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

In the Matter of:	)	
	)	File No. SAT-MOD_____
ECHOSTAR CORPORATION	)	File No. SAT-AMD-20051118-00244
	)	File No. SAT-LOA-20030609-00113
Application for Minor Modification of its Authority To Operate a DBS Satellite at 86.5° W.L.	)	Call Sign S2454

APPLICATION FOR MINOR MODIFICATION

EchoStar Corporation ("EchoStar") requests a minor modification of its authority to construct a new Direct Broadcast Satellite ("DBS") service satellite to be located at the 86.5° W.L. orbital location ("86.5° W.L. satellite") in order to satisfy two conditions imposed on its authorization.[1] First, pursuant to Condition (e) of the *Order and Authorization*,[2] EchoStar is providing a Supplemental Technical Annex incorporating an updated orbital debris mitigation plan that specifies the end-of-life operations for the satellite.[3] Second, pursuant to Condition (h),

[1] *EchoStar Satellite L.L.C., Application to Construct, Launch, and Operate a Direct Broadcast Satellite at the 86.5° W.L. Orbital Location*, Order and Authorization, 21 FCC Rcd 14045 (Int'l Bur. 2006) ("*Order and Authorization*"); *affirmed in* Memorandum Opinion and Order, 23 FCC Rcd 3252 (2008) ("*Memorandum Opinion and Order*"). As EchoStar has previously advised the Commission, on January 1, 2008, EchoStar Communications Corporation ("ECC") assigned several satellite space station assets previously owned by its subsidiaries, including the above referenced license, to EchoStar (the "Spin-Off"). *See* Public Notice, DA 07-4655 (rel. Nov. 16, 2007) (consenting to the transfer of several authorizations as part of the Spin-Off).

[2] *Order and Authorization* at ¶ 28.

[3] Attached hereto as Attachment 1.

which the Commission added to EchoStar's authorization *sua sponte* in its *Memorandum Opinion and Order*, EchoStar is submitting a revised transmit antenna pattern reflecting the progress that it has achieved towards coordination between EchoStar and Telesat Canada ("Telesat").[4]

On November 29, 2006, the International Bureau issued an *Order and Authorization* authorizing EchoStar to construct a new DBS service satellite to be located at 86.5° W.L. In that Order, the Bureau noted that EchoStar had amended its application to incorporate an orbital debris mitigation plan as required by the Commission's *Orbital Debris Public Notice*.[5] Owing to the nascent stage of the satellite's design, however, EchoStar was not in a position to provide specific information concerning the four elements of orbital debris mitigation identified in Section 25.114(d) and the *Orbital Debris Public Notice*.[6] Therefore, the Bureau imposed a condition on EchoStar's authorization requiring it to provide a detailed orbital debris mitigation plan for the satellite no later than December 29, 2008.[7] In fulfillment of this condition, EchoStar is submitting a Supplemental Technical Annex, which includes a detailed orbital debris mitigation plan.[8]

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[4] *Memorandum Opinion and Order* at ¶ 25. Pursuant to Section 25.117(d)(1), this application need only include those items listed in Section 25.114 that change. 47 C.F.R. § 25.117(d)(1). Some information provided in the Supplemental Technical Annex and Schedule S attached to this application may duplicate information previously provided, but this information is included only to provide context to the modified information.

[5] Public Notice, Disclosure of Orbital Debris Mitigation Plans, Including Amendment of Pending Applications, DA 05-2698 (Oct. 13, 2005).

[6] *Order and Authorization* at ¶ 21.

[7] *Id.* at ¶¶ 21, 28(e).

[8] *See* Attachment 1.

On February 25, 2008, the Commission released a *Memorandum Opinion and Order* dismissing Telesat's application for review of EchoStar's authorization.[9] In doing so, the Commission imposed an additional condition on its own motion requiring EchoStar to "provide all technical characteristics of its satellite modified as a result of the coordination process, regardless of whether coordination is successful" within 30 days of completing critical design review ("CDR") for the satellite.[10]

EchoStar has been engaged in coordination negotiations with Telesat for several months and has made good progress towards coordination. These discussions have made clear that the method for coordinating the proposed satellite will simply be a modification of its coverage area.

