across several bands, EchoStar seeks authority to launch a new FSS satellite.

As a result, EchoStar requests authority to build the ECHO-45W satellite, launch it to the nominal 45º W.L. orbital location, and operate it there using the ITU Radio Regulations Appendix 30B Ku-bands: 12.75-13.25 GHz, 10.7-10.95 GHz, and 11.2-11.45 GHz. The satellite will use these frequencies over a series of sixteen transponders operating over 115 MHz channels reconfigurable to access 8 channels in each of the satellite's North and South American beams.

The Technical Appendix is attached, providing the information required pursuant to Section 25.114 of the Commission's rules.[5] EchoStar also requests that the United States promptly submit the Article 4 information for the ECHO-45W satellite as required by Article 6.1 of Appendix 30B of the ITU Radio Regulations to introduce an additional system into the Appendix 30B Plan.

II. THIS REQUEST IS IN THE PUBLIC INTEREST AND WILL NOT CAUSE HARMFUL INTERFERENCE

Grant of this application will serve the public interest by facilitating the provision of U.S.-originated programming from the nominal 45º W.L. orbital location—primarily the transmission of U.S.-originated programming, directly or indirectly, to Brazilian customers.

[5] *Id.* § 25.114.

EchoStar intends to use its BSS capabilities at the nominal 45º W.L. orbital location primarily for the purpose of providing satellite television programming to consumers in Brazil, and to use the ECHO-45W satellite for the purpose of supporting those Brazilian BSS operations with U.S.-Brazilian backhaul operations. As a result, EchoStar will be able to take advantage of an attractive avenue for bringing U.S. satellite services to international audiences throughout North and South America. As the market develops, EchoStar may also use these FSS capabilities to provide DTH service direct to Brazil, as well as to provide backhaul services to other parties. Grant of this application is consistent the Commission's policy toward applications to provide international services from U.S.-licensed satellites.[6]

Nor will the grant of the requested authority cause harmful interference to any authorized user of the spectrum. Presently, no satellites operate over the referenced Ku-band frequencies within two degrees of 45.1º W.L. The only Ku-band satellites operating within 2 degrees of 45.1º W.L. are Intelsat 14 at 45.0º W.L. and NSS-703 at 47.05º W.L., but neither operates nor is Commission authorized to operate on frequencies that would overlap with those proposed for ECHO-45W. The nearest co-frequency satellite is Intelsat 11 at 43.0 W.L., at more than two degrees of separation from ECHO-45W. Nevertheless, the attached Technical Appendix demonstrates that operation of ECHO-45W would not cause harmful interference into the Intelsat 11 satellite even if it were operating at only 2 degrees of separation. In any event, coordination between ECHO-45W and any affected satellite system, including currently filed-

[6] *See, e.g.*, Intelsat North America LLC, Call Sign S2750, File No. SAT-LOA-20080416-00085 (granted) (granting authority to build and launch the Intelsat 16 satellite, with a primary service area of Mexico, the Caribbean, and Central America); Intelsat North America, LLC, Call Sign S2804, File No. SAT-A/O-20091223-00151 (granted Apr. 2, 2010) (granting authority to operate Intelsat 25 under U.S. flag to provide service to Asia, Africa, as well as the western United States from 31.5º W.L.); SES Americom, Inc., Call Sign 2434, File No. SAT-LOA-20020114-00008 (granted Sept. 3, 2004) (granting authority to launch AMC-9 to provide service to Canada and Mexico, as well as the United States).

but-unlaunched satellite systems, will be conducted in accordance with Commission rules and ITU Radio Regulations.

