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April 14, 2011

Via IBFS

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

RE: EchoStar Corporation; File Nos. SAT-LOA-20070105-00001, SAT-AMD-20080114-00021, SAT-MOD-20110325-00062, SAT-AMD-20110408-00070 (Call Sign S2723)

Dear Ms. Dortch:

On April 8, 2011, EchoStar Corporation ("EchoStar") filed an amendment to its modification application submitting a revised Technical Narrative and Schedule S for its authorized 17/24 GHz Broadcast-Satellite Service ("BSS") satellite to be located at 62.15° W.L.[1] EchoStar is submitting this letter pursuant to Section 1.65 of the Commission's rules,[2] to update and revise one statement in the Technical Narrative and two entries in the Schedule S submitted with the amendment application.

Specifically, page 3 of the original Technical Narrative indicated that additional uplinks for some of the satellite's spot beams will be provided from EchoStar's earth station facilities in Monee, IL. In fact, the uplinks will occur from Mt. Jackson, VA. A revised Technical Narrative is attached to this letter reflecting this change.

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[1] *See* File No. SAT-AMD-20110408-00070 (filed Apr. 8, 2011).

[2] 47 C.F.R. §1.65.

With respect to the Schedule S, block S.6 should be correspondingly defined as “Area around Mt. Jackson, VA” rather than “Area around Monee, IL.” Additionally, Channel ID TLM in block S.9 should be 17302 MHz. EchoStar is enclosing with this letter a Schedule S incorporating these revisions.

Respectfully submitted,

/s/
Petra A. Vorwig
Counsel for EchoStar Corporation

Enclosure

ECHOSTAR EX-5

ATTACHMENT A

Technical Information to Supplement Schedule S

A.1 SCOPE

This attachment contains the information required by 47 C.F.R. §25.114(c) and other sections of the FCC's Part 25 rules that cannot be entered into the Schedule S submission. Together with the associated Schedule S this information provides a complete description of the ECHOSTAR EX-5 satellite, as amended.

A.2 ORBITAL LOCATION (§25.114(c)(5))

The orbital location selected for the ECHOSTAR EX-5 satellite is 62.15° W.L. This location has been selected because it provides good elevation angles towards eastern CONUS and it is close enough to the 61.5° W.L. 12 GHz DBS cluster to allow a shared receive dish feed, yet far enough away from the 61.5° W.L. cluster to avoid satellite-to-satellite interference. The Commission has previously authorized EchoStar to operate a 17/24 GHz satellite at 62.15° W.L.

A.3 GENERAL DESCRIPTION OF OVERALL SYSTEM FACILITIES, OPERATIONS AND SERVICES (§25.114(d)(1))

The ECHOSTAR EX-5 satellite will operate at the 62.15° W.L. orbital location and will provide BSS services primarily to CONUS and Puerto Rico. The satellite also has a steerable downlink spot beam that is currently intended to serve southern Mexico, subject to receipt of appropriate authorizations. The satellite will provide service to U.S. territories using the 17.3-17.7 GHz downlink band, while the Mexico downlink spot beam will operate in the 17.7-17.8 GHz downlink band.

The satellite will employ four types of downlink beams, three with a fixed large area coverage and one with a steerable spot beam pattern coverage. The four beam types are:

1) A CONUS large area coverage beam, which serves all of the continental US;

2) A Northern CONUS large area coverage beam, which serves the northern and south-eastern parts of CONUS;

3) A Southern CONUS large area coverage beam, which serves the southern parts of CONUS, Mexico and Central America;

4) An array of 30 small spot beams, which can be steered as a single group, but which in the baseline configuration are pointed to provide service to CONUS, Puerto Rico and Southern Mexico.

The satellite can be operated in one of two modes. In the first mode, the three CONUS-type beams are operated, providing twenty-four 26 MHz wide channels and using the lower 400 MHz of the 24.75-25.25 GHz / 17.3-17.8 GHz bands. Additionally, the Mexico spot beam can be operated using the upper 100 MHz. In this mode, full frequency reuse is achieved through the use of dual orthogonal circular polarizations. In the second mode, the CONUS North and CONUS South beams and the 30 spot beams are simultaneously operated. The two CONUS beams each use six 26 MHz channels in opposite polarizations. The thirty spot beams use 88 MHz wide channels. For the spot beams, full frequency reuse is achieved through a combination of dual orthogonal circular polarizations and spatial isolation. In the second mode, all downlink beams serving U.S. territory utilize the lower 400 MHz of the 17 GHz band, while the Mexico spot beam utilizes the upper 100 MHz. The frequency plan details are provided in the updated Schedule S that is being submitted as part of this amendment application.

The feeder uplink transmissions to all the transponders in the large area coverage beams and some of the spot beams will occur from EchoStar's existing feeder link station facilities in Cheyenne, WY. Additional uplinks for the remaining spot beams are from Gilbert, AZ, Mt. Jackson, VA, New Braunfels, TX, and optionally from Puerto Rico and Mexico City.

All active communications transponders will use either a single, a dual combined, or a triple combined 135W traveling wave tube amplifier (TWTA) arrangement giving a total saturated RF power per transponder of 405 Watts (i.e., up to 3 x 135 Watts). This produces peak EIRP levels of between 60.2 dBW and 60.7 dBW in the large area coverage CONUS beams. For the spot beams the peak EIRP levels vary between 60.3 dBW to 66.5 dBW. The peak EIRP for the individual downlink spot beams vary to account for different rain attenuation characteristics of the relevant service areas.

Spacecraft TT&C functions will take place in the 24/17 GHz frequency bands for on-station operations, and orbit raising. The TT&C earth stations for on-station operations will be located at EchoStar's existing satellite control facilities in Cheyenne, WY and Gilbert, AZ.