When EchoStar informed the Bureau on December 1, 2008 that it had completed CDR for the 86.5° W.L. satellite, it also explained that the antenna coverage area and certain other characteristics of the satellite set forth in the CDR may need to be modified in the process of coordinating the satellite.[11] As anticipated by that filing, EchoStar is now submitting a revised antenna pattern tailored to reduce the satellite's EIRP over Canadian territory as part of the attached Supplemental Technical Annex and Schedule S.[12] In the event the definitive coordination agreement entails further changes to the satellite parameters, EchoStar will promptly submit a further modification application describing these changes.

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[9] *See Memorandum Opinion and Order* at ¶ 20.

[10] *Id.* at ¶ 20.

[11] *See* Letter to Marlene H. Dortch, Secretary, FCC, from Pantelis Michalopoulos, Counsel for EchoStar Corporation, dated December 1, 2008.

[12] EchoStar also proposes the incorporation of two uplink spot beams, rather than the original single uplink beam.

Respectfully submitted,

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December 29, 2008

ATTACHMENT 1

SUPPLEMENTAL TECHNICAL ANNEX

Technical Description of EchoStar-86.5W

1. General Description

EchoStar-86.5W will deliver 32 DBS channels from the 86.5°W.L. geostationary orbital position. A single North American shaped antenna beam is used to transmit DBS signals over all of CONUS, Puerto Rico, US Virgin Islands and Mexico. Full frequency re-use is achieved by the use of dual circular polarization. Uplinks are provided from either of EchoStar's two existing facilities: Cheyenne, WY and Gilbert, AZ.

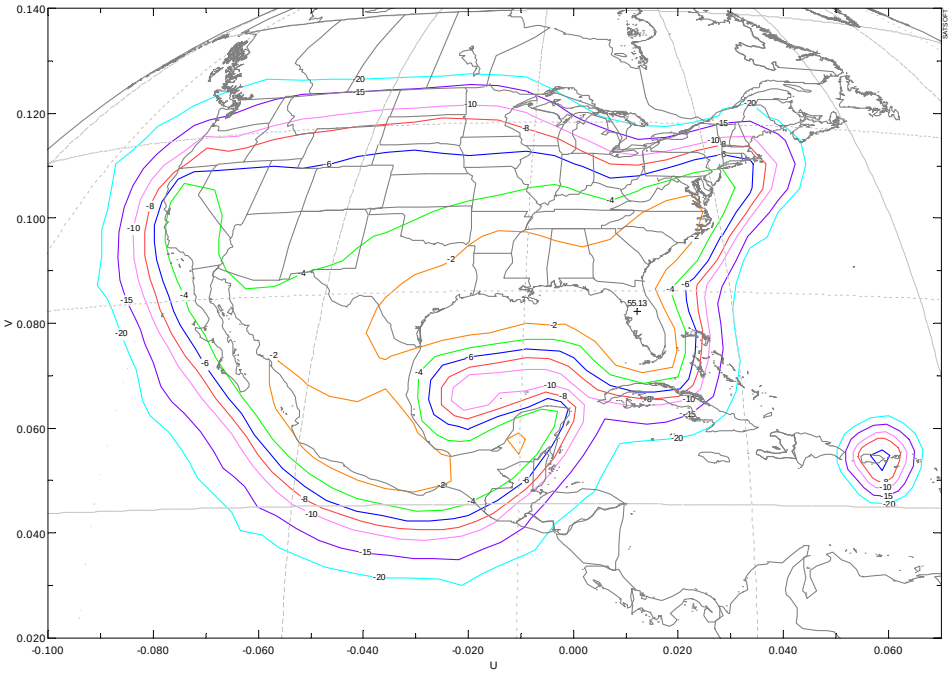
This supplemental technical annex is largely confined to aspects of the satellite that are changed as a result of the modification application that the Annex accompanies. However, it also includes other technical information that provides the context for the changes as well as certain pertinent technical information that cannot be submitted within the Schedule S software. EchoStar is also submitting a Schedule S with this application (the original application had been filed before Schedule S was introduced under the Commission's rules).

