Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
ECHOSTAR CORPORATION	)	File No. SAT-MOD-20101124-00244
	)	File No. SAT-AMD-2011____-_____
Amendment to Application for Modification of Authority to Provide DBS Service at 86.5º W.L. Using the EchoStar 8 Satellite	)	Call Sign S2454

AMENDMENT

Pursuant to Section 25.116 of the Commission's rules,[1] EchoStar Corporation ("EchoStar")[2] hereby amends its pending application for modification of its authority to provide Direct Broadcast Satellite ("DBS") service at the 86.5º W.L. orbital location using the EchoStar 8 satellite ("*EchoStar 8 Application*").[3] This amendment seeks to update the Technical Narrative submitted in the original application to reflect the fact that command instructions will be transmitted to the satellite over the 14003 MHz frequency while it is on-station and to request a

[1] 47 C.F.R. § 25.116.

[2] On February 24, 2011, EchoStar Corporation filed an application requesting consent to the *pro forma* assignment of its authorization to operate a Direct Broadcast Satellite service satellite at 86.5° W.L. (Call Sign S2454) to EchoStar Satellite Operating Corporation. File No. SAT-ASG-20110224-00033 (filed Feb. 24, 2011).

[3] *See* File No. SAT-MOD-20101124-00244 (filed Nov. 24, 2011) ("*EchoStar 8 Application*").

waiver of Section 25.202(g) of the Commission's rules[4] to allow EchoStar to provide such command signals outside the edges of the allocated DBS bands.

I. AMENDMENT TO TECHNICAL REQUIREMENTS OF PART 25

As EchoStar has previously reported to the Commission, the EchoStar 8 satellite, which is currently operating under Mexican authority at the 77.05° W.L. orbital location, experienced a single event upset ("SEU") in January 2011.[5] Since that time, EchoStar has conducted testing to determine whether and how the satellite was affected by the SEU.[6] EchoStar has determined that the SEU did not have a major effect on the health or the longevity of the satellite, and it has not impaired the functionality of the payload. But the SEU did result in the partial disabling of the satellite's remaining 17 GHz receiver. While that receiver is capable of providing ranging functions, it is not capable of receiving command instructions, which therefore have to be conveyed over the 14003 MHz frequency.[7]

In the *EchoStar 8 Application*, EchoStar submitted a Technical Narrative describing the satellite's physical and operational characteristics, including EchoStar 8's use of the 17799 MHz frequency to provide both command and ranging functions. EchoStar hereby amends its pending

[4] 47 C.F.R. § 25.202(g).

[5] *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).

[6] EchoStar is simultaneously filing an interim report of these test results under a request for confidential treatment. *See* Letter from Petra A. Vorwig, Counsel for EchoStar Corporation, to Marlene H. Dortch, Secretary, FCC, *filed in* File Nos. SAT-MOD-20101124-00244, SAT-T/C-20090217-00026 (Mar. 30, 2011).

[7] EchoStar is also adapting a flight software patch previously employed in other in-orbit satellites to allow EchoStar to provide emergency command instructions over the 17 GHz feeder link frequency in the event the 14 GHz receiver experiences a problem. EchoStar plans to complete this adaptation prior to the proposed relocation of the satellite to 86.5° W.L.

modification application to provide a revised Technical Narrative (Attachment A) reflecting the fact that the satellite will use the 14003 MHz frequency for command signals and the 17799 MHz frequency only for ranging.[8]

As stated in the Commission's rules with respect to applications 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."[9] The amended technical information required pursuant to Part 25 of the Commission's rules is set forth in the accompanying Technical Narrative and FCC Form 312.[10] EchoStar hereby certifies that, except as described in this application, no information in its modification application has changed.[11]

II. PUBLIC INTEREST CONSIDERATIONS

EchoStar has previously described in its modification application, which is hereby incorporated by reference, the public interest benefits that will result from a grant of authority to

[8] *See* Attachment A, Technical Narrative, at 5.