A.4 PREDICTED SPACE STATION ANTENNA GAIN CONTOURS (§25.114(d)(3))

The ECHOSTAR EX-5 antenna gain contours for the receive and transmit beams, as required by §25.114(d)(3), are given in GXT format. However, because of the large number of beams involved and the known problems of the Schedule S software in handling a large number of beams, the GXT files have not been embedded in the Schedule S software file and are being provided separately to the Commission. For the steerable spot beams, the gain contours in the GXT files are representative of the baseline configuration pointing of the beams.

A.5 SERVICES TO BE PROVIDED (§25.114(d)(4))

The ECHOSTAR EX-5 satellite will provide a range of DBS services to millions of small and inexpensive subscriber receive-only earth terminals. The spot beams may be used for local-into-local broadcasting and for video-on-demand services.

There will be one wideband digitally modulated signal transmitted in each of the active transponders, supporting a range of information data rates depending on the order of the modulation (e.g., QPSK, 8PSK) and the type and degree of FEC coding used.

Representative link budgets, which include details of the transmission characteristics, performance objectives and earth station characteristics, are provided in the associated Schedule S form. The representative modulation/coding schemes provided in the associated Schedule S submission are as follows:

a) QPSK, Turbo rate 5/6 inner coding (27 MHz[1] and 88 MHz bandwidths);

b) 8PSK, Turbo rate 2/3 inner coding (25.8 MHz and 88 MHz bandwidths).

A.5.1 Earth Stations

For most geographic locations within the service areas of each of the DBS beams, the standard receive dish size will have a 45 cm equivalent reflector diameter, although larger dish sizes (typically up to 90 cm in diameter) may be used in some geographic areas subject to high rain attenuation. There will be millions of these types of terminals across the service areas.

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[1] The 27 MHz carriers will be transmitted in the 26 MHz channels. These emissions can be accommodated within the useful bandwidth of the channel filters.

The feeder uplink earth stations (main and back-up) will typically use a 12 meter antenna.[2] In addition, all feeder link transmissions will comply with §25.223(b)(1), (2) and (4).

A.6 TT&C CHARACTERISTICS (§25.114(c)(4)(1) AND §25.114(c)(9))

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

The ECHOSTAR EX-5 TT&C sub-system provides for communications during pre-launch, transfer orbit and on-station operations, as well as during spacecraft emergencies. The TT&C sub-system will operate at the edges of the 17/24 GHz BSS frequency bands during the launch and early operations phases of the mission, as well as on-station.

During transfer orbit and on-station emergencies, the TT&C signals will be received and transmitted by the satellite using a combination of antennas on the satellite that create a near omni-directional gain pattern. During normal on-station operation, the TT&C signals will be received via a high gain communications receive antenna and transmitted via the CONUS transmit antenna. A summary of the TT&C subsystem characteristics is given in Table A.6-1.

[2] EchoStar will apply for all necessary earth station licenses for U.S. feeder link earth stations in due course.

Table A.6-1: TT&C Performance Characteristics

Command Modulation	PCM/FSK
Command/Ranging Frequencies (On-Station)	24,753.0 MHz 24,755.0 MHz
Uplink Flux Density	Between -110 and -82 dBW/m^2
Satellite Receive Antenna Types	Pseudo-omni antenna during transfer orbit and on-station emergencies; Communications spot antenna during on-normal on-station mode.
Polarization of Satellite Receive Antennas	RHCP for all antennas
Peak Deviation (Command/Ranging)	± 400 kHz
Telemetry/Ranging Frequencies (Launch and Early Operations Phase and On-Station)	17,301.0 MHz 17,302.0 MHz
Satellite Transmit Antenna Types	Pseudo-omni antenna during transfer orbit and on-station emergencies; CONUS coverage antenna during on-normal on-station operations.
Polarization of Satellite Transmit Antennas	LHCP for all antennas
Maximum Downlink EIRP	10 dBW (pseudo-omni antenna); 21 dBW (CONUS coverage antenna).
Telemetry/Ranging Modulation Index: 1 sub-carrier 2 sub-carriers 3 sub-carriers	 1.0 0.7 0.6

A.7 SATELLITE TRANSPONDER FREQUENCY RESPONSES (§25.114(c)(4)(vii))

The predicted worst case receive and transmit channel filter response performance is given in Table A.7-1 below. The receive response is measured from the satellite receive antenna up to the input of the TWTA. The transmit response is measured from the input of the TWTA to the satellite transmit antenna.

Table A.7-1: Typical Receiver and Transmitter Filter Responses

Frequency offset from channel center	Gain relative to channel center frequency (dB)		Comments
	Receive	Transmit	
CF±6 MHz	0.35	0.43	In-Band Value does not exceed these p-p values
CF±7.7 MHz	0.45	0.56	
CF±9.6 MHz	0.61	0.90	
CF±12 MHz	1.52	2.55	
CF±13 MHz	2.93	4.12	
CF±16.5 MHz	-3.0		Out-of-Band Attenuation is not less than these values
CF±20.0 MHz		-3.0	
CF±27.0 MHz		-25.0	
CF±29.1 MHz	-30.0		

A.8 CESSATION OF EMISSIONS (§25.207)

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

A.9 FOUR-DEGREE COMPATIBILITY (§25.140)

The demonstration of four-degree compatibility is contained in the link budgets embedded in the associated Schedule S form. The link budgets show the end-to-end link performance taking into account the assumed interference environment, which is described below.

Currently there are no 17/24 GHz satellites authorized to operate within four degrees of 62.15° W.L. For purposes of this amendment application, it has been assumed that future 17/24 GHz satellites will be located at four-degree increments from the 62.15° W.L. location. All link budgets assume pairs of interfering adjacent satellites nominally located at 4° and 8° from the requested orbital location[3] and transmitting digital carriers. All adjacent networks were assumed to be transmitting with an uplink input power density of -56.5 dBW/Hz. The interfering downlink EIRP density assumed was dependent on the victim receive antenna's location. That is, a receive location located within the regions defined by §25.208(w)(1) and §25.208(w)(4) is assumed to experience interference levels caused by adjacent satellites transmitting with a PFD level of -115 dBW/m^2/MHz. Receive locations located within the regions defined by §25.208(w)(2) and §25.208(w)(3) are assumed to experience interference levels caused by adjacent satellites transmitting with a PFD level of -118 dBW/m^2/MHz and -121 dBW/m^2/MHz, respectively. Note that all earth station antennas considered were assumed to have a sidelobe pattern of 29-25 log(θ).

