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

In the Matter of	)	File No. SAT-LOA-20020328-00050
	)	File No. SAT-AMD-20051118-00247
ECHOSTAR CORPORATION	)	File No. SAT-AMD-20080114-00018
	)	File No. SAT-AMD-20080213-00044
Application for Modification of Authority to Construct, Launch, and Operate a Satellite at 79º W.L. in the 17/24 BSS GHz Band	)	File No. SAT-MOD-2011____-_____
	)	Call Sign S2440

APPLICATION FOR MODIFICATION

Pursuant to Sections 308 and 309 of the Communications Act of 1934, as amended,[1] and Section 25.116 of the Commission's rules,[2] EchoStar Corporation ("EchoStar")[3] respectfully submits this application to modify its authority to construct, launch, and operate a 17/24 GHz Broadcast-Satellite Service ("BSS") satellite at the 79º W.L. orbital location. This application for modification requests authority to locate the satellite at a slight offset of 0.15 degrees from the 79° W.L. orbital location at 79.15° W.L. to avoid station keeping overlap with the AMC-5 satellite, consistent with Commission rules. This modification application also updates the

[1] 47 U.S.C. §§ 308, 309.

[2] 47 C.F.R. § 25.116.

[3] On April 21, 2011, the Commission consented to the *pro forma* assignment of EchoStar Corporation's authorization to launch and operate the above-referenced space station to EchoStar Satellite Operating Corporation. File No. SAT-ASG-20110224-00034 (granted Apr. 21, 2011). The *pro forma* assignment has not yet been consummated.

Technical Narrative and Schedule S submitted in the original application[4] to reflect satellite design changes described in the recently completed Critical Design Review ("CDR")[5] and provides a revised post-mission disposal plan for the EchoStar EX-3 satellite as required under Condition 8 of EchoStar's authorization.[6]

I. MODIFICATION TO TECHNICAL REQUIREMENTS OF PART 25

A. Revised Orbital Location

On April 20, 2009, the Commission authorized EchoStar to construct, launch and operate a 17/24 GHz BSS satellite at 79.0° W.L.[7] EchoStar requests authority to operate the satellite at 79.15° W.L. -- an offset of 0.15 degrees from its authorized orbital location -- in order to ensure the satellite's station keeping volume does not overlap with that of the AMC-5 satellite operated by SES Americom at the nominal 79.05° W.L. orbital location. EchoStar requests authority to operate at this offset location on a full-power, full interference protection basis pursuant to Section 25.262(b) of the Commission's rules.[8] As discussed in the attached Technical Narrative, no other operator has received Commission authorization to operate a 17/24 GHz BSS satellite within four degrees of 79.15° W.L. EchoStar currently has Commission authority to operate a

[4] *See* File Nos. SAT-LOA-2002328-00050 (filed Mar. 24, 2002), SAT-AMD-20051118-00247 (filed Nov. 18, 2005), SAT-AMD-20080114-00018 (filed Jan. 14, 2008), SAT-AMD-20080213-00044 (filed Feb. 13, 2008) ("*79° W.L. Application*").

[5] *See* Confidential Letter from Pantelis Michalopoulos, Counsel for EchoStar Corporation to Marlene H. Dortch, Secretary, FCC, *filed in* File Nos. SAT-LOA-2002328-00050, SAT-AMD-20051118-00247, SAT-AMD-20080114-00018, SAT-AMD-20080213-00044 (April 20, 2011), *revised by* Confidential Letter from Pantelis Michalopoulos, Counsel for EchoStar Corporation to Marlene H. Dortch, Secretary, FCC (Apr. 27, 2011).

[6] Stamp Grant, File Nos. SAT-LOA-2002328-00050, SAT-AMD-20051118-00247, SAT-AMD-20080114-00018, SAT-AMD-20080213-00044, Condition 8 (granted Apr. 20, 2009).

[7] *Id*.

17/24 GHz BSS satellite at 75° W.L.[9] EchoStar has a pending application before the Commission to operate that satellite at 75.15° W.L. for a similar reason in order to avoid the station-keeping volume of the Brasilsat B3 satellite that operates nominally at 75° W.L.[10] If the requested revision is granted, EchoStar will operate both of its satellites with four degree spacing, ensuring no harmful interference into either.

