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

| | | |
|---|---|---|
| In the Matter of | ) | |
| | ) | Call Sign S2232 |
| **ECHOSTAR CORPORATION** | ) | |
| | ) | File No. SAT-STA-2011_____ |
| Application for Emergency Special Temporary Authority to Operate EchoStar 6 at 76.95° W.L. | ) | |

***EXPEDITED CONSIDERATION REQUESTED***

**APPLICATION FOR EMERGENCY SPECIAL TEMPORARY AUTHORITY**

By this Application, EchoStar Corporation ("EchoStar") requests emergency Special Temporary Authority ("STA"),[1] under Section 25.120(a),[2] for 30 days to operate the EchoStar 6 satellite from the 76.95º W.L. orbital location. The Commission has already granted EchoStar's request for emergency STA to move the satellite from 61.65º W.L. to 76.95º W.L.[3] These emergency requests are necessary to allow EchoStar to transfer traffic to EchoStar 6 while it completes its restoration activities following the recent single event upset ("SEU") that

[1] In conjunction with this application, EchoStar is filing an application for STA to operate three transmit/receive earth stations to provide TT&C and feeder link service to EchoStar 6 while it is located at 76.95° W.L.

[2] 47 C.F.R. § 25.120(a).

[3] *See* Stamp Grant, File No. SAT-STA-20110204-00025 (granted Feb. 4, 2011). EchoStar also filed applications for STA to operate four transmit/receive earth stations to provide TT&C for the satellite while it is relocated to 76.95° W.L. *See* Stamp Grant, File Nos. SES-STA-INTR2011-00376 (granted Feb. 4, 2011), SES-STA-INTR2011-00377 (granted Feb. 4, 2011), SES-INTR2011-00378 (granted Feb. 4, 2011), SES-STA-INTR2011-00379 (granted Feb. 4, 2011).

temporarily affected the EchoStar 8 satellite.[4] As a consequence, EchoStar had to move traffic from EchoStar 8 to other satellite capacity. The problems caused by the SEU have been resolved in part, and EchoStar has started to restore traffic on EchoStar 8. EchoStar has determined, however, that additional tests of EchoStar 8's health are necessary. To conduct these tests without disrupting service to customers, it is necessary to be able to transfer traffic seamlessly to another satellite at the same orbital location. The instant request is in response to this need.

The Mexican concessionaire for the 77° W.L. orbital location informed COFETEL of the SEU, and COFETEL "expressed no objection to placement of the Echo 6 satellite in the 77 W cluster."[5]

Since the need for the EchoStar 8 tests is urgent, EchoStar respectfully requests action on this request by **February 10, 2011**.[6]

## I. BACKGROUND

The nominal 77º W.L. orbital location is allotted to Mexico under the Region 2 Broadcasting-Satellite Service plan set forth in Appendices 30 and 30A to the international

[4] As EchoStar stated to the Commission in a letter dated February 1, 2011, EchoStar believes that the SEU, which occurred on January 30, 2011, did not cause any significant or permanent damage that will affect EchoStar 8's future operations. *See* Letter from Petra A. Vorwig, Counsel for EchoStar Corporation, to Marlene H. Dortch, Secretary, FCC, filed in File No. SAT-T/C-20090217-00026 (Feb. 1, 2011).

[5] *See* Attachment 2, Letter from Ricardo Ríos Ferrer, Legal Representative, QuetzSat, S. de R.L. de C.V., to EchoStar Satellite Service LLC (Feb. 4, 2011). EchoStar will soon file a modification application to allow the provision of service to the United States (to the extent necessary) from EchoStar 6 located at 76.95° W.L. as a Mexican-licensed satellite.

[6] The technical parameters of the satellite and its proposed operations are provided in the attached Technical Annex (Attachment 1) and Schedule S. Please note that the Schedule S was created based on an orbital location of 77.0° W.L.; however, EchoStar 6 will operate at 76.95° W.L. The 0.05° offset from the orbital position described in the Schedule S will affect the interference analysis provided in the Schedule S by only 0.003 dB for a 50 cm antenna, which in practical terms is negligible.