III. THE APPLICATION SATISFIES ALL COMMISSION RULES

A. EchoStar Is Legally Qualified

EchoStar is legally qualified to hold the space station authorization requested in this application.[7] The material provided in the attached Form 312 and the attached exhibits demonstrates EchoStar's compliance with the Commission's basic legal qualifications. In addition, EchoStar already holds several Commission satellite licenses, and its legal qualifications are a matter of record before the Commission. Indeed, the Commission recently approved the transfer of control of licenses held by Hughes Network Systems, LLC to EchoStar[8] and, more recently, approved EchoStar's request to authorize the launch and operation of EchoStar 16 at 61.5º W.L.[9]

B. EchoStar Is Technically Qualified

In the attached Form 312, Schedule S, and Technical Appendix, EchoStar demonstrates that it is technically qualified to hold the authorization requested herein. Specially, EchoStar provides the technical information for the ECHO-45W satellite that is required to be submitted pursuant to Part 25 of the Commission's rules.[10] In addition, EchoStar's Technical Appendix

[7] Section 25.159(a) of the Commission's rules limit pending satellite applications or licensed-but-unbuilt satellite authorizations to a maximum of five for any particular frequency band. 47 C.F.R. § 25.159(a). This is EchoStar's only pending application for Ku-band frequencies, and it has no authorized-but-unlaunched satellites in the Ku-bands.

[8] *See* BRH Holdings GP, Ltd, Transferor and EchoStar Corporation, Transferee, IB Docket No. 11-55, *Order*, DA 11-1005 (rel. June 8, 2011).

[9] *Grant Stamp*, File No. SAT-LOA-20110902-00172 (granted June 22, 2012).

[10] 47 C.F.R. § 25.114.

provides information on its compliance with the Commission's orbital debris mitigation rules,[11] including a plan for safe stationkeeping.[12]

C. Other Requirements

EchoStar also meets all other applicable space station licensing requirements. Under the Commission's first-come, first-served policy for GSO-like satellites, this application qualifies for grant because EchoStar will operate the ECHO-45W satellite in a manner that will not cause harmful interference to any previously licensed operations.[13] In addition, EchoStar is committed to meeting the milestone schedule set forth in the Commission's rules.[14] Accordingly, EchoStar plans to implement its ECHO-45W satellite on the following timetable: (i) execute a binding contract for construction of its satellite prior to the one year anniversary of the grant of this authorization; (ii) complete critical design review for the spacecraft within two years of grant; (iii) commence physical construction within three years of grant; and (iv) launch the satellite and begin operations within five years of grant. EchoStar will also comply with the bond posting requirement.[15] The satellite will be operated on a non-common carrier basis.

D. This Application Is Subject to First Come, First Served Processing

First come, first served processing is applicable to this request. Under the *First Come, First Served Order*, all satellite applications other than for DBS and Digital Audio Radio Service

---

[11] *Id.* § 25.114(d)(14).

[12] *Id.* § 25.114(d)(14)(iii).

[13] *Id.* § 25.158.

[14] *Id.* § 25.164.

[15] *Id.* § 25.165.

are subject to processing and grant in the order in which they are received.[16] And the Commission has previously applied the first come, first served procedures specifically to requests to use extended Ku-band frequencies, including those frequencies enumerated in Appendix 30B.[17]

IV. PROVISION OF INTERNATIONAL SERVICE CONSISTENT WITH FOOTNOTE 2 OF SECTION 25.202(A)(1) AND FOOTNOTE NG104 OF THE TABLE OF ALLOCATIONS

The proposed application satisfies all applicable requirements, including footnote NG104 of the Table of Allocations and footnote 2 of Section 25.202(a)(1), which limit FSS operations in these bands to international service only.[18] In particular, ECHO-45W will be primarily used to receive uplinks from the United States and either backhaul them to Brazilian programming centers or transmit them direct to homes in Brazil. Should market conditions develop and EchoStar decide at some later point to provide domestic service into the United States using ECHO-45W, it will request a waiver of footnote NG104 as appropriate.[19]

---

[16] Amendment of the Commission's Space Station Licensing Rules and Policies; Mitigation of Orbital Debris, *First Report and Order*, 18 FCC Rcd. 10760, 10764 n.4 (2003).

[17] *See* EchoStar Satellite LLC; Application for Authority to Construct, Launch, and Operate a Geostationary Satellite Using the Extended Ku-band Frequencies in the Fixed-Satellite Service at the 101 [degrees] W.L. Orbital Location, *Order*, 20 FCC Rcd. 12027 (2005) (denying EchoStar's second-in-line request to use extended Ku-Band frequencies at the 101º W.L. orbital location).