B. Revised Technical Information

This modification application also reflects revised physical and operational characteristics for EchoStar's 17/24 GHz BSS satellite, including its beam configuration; telemetry, tracking and control ("TT&C") frequencies; and power flux density ("PFD") levels. Since EchoStar filed its original application, improvements in satellite design have allowed the satellite manufacturer to revise the satellite's beam configuration to provide additional flexibility between CONUS and spot beam coverage. Specifically, the current design includes three large area coverage beams and an array of 30 small spot beams, which can be steered as a single group. The satellite design has also been revised to allow for TT&C operations at the edge of the satellite's authorized bands, bringing it into conformance with Section 25.202(g) of the Commission's rules.[11] These changes, in turn, have necessitated certain minor revisions to the original PFD analysis. Additionally, EchoStar is providing a revised orbital debris mitigation

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[8] 47 C.F.R. § 25.262(b).

[9] Stamp Grant, File Nos. SAT-LOA-20070105-00003, SAT-AMD-20080114-00022, SAT-AMD-20080213-00045 (granted Mar. 18, 2009).

[10] *See* File No. SAT-AMD-20110427-00080 (filed April 27, 2011).

[11] 47 C.F.R. §25.202(g). EchoStar notes that because the TT&C frequencies have been revised to conform to Section 25.202(g), the waiver granted in the original authorization is no longer required. *See* Stamp Grant, File Nos. SAT-LOA-2002328-00050, SAT-AMD-20051118-00247, SAT-AMD-20080114-00018, SAT-AMD-20080213-00044, at ¶4 (granted Apr. 20,

(Continued …)

plan, including an updated post-mission disposal plan, which was developed based on the concrete satellite design presented during the CDR. Under the revised disposal plan, the satellite will be maneuvered to at least 300 km above the geostationary orbit.[12] This is 10 km greater than the minimum disposal orbit required under Section 25.283(a) of the Commission's rules.[13]

As stated in the Commission's rules with respect to an application for modification, "only those items of information listed in § 25.114 that change need to be submitted, provided that the applicant certifies that the remaining information has not changed."[14] The modified technical information required pursuant to Part 25 of the Commission's rules is set forth in the accompanying Technical Narrative, Schedule S, and FCC Form 312. EchoStar hereby certifies that, except as described in this application for modification, no information in its amended application has changed.[15]

II. PUBLIC INTEREST CONSIDERATIONS

EchoStar has previously described in its application, which is hereby incorporated by reference, the public interest benefits from the construction, launch and operation of a 17/24 GHz BSS satellite at 79° W.L.[16] This modification application is in the public interest for the same reasons. The slight change in orbital location will allow EchoStar to avoid physical collision

2009).

[12] *See* Attachment A at 13-14.

[13] 47 C.F.R. § 25.283(a).

[14] 47 C.F.R. § 25.117(d)(1).

[15] The proposed change to the satellite's command frequency does not implicate the geographic service requirements of Section 25.148(c) of the Commission's rules, 47 C.F.R. § 25.148(c), since service to Alaska and Hawaii is not technically feasible from the 79.15º W.L. orbital location.

with the AMC-5 satellite without affecting the services that may be provided from the satellite. Additionally, the technical changes described in this modification application are the result of design improvements and technical developments that have occurred since the Technical Narrative was submitted. These developments will allow EchoStar to use spectrum more efficiently, resulting in better service to its customers. Furthermore, the revised post-mission disposal plan will ensure that the satellite is properly deorbited at the end of its life, reducing the risk it will become a collision risk for operating satellites.

These changes also will not result in additional interference to any authorized user in the spectrum. Of course, EchoStar will coordinate its operations as required under the Commission's rules.

III. CONCLUSION

For the foregoing reasons, EchoStar submits this application to modify its authority to construct, launch, and operate a 17/24 GHz BSS satellite at the 79º W.L. orbital location to request authority to operate the satellite 0.15 degrees offset from its authorized orbital location at 79.15° W.L. with full-power and full interference protection and to provide an updated and revised Technical Narrative, Schedule S, and post-mission disposal plan.