The main technical changes to the EchoStar-86.5W satellite are (a) the tailoring of the North American downlink beam to reduce the EIRP over Canadian territory, and (b) the incorporation of two uplink spot beams, rather than the original single uplink beam. A revised orbital debris mitigation plan is also incorporated.

2. Satellite Transmit Performance (Downlink)

The EchoStar-86.5W satellite has a single North American shaped transmit beam that operates in both RHC and LHC polarizations. The beam has a peak EIRP of 55.1 dBW in High Power mode and 52.3 dBW in Medium Power mode. The performance in both RHC and LHC polarizations is nominally the same.

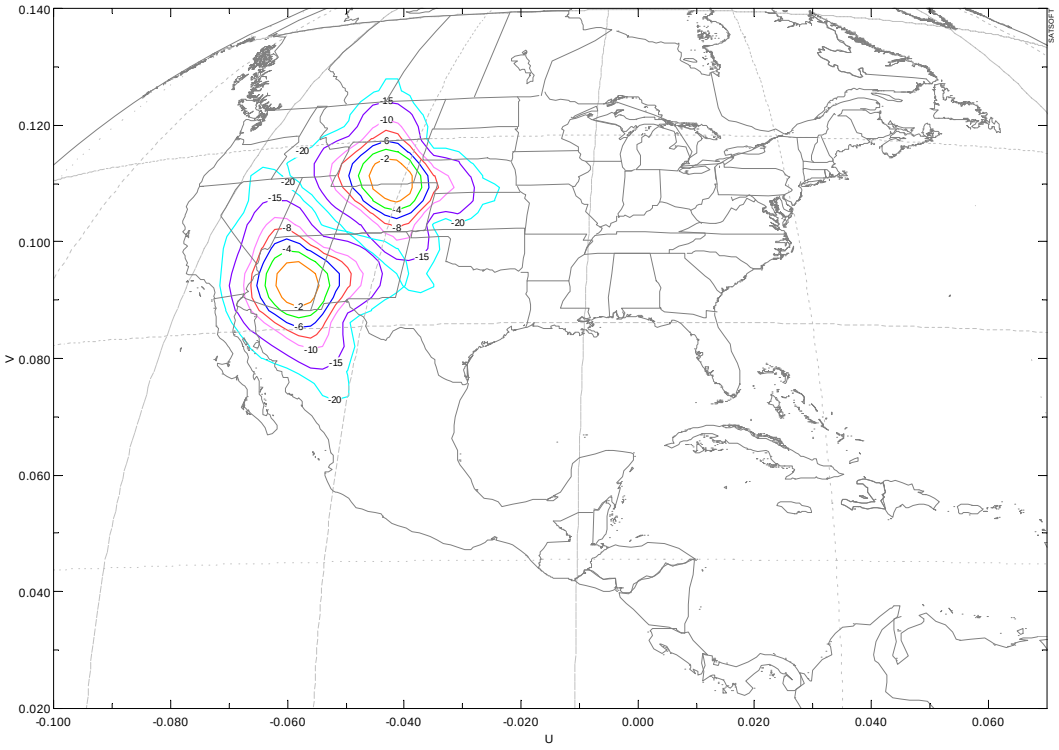
Figure 2-1: Relative Antenna Gain Contours for the North American Shaped Transmit Beam (-2, -4, -6, -8, -10, -15 and -20 dB)



3. Satellite Receive Performance (Uplink)

The EchoStar-86.5W satellite has two separate receive beams that provide coverage of the EchoStar feeder uplink sites at Cheyenne, WY, and Gilbert, AZ. The beam coverage areas are shown in Figure 3-1. The performance in both RHC and LHC polarizations is nominally the same.

Figure 3-1: Relative Antenna Gain Contours for the Two Receive Spot Beams (-2, -4, -6, -8, -10, -15, -20 dB)



The G/T performance in the direction of the EchoStar feeder uplink sites is summarized in Table 3-1.