Radio Regulations. EchoStar currently operates three Direct Broadcast Satellites ("DBS") at the nominal 77° W.L. orbital location under Mexican authority issued to its partner, QuetzSat, S. de R.L. de C.V. ("QuetzSat"): EchoStar 1, EchoStar 4, and EchoStar 8. The satellites are used by EchoStar's customer DISH Network L.L.C. ("DISH") and DISH Mexico to provide DBS service in the United States and Mexico, respectively. The U.S. service includes local-into-local programming in a number of markets in the southern United States.

The spare capacity available at 77º W.L. is not enough to provide full "redundancy" for EchoStar 8. As the Commission is aware, EchoStar 4 recently experienced transponder anomalies, and is not currently operational.[7] As for EchoStar 1, a satellite launched in December 1995, it has limited capability (only up to 16 transponders), and thus it, too, is inadequate to the task of carrying the traffic necessary during EchoStar 8's tests.

For the reasons set forth herein, grant of this Application will not cause harmful interference to any authorized user of the spectrum and will serve the public interest.

## II. GRANT OF THIS APPLICATION IS IN THE PUBLIC INTEREST

The emergency STA requested in this application is in the public interest because it will ensure the provision of DBS service to the United States, including the provision of local-into-local service in the southern United States, and ensure continuity of receipt of both national and local programming for the subscribers of EchoStar's customer, DISH, while EchoStar 8 undergoes testing. Additionally, it will provide spare capacity at 77° W.L. in the event EchoStar 1 or EchoStar 8 suffers a problem. Moreover, this move will not result in a service interruption at 61.65º W.L. because EchoStar 12 and EchoStar 15 will continue to provide service from that

[7] *See* Confidential Letter from Pantelis Michalopoulos, Counsel for EchoStar Corporation to Stephen Duall, IB, FCC, File Nos. SAT-STA-20100920-00199, SAT-STA-20100920-00198, SAT-STA-20100920-00197 (Jan. 18, 2011).

orbital slot, and EchoStar 3 is available as an in-orbit spare in the event either of these satellites suffers an outage.[8]

The relocation of EchoStar 6 to 76.95º W.L. and its operation there also will not cause harmful interference to any other U.S.-licensed satellite operator. There is no DBS orbital location in the vicinity of 77° W.L. that is assigned to the United States (the closest U.S. location is 61.5° W.L.). There will likewise be no harmful interference from the operation of an additional satellite at 76.95° W.L. into Canada's DBS allotments at 72.5º W.L. and 82º W.L. There is an existing coordination agreement between Mexico and Canada regarding the Mexican 77° W.L. orbital location and the Canadian orbital locations 82° W.L. and 72.5° W.L. While EchoStar 6 will remain a U.S.-licensed satellite, EchoStar will operate the satellite so that it is within the specifications of that agreement and/or future coordination agreements.

While EchoStar 6 is operating at 76.95° W.L., EchoStar will operate the satellite in accordance with the following conditions:

1. Operations shall be on a non-harmful interference basis, meaning that EchoStar shall not cause interference to, and shall not claim protection from, interference caused to it by any other lawfully operating satellites operating within the parameters of applicable international coordination agreements.

2. In the event that any harmful interference is caused while the satellite is operating at 77° W.L., EchoStar shall cease operations immediately upon notification of such interference and shall inform the Commission immediately, in writing, of such event.

Finally, the proposed temporary operation of the EchoStar 6 satellite at 76.95º W.L. will not create any risk of in-orbit collision. EchoStar 6 will be maintained within +/- 0.05º east/west

[8] *See* Stamp Grant, File No. SAT-STA-20110103-00002 (granted Jan. 13, 2011).

station-keeping, which will ensure that its station-keeping volume will not overlap with EchoStar's own satellites at 77º W.L.

## III. WAIVER PURSUANT TO SECTION 304 OF THE ACT

In accordance with Section 304 of the Communications Act of 1934, as amended, 47 U.S.C. § 304, EchoStar hereby waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise.

## IV. CONCLUSION

For the foregoing reasons, EchoStar respectfully requests the grant of its application for emergency special temporary authority for 30 days to operate EchoStar 6 at the 76.95° W.L. nominal orbital location.