[9] 47 C.F.R. § 25.117(d)(1).

[10] The Schedule S submitted with the *EchoStar 8 Application* identified the 14003 MHz frequency as one frequency over which EchoStar 8 is capable of operating; therefore, there are no changes to the Schedule S.

[11] 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 86.5º W.L. orbital location. 47 C.F.R. § 25.148(c); *see also* EchoStar Satellite L.L.C., Application to Construct, Launch and Operate a Direct Broadcast Satellite at the 86.5º W.L. Orbital Location, *Order and Authorization*, 21 FCC Rcd. 14045 ¶ 19 (2006) ("Given the very low elevation angles to the 86.5º W.L. orbital location from Alaska and Hawaii, it is very unlikely that service to these states from EchoStar-86.5W would be technically feasible. Therefore, we will not require EchoStar-86.5W to provide service to Alaska and Hawaii from the 86.5º W.L. orbital location.").

operate the EchoStar 8 satellite at 86.5° W.L.[12] In short, U.S. consumers will have access to additional DBS satellite capacity, thereby increasing the video programming options available to them, years earlier than contemplated under EchoStar's license. The proposed amendment to the EchoStar 8 satellite's command frequency is necessary to ensure that the satellite can be safely maintained at the 86.5° W.L. orbital location, but it will not have any effect on the services that EchoStar can provide over the satellite.

III. REQUEST TO WAIVE SECTION 25.202(g)

Section 25.202(g) of the Commission's rules[13] requires that telemetry, tracking and control ("TT&C") functions be conducted at the edges of a satellite's allocated bands. EchoStar requests a waiver of this rule in order to provide command signals to its DBS satellite, EchoStar 8, over the 14003 MHz frequency at the 86.5° W.L. orbital location.

Commission rules may be waived if there is good cause to do so.[14] Good cause can be shown by demonstrating that the waiver "would not undermine the policy objective of the rule or order in question, special circumstances warrant a deviation from the general rule, and such a deviation will serve the public interest."[15] In this case, there is good cause to waive the requirements of Section 25.202(g) to allow the satellite to receive command signals over the

[12] *See EchoStar 8 Application*, Narrative, at 7-8.

[13] 47 C.F.R. § 25.202(g).

[14] *See id.* § 1.3; *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969).

[15] Telephone Number Portability; Sprint Local Telephone Companies Petition for Waiver, *Order*, 19 FCC Rcd. 23962 ¶ 4 (2004); *see also* U.S. West Petition for Waiver of the Tariff Review Plan Rules, *Memorandum Opinion and Order*, 12 FCC Rcd. 8343 ¶ 10 (1997); *WAIT Radio*, 418 F.2d at 1159.

14003 MHz frequency. The recent SEU experienced by EchoStar 8 partially disabled the satellite's remaining 17 GHz receiver, necessitating this waiver request.

Allowing EchoStar to provide TT&C outside of the edges of its allocated bands would not undermine the purpose of Section 25.202(g), which is to maximize efficient use of the radio frequency spectrum and encourage competition.[16] Specifically, EchoStar proposes to use a small sliver of Fixed-Satellite Service ("FSS") spectrum to provide command instructions to the satellite. EchoStar has begun coordination discussions with SES World Skies with respect to its AMC-3 satellite operating at 87.0° W.L. and will ensure EchoStar 8's operations over the 14003 MHz frequency are coordinated prior to operation at 86.5° W.L.

The requested waiver also responds to special circumstances that are outside EchoStar's control. EchoStar could not foresee the effects of the SEU, but it has worked diligently to mitigate those effects and ensure that the satellite can operate safely while it provides service from 86.5° W.L to millions of U.S. subscribers. Both the continued safe operation of the satellite and the service the satellite provides are in the public interest, further supporting grant of the requested waiver.