The link budgets demonstrate that the proposed services can successfully operate given the assumed interference environment and with reasonably high link availabilities. With the assumption that an adjacent satellite located four degrees from 62.15° W.L. has similar technical characteristics to the ECHOSTAR EX-5 satellite, the link budgets then also serve to show that the interference into the adjacent satellite network is acceptable.

A.10 OFF-AXIS EIRP DENSITY LEVELS (§25.223)

The off-axis EIRP spectral density levels of the feeder link earth station antennas transmitting to the ECHOSTAR EX-5 satellite will not exceed the limits of §25.223.

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[3] To account for station-keeping tolerances, the actual geocentric orbital separations used in the interference calculations were 3.9° and 7.9°.

A.11 PFD ANALYSIS

(§25.208)

The power flux density ("PFD") analysis of the ECHOSTAR EX-5 satellite is included in Annex 1 to this Attachment. The analysis shows that three beams of the ECHOSTAR EX-5 satellite have the capability of exceeding the PFD levels of §25.208(w):

- The CONUS beam has the capability of exceeding the PFD level of §25.208(w)(3) by a maximum of 0.6 dB;
- Beam SP06 has the capability of exceeding the PFD level of §25.208(w)(3) by a maximum of 2.3 dB;
- Beam SP12 has the capability of exceeding the PFD level of §25.208(w)(3) by a maximum of 1.1 dB.

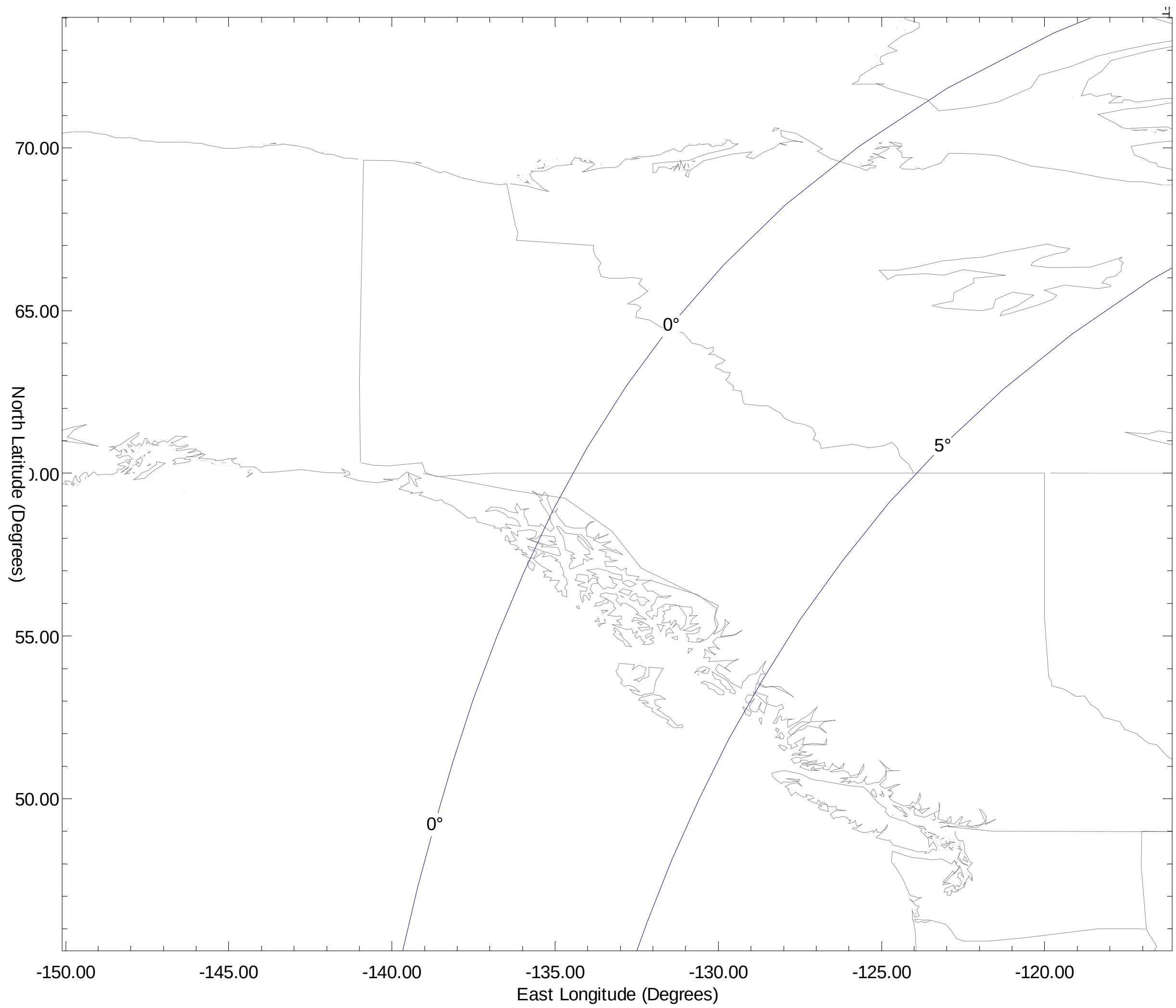
In order to comply with the PFD level of §25.208(w)(3), EchoStar will reduce the maximum downlink EIRP of the CONUS beam, beam SP06 and beam SP12 by 0.6 dB, 2.3 dB and 1.1 dB, respectively. EchoStar will not exceed the PFD levels of §25.208(w)(3) unless higher-powered operations are coordinated with adjacent, authorized 17/24 GHz BSS operators as allowed by §25.262(f)(1).