Respectfully submitted,

/s/

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February 7, 2011

# ATTACHMENT 1

# Technical Information for ECHOSTAR-6

## 1. GENERAL DESCRIPTION

The ECHOSTAR-6 satellite will provide DBS services to the Continental United States from the 76.95° W.L. geostationary orbital position. While this orbital location is allotted to Mexico, EchoStar is requesting emergency Special Temporary Authority from the Commission to operate ECHOSTAR-6 from the slot in response to a recent anomaly suffered by ECHOSTAR-8 operating at 77° W.L. ECHOSTAR-6 was designed to provide 32 channels in medium power mode or 16 channels in high power mode. Full frequency re-use is achieved through the use of dual circular polarization.

## 2. SATELLITE TRANSMIT PERFORMANCE

The downlink beam coverage of the ECHOSTAR-6 satellite from the 76.95° W.L. location is shown in Figure 2-1.[1,2] The satellite employs two shaped reflectors, each operating in both right-hand circular polarization (RHCP) and left-hand circular polarization (LHCP). The performance in both polarizations is nominally the same. The cross-polar isolation of the satellite transmit antennas exceeds 30 dB at all transmit frequencies. The peak antenna gain is 35.5 dBi.

Each transponder will use either a single 125 Watt Traveling Wave Tube Amplifier (TWTA) ("medium power" mode) or two paralleled 125 Watt TWTAs ("high power" mode), the latter giving approximately a 2.5 dB increase in transmit EIRP. The losses between the TWTA output

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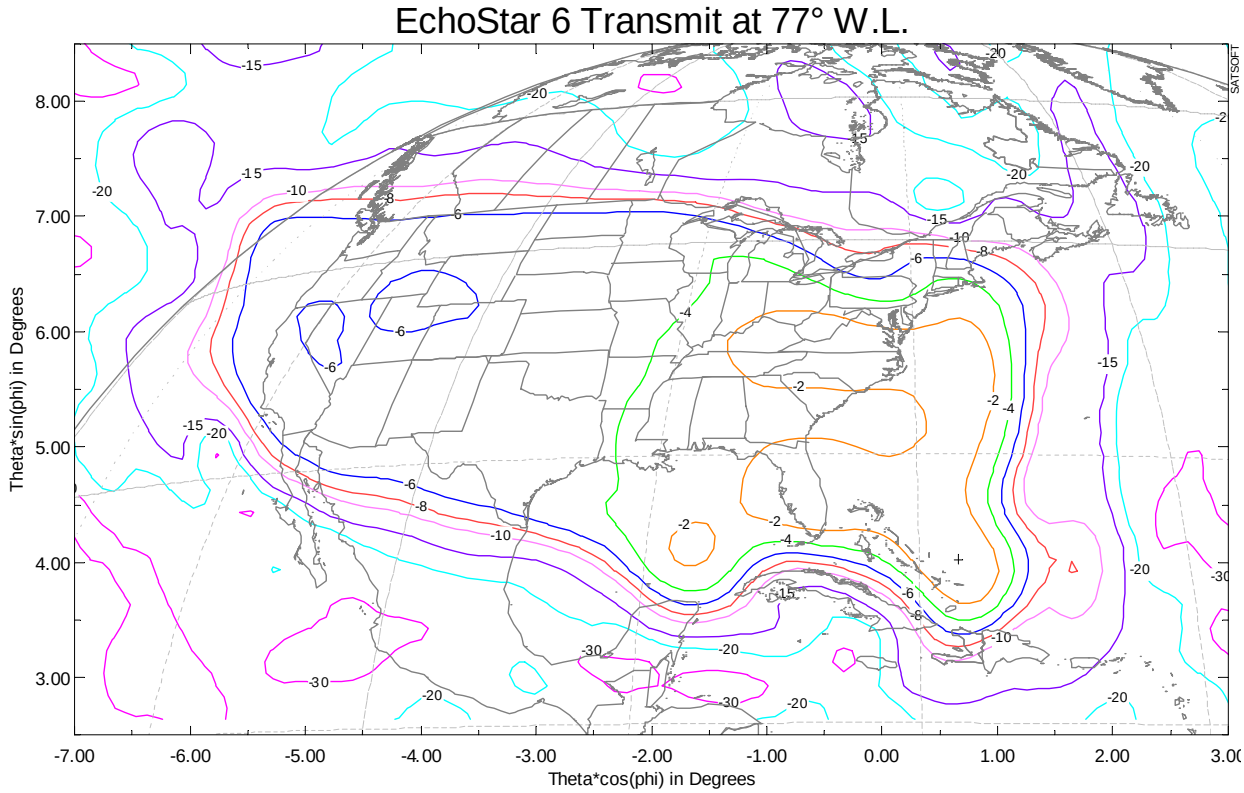
[1] This beam coverage is achieved by applying appropriate pointing bias to the ECHOSTAR-6 satellite, which was originally designed for operation at the 110°W.L. orbital location, to provide CONUS coverage and near-CONUS service.