Respectfully submitted,

________/s/___________

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[16] *See 79° W.L. Application.*

May 4, 2011

ECHOSTAR EX-3

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-3 satellite, as amended.

A.2 ORBITAL LOCATION (§25.114(c)(5))

The Commission has previously authorized EchoStar to operate a 17/24 GHz satellite at 79° W.L. As explained in section A.13.3, EchoStar proposes to offset the satellite by 0.15° and to center the station-keeping box at 79.15° W.L. in order to avoid an overlap of the station-keeping volume with the AMC-5 satellite that operates nominally at 79.05° W.L.

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

The ECHOSTAR EX-3 satellite will operate at the 79.15° 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 coverage area 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 that 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 primary 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. There are variations of the second mode, which allow varying numbers of CONUS beam channels to be used with a proportionate reduction in the number of spot beams that can be used. 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 travelling 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 59.2 dBW and 59.8 dBW in the large area coverage CONUS beams. For the spot beams, the peak EIRP levels vary between 60.5 dBW to 66.6 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-3 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 provided 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-3 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.

[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-3 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.

No satellite operator has received Commission authorization to operate a 17/24 GHz satellite within four degrees of 79.15° W.L. EchoStar currently has Commission authorization to operate the 17/24 GHz ECHOSTAR EX-4 satellite at 75° W.L. EchoStar has a pending application before the Commission to operate the ECHOSTAR EX-4 satellite at 75.15° W.L. instead. Operation of the satellite at 75.15° W.L. avoids the station-keeping volume of the BRASILSAT B3 satellite that operates nominally at 75° W.L. and it has the additional benefit of creating a four-degree separation from the 79.15° W.L. location.

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 79.15° 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. All victim and interfering earth station antennas 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 future adjacent satellites located four degrees from 79.15° W.L. have similar technical characteristics to the ECHOSTAR EX-3 satellite, which is the case for the planned ECHOSTAR EX-4 satellite, the link budgets then also serve to show that the interference into future adjacent satellite networks is acceptable.

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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.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-3 satellite will not exceed the limits of §25.223.

A.11 PFD ANALYSIS

(§25.208)

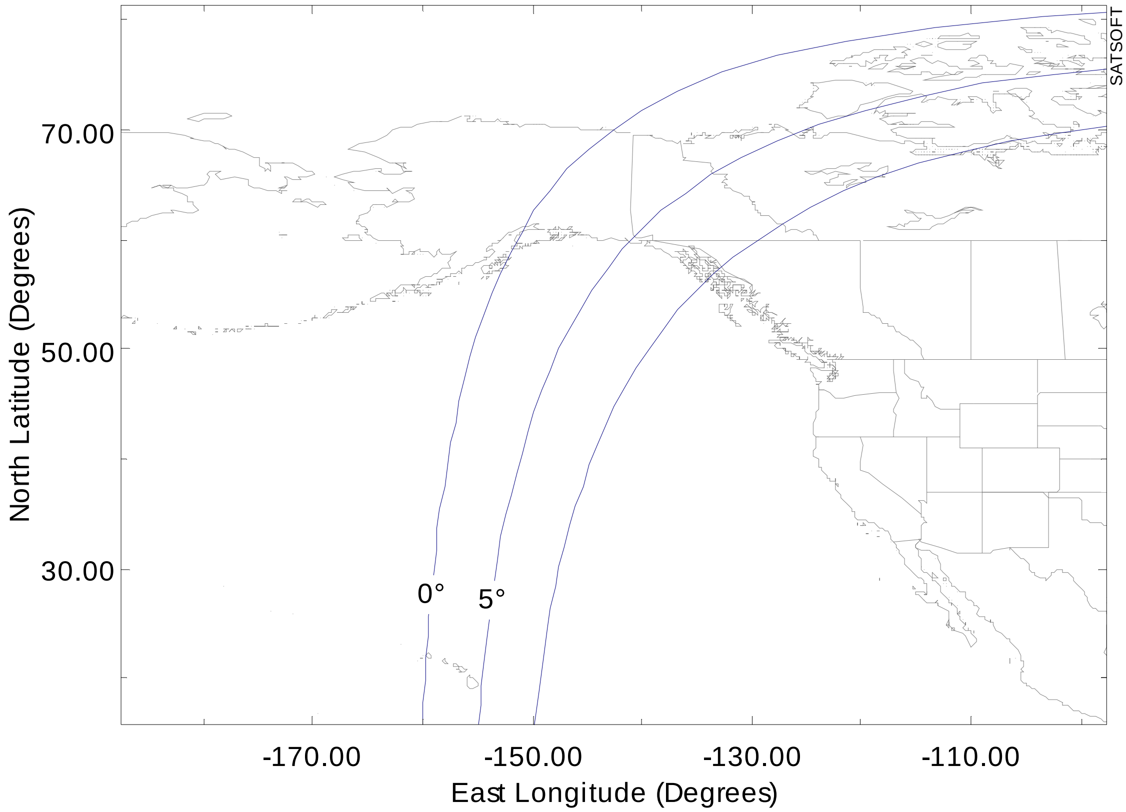
The power flux density ("PFD") analysis of the ECHOSTAR EX-3 satellite is included in Annex 1 to this Attachment. The analysis demonstrates that all beams of the ECHOSTAR EX-3 satellite that transmit in the 17.3-17.7 GHz band are compliant with the PFD levels of §25.208(w) and in all four regions defined by §25.208(w). In addition, the analysis demonstrates that the Mexico spot beam, which transmits in the 17.7-17.8 GHz band, is compliant with the PFD levels of §25.208(c).