A.12 GEOGRAPHIC SERVICE REQUIREMENTS

(§25.225)

The 62.15° W.L. location is not suitable for the provision of BSS service to either Alaska or Hawaii. Hawaii is not visible from the 62.15° W.L. location, nor is the vast majority of Alaska (see Figure A12-1). For those small Alaskan areas that are visible, the extremely low elevation angles would not permit a viable BSS service due to the difficulty in locating user receive dishes such that they would have line-of-sight to the satellite because of blockage from buildings, terrain and foliage.

Figure A.12-1: Elevation Angles from 62.15° W.L.



A.13 ORBITAL DEBRIS MITIGATION PLAN (§25.114(d)(14))

A.13.1 Spacecraft Hardware Design

Space Systems/Loral ("Loral") is the manufacturer of the ECHOSTAR EX-5 satellite. Loral has assessed the launch, orbit raising, deployment and normal operations portions of the mission and determined that no debris will be released by the spacecraft except for the following case during deployment. The only portion of the mission in which portions of the spacecraft are separated from the main spacecraft body is during deployment. Separation and deployment mechanisms are intended to contain the debris generated when activated. There are several reflector deployment hold-down electro-explosive devices ("EED"s) that have the potential to expel a small amount of debris — up to 3mg of titanium debris from the hold-down and 2mg of "soot" per firing. These EEDs have flown on over 35 spacecraft and had no failures. The assessment found no other sources for debris throughout the mission.

To protect the spacecraft from small body collisions, including debris less than one centimeter in diameter, the design of the ECHOSTAR EX-5 spacecraft allows for individual faults without losing the entire spacecraft. All critical components (*i.e.* computers and control devices) are built within the structure and shielded from external influences. Items that cannot be built within the spacecraft nor shielded (like antennas) are redundant and/or are able to withstand impact. The ECHOSTAR EX-5 spacecraft can be controlled through both the normal payload antennas and wide angle antennas. The likelihood of both being damaged during a small body collision is minimal. The wide angle antennas on this spacecraft are similar to open waveguides that point towards the Earth (there is one set on each side of the spacecraft; either set could be used to successfully de-orbit the spacecraft). These wide angle antennas would continue to operate even if struck and bent.

A.13.2 Accidental Explosion Assessment (§25.144(d)(14)(ii))

Loral has reviewed failure modes for all equipment to assess the possibility of an accidental explosion onboard the spacecraft. In order to ensure that the spacecraft does not explode on orbit, the satellite controller will take specific precautions. All batteries and fuel tanks are monitored for pressure or temperature variations. Alarms in the Satellite Control Center ("SCC") inform controllers of any variations. Additionally, long term trending analysis will be performed to monitor for any unexpected trends.

Operationally, batteries will be operated utilizing the manufacturer's automatic recharging scheme. Doing so will ensure that charging terminates normally without building up additional heat and pressure. As this process occurs wholly within the spacecraft, it also affords protection from command link failures (on the ground).

In order to protect the propulsion system, fuel tanks will all be operated in a blow down mode. At the completion of orbit raising, the pressurant will be isolated from the fuel system. This will cause the pressure in the tanks to decrease over the life of the spacecraft. This will also protect against a pressure valve failure causing the fuel tanks to become over pressurized.

In order to ensure that the spacecraft has no explosive risk after it has been successfully de-orbited, all stored energy onboard the spacecraft will be depleted and removed. Upon successful de-orbit of the spacecraft, all propulsion lines and latch valves will be vented and left open. All battery chargers will be turned off and batteries will be left in a permanent discharge state. These steps will ensure that no buildup of energy can occur resulting in an explosion in the years after the spacecraft is de-orbited.

A.13.3 Safe Flight Profiles

In considering current and planned satellites that may have a station-keeping volume that overlaps the ECHOSTAR EX-5 satellite, EchoStar has reviewed the lists of FCC licensed satellite networks, as well as those that are currently under consideration by the FCC (i.e., those filed with the FCC before this application). In addition, networks for which a request for coordination has been published by the ITU within ±0.15° of 62.15° W.L. have also been reviewed.

Based on these reviews, NASA operates the TDRS-9 satellite near 62° W.L., there are no pending applications before the Commission to use an orbital location in the immediate vicinity of 62.15° W.L. and there are three ITU networks filed at 62° W.L.:

- TDRS 62W: filed on behalf of NASA for TDRS operations at 62° W.L.
- USASAT-70A: a Ka-band network filed on behalf of Rainbow DBS Company ("Rainbow"). Rainbow has since surrendered its Ka-band authorization and the USASAT-70A network's ITU seven-year regulatory period expired in November 2010.
- Luxembourg's 17/24 GHz LUX-G6-48 network.

With respect to the Luxembourg network, EchoStar can find no evidence that this network is being progressed towards launch.

Based on the April 4, 2011 NORAD two-line element set for the TDRS-9 satellite, the satellite operates with an inclination of approximately 1.43° and with a maximum east-west excursion of approximately 0.5° (measured between the satellite's maximum northern and southern latitudes). The satellite currently makes 0° crossings at 62.32° W.L. (heading northward) and 62.47° W.L. (heading southward). Based on observations of the satellite's locations over a two-week period, it appears that the satellite is being slowly drifted to the west. Based on the TDRS-9 satellite's current ephemerides, a satellite located at 62.15° W.L. and maintaining an east-west station-keeping tolerance of 0.05° and an inclination of 0.05° will not have any station-keeping volume overlap with the TDRS-9 satellite. The ECHOSTAR EX-5 will be operated with an east-west and north-south station-keeping tolerance of 0.05°, thus there is no possibility of station-keeping overlap between the ECHOSTAR EX-5 and TDRS-9 satellites. EchoStar will continue to monitor the location of the TDRS-9 satellite to determine whether there is a need for physical coordination discussions with NASA.

EchoStar concludes that physical coordination of the ECHOSTAR EX-5 satellite with another party will not be required at the present time. EchoStar will continue to monitor Commission, NORAD and ITU resources to identify satellites that reasonably can be expected to operate at, or near, 62.15° W.L. In the event that concrete plans are made by another party to operate a satellite near 62.15° W.L. such that there is a possibility of physical collision with the ECHOSTAR EX-5 satellite, EchoStar will engage in coordination discussions to establish any necessary operational procedures to ensure that a physical collision will not take place.