[2] Note that service to Hawaii and Alaska is not possible using ECHOSTAR-6 from the 77° W.L. orbital location owing to the fact that Hawaii is below 3° elevation angle and the highest elevation angle towards Alaska from the 77°W.L. orbital location is less than 10°.

and the antenna input amount to 1.8 dB in medium power mode and 2.3 dB in high power mode. The maximum beam peak saturated EIRP level for the transponders in medium power mode is 54.7 dBW and 57.2 dBW in high power mode. For operations at 76.95° W.L. ECHOSTAR-6 will only be operated in medium power mode.

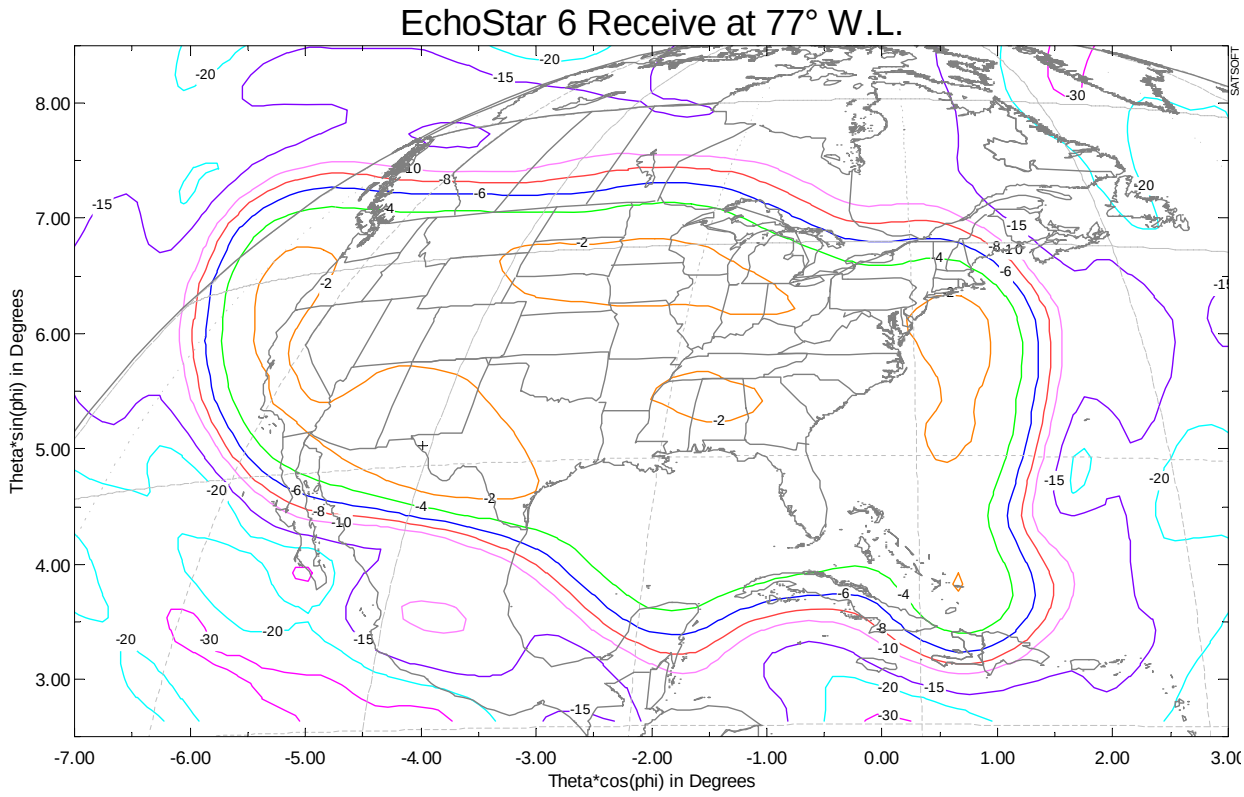
**Figure 2-1: ECHOSTAR-6 Downlink Beam Coverage from 76.95°W.L.**




## 3. SATELLITE RECEIVE PERFORMANCE

This uplink beam operates in both RHCP and LHCP. The antenna gain contours of the beam are shown in Figure 3-1. The performance in both polarizations is nominally the same. The cross-polar isolation of the satellite receive antennas exceeds 30 dB at all receive frequencies. The peak gain of the beam is 33.8 dBi, with a noise temperature of 590K, for a peak G/T of 6.1 dB/K.