[18] 47 C.F.R. § 2.106 n. NG104; *id.* § 25.202(a)(1) n.2.

[19] *See* PanAmSat Licensee Corporation, Application for Authority to Use Extended Ku-Band Frequencies for Domestic Service, *Order and Authorization*, File Nos. SAT-MOD-20050325-00072, SAT-MOD-20050325-00073 and SAT-MOD-20050325-00074 (rel. Sept. 15, 2005); EchoStar 83° Waiver; EchoStar Satellite LLC Application for Authority to Construct, Launch and Operate a Geostationary Satellite Using the Extended Ku-band Frequencies in the Fixed-Satellite Service at the 109° W.L. Orbital Location, *Order and Authorization*, DA 04-3163 (rel., Sept. 30, 2004); EchoStar KuX Corporation Application for Authority to Construct, Launch and Operate a Geostationary Satellite Using the Extended Ku-band Frequencies in the Fixed-Satellite Service at the 121° W.L. Orbital Location, *Order and Authorization*, DA 04-3164 (rel. Sept. 30, 2004).

V. ITU MATTERS

A. Notification under Article 6.1 of Appendix 30B

Article 6.1 of Appendix 30B provides that, "[w]hen an administration . . . intends to introduce an additional system" to take advantage of the planned FSS band, it must provide notice to the ITU and potentially affected administrations by submitting to "the Bureau the information specified in Appendix 4 [of the Radio Regulations]."[20] ESOC respectfully requests that the United States submit on its behalf the notice and Appendix 4 information required by the ITU Radio Regulations for provision of service from the ECHO-45W satellite using Appendix 30B frequencies from 45.1º W.L. To that end, ESOC is providing the Commission with a draft submission to the ITU containing the requisite information, which will be submitted under separate cover.

B. Cost Recovery

ESOC is aware that, as a result of the actions taken at the 1998 Plenipotentiary Conference, as modified by the ITU Council in June 2001, processing fees are now charged by the ITU for satellite network filings. As a consequence, Commission applicants are responsible for any and all fees charged by the ITU. ESOC affirms it is aware of, and unconditionally accepts, this requirement and its responsibility to pay any ITU cost recovery fees for the ITU filings associated with this application. Invoices for such fees may be sent to the contact representative listed in the accompanying FCC Form 312.

VI. 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, ESOC hereby waives any claim to the use of any particular frequency or use of

[20] ITU Radio Regulations, Appendix 30B, Article 6.1.

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.

VII. CONCLUSION

For the foregoing reasons, ESOC respectfully requests grant of the requested authority so that it can proceed in constructing the ECHO-45W satellite, launch it to the nominal 45° W.L. orbital location, and provide advanced satellite services to North and South American consumers.

Respectfully submitted,

/s/

Alison Minea
Corporate Counsel
EchoStar Satellite Operating Corporation
1110 Vermont Avenue, NW, Suite 750
Washington, D.C. 20005
(202) 293-0981

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

September 21, 2012

ATTACHMENT 1

TECHNICAL APPENDIX

ECHO-45W

ATTACHMENT A

Technical Information to Supplement Schedule S

1 SCOPE

This Attachment 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 ECHO-45W satellite at the 45.1° W.L. orbital location.

2 GENERAL DESCRIPTION

The ECHO-45W satellite will operate at the 45.1° W.L. orbital location. The Ku-band-only satellite will provide a range of Fixed-Satellite Service ("FSS") and direct-to-home ("DTH") services to North and South America.[1] The satellite will use the planned "Appendix 30B" portion of the Ku-band: the 12.75-13.25 GHz uplink band and the 10.7-10.95 GHz / 11.2-11.45 GHz downlink bands. The satellite will specifically be equipped with two beams, each of which will operate in both transmission directions: a North America ("N.A.") beam and a South America ("S.A.") beam.

The satellite will have sixteen 115 MHz transponders operating in both left-hand circular polarization ("LHCP") and right-hand circular polarization ("RHCP"), thereby achieving full frequency re-use in accordance with Section 25.210 of the FCC's rules. The peak downlink equivalent isotropically radiated power ("EIRP") for the N.A. beam will be 56.3 dBW. The peak downlink EIRP for the S.A. beam will be 56.1 dBW.