A.12 GEOGRAPHIC SERVICE REQUIREMENTS

(§25.225)

The 79.15° W.L. location is not suitable for the provision of BSS service to either Alaska or Hawaii due to the extremely low elevation angles toward these geographic areas as shown in Figure A.12-1. The elevation angles towards the majority of Alaska are less than 5° and a significant portion of Alaska is not even visible. The elevation angles towards Hawaii are below 5°. For those geographic 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 79.15° W.L. towards Alaska and Hawaii



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-3 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-3 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-3 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 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-3 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 79.15° W.L. have also been reviewed.

Based on these reviews, there are two satellites operating near the 79° W.L. location, both under the control of SES Americom. Specifically, SES Americom is authorized to operate the AMC-2 satellite at 78.95° W.L. and the AMC-5 satellite at 79.05° W.L., both with an east-west station-keeping tolerance of ±0.05°. There are no pending applications before the Commission to use a location within ±0.15° of 79.15° W.L. With respect to published ITU filings, there are numerous networks filed at 79° W.L. on behalf of Luxembourg, Malaysia, the U.K. and the USA. Except for the USA networks used by the two SES Americom satellites, EchoStar can find no evidence that any of the other networks are being progressed towards launch.

Based on the preceding, EchoStar seeks to operate the ECHOSTAR EX-3 satellite at 79.15° W.L., with an east-west station-keeping tolerance of ±0.05°, in order to eliminate the possibility of any station-keeping volume overlap with the SES Americom satellites. EchoStar therefore concludes that physical coordination of the ECHOSTAR EX-3 satellite with another party is not required at the present time.