**Figure 3-1: ECHOSTAR-6 Uplink Beam Coverage from 76.95°W.L.**




## 4. FREQUENCY AND POLARIZATION PLANS

The ECHOSTAR-6 satellite uses the standard channel center frequencies and channel bandwidths prescribed in the ITU's Region 2 BSS Plan.[3] Circular polarization is used on both the uplink and downlink.

[3] Channel bandwidth is 24 MHz. Spacing between center frequencies of adjacent cross-polar channels is 14.58 MHz. Thus, the center of the co-polar channels is offset by 29.16 MHz.

## 5. COMMUNICATIONS PAYLOAD CONFIGURATION

The uplink signals are received in both polarizations by the satellite receive antenna. Two active receivers are used on the satellite – one for each polarization. After appropriate down-conversion, channel filtering and amplification the signals are transmitted from the satellite using a single 125 Watt TWTA per channel in the case of medium power mode operation. Each channel can be configured to use two parallel TWTAs for high power mode operation, giving a corresponding increase in the EIRP level of approximately 2.5 dB. In total, the communications payload can support 32 channels in medium power mode, or 16 channels in high power mode, or the corresponding number of a mixture of high power and medium power mode transponders. The reconfiguration of all transponders is switchable by ground telecommand. The outputs of the TWTAs are then multiplexed into the appropriate downlink antenna ports.

## 6. SATURATION FLUX DENSITY AND TRANSPONDER GAIN

The Saturation Flux Density (SFD) of the uplink receive beam ranges between –74.7 dBW/$m^2$ (low gain) to –94.7 dBW/$m^2$ (high gain) at receive beam peak and is adjustable in 1 dB steps.

The transponder gain is controlled by an Automatic Level Control (ALC) system which automatically adjusts the transponder gain to give a constant satellite transmit power level for each transponder. The maximum transponder gain is 129.1 dB.

## 7. RECEIVER AND TRANSMITTER CHANNEL FILTER RESPONSE CHARACTERISTICS

The typical receiver and transmitter frequency responses of each RF channel, as measured between the receive antenna input and transmit antenna, fall within the limits shown in Table 7-1 below.

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

**Table 7-1: Typical Receiver and Transmitter Filter Responses**

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

## 8. SPACECRAFT DESCRIPTION

The ECHOSTAR-6 satellite's characteristics, including its physical and electrical characteristics, are described in the associated Schedule S form.[4]

[4] Please note that the Schedule S was created based on an orbital location of 77.0° W.L.; however, ECHOSTAR-6 will operate at 76.95° W.L. The 0.05° offset from the orbital position described in the Schedule S will affect the interference analysis provided in the Schedule S by only 0.003 dB for a 50 cm antenna, which in practical terms is negligible.

## 9. EARTH STATIONS

The primary subscriber earth station antennas to be used with the ECHOSTAR-6 satellite will range between 45 cm and 60 cm, although slightly larger antennas might be used in certain circumstances.

The feeder link earth stations will be located at EchoStar's existing facilities in Cheyenne, WY and Gilbert, AZ.

## 10. Telemetry, Tracking and Control (TT&C)

A summary of the TT&C subsystem performance is given in Table 10-1.

**Table 10-1: Summary of the TT&C Subsystem Performance**

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

## 11. LINK BUDGETS

Representative link budgets for the DBS transmissions, which include details of the transmission characteristics, performance objectives and earth station characteristics, are provided in the associated Schedule S submission, which will be provided in a supplemental filing. Link budgets for the TT&C transmissions are also included therein.

## 12. ORBITAL DEBRIS MITIGATION PLAN

Several sections of Section 25.114(d) require a statement that the station operator has made certain assessments.[5]

### 12.1 Spacecraft Hardware Design

The ECHOSTAR-6 satellite was designed and manufactured by Space Systems/Loral and was launched in 2000. The satellite will not undergo any planned release of debris during its operation.