[1] EchoStar is not, at this time, requesting authority to provide DTH service to the United States from ECHO-45W.

Switching capabilities for all transponders will allow for either intra-beam connectivity (e.g., N.A.-to-N.A.) or inter-beam connectivity (e.g., S.A.-to-N.A.). Table 2-1 shows the satellites frequency plan and beam inter-connectivity switching options.

Table 2-1: Frequency Plan and Beam Inter-Connectivity Options

UPLINK					DOWNLINK				
BEAM				Center Freq. (MHz)	BEAM				Center Freq. (MHz)
NAUR	NAUL	SAUR	SAUL		NADR	NADL	SADR	SADL	
X				12812.5		X		X	10762.5
X				12937.5		X		X	10887.5
X				13062.5		X		X	11262.5
X				13187.5		X		X	11387.5
	X			12812.5	X		X		10762.5
	X			12937.5	X		X		10887.5
	X			13062.5	X		X		11262.5
	X			13187.5	X		X		11387.5
		X		12812.5		X		X	10762.5
		X		12937.5		X		X	10887.5
		X		13062.5		X		X	11262.5
		X		13187.5		X		X	11387.5
			X	12812.5	X		X		10762.5
			X	12937.5	X		X		10887.5
			X	13062.5	X		X		11262.5
			X	13187.5	X		X		11387.5

3 PREDICTED SPACE STATION ANTENNA GAIN CONTOURS

As required by Section 25.114(d)(3), the ECHO-45W antenna gain contours for the receive and transmit beams are given in GXT format and embedded in the associated Schedule S submission.

4 SERVICES TO BE PROVIDED

The ECHO-45W satellite will provide a variety of FSS services ranging from narrowband to wideband digital services, potentially including DTH services into Brazil. Representative link budgets, which include details of the transmission characteristics, performance objectives, and earth station characteristics, are provided in the associated Schedule S submission.

5 TT&C CHARACTERISTICS

The information provided in this section complements that provided in the associated Schedule S submission.

The TT&C sub-system provides for communications during pre-launch, transfer orbit, and on-station operations, as well as during spacecraft emergencies. During transfer orbit and on-station emergencies, the TT&C signals will be received and transmitted by the satellite using dual wide-angle antennas on the satellite that create a near omni-directional gain pattern around the satellite. During normal on-station operations, TT&C transmissions will utilize a global beam. All TT&C operations will be conducted at the edges of the allocated frequency bands. The TT&C earth station locations have not yet been chosen. Table 5-1 shows the TT&C frequencies and polarizations for both on-station and emergency operations.

Table 5-1: TT&C Frequencies and Polarizations

Command/Ranging Frequencies (Launch and Early Operations Phase)	13,248.0 MHz (HP) 13,249.0 MHz (HP)
Command/Ranging Frequencies (On-Station)	13,248.0 MHz (RHCP) 13,249.0 MHz (RHCP)
Telemetry/Ranging Frequencies (Launch and Early Operations Phase)	11,448.0 MHz (HP) 11,449.0 MHz (HP)
Telemetry/Ranging Frequencies (On-Station)	11,448.0 MHz (RHCP) 11,449.0 MHz (RHCP)

6 SATELLITE TRANSPONDER FREQUENCY RESPONSES

The predicted receive and transmit channel filter response performance is given 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) will be met.

Table 6-1: Predicted Transponder Frequency Response

Frequency offset from channel center	Gain relative to channel center frequency (dB p-p)	
	Receive	Transmit
CF±30 MHz	-0.50	-0.85
CF±45 MHz	-1.0	-1.90
CF±57.5 MHz	-2.0	-4.3

7 INTERFERENCE AND PFD ANALYSES

The interference and power-flux density ("PFD") analyses are contained in Annex 1 to this Attachment.