Table 3-1: G/T Performance towards EchoStar Uplink Sites

Uplink Site	Minimum G/T (dB/K)
Gilbert, AZ	**14**
Cheyenne, WY	**14**

4. Frequency Plans

The EchoStar-86.5W satellite uses the standard channel center frequencies and channel bandwidths prescribed in the ITU's Region 2 BSS Plan.[1] The difference is that the polarization of the channels is opposite to that in the Plan. This helps to reduce interference with respect to the adjacent BSS satellites, because the guard band between transponders is now co-polar with the adjacent satellites' transponders, due to the fact that co-polar and cross-polar channels are offset by approximately half the transponder bandwidth.

5. Communications Payload Configuration

The uplink signals are received in both polarizations by the satellite receive antenna. Two active receivers are used – one for each polarization. After appropriate down-conversion, channel filtering and amplification the signals are transmitted using a single 150 Watt Traveling Wave Tube Amplifier (TWTA) per channel in the case of low power mode operation. Each channel can also be configured to use two parallel 150W TWTAs for high power mode operation, giving a corresponding increase in the EIRP level of approximately 2.8 dB. In total, the communications payload can support 32 channels in low power mode, or 16 channels in high power mode, or the corresponding number of a mixture of high power and low power mode transponders. The reconfiguration of all transponders is switchable by ground telecommand. The outputs of all the TWTAs operating in the same polarization are then multiplexed into the appropriate downlink antenna port.

6. TT&C

EchoStar will telecommand the ECHOSTAR-86.5 satellite at the 86.5° W.L. orbital position using the 17.305 GHz telecommand carrier operating in right hand circular polarization. This telecommand carrier does not conflict with any adjacent satellites that might potentially be affected.

A summary of the TT&C subsystem performance is given in Table 6-1.

[1] Channel bandwidth is 24 MHz. Spacing between center frequencies of adjacent co-polar channels is 29.16 MHz. Cross-polar channels offset by 14.58 MHz.

Table 6-1: Summary of the TT&C Subsystem Performance

Parameter	Performance
On-Station Command Frequency	17305 MHz
Uplink Flux Density	Between -70.5 and -91.5 dBW/m^2
Uplink Tx Earth Station Polarization	RHCP
On-Station Telemetry Frequencies	12,203 MHz 12,204 MHz
Maximum Downlink EIRP	13.5 dBW
Downlink Polarization	RHCP

The primary TT&C earth stations will be in Gilbert, AZ and Cheyenne, WY.

7. Spacecraft Description and Launch Vehicle

The EchoStar-86.5W satellite will use a state-of-the-art FS-1300 high power spacecraft platform, available from Space Systems Loral. The spacecraft dry mass will be 1654 Kg and although dependent on the launch vehicle selected, the launch mass will be approximately 3875 Kg.

The antenna configuration will consist of two large single surface reflectors for the North American downlink beam, deployed from the east and west sides of the spacecraft, and a small feeder uplink receive antenna mounted on the earth deck.

The design life of the satellite is 15 years.

The EchoStar-86.5W spacecraft will be compatible with a number of commercially available launch vehicles, including Atlas V, Ariane 5, Proton and Sea Launch.

8. Feeder Links

The EchoStar-86.5W feeder link earth stations will be located at EchoStar's existing facilities in Cheyenne, WY, and Gilbert, AZ. EchoStar will file the necessary earth station modification applications with the FCC for the EchoStar-86.5W feeder link earth stations.

9. Compliance with ITU Annexes 1 to Appendices 30 and 30A

Annexes 1 to Appendices 30 and 30A provide criteria to determine if another administration is affected by a proposed modification to the Region 2 BSS Plan. If an administration is found to be affected then the agreement of that administration is sought through the procedures of the ITU.

The EchoStar-86.5W satellite will attenuate its downlink EIRP as much as possible over Canadian territory, consistent with still providing reasonable service to all parts of CONUS. This is because of the proximity of the adjacent Canadian orbital assignments at 82°W and 91°W, both equally spaced 4.5° from the orbital location of the EchoStar-86.5W satellite. This beam pattern will reduce interference to a low level into Canada's original Plan assignments which serve Canada only. Compatible operation with the Canadian modifications to the BSS Plan, which include CONUS in their service area, can also be achieved through coordination.[2]

There are also other Caribbean and South American assignments within the orbital range 91°W to 82°W, and these may also need to be addressed in the context of the negotiation procedures of the ITU, to ensure compatibility.