EchoStar has assessed and limited the probability of the satellite becoming a source of debris by collisions with small debris or meteoroids of less than one centimeter in diameter that could cause loss of control and prevent post-mission disposal. Such probability has been limited through component placement and the use of redundant systems.

The ECHOSTAR-6 satellite has separate TT&C and propulsion subsystems that are necessary for end-of-life disposal. The spacecraft TT&C system, vital for orbit raising, is extremely rugged with regard to meteoroids smaller than 1 cm, by virtue of its redundancy, shielding, separation of components and physical characteristics. An omni-directional antenna and wide angle horn system are used principally during orbit raising. The redundant command receivers and decoders and telemetry encoders and transmitters are located within a shielded area and physically separated. A single rugged thruster and shielded propellant tank provide the energy for orbit raising. Otherwise, there are no single points of failure in the system.

### 12.2 Minimizing Accidental Explosions

EchoStar has assessed and limited the probability of accidental explosions during and after completion of mission operations. A Failure Mode Verification Analysis has also been conducted, and the probability of accidental explosions has been limited through extensive monitoring of the ECHOSTAR-6 satellite's batteries and fuel tanks for pressure and temperature.

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[5] 47 C.F.R. §§ 25.114(d)(14)(i-iii).

Furthermore, bipropellant mixing is prevented by the use of valves that prevent backwards flow in propellant lines and pressurization lines. Excessive battery charging or discharging is limited by a monitoring and control system which will automatically limit the possibility of fragmentation. Corrective action, if not automatically undertaken, will be immediately undertaken by the spacecraft operator to avoid destruction and fragmentation. Thruster temperatures, impulse and thrust duration are carefully monitored, and any thruster may be turned off via redundant valves. At the end of the satellite's life, all energy sources will be depleted. Specifically, the batteries will be left in a permanent state of discharge, chemical propulsion systems will be depleted, and the electrical propulsion system will be disabled.

### 12.3 Safe Flight Profiles

In considering current and planned satellites that may have a station-keeping volume that overlaps the ECHOSTAR-6 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 that have been submitted to the ITU within ±0.15 degrees from 76.95° W.L. have also been reviewed.

Currently there are three operational Mexican licensed satellites in the vicinity of 76.95° W.L. These are as follows:

- ECHOSTAR-4 satellite at 76.85° W.L.
- ECHOSTAR-8 satellite at 77.05° W.L.[6]
- ECHOSTAR-1 satellite at 77.15° W.L.

Both ECHOSTAR-8 and ECHOSTAR-1 satellites are operated with an east-west station-keeping tolerance of ±0.05 degrees. Upon ECHOSTAR-6's arrival at 76.95° W.L., EchoStar will operate

[6] This orbital location represents a slight revision to the technical information submitted on February 4, 2011. *See* File No. SAT-STA-20110204-00025, Attachment 1. This slight move of ECHOSTAR-8 is necessary to safely accommodate ECHOSTAR-6 at 76.95° W.L.

ECHOSTAR-4 at -0.1 degrees on the eastern edge of its stationkeeping box and +0.05 degrees on the western edge. ECHOSTAR-6 will be operated with an east-west station-keeping tolerance of ±0.05°. Before the ECHOSTAR-6 satellite arrives at 76.95° W.L., ECHOSTAR will coordinate the location of each spacecraft with the Mexican Regulatory Authority to safely locate each spacecraft within the ±0.2 degree cluster of 77° W.L. and in a manner such that there will be no station-keeping volume overlap between the various satellites.

There are no pending applications before the Commission for additional satellites to be located at an orbital location in the immediate vicinity of 76.95° W.L. The BSS ITU networks in the vicinity of 76.95° W.L. belong to Mexico. Although there are numerous FSS networks within ±0.15 degrees of 76.95° W.L., EchoStar can find no evidence that any of these networks are under construction or scheduled for launch.

Based on the preceding, EchoStar concludes there is no requirement to physically coordinate the ECHOSTAR-6 satellite with another satellite operator at the present time.