A.13.4 Post-Mission Disposal

At the end of the operational life of the ECHOSTAR EX-5 satellite, EchoStar will maneuver the satellite to a disposal orbit with a minimum perigee of 300 km above the normal GSO operational orbit. This proposed disposal orbit altitude exceeds the minimum required by 47 C.F.R § 25.283, which is calculated below.

The input data required for the calculation are as follows:

Total Solar Pressure Area "A" = 110.5 m^2
"M" = Dry Mass of Satellite = 2491 kg
"C_R" = Solar Pressure Radiation Coefficient (worst case) = 1.24

Using the formula given in § 25.283, the Minimum Disposal Orbit Perigee Altitude is calculated as follows:

= 36,021 km + 1000 x C_R x A/m

= 36,021 km + 1000 x 1.24 x 110.5/2491

= 36,076 km

= 290 km above GSO (35,786 km)

While the minimum disposal orbit altitude required by § 25.283 is 290 km, EchoStar will reserve enough fuel to meet or exceed a minimum perigee disposal orbit of 300 km out of an abundance of caution. Thus, the designed disposal orbit of 300 km above GSO exceeds the required minimum by a margin of 10 km. Taking account of all fuel measurement uncertainties, performing the final orbit raising maneuvers will require approximately 11.6 kg of propellant, which will be reserved.

A.14 SPACECRAFT CHARACTERISTICS

(§25.114(c)(10))

Spacecraft physical and electrical characteristics are included in the associated Schedule S form.

The spacecraft reliability is consistent with current manufacturing standards in place for the major suppliers of space hardware. Payload and bus design reliability are both greater than 0.8 with an overall spacecraft reliability to EOL of greater than 0.7. Transponder sparing is consistent with documented failure rates which allow attaining the overall reliability stated 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
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ANNEX 1 to ATTACHMENT A

1.0 PFD ANALYSIS

EchoStar calculates the power flux density/MHz on the Earth's surface from these emissions as: EIRP minus spreading loss in direction of interest minus bandwidth correction factor.[1] For the CONUS beams, the bandwidth correction factor is 25.8, which corresponds to the narrower 25.8 MHz carrier. For the spot beams, the bandwidth correction factor is 88, which corresponds to the 88 MHz channel bandwidth.

1.1 17.3-17.7 GHz Band

All downlink beams of the ECHOSTAR EX-5 satellite operate in the 17.3-17.7 GHz band except for the Mexico spot beam. The allowable PFD levels in the 17.3-17.8 GHz band are defined by §25.208(w) as:

(1) In the region of the contiguous United States, located south of 38° North Latitude and east of 100 West Longitude: −115 dBW/m^2 /MHz.

(2) In the region of the contiguous United States, located north of 38° North Latitude and east of 100° West Longitude: −118 dBW/m^2 /MHz.

(3) In the region of the contiguous United States, located west of 100° West Longitude: −121 dBW/m^2 /MHz.

(4) For all regions outside of the contiguous United States including Alaska and Hawaii: −115 dBW/m^2 /MHz.

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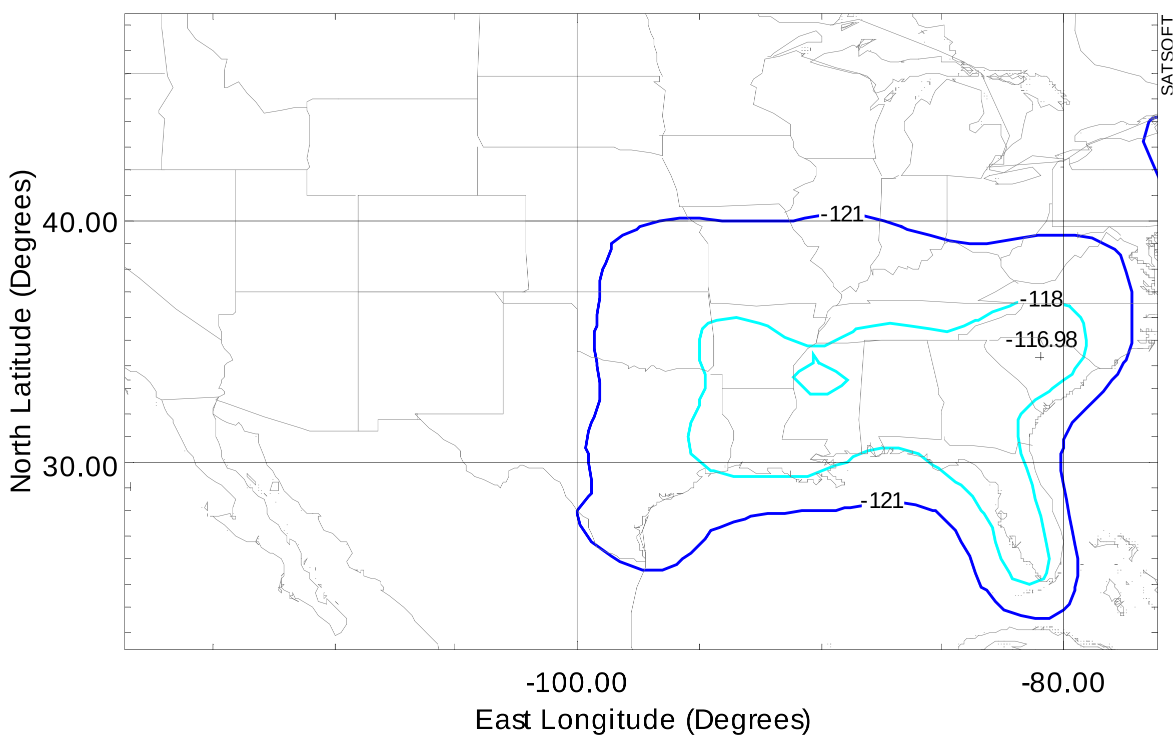
[1] Note that this is a conservative estimate of maximum PFD since the calculation does not take into account clear sky atmospheric losses.