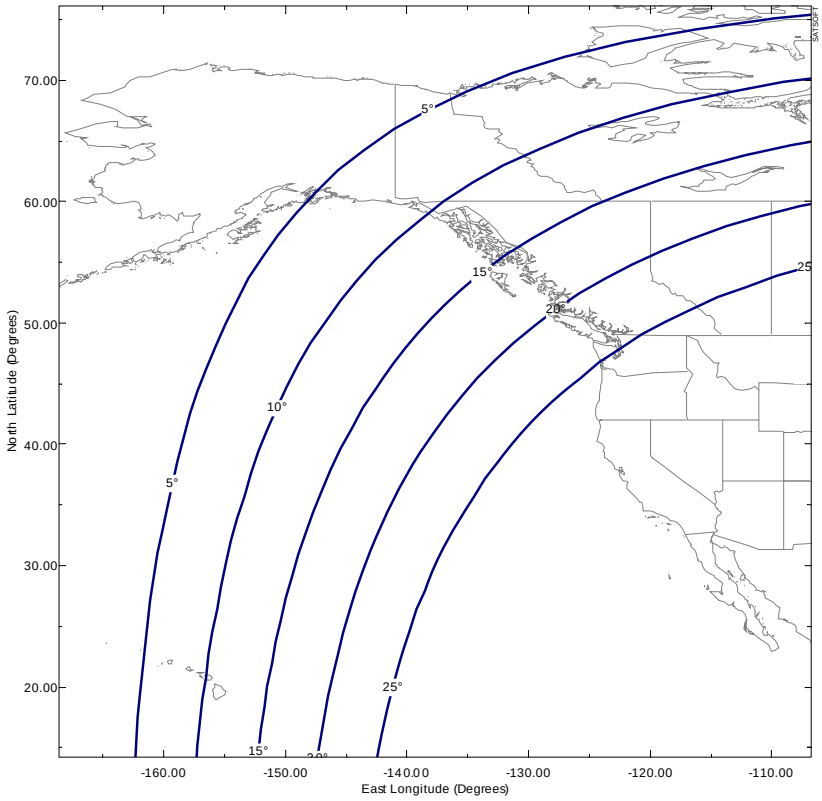
There are no U.S. assignments that will be potentially affected by EchoStar-86.5W.

10. Compliance with Geographic Service Requirements

The geostationary orbital location of 86.5°W is not suitable for providing DBS service to either Hawaii or Alaska because of the low elevation angles to these territories from this orbital position. Figure 10-1 below illustrates the elevation angles, which are between 7° and 12° for Hawaii and lower than 8° for Alaska, with the majority of Alaska not even visible from the 86.5°W orbital location. Even where those territories are visible the extremely low elevation angle would not permit a viable DBS service due to the difficulty in locating user receive dishes where they could "see" the 86.5°W satellite because of building and foliage blockage.

[2] Appropriate ITU materials and analysis will be submitted to the FCC upon finalization of the coordination with Telesat Canada.

Figure 10-1: Elevation Angles from 86.5°W towards Alaska and Hawaii



11. Orbital Debris Mitigation Plan

EchoStar and its satellite manufacturer has assessed and limited the amount of debris released during normal operations. The satellite has been designed to minimize debris generated after separation from the launch vehicle and to cause no debris during normal on-station operations. All pyrotechnic devices onboard the satellite have been designed to retain all physical debris. EchoStar and Loral have assessed and limited the probability of the space station becoming a source of debris by collisions with small debris or meteoroids smaller than one centimeter in diameter that could cause loss of control and prevent post-mission disposal. The possibility of collisions with small debris and meteoroids has been taken into account as part of the satellite design. EchoStar and Loral have taken steps to limit the effects of such collisions through the use of shielding, the placement of components, and the use of redundant systems. In addition, all sources of stored energy are located within the body of the spacecraft, thereby providing protection from small orbital debris.