### 12.4 Post Mission Disposal

Upon mission completion, the ECHOSTAR-6 satellite will be maneuvered to a disposal orbit at least 300 km above its operational geostationary orbit.[7] Based on data from the satellite manufacturer, less than 7 kg of fuel will be required to achieve this. Accordingly, 7 kg of fuel will be reserved at the end of the satellite's life. The fuel reserve will be calculated using three methods. The first method is the pressure-volume temperature method, which uses tank pressure and temperature information to determine remaining propellant. The second method is 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. The third method is the propellant depletion gauge operations method, which uses propellant temperature measurements

[7] The ECHOSTAR-6 satellite was launched in 2000. Pursuant to the Commission's *Mitigation of Orbital Debris*, Second Report and Order, 19 FCC Rcd 11567 (2004), a calculation of the satellite's disposal orbit according to the IADC formula is not required. *See id.* ¶ 81 ("[W]e will grandfather all on orbit GEO spacecraft that were launched as of the release of the *Notice* in this proceeding").

taken while tank heaters are activated to determine more accurately the amount of oxidizer and fuel in tanks at the end of mission life. EchoStar has assessed fuel gauging uncertainty and has provided an adequate margin of fuel to address such uncertainty.

## 13. INTERFERENCE ANALYSES - 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 Mexican administration will be responsible for coordinating the operation of the ECHOSTAR-6 satellite following these ITU procedures. Nevertheless, the analyses required by Annex 1 to Appendix 30 and Annex 1 to Appendix 30A were performed and are contained in Appendices 1 and 2 to this Attachment.

**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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February 7, 2011

# Appendix 1

## Analysis of ANNEX 1 of Appendix 30[8]

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

Not Applicable to Region 2.

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

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

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

Annex 1 to this Appendix shows the MSPACE results using the technical characteristics of the ECHOSTAR-6 satellite and using IFIC 2685. The ECHOSTAR-6 satellite will operate under Mexico's QUETZSAT-77 network. The QUETZSAT-77 network has been coordinated and notified to the ITU. Of particular note is that the operation of the ECHOSTAR-6 satellite will be consistent with the satellite coordination agreements that are in place between Mexico and Canada (at 72.7° W.L. and 82° W.L.).

[8] This analysis of Annex 1 of Appendix 30 and 30A is for the operation of a satellite at the 77.0° W.L. nominal orbital location. ECHOSTAR-6, however, will be stationed at 76.95° W.L. The 0.05° offset will affect the interference analysis by only 0.003 dB for a 50cm antenna, which is driven by the difference in antenna discrimination as follows. For the 77° W.L. orbital location, the gain is 34.453 dB, whereas at the 76.95° W.L. orbital location, the gain is 34.450 dB. In practical terms, this difference in the interference analysis is negligible.

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

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

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

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

The closest Regions 1 and 3 BSS network is the Russian INTERSPUTNIK-47.5W-B network at 47.5°W, which is greater than 10.57 degrees from the 86.5°W.L. location, therefore the –103.6 dB(W/(m$^2$ . 27 MHz)) PFD level applies for this network and all other Regions 1 and 3 networks. The GIMS Appendix 30 pfd tool was used to assess compliance with this Section. Using the antenna gain contours and power levels of the transmit beams, the GIMS pfd tool showed that no administrations are affected. Therefore the ECHOSTAR-6 satellite network is compliant with this Section.

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

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

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

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

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

*where $\theta$ represents the angle of arrival. (WRC-03)*

The GIMS pfd tool was used to determine the administrations whose terrestrial services may be affected by the ECHOSTAR-6 satellite network. The GIMS pfd tool showed that no Administrations are affected and therefore the ECHOSTAR-6 satellite is compliant with this Section.

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

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

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

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

$$\begin{array}{lll} -186.5 \quad dB(W/(m^2 \cdot 40\ kHz)) & for & 0^\circ \le \theta < 0.054^\circ \\ -164.0 + 17.74 \log \theta \quad dB(W/(m^2 \cdot 40\ kHz)) & for & 0.054^\circ \le \theta < 2.0^\circ \end{array}$$

$-165.0 + 1.66\ \theta^2$ $dB(W/(m^2 \cdot 40\ kHz))$ for $2.0° \leq \theta < 3.59°$

$-157.5 + 25 \log \theta$ $dB(W/(m^2 \cdot 40\ kHz))$ for $3.59° \leq \theta < 10.57°$

$-131.9$ $dB(W/(m^2 \cdot 40\ kHz))$ for $10.57° \leq \theta$

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

The GIMS pfd tool was used to verify compliance with this Section. All Regions 1 and 3 FSS satellites are greater than 10.57° from the 77° W.L. location, therefore the –131.9 dB (W/($m^2$ . 40 kHz)) level applies. The results of the GIMS analysis shows that no administrations are affected. Therefore the ECHOSTAR-6 satellite network is compliant with this Section.