EchoStar will continue to monitor Commission and ITU resources to identify satellites that reasonably can be expected to operate at, or near, 79.15° W.L. In the event that concrete plans are made by another party to operate a satellite near 79.15° W.L. such that there is a possibility of physical collision with the ECHOSTAR EX-3 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-3 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/
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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-3 satellite operate in the 17.3-17.7 GHz band except for the Mexico spot beam. The allowable PFD levels in the 17.3-17.7 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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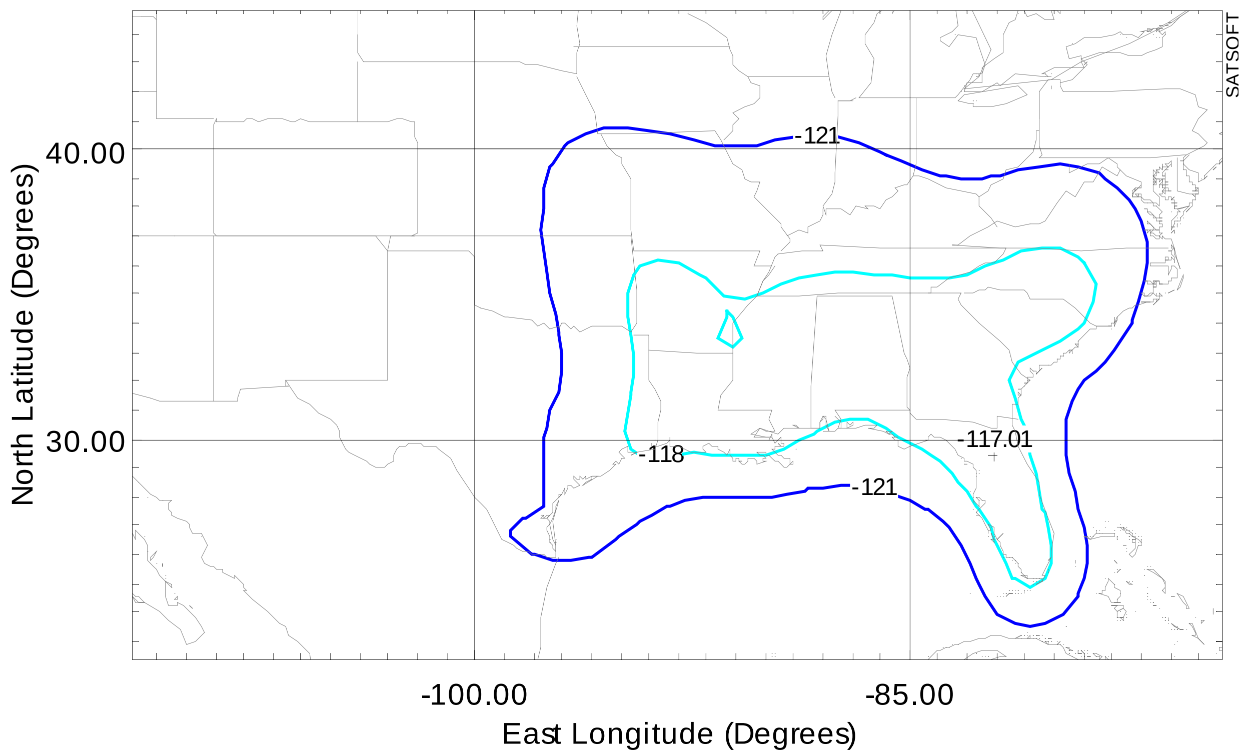
[1] Note that this is a conservative estimate of maximum PFD since the calculation does not take into account clear sky atmospheric losses.

CONUS Beam:

The maximum downlink EIRP of the CONUS beam is 59.4 dBW. The maximum PFD level that the beam is capable of producing is -117.01 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 the PFD levels produced by the CONUS beam are compliant in all regions defined by §25.208(w).

Figure 1. PFD contours of the CONUS beam.