EchoStar and Loral have assessed and limited the probability of accidental explosions during and after completion of mission operations. The satellite has been designed to ensure that debris generation does not result from the conversion of energy sources on board the satellite into energy that fragments the satellite. The propulsion subsystem pressure vessels have been designed to provide high safety margins. EchoStar and Loral have limited the probability of accidental explosions during mission operations by means of a failure mode verification analysis. All pressures, including those of the batteries, will be monitored by telemetry. At end-of-life and once the satellite has been placed into its final disposal orbit, all on-board sources of stored energy will be depleted, the batteries will be discharged and all fuel line valves will be left opened.

In considering current and planned satellites that may have a station-keeping volume that overlaps the EchoStar-86.5W 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, networks for which a request for coordination has been submitted to the ITU in the vicinity of 86.5° W.L. have also been reviewed. Only those networks that either operate, or are planned to operate, and have an overlapping station-keeping volume with the EchoStar-86.5W satellite, have been taken into account in the analysis. For purposes of calculating potential station-keeping volume overlap, US satellites have been assumed to have a maximum east-west excursion of ±0.05° from their nominal location, while non-US satellite networks have been assumed to have a maximum excursion of ±0.1° from their nominal location.

Based on these reviews, there are no operational satellites within ±0.15° of 86.5° W.L. and there are no pending applications before the Commission to use a location within ±0.15° of 86.5° W.L. The closest operational adjacent satellites are at the nominal 85°W.L. and 87°W.L. locations.

With respect to published ITU networks, Canada has three 17/24 GHz networks at the 86.5° W.L. location. EchoStar can find no evidence that a satellite construction contract has been awarded for a Canadian 17/24 GHz satellite at 86.5° W.L. Furthermore, no publicly available launch manifests indicate any plan to launch such a satellite in the foreseeable future. Should this, or any other satellite, progress toward launch at, or near, 86.5° W.L. in the future, EchoStar will seek to coordinate the physical position of the satellite with the relevant operators.

EchoStar therefore concludes that physical coordination of the EchoStar-86.5W satellite with a second party will not be required at the present time. Prior to launch of the EchoStar-86.5W satellite, EchoStar will continue to monitor Commission and ITU resources to identify satellites that reasonably can be expected to operate at, or near, 86.5° W.L. In the event that concrete plans are made by another party to launch a satellite in the immediate vicinity of 86.5° W.L., EchoStar will initiate appropriate physical coordination discussions to establish any necessary operational procedures to ensure that a physical collision will not take place.

POST-MISSION DISPOSAL

At the end of the operational life of the EchoStar-86.5W satellite, EchoStar will maneuver the satellite to a disposal orbit with a minimum perigee of 333 km above the normal GSO operational orbit. This proposed disposal orbit altitude exceeds the minimum required by §25.283, which is calculated below.

The input data required for the calculation is as follows:

Total Solar Pressure Area "A" = 74.9 m^2
(includes area of solar array, satellite body and deployed antennas)
"M" = Dry Mass of Satellite = 1742 kg
"C_R" = Solar Pressure Radiation Coefficient (worst case) = 2

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 2 x 74.9/1742
= 36,107 km
= 321 km above GSO (35,786 km)

Thus, the designed disposal orbit of 333 km above GSO exceeds the required minimum by a margin of 12 km. Maneuvering the satellite to the disposal orbit will require 10 kg of propellant, and this quantity of fuel, taking account of all fuel measurement uncertainties, will be reserved to perform the final orbit raising maneuvers. The fuel reserve was calculated using two methods. The first method applied was the pressure-volume temperature method, which uses tank pressure and temperature information to determine remaining propellant. The second method applied was the bookkeeping method, which evaluates the flow rate at average pressure and total thruster on-time of orbital maneuvers to determine the amount of propellant used. EchoStar and Loral have

assessed fuel gauging uncertainty and has provided an adequate margin of fuel to address such uncertainty.

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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