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

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

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

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

## Annex 1 to Appendix 1

## ECHOSTAR-6 MSPACE Results

| Admin | Orbital Position (degrees E) | Network | Max. OEPM Degradation (dB) |
|---|---|---|---|
| DMA | -79.30 | DMAIFRB1 | 0.327 |
| LCA | -79.30 | LCAIFRB1 | 0.314 |
| G | -79.70 | MSR00001 | 0.264 |
| KNA | -79.70 | KNA00001 | 0.306 |
| VCT | -79.30 | VCT00001 | 0.339 |
| CAN | -82.00 | CAN-BSS1 | 0.282 |
| CAN | -72.70 | CAN-BSS3 | 0.300 |
| CAN | -82.00 | CAN-BSS1X | 0.281 |
| HOL | -78.00 | NSS-BSS-G2 78W | 0.260 |

# Appendix 2

## Analysis of ANNEX 1 of Appendix 30A

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

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

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

See the results described under Section 2 of the Appendix 30 Annex 1 Analysis.

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

Not Applicable to Region 2.

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

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

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

| Closest Region 1 or 3 Feeder Link Space Station | | | E/S Lat (°N) | E/S Long (°E) | Range (km) | E/S Gain towards Victim Satellite (dBi) | Victim Satellite Rx System Noise Temp (K) | Calculated ΔT/T (%) |
|---|---|---|---|---|---|---|---|---|
| Network Name | Orbital Position | Peak Receive Antenna Gain (dBi) | | | | | | |
| INTERSPUTNIK-47.5W-B | -47.5 | 37 | 33.3 | -111.8 | 40296 | -8.5 | 600 | 0.04% |
| MCO-BSS-40.5W | -40.5 | 35.9 | 33.3 | -111.8 | 40921 | -10 | 600 | 0.02% |
| IRL21100 | -37.2 | 48.08 | 33.3 | -111.8 | 41222 | -10 | 600 | 0.32% |
| NGR11500 | -37.2 | 38.47 | 33.3 | -111.8 | 41222 | -10 | 600 | 0.03% |
| DBL-G4-37.2W | -37.2 | 35 | 33.3 | -111.8 | 41222 | -10 | 300 | 0.03% |
| AND34100 | -37 | 48.88 | 33.3 | -111.8 | 41241 | -10 | 600 | 0.38% |
| GMB30200 | -37 | 47.69 | 33.3 | -111.8 | 41241 | -10 | 600 | 0.29% |
| GUI19200 | -37 | 42.29 | 33.3 | -111.8 | 41241 | -10 | 600 | 0.08% |
| POR__100 | -37 | 47.17 | 33.3 | -111.8 | 41241 | -10 | 600 | 0.26% |
| MTN__100 | -36.8 | 37.55 | 33.3 | -111.8 | 41259 | -10 | 600 | 0.03% |
| SMR31100 | -36.8 | 48.88 | 33.3 | -111.8 | 41259 | -10 | 600 | 0.38% |

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

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

Not Applicable to Region 2.

Attachment 2

QUETZSAT

Mexico City, Mexico, February 4th, 2011

**EchoStar Satellite Services LLC**
100 Inverness Terrace East
Englewood, CO 80112

On February 3, 2010, QuetzSat, S. de R.L. de C.V. ("QuetzSat") notified the Federal Commission of Telecommunications ("Cofetel") of satellite recently incurred a single event upset ("SEU") on the morning of January 30th involving the EchoStar 8 satellite, which the satellite operator believes was caused by increased space environment activity. QuetzSat informed Cofetel that services in Mexico have never been suspended and that the SEU did not affect the provision of capacity in Mexico, as currently the capacity is provided through the Echo-1 and Echo-8 is the support satellite.

Today we informed Cofetel that the Echo-6 is moving to the 77 W orbital location to support the US service. Cofetel expressed no objection to placement of the Echo 6 satellite in the 77 W cluster.

Sincerely,

Ricardo Ríos Ferrer
Legal Representative
QuetzSat, S. de R.L. de C.V.