IV. CONCLUSION

For the foregoing reasons, EchoStar amends its modification application to provide DBS service from the 86.5º W.L. orbital location using the EchoStar 8 satellite and requests that the Commission grant the requested modification and waiver as expeditiously as possible.

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[16] *See* Applications of Intelsat LLC; For Authority to Operate, and to Further Construct, Launch, and Operate C-band and Ku-band Satellites that Form a Global Communications System in Geostationary Orbit, *Memorandum Opinion Order and Authorization*, 15 FCC Rcd. 15460 ¶ 66 (2000).

Respectfully submitted,

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ECHOSTAR-8 AT 86.5º W.L.

ATTACHMENT A
Technical Information to Supplement Schedule S

A.1 Scope

This attachment contains the information required by § 25.114(c) and other sections of the FCC § 25 rules that cannot be entered into the Schedule S software regarding the proposed operation of the ECHOSTAR-8 satellite at 86.5º W.L.

A.2 General Description of Overall System Facilities, Operations and Services (§ 25.114(d)(1))

The ECHOSTAR-8 satellite will operate at the 86.5° W.L. orbital location and will provide BSS services to CONUS and Mexico. The satellite was designed to provide 32 channels in medium power mode or 16 channels in high power mode.

The satellite will be biased such that the beams are steered towards the south in order to protect the operations of Telesat Canada at the nominal 82° W.L. and 91° W.L. locations. The CONUS beam will be operated in normal-mode only with a peak downlink EIRP of 54.6 dBW. The Mexican beam can be operated either in normal-mode or high-powered-mode, the latter with a peak downlink EIRP of 57.3 dBW.

EchoStar will use its two main feeder link earth station facilities with the ECHOSTAR-8 satellite. These are located in Cheyenne, WY and Gilbert, AZ. Spacecraft TT&C functions will take place from EchoStar's primary TT&C earth station and satellite control facility located in Cheyenne, WY and the back-up facility located in Gilbert, AZ.

A.3 Predicted Space Station Antenna Gain Contours (§ 25.114(d)(3))

The ECHOSTAR-8 antenna gain contours for the receive and transmit beams, as required by § 25.114(d)(3), are given in GXT format and embedded in the associated Schedule S submission. These contours reflect the planned biasing of the satellite and adjustment of the reflectors.

A.4 Services to be Provided (§ 25.114(d)(4))

The ECHOSTAR-8 satellite will provide a range of DBS services to millions of small and inexpensive subscriber receive-only earth terminals. The proposed operation 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 86.5º W.L. orbital location. *See* 47 C.F.R. § 25.148(c); *see also 86.5º W.L. Order* ¶ 19 ("Given the very low elevation angles to the 86.5º W.L. orbital location from Alaska and Hawaii, it is very unlikely that service to these states from EchoStar-86.5W would be technically feasible. Therefore, we will not require EchoStar-86.5W to provide service to Alaska and Hawaii from the 86.5º W.L. orbital location.").

Representative link budgets, which include details of the transmission characteristics, performance objectives and earth station characteristics, are provided in the associated Schedule S submission.

A.5 Satellite Transponder Frequency Responses (§ 25.114(c)(4)(vii))

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 A.5-1 below.

In addition, the frequency tolerances of § 25.202(e) and the out-of-band emission limits of § 25.202(f) (1), (2) and (3) will be met.

Table A.5-1: 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

A.6 TT&C Characteristics
(§ 25.114(c)(4)(i) and § 25.114(c)(9))

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

Table A.6-1: Summary of the on-station TT&C Subsystem Performance

Parameter	Performance
On-Station Command Frequency	14003 MHz
On-Station Ranging Frequency	17799 MHz
Uplink Flux Density	Between -72.6 and -82.6 dBW/m^2
Uplink Polarization	RHCP
On-Station Telemetry Frequencies	12,206 MHz 12,207 MHz
Maximum Downlink EIRP	21.1 dBW
Downlink Polarization	LHCP

A.7 Interference Analyses
(§ 25.114(d)(13))

The ECHOSTAR-8 satellite network will operate on an unprotected, non-harmful interference basis, until fully coordinated. Pending coordination, in the event operations of the ECHOSTAR-8 satellite network cause harmful interference into another network, EchoStar will either cease operations, or reduce transmission levels appropriately, immediately upon notification of such interference.