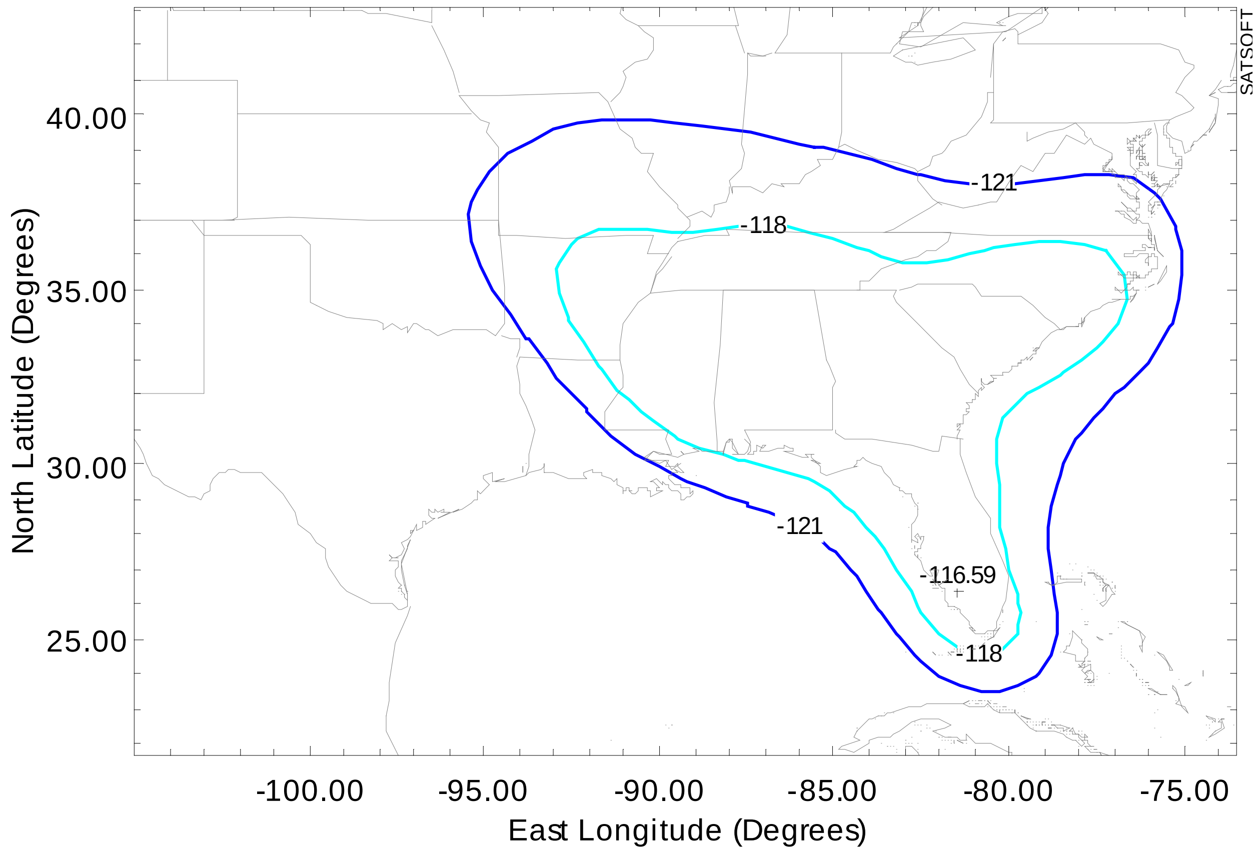


CONUS North Beam:

The maximum downlink EIRP of the CONUS North beam is 59.8 dBW. The maximum PFD level that the beam is capable of producing is -116.59 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).

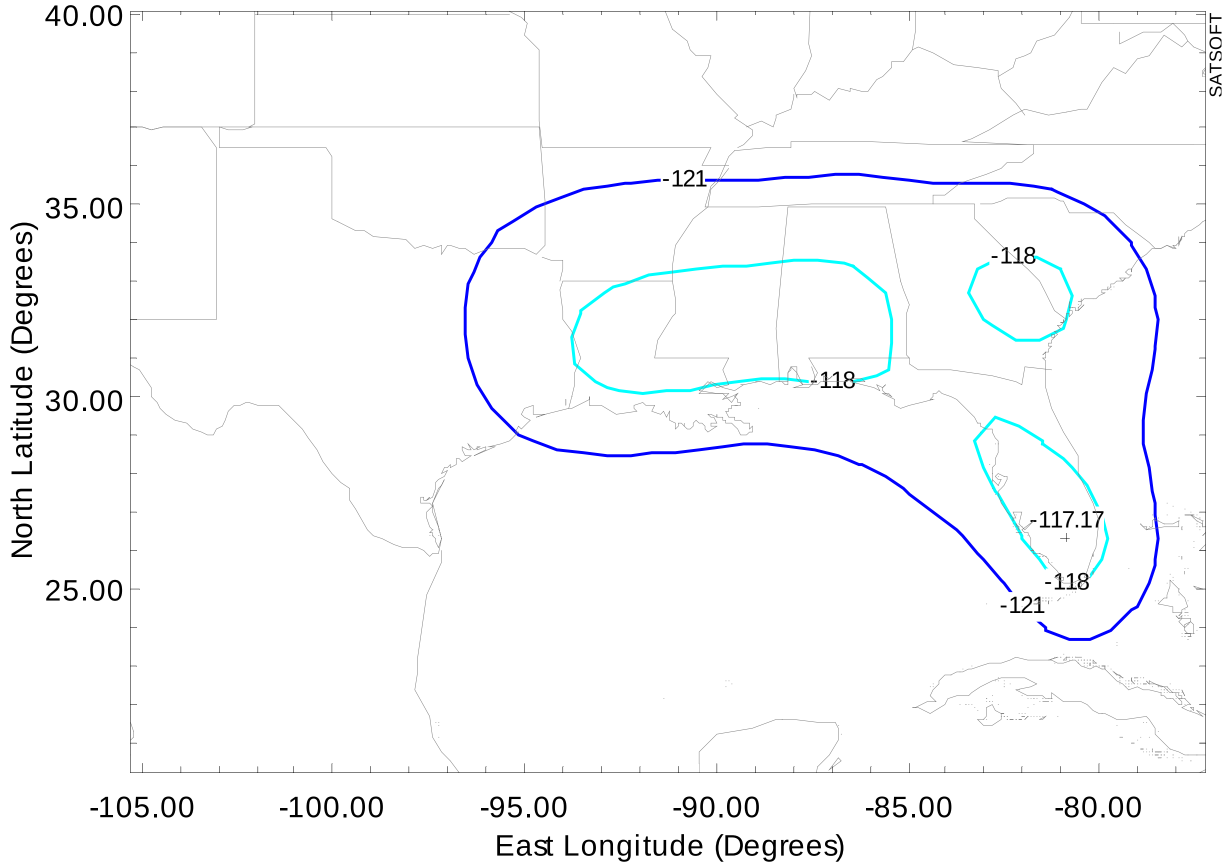
Figure 2. PFD contours of the CONUS North beam.