8 ORBITAL DEBRIS MITIGATION PLAN

Although the spacecraft manufacturer for the ECHO-45W satellite has not yet been selected, EchoStar will incorporate the objectives and requirements of Section 25.114(d)(14) into its satellite Technical Specifications, Statement of Work, and Test Plans. The Statement of Work will include provisions to review orbital debris mitigation as part of the preliminary design review ("PDR") and the critical design review ("CDR") and to incorporate the relevant requirements, as appropriate, into the Test Plan, including a formal Failure Mode Verification Analysis ("FMVA") for orbital debris mitigation involving particularly the TT&C, propulsion, and energy systems. Should this process indicate that changes to the Orbital Debris Mitigation Plan are advisable or required, EchoStar will provide the Commission with updated information, as appropriate.

8.1 Spacecraft Hardware Design

Although the ECHO-45W satellite is an early stage design, based on its experience, EchoStar does not expect that the satellite will undergo any release of debris during its operation. Furthermore, all separation and deployment mechanisms, and any other potential source of debris are expected to be retained by the spacecraft or launch vehicle.

In conjunction with the spacecraft manufacturer, EchoStar will assess and limit the probability of the satellite becoming a source of debris by collisions with small debris or meteoroids of less than one centimeter in diameter that could cause loss of control and prevent post-mission disposal. EchoStar will take steps to limit the effects of such collisions through the use of shielding, the placement of components, and the use of redundant systems.

EchoStar will incorporate a rugged TT&C system with regard to meteoroids smaller than 1 cm through redundancy, shielding, and appropriate physical separation of components. The TT&C subsystem will have no single points of failure, as it will be equipped with near omni-directional antennas mounted on opposite sides of the spacecraft. These antennas, each providing greater than hemispherical coverage patterns, are extremely rugged and capable of providing adequate coverage even if struck, bent or otherwise damaged by a small- or medium-sized particle. Either one of the two omni-directional antennas, for both command and telemetry, will be sufficient to enable orbit raising. The command receivers and decoders and telemetry encoders and transmitters will be located within a shielded area and will be totally redundant and physically separated. A single rugged thruster and shielded propellant tank provide the energy for orbit-raising.

The propulsion subsystem will be designed so that it will not be separated from the spacecraft after de-orbit maneuvers. It will be protected from the effects of collisions with small debris through shielding. Moreover, propulsion subsystem components critical to disposal (e.g., propellant tanks) will be located deep inside the satellite, while other externally placed components (e.g., the thrusters) will be redundant to allow for de-orbit despite a collision with debris.

8.2 Minimizing Accidental Explosions

EchoStar and the manufacturer will assess and limit the probability of accidental explosions during and after completion of mission operations. The satellite will be designed to ensure that debris generation will not result from the conversion of energy sources onboard the satellite into energy that fragments the satellite. The propulsion subsystem pressure vessels will be designed with high safety margins. Bipropellant mixing will be prevented by the use of valves that prevent backwards flow in propellant lines and pressurization lines. All pressures will be monitored by telemetry. EchoStar will work with the satellite's manufacturer to ensure that, at the end of its life and once the satellite has been placed into its final disposal orbit, all stored energy from the spacecraft will be released to the fullest extent possible, thereby leaving the spacecraft in a safe state with minimal or no possibility of debris release or radio frequency transmission. Once the satellite design is finalized, EchoStar will update the Commission with the precise procedures to be used in conformance with Section 25.114(d)(14)(ii) or request relevant waivers.

8.3 Safe Flight Profiles

In considering current and planned satellites that may have a station-keeping volume that overlaps the ECHO-45W satellite, EchoStar has reviewed the lists of FCC-licensed satellite networks, as well as those that are currently under consideration by the FCC. In addition, non-U.S. networks for which a request for coordination has been published by the International Telecommunication Union ("ITU") within ±0.15° of 45.1° W.L. have been reviewed.

The Intelsat 14 ("IS-14") satellite operates at 45.0° W.L. with an east-west station-keeping tolerance of ±0.05°.

There are no pending applications before the Commission to use an orbital location ±0.15° from 45.1° W.L. EchoStar is not aware of any satellite with an overlapping station-keeping volume with the ECHO-45W satellite that is the subject of an ITU filing and that is either in orbit or progressing towards launch.

Based on the preceding, EchoStar seeks to locate the ECHO-45W satellite at 45.1° W.L. in order to eliminate the possibility of any station-keeping volume overlap with the IS-14 satellite. EchoStar therefore concludes that physical coordination of the ECHO-45W satellite with another party is not required at the present time.