The analyses of the proposed ECHOSTAR-8 satellite network with respect to the limits in Annex 1 to Appendices 30 and 30A are provided in Appendices 1 and 2 to this document. The results of these analyses are discussed below.

Appendix 1 shows that the proposed ECHOSTAR-8 satellite network meets the ITU criteria in Annex 1 to Appendix 30, except for § 4.2.3 c) of Article 4 of Appendix 30/30A. There are a number of adjacent Region 2 BSS networks that were deemed to be affected (*see* Annex 1 to Appendix 1). The affected foreign administrations are Bahamas, Bolivia, Canada, Cuba, Dominican Republic, Haiti, Holland, Jamaica, Mexico, Peru and the UK. Each of the affected networks is discussed below:

- The affected networks of the Bahamas, Bolivia, Cuba, Dominican Republic, Haiti, Jamaica and Peru are all original Plan networks. None of these networks are currently operational, nor can we find any evidence that any of these networks are under construction or scheduled for launch.

- The Canadian networks at the nominal 82° W.L. and 91° W.L. locations are deemed to be affected. The Canadian networks are assigned to Telesat Canada. EchoStar and Telesat Canada have executed a coordination agreement for EchoStar operations at 86.5° W.L. Telesat Canada has informed EchoStar as to the maximum downlink EIRP levels that EchoStar's operations can cause over Canadian territory. The beams of the ECHOSTAR-8 satellite will be biased towards the south specifically to protect the Canadian networks to these protection levels.

- Mexico's networks at the nominal 77° W.L. location are deemed to be affected. The Mexican networks are assigned to QuetzSat. EchoStar will coordinate the operations of the ECHOSTAR-8 satellite network with QuetzSat. Coordination should be straightforward given the 9.5 degree orbital separation.

- Holland's network at 58° W.L. is deemed to be affected. We can find no evidence that this network is under construction or scheduled for launch. In the event the network were to progress, it is expected that coordination could be achieved given the large orbital separation and the small OEPM degradation caused to the network.

- The UK has five networks at 86.5° W.L. We can find no evidence that any of the networks are under construction or scheduled for launch.

In addition, the USA's USABSS-15 network at 110° W.L. was deemed to be affected. This network receives a small OEPM degradation, and it is assigned to EchoStar's affiliate, DISH Network L.L.C.

Based on the preceding, EchoStar concludes that operation of the ECHOSTAR-8 satellite will not cause harmful interference, or even unacceptable interference, into any adjacent operational satellite network.

Appendix 2 shows that the proposed ECHOSTAR-8 satellite network meets all of the ITU criteria in Annex 1 to Appendix 30A.

A.8 Orbital Debris Mitigation Plan (§ 25.114(d)(14))

A.8.1 Spacecraft Hardware Design

The ECHOSTAR-8 satellite was designed and manufactured by Space Systems/Loral and was launched in 2002. The satellite is not expected to undergo any planned release of debris during its operation. EchoStar and the satellite manufacturer have 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-8 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 command receivers, decoders, telemetry encoders and transmitters are located within a shielded area, and are redundant and physically separated. A single rugged thruster and shielded propellant tank provides the energy for orbit raising. Otherwise, there are no single points of failure in the system.

A.8.2 Accidental Explosion Assessment (§ 25.144(d)(14)(ii))

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 ECHOSTAR-8 satellite's batteries and fuel tanks for pressure and temperature. 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.