CONUS Beam:

The maximum downlink EIRP of the CONUS beam is 60.2 dBW. With this EIRP level, a PFD analysis shows that the maximum PFD levels produced in the four regions defined by §25.208(w) are met, except for the region defined by §25.208(w)(3). In order to comply with the PFD level of §25.208(w)(3), EchoStar will reduce the maximum downlink EIRP of the CONUS beam to be 59.6 dBW. EchoStar will not operate the CONUS beam with a downlink EIRP greater than 59.6 dBW unless higher-powered operations are coordinated with adjacent, authorized 17/24 GHz BSS operators as allowed by §25.262(f)(1).

With a maximum downlink EIRP of 59.6 dBW, the maximum PFD level that the CONUS beam is capable of producing is -116.98 dBW/m^2/MHz. This occurs in the southeast portion of CONUS. Figure 1 shows the geographic location of the maximum PFD and the -118 dBW/m^2/MHz and -121 dBW/m^2/MHz contours. The diagram demonstrates that, with a peak downlink EIRP of 59.6 dBW, the CONUS beam is in compliance with §25.208(w).

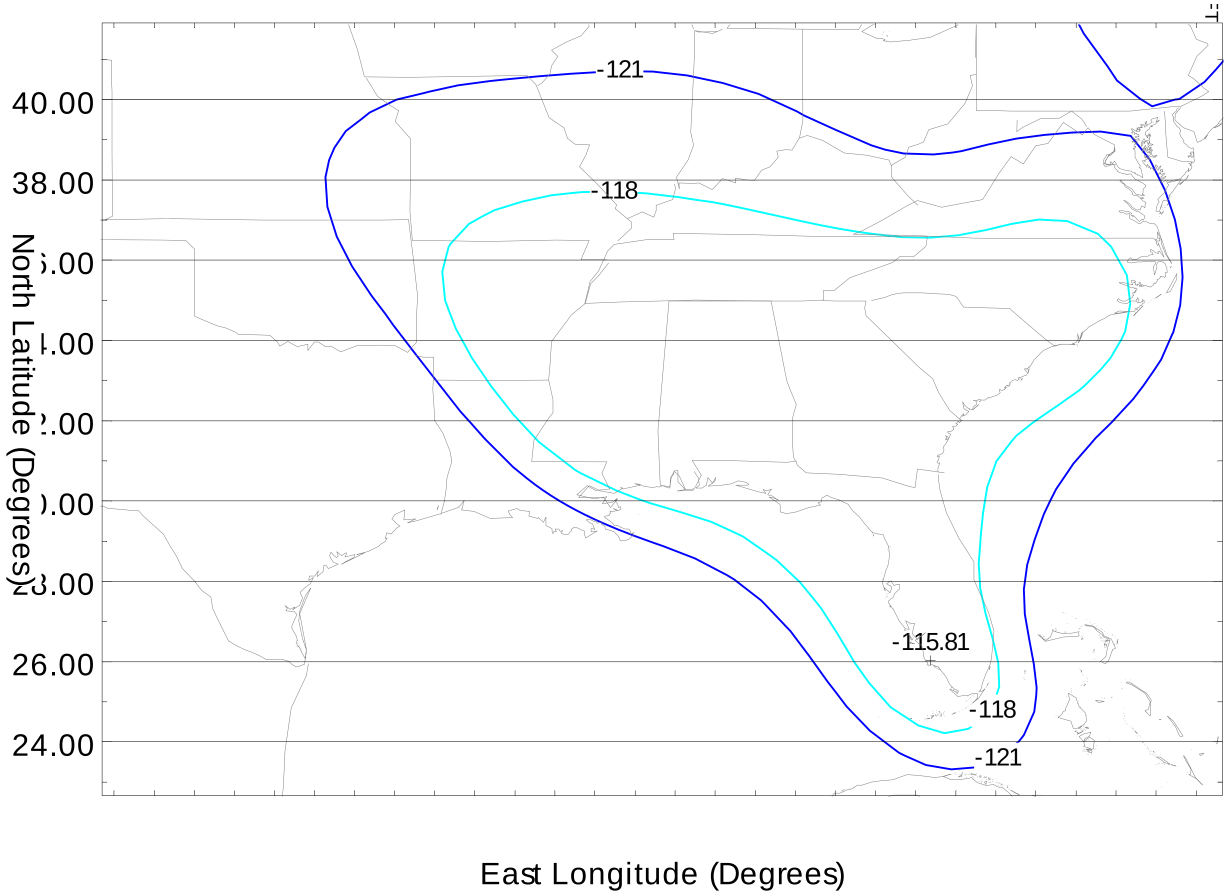
Figure 1. PFD contours of the CONUS beam with a peak downlink EIRP of 59.6 dBW.



CONUS North Beam:

The maximum downlink EIRP of the CONUS North beam is 60.7 dBW. The maximum PFD level that the beam is capable of producing is -115.81 dBW/m^2/MHz. This occurs in the southeast portion of CONUS. Figure 2 shows the geographic location of the maximum PFD and the -118 dBW/m^2/MHz and -121 dBW/m^2/MHz contours. The diagram demonstrates that the PFD levels produced by the CONUS North beam are compliant in all regions defined by §25.208(w).