8.4 Post Mission Disposal Plan

At the end of the operational life of the ECHO-45W satellite, EchoStar will maneuver the satellite to a disposal orbit with a minimum perigee of 300 km above the normal operational orbit for geostationary orbit ("GSO") satellites. This proposed disposal orbit altitude exceeds the minimum perigee required for the satellite, based on the following calculation, as required in Section 25.283:

Total Solar Pressure Area "A" = 47.2 m^2
"M" = Dry Mass of Satellite = 1210 kg
"C_R" = Solar Pressure Radiation Coefficient = 1.29

Therefore the Minimum Disposal Orbit Perigee Altitude:

= 36,021 km + 1000 x C_R x A/m
= 36,021 km + 1000 x 1.29 x 47.2/1210
= 36,071.3 km
= 285.3 km above GSO (35,786 km)

Thus, the designed disposal orbit of 300 km above GSO exceeds the required minimum by a margin of more than 14 km. Maneuvering the satellite into a disposal orbit will require approximately 7.5 kg of propellant, taking account of all fuel measurement uncertainties, and this quantity of fuel will be reserved to perform final orbit raising maneuvers.

EchoStar will apply standard propellant accounting methodologies to track propellant usage to ensure the necessary amount of fuel is reserved to perform deorbit procedures. Such methodologies include the bookkeeping method and the pressure volume-temperature ("PVT")

method. These methodologies may also be used in conjunction with any methodologies specifically recommended by the spacecraft manufacturer.

9 ITU FILING FOR ECHO-45W

All materials related to the ITU filing for ECHO-45W (to be filed as the "USASAT-55U" network) will be submitted under separate cover. These consist of the following:

- SpaceCap database file (USASAT-55U AP30B.mdb) containing the data required by the ITU as stated in Appendix 4 of the Radio Regulations.
- Contour data files in .gxt format for the transmit and receive beams and their service area definitions. These are combined into a single database file (USASAT-55U GIMSDB.mdb) that can be read by the ITU's GIMS software.
- The file USASAT-55U (VAL).txt which contains the validation results using SpaceVal version 6.1.14. There are no fatal errors.

10 ESTIMATED OPERATIONAL LIFETIME AND RELIABILITY

EchoStar will update the Commission with full and precise spacecraft physical characteristics when the satellite manufacturer has been selected and the satellite design has been finalized. Estimates of these characteristics are included in the Schedule S form.

The ECHO-45W satellite will be designed for a 15 year life once on station. The spacecraft reliability will be consistent with current manufacturing standards in place for the major suppliers of space hardware. Bus reliability will be greater than 0.8 with an overall spacecraft reliability to EOL of greater than 0.7. Transponder sparing will be consistent with documented failure rates which allow attaining the overall spacecraft reliability numbers listed above.

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/

Stephen D. McNeil
Telecomm Strategies Canada, Inc.
Ottawa, Ontario, Canada
(613) 270-1177

ANNEX 1

INTERFERENCE AND PFD ANALYSES

1.0 Interference Analyses

There are no adjacent satellites within two degrees of 45.1° W.L. that have overlapping frequencies with those proposed for ECHO-45W. The nearest co-frequency satellite to 45.1º W.L. is the Intelsat 11 ("IS-11") satellite at 43.0° W.L., operated by PanAmSat Licensee Corp. ("PanAmSat"). While the two satellites would be more than two degrees apart, this section nevertheless demonstrates that the operation of the ECHO-45W satellite network would be compatible with the operation of the IS-11 satellite network with an assumed two degree separation (i.e., IS-11 assumed to be located at 43.1° W.L.).

Table 1 provides a summary of the ECHO-45W satellite network's transmission parameters derived from the ECHO-45W link budgets that are embedded in the Schedule S form. Table 2 provides a summary of the Ku-band transmission parameters as contained in the FCC application for the IS-11 satellite.[2]

The interference calculations assumed the following: a 1 dB advantage for topocentric-to-geocentric conversion; that all wanted and interfering carriers are co-polarized; and that all earth station antennas conform to a sidelobe pattern of 29-25 log(θ). The C/I calculations were performed on a per Hz basis. Note that the interference analysis used the conclusions of Recommendation ITU-R S.1555-0 to assess the interference of the circularly polarized ECHO-45W transmissions into the linearly polarized IS-11 transmissions.