A.8.3 Safe Flight Profiles (§ 25.144(d)(14)(iii))

In considering current and planned satellites that may have a station-keeping volume that overlaps with the ECHOSTAR-8 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 within ±0.15 degrees of 86.5° W.L. have been reviewed.

There are no operational satellites in the immediate vicinity of 86.5° W.L.

With respect to ITU networks, Canada has two 17/24 GHz networks at 86.5° W.L. and the UK has five BSS networks at 86.5° 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-8 satellite with another satellite operator at the present time.

A.8.4 Post Mission Disposal Plan (§ 25.144(d)(14)(iv))

At the end of the operational life of the ECHOSTAR-8 satellite, EchoStar will maneuver the satellite to a disposal orbit with a minimum perigee of 360 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" = 112 m^2

"M" = Dry Mass of Satellite = 1807 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 112/1807

= 36,145 km

= 359 km above GSO (35,786 km)

Thus, the designed disposal orbit of 360 km above GSO exceeds the required minimum by a margin of 1 km. Maneuvering the satellite to the disposal orbit will require 6 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 has 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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APPENDIX 1 TO
ATTACHMENT A (TECHNICAL INFORMATION TO SUPPLEMENT SCHEDULE S)

Analysis of ANNEX 1 of Appendix 30

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

Does not apply to the Region 2 Plan.

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[28] 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)*

The MSPACE analysis was performed utilizing the Region 2 BSS Plan as contained in IFIC 2681. The CONUS beam was assumed to operate with a peak downlink EIRP of 54.6 dBW, while the Mexican beam was assumed to transmit with a peak downlink EIRP of 57.3 dBW. The results of the analysis are contained in Annex 1 to this Appendix. As shown, the affected foreign administrations are Bahamas, Bolivia, Canada, Cuba, Dominican Republic, Haiti, Holland, Jamaica, Mexico, Peru and the UK. The results are discussed below for each of these administrations:

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[28] For the definition of the overall equivalent protection margin, see § 1.11 of Annex 5.

- The affected networks of the Bahamas, Bolivia, Cuba, Dominican Republic, Haiti, Jamaica and Peru are all original Plan networks. None of these networks is currently operational. Until coordination, the ECHOSTAR-8 satellite network will operate on an unprotected, non-harmful interference basis, and in the event operations of the ECHOSTAR-8 satellite network cause harmful interference into these and any other network, EchoStar will either cease operations, or reduce transmission levels appropriately, immediately upon notification of such interference.
- The Canadian networks at the nominal 82° W.L. and 91° W.L. locations are deemed to be affected. The Canadian networks are assigned to Telesat Canada. EchoStar and Telesat Canada have executed a coordination agreement. The beams of the ECHOSTAR-8 satellite will be biased towards the south specifically to protect the Canadian networks to the protection levels required by Telesat Canada.
- Mexico's networks at the nominal 77° W.L. location are deemed to be affected. The Mexican networks are assigned to QuetzSat. EchoStar will coordinate the operations of the ECHOSTAR-8 satellite network with QuetzSat. Coordination should be straightforward given the 9.5 degree orbital separation.
- Holland's network at 58° W.L. is deemed to be affected. We can find no evidence that this network is under construction or scheduled for launch.
- The UK has five networks at 86.5° W.L. We can find no evidence that any of the networks are under construction or scheduled for launch.

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 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. *(WRC-03)*

The closest Regions 1 or 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 beams the GIMS pfd tool showed that no administrations are affected. Therefore, the ECHOSTAR-8 satellite network is compliant with this Section.

4 Limits to the power flux-density to protect the terrestrial services of other administrations[29], [30], [31]

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:

$$-148 \quad dB(W/(m^2 \cdot 4\ kHz)) \qquad for \quad \theta \le 5°$$

$$-148 + 0.5\,(\theta - 5)\ dB(W(m^2 \cdot 4\ kHz) \qquad for \quad 5° < \theta \le 25°$$

$$-138 \quad dB(W/(m^2 \cdot 4\ kHz)) \qquad for \quad 25° < \theta \le 90°$$

where θ 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-8 satellite network. The GIMS pfd tool showed that no Administrations are affected and therefore the ECHOSTAR-8 satellite is compliant with this Section.