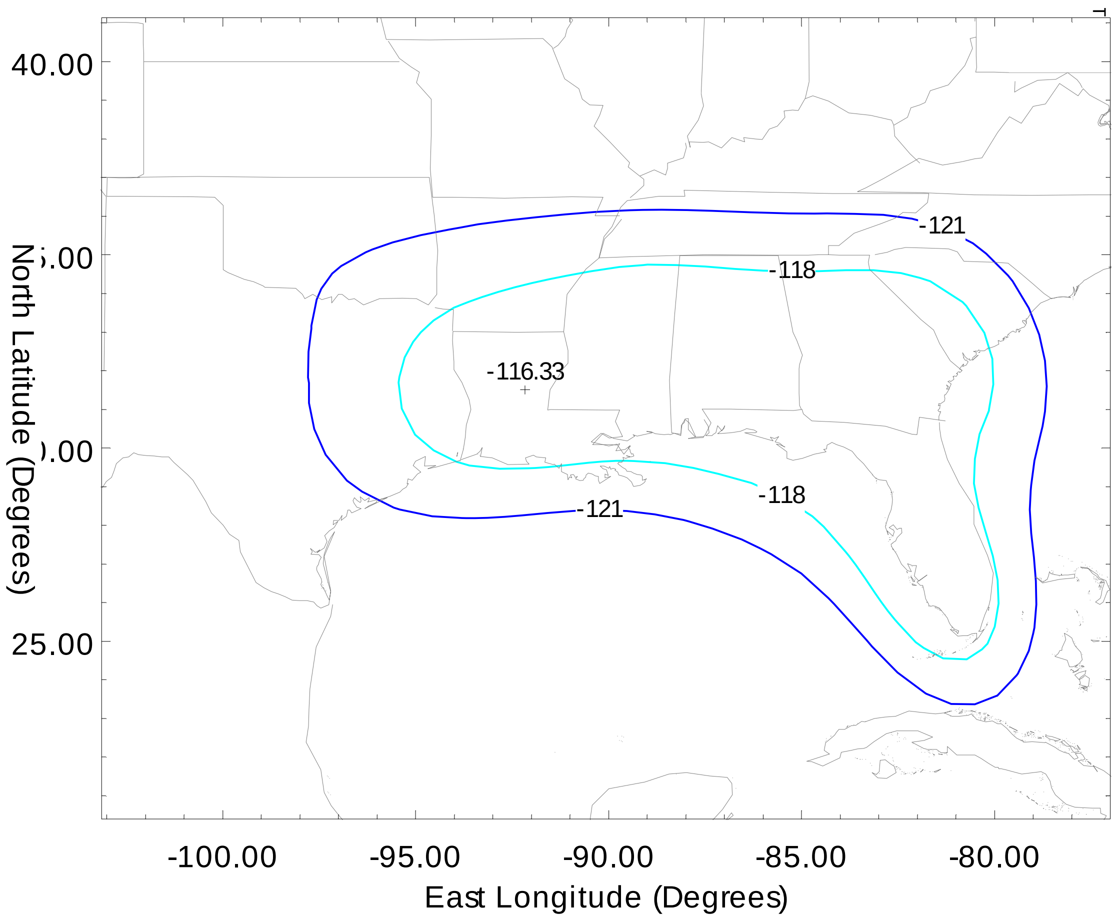
Figure 2. PFD contours of the CONUS North beam.



CONUS South Beam:

The maximum downlink EIRP of the CONUS South beam is 60.3 dBW. The maximum PFD level that the CONUS beam is capable of producing is -116.33 dBW/m^2/MHz. This occurs in the southeast portion of CONUS. Figure 3 shows the geographic location of the maximum PFD and the -118 dBW/m^2/MHz and -121 dBW/m^2/MHz contours. The diagram demonstrates that the PFD levels produced by the CONUS South beam are compliant in all regions defined by §25.208(w).

Figure 3. PFD contours of the CONUS South beam.



Spot Beams:

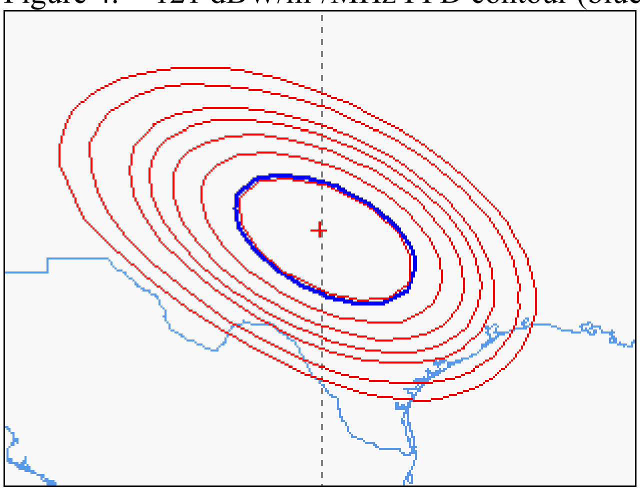
Table 1 shows the maximum PFD levels that can occur at the boresight of each of the spot beams. These levels are then compared to the applicable regional PFD level of §25.208(w). Table 1 shows that the peak PFD is less than the applicable PFD level of §25.208(w) for all beams, except for beam SP06.

Table 1. Peak PFD levels of the spot beams.

Beam ID	Beam Peak Latitude (°N)	Beam Peak Longitude (°W)	Applicable 25.208(w) PFD Limit ($dBW/m^2/MHz$)	Peak PFD ($dBW/m^2/MHz$)	PFD Margin (dB)
SP01	27.80	95.16	-115	-121.6	6.6
SP02	24.80	80.77	-115	-115.3	0.3
SP03	19.61	99.71	N/A (Mexico beam)	-118.7	N/A
SP04	18.29	66.99	-115	-115.2	0.2
SP05	33.19	108.05	-121	-121.8	0.8
SP06	32.64	100.01	-121	-118.7	-2.3
SP07	31.55	92.94	-115	-116.0	1.0
SP08	30.63	87.47	-115	-115.4	0.4
SP09	29.76	81.82	-115	-115.3	0.3
SP10	38.96	116.83	-121	-122.0	1.0
SP11	37.31	106.33	-121	-121.8	0.8
SP12	36.70	98.14	-115	-118.6	3.6
SP13	35.58	91.68	-115	-116.6	1.6
SP14	34.55	85.26	-115	-115.5	0.5
SP15	33.66	80.13	-115	-115.4	0.4
SP16	44.98	120.66	-121	-122.1	1.1
SP17	42.71	106.11	-121	-121.9	0.9
SP18	41.20	97.58	-118	-120.2	2.2
SP19	39.89	89.79	-118	-118.6	0.6
SP20	38.81	83.84	-118	-118.5	0.5
SP21	37.81	77.73	-115	-118.4	3.4
SP22	50.98	125.21	-121	-122.3	1.3
SP23	48.06	107.61	-121	-122.0	1.0
SP24	46.14	96.56	-118	-120.2	2.2
SP25	44.65	88.10	-118	-118.6	0.6
SP26	43.45	81.73	-118	-118.6	0.6
SP27	42.37	75.24	-118	-118.6	0.6
SP28	43.89	70.32	-118	-118.6	0.6
SP29	34.69	118.23	-121	-122.1	1.1
SP30	28.16	101.80	-121	-121.7	0.7