Tables 3 and 4 show the results of the interference calculations between the two networks in terms of overall C/I margins. All C/I margins are positive, demonstrating the compatibility between the two networks.

---

[2] *See* PanAmSat Licensee Corp., Application, Exhibit 1, SAT-MOD-20090108-00004 (filed Mar. 6, 2009).

Table 1: ECHO-45W Typical Transmission Parameters

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion (dB)
1	48K6G7W	0.0486	42.3	42.6	16.3	46.9	15.9
2	1M34G7W	1.34	48.4	63.0	30.7	44.4	15.9
3	6M33G7W	6.33	52.1	67.1	37.5	46.9	16.0
4	36M0G7W	36	53.8	82.8	52.3	38.3	15.9
5	36M0G7W	36	53.8	82.8	44.5	46.9	16.7
6	72M0G7W	72	53.8	85.8	52.3	44.4	16.7
7	48K6G7W	0.0486	48.4	48.6	22.3	40.8	15.9
8	48K6G7W	0.0486	48.4	48.6	22.1	40.8	15.9
9	1M34G7W	1.34	48.4	63.0	30.5	46.9	15.9
10	6M33G7W	6.33	52.1	67.1	37.3	46.9	16.0
11	36M0G7W	36	53.8	82.8	52.1	38.3	15.9
12	36M0G7W	36	53.8	82.8	44.3	46.9	16.7
13	72M0G7W	72	53.8	85.8	52.1	44.4	16.7
14	48K6G7W	0.0486	42.3	42.6	16.1	46.9	15.9

Table 2: IS-11 Satellite Network's Transmission Parameters

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion (dB)
1	30M1G7W	30.133	56.7	80.1	51.4	40.6	16.2
2	4M15G7W	4.154	56.7	73.3	42.1	40.6	15.9
3	1M21G7W	1.2128	56.7	67.2	36.0	40.6	15.1
4	1M23G7W	1.229	56.7	63.1	31.9	44.1	15.5
5	307KG7W	0.307	46.2	53.4	22.2	54.8	18.2
6	75K4G7W	0.0754	56.7	52.5	21.4	40.6	13.5

Table 3: Summary of the Overall Link C/I Margins (dB); ECHO-45W Interfering into IS-11

		Interfering Carriers													
	Carrier ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Wanted Carriers	1	9.7	9.7	10.8	3.6	10.1	6.3	4.7	4.9	9.8	10.9	3.7	10.2	6.5	9.8
	2	9.9	9.9	10.5	3.3	10.3	6.1	4.5	4.7	10.0	10.7	3.5	10.4	6.3	10.0
	3	9.9	9.9	10.6	3.4	10.3	6.2	4.5	4.7	10.1	10.8	3.5	10.5	6.4	10.1
	4	8.0	8.0	9.3	2.1	8.3	4.8	3.2	3.4	8.1	9.4	2.3	8.5	4.9	8.1
	5	5.8	5.8	10.4	3.6	5.9	4.8	4.2	4.3	5.8	10.5	3.7	5.9	4.9	5.8
	6	9.0	9.0	9.6	2.4	9.4	5.3	3.6	3.8	9.1	9.8	2.6	9.5	5.4	9.1

Table 4: Summary of the Overall Link C/I Margins (dB); IS-11 Interfering into ECHO-45W

		Interfering Carriers					
	Carrier ID	1	2	3	4	5	6
Wanted Carriers	1	2.6	2.8	3.6	7.8	6.0	6.2
	2	0.8	1.4	2.1	6.3	8.4	4.7
	3	2.9	3.3	4.1	8.2	8.3	6.6
	4	2.0	2.7	3.5	7.6	10.6	6.0
	5	2.0	2.6	3.4	7.6	10.4	5.9
	6	4.2	4.8	5.6	9.8	12.2	8.1
	7	3.2	3.7	4.5	8.6	9.8	7.0
	8	3.0	3.5	4.3	8.4	9.7	6.8
	9	3.0	3.5	4.3	8.5	9.7	6.8
	10	2.7	3.2	3.9	8.1	8.2	6.5
	11	1.9	2.5	3.3	7.4	10.4	5.8
	12	1.8	2.5	3.2	7.4	10.3	5.8
	13	4.0	4.7	5.4	9.6	12.0	7.9
	14	2.5	2.7	3.5	7.6	6.0	6.0