CONUS South Beam:

The maximum downlink EIRP of the CONUS South beam is 59.2 dBW. The maximum PFD level that the CONUS beam is capable of producing is -117.17 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 and compares these levels 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.

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 ($dBW/m^2/MHz$)**	**ECHOSTAR EX-3 Peak PFD ($dBW/m^2/MHz$)**	**PFD Margin (dB)**
SP01	45.35	122.01	-121	-121.8	0.8
SP02	45.67	112.79	-121	-121.7	0.7
SP03	45.63	104.49	-121	-121.6	0.6
SP04	45.81	97.52	-118	-120.4	2.4
SP05	46.10	90.41	-118	-118.6	0.6
SP06	46.52	83.47	-118	-118.3	0.3
SP07	48.45	68.06	-118	-118.4	0.4
SP08	39.00	120.00	-121	-121.7	0.7
SP09	38.87	111.60	-121	-121.6	0.6
SP10	38.90	104.31	-121	-121.5	0.5
SP11	39.57	98.26	-118	-120.7	2.7
SP12	39.82	91.85	-118	-118.4	0.4
SP13	40.17	85.63	-118	-118.4	0.4
SP14	40.61	79.44	-118	-118.4	0.4
SP15	41.15	73.16	-118	-118.4	0.4
SP16	33.01	119.19	-121	-121.0	0.0
SP17	33.41	111.77	-121	-121.5	0.5
SP18	33.47	104.97	-121	-121.4	0.4
SP19	33.63	98.72	-115	-121.2	6.2
SP20	33.88	93.23	-115	-116.8	1.8
SP21	34.19	87.49	-115	-117.2	2.2
SP22	35.00	81.85	-115	-115.3	0.3
SP23	35.44	76.13	-115	-115.3	0.3
SP24	28.28	99.87	-115	-121.3	6.3
SP25	28.91	94.33	-115	-115.2	0.2
SP26	29.20	89.28	-115	-115.3	0.3
SP27	29.53	83.94	-115	-115.2	0.2
SP28	25.21	80.81	-115	-115.2	0.2
SP29	18.88	99.23	N/A (Mexico beam)	-115.9	N/A
SP30	18.38	66.53	-115	-115.8	0.8

All beams conform to the applicable PFD level of §25.208(w) at each beam's boresight. 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 and it was found that all such beams comply with the PFD levels of §25.208(w) in all four regions.

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-3 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 65.8 dBW. The maximum PFD can be calculated to be -115.9 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).