The boresight of beam SP06 is slightly west of 100° W.L. Figure 4 shows the -121 dBW/m^2/MHz PFD contour of the beam if it were to transmit with its maximum downlink EIRP of 63.4 dBW. The beam has the capability of exceeding the PFD level of §25.208(w)(3) by 2.3 dB. In order to comply with the PFD level of §25.208(w)(3), EchoStar will reduce the maximum downlink EIRP of beam SP06 by 2.3 dB. EchoStar will not operate beam SP06 with a downlink EIRP greater than 61.1 dBW unless higher-powered operations are coordinated with adjacent, authorized 17/24 GHz BSS operators as allowed by §25.262(f)(1).

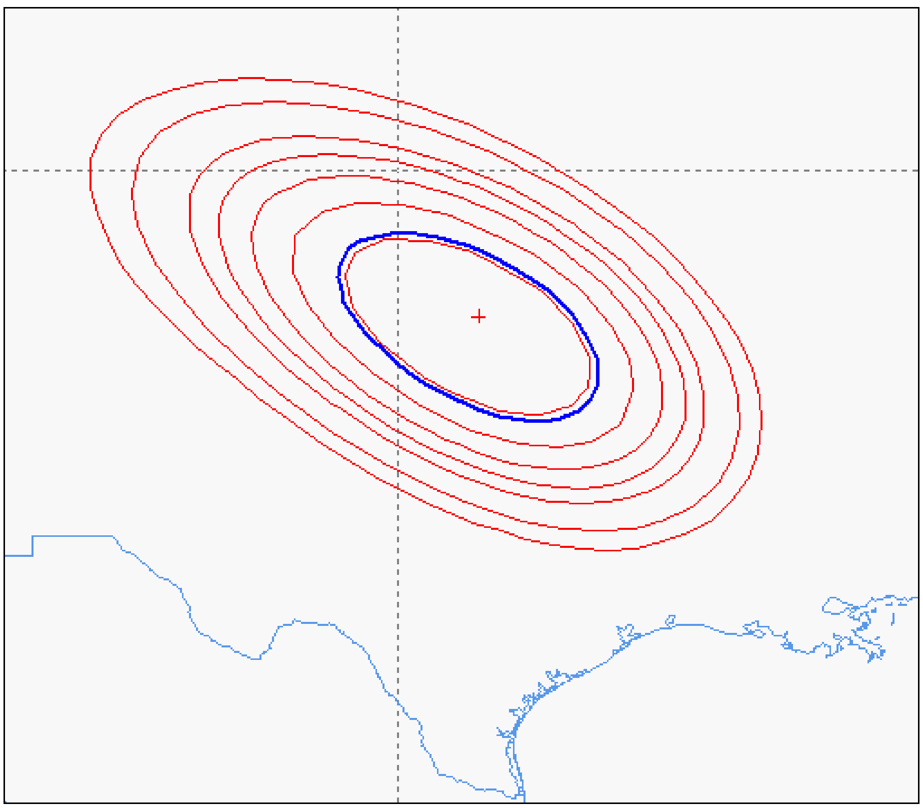
Figure 4. -121 dBW/m^2/MHz PFD contour (blue) of beam SP06 with an EIRP of 63.4 dBW.



Except for beam SP06, all other beams conform to the applicable PFD level of §25.208(w) <u>at the beam's boresight</u>. However, since a beam centered in one region defined by §25.208(w) can overlap into a region with a lower allowable PFD level, it is necessary to examine those beams that are near regional boundaries to determine whether they conform to all the PFD levels of §25.208(w). Such an examination was performed for all beams located near regional boundaries. All beams were found to conform to the PFD levels of §25.208(w) in all four regions, except for beam SP12.

Figure 5 shows the -121 dBW/m^2/MHz PFD contour of beam SP12 if it were to transmit with its maximum downlink EIRP of 63.5 dBW. The beam has the capability of exceeding the PFD level of §25.208(w)(3) by a maximum of 1.1 dB. In order to comply with the PFD level of §25.208(w)(3), EchoStar will reduce the maximum downlink EIRP of beam SP12 by 1.1 dB. EchoStar will not operate beam SP12 with a downlink EIRP greater than 62.4 dBW unless higher-powered operations are coordinated with adjacent, authorized 17/24 GHz BSS operators as allowed by §25.262(f)(1).

Figure 5. -121 dBW/m^2/MHz PFD contour (blue) of beam SP12 with an EIRP of 63.4 dBW.



1.2 17.7-17.8 GHz Band

§25.208(c) contains PFD limits that apply in the 17.7-17.8 GHz band. The PFD limits of §25.208(c) are as follows:

(1) -115 dB(W/m^2) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

(2) -115+(δ-5)/2 dB(W/m^2) in any 1 MHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane; and

(3) -105 dB(W/m^2) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

Only the ECHOSTAR EX-5 satellite's Mexico spot beam has the capability of transmitting in the 17.7-17.8 GHz band. The beam's peak downlink EIRP is 63.3 dBW. The maximum PFD can be calculated to be -118.7 dBW/m^2/MHz. This PFD level is lower than all PFD levels of §25.208(c) (i.e. at all elevation angles), therefore the Mexico spot beam is compliant with §25.208(c).