The preceding demonstrates that the transmission characteristics of the IS-11 and ECHO-45W satellite networks are compatible when both networks transmit digitally modulated carriers.

The FCC application for IS-11 also includes analog television/frequency-modulation ("TV/FM") carriers.[3] An interference assessment of TV/FM carriers interfering into the digital transmissions of the ECHO-45W network was not performed since TV/FM carriers have most of their power-density near the center frequency of the carrier. Accordingly, sensitive narrowband carriers typically cannot be assigned within the high power-density bandwidth of the TV/FM carrier. Operation of TV/FM carriers is normally achieved through coordination with the adjacent operator on a case-by-case basis, and in the event that transmission of TV/FM carriers is actually required. Performing C/I calculations would simply demonstrate the well-known result that narrowband carriers typically cannot operate, on a two-degree basis, when assigned near the center frequency of the adjacent TV/FM carrier.

[3] *Id.* at 21.

2.0 PFD Analyses

EchoStar will operate the ECHO-45W satellite such that all downlink transmissions will comply with the PFD limits of Article 21 of the ITU's Radio Regulations. While the FCC's Part 25 rules do not contain PFD limits for the Appendix 30B Ku-bands, Article 21 of the ITU Radio Regulations does include PFD limits that are applicable to GSO satellites using the 10.7-10.95 and 11.2-11.45 GHz bands. These ITU limits are identical to those of Section 25.208(b), which pertains to the adjacent 10.95-11.2 GHz and 11.45-11.7 GHz bands.

Tables 5 and 6 show the PFD levels that will occur at various angles of arrival for the N.A. beam and S.A. beam, respectively, when transmitting with the following peak downlink EIRP densities:

1) Beams NADR and NADL: Peak downlink EIRP density = -19.3 dBW/Hz; and
2) Beams SADR and SADL: Peak downlink EIRP density = -19.5 dBW/Hz.

Tables 5 and 6 demonstrate compliance with the ITU's Article 21 PFD limits in all cases.

Table 5: Maximum PFD Levels of Beams NADR and NADL

Angle of Arrival	Applicable PFD Limit for Angle of Arrival ($dBW/m^2/4$ kHz)	Spreading Loss (dBW/m^2)	Gain Contour (dB)	Worst Case PFD Level at Angle of Arrival ($dBW/m^2/4$ kHz)	PFD Margin (dB)
0°	-150.0	-163.4	-4.9	-151.6	1.6
5°	-150.0	-163.3	-3.8	-150.4	0.4
10°	-147.5	-163.2	-2.8	-149.2	1.7
15°	-145.0	-163.0	-1.8	-148.1	3.1
20°	-142.5	-162.9	-1.5	-147.7	5.2
25°	-140.0	-162.8	-1.5	-147.6	7.6
34.8° (Peak)	-140.0	-162.6	0	-145.9	5.9

Table 6: Maximum PFD Levels of Beams SADR and SADL

Angle of Arrival	Applicable PFD Limit for Angle of Arrival (dBW/m^2/4 kHz)	Spreading Loss (dBW/m^2)	Gain Contour (dB)	Worst Case PFD Level at Angle of Arrival (dBW/m^2/4 kHz)	PFD Margin (dB)
0°	-150.0	-163.4	-20	-166.9	16.9
5°	-150.0	-163.3	-20	-166.8	16.8
10°	-147.5	-163.2	-20	-166.6	19.1
15°	-145.0	-163.0	-20	-166.5	21.5
20°	-142.5	-162.9	-16	-162.4	19.9
25°	-140.0	-162.8	-10	-156.3	16.3
53.3° (Peak)	-140.0	-162.3	0	-145.8	5.8