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[29] See § 3.18 of Annex 5.

[30] In the band 12.5-12.7 GHz in Region 1, these limits are applicable only to the territory of administrations mentioned in Nos. **5.494** and **5.496**.

[31] See Resolution **34**.

5 (Not used.)

6 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[32] 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 § 4.2.3 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, 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:

-186.5 dB(W/(m^2 · 40 kHz)) for $0° \le \theta < 0.054°$

$-164.0 + 17.74 \log \theta$ dB(W/(m^2 · 40 kHz)) for $0.054° \le \theta < 2.0°$

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

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

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

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 86.5°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-8 satellite network is compliant with this Section.

[32] Including assignments operating under No. **5.485**.

7 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-8 satellite network is compliant with this Section.

Annex 1 to Appendix 1 to Technical Annex

ECHOSTAR-8

MSPACE Results

Admin	Orbital Position (degrees E)	Network	Max. OEPM Degradation (dB)
BAH	-87.20	BAHIFRB1	19.269
BOL	-87.20	BOL00001	1.282
JMC	-92.30	CRBBAH01	0.612
JMC	-92.30	CRBBLZ01	3.691
JMC	-92.30	CRBJMC01	0.927
JMC	-92.70	JMC00002	0.829
CUB	-89.20	CUB00001	5.504
DOM	-83.30	DOMIFRB2	0.262
HTI	-83.30	HTI00002	2.158
PRU	-85.80	PRU00004	1.617
CAN	-82.00	CAN-BSS1	1.255
CAN	-91.10	CAN-BSS2	1.752
MEX	-77.00	MEX-TDH1	1.366
MEX	-76.80	MEX-TVD1	0.937
MEX	-77.20	MEX-TVD2	0.591
MEX	-77.00	QUETZSAT-77	1.997
USA	-110.00	USABSS-15	0.306
G	-86.50	USAT-S3	31.369
G	-86.50	USAT-S3 MOD-A	29.846
G	-86.50	USAT-S3 MOD-B	30.086
G	-86.50	USAT-S3 MOD-C	30.215
G	-86.50	USAT-S3 MOD-D	29.846
HOL	-58.00	NSS-BSS 58W	0.361

APPENDIX 2 TO
ATTACHMENT A (TECHNICAL INFORMATION TO SUPPLEMENT SCHEDULE S)

Analysis of ANNEX 1 of Appendix 30A

1 (SUP - WRC-2000)

2 (SUP - WRC-2000)

3 **Limits to the change in the overall equivalent protection margin with respect to frequency assignments in conformity with the Region 2 feeder-link plan**[33] (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[34] 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 Appendix 30 Annex 1 Analysis.

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[33] With respect to § 3 the limit specified relates to the overall equivalent protection margin calculated in accordance with § 1.12 of Annex 3.

[34] For the definition of the overall equivalent protection margin, see § 1.11 of Annex 5 to Appendix **30**.

4 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)

Does not apply to the Region 2 Plan.

5 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 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)*

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-8 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	-10	600	0.01%
MCO-BSS-40.5W	-40.5	35.9	33.3	-111.8	40921	-10	600	0.01%
IRL21100	-37.2	48.08	33.3	-111.8	41222	-10	600	0.15%
NGR11500	-37.2	38.47	33.3	-111.8	41222	-10	600	0.02%
DBL-G4-37.2W	-37.2	35	33.3	-111.8	41222	-10	300	0.01%
AND34100	-37	48.88	33.3	-111.8	41241	-10	600	0.18%
GMB30200	-37	47.69	33.3	-111.8	41241	-10	600	0.14%
GUI19200	-37	42.29	33.3	-111.8	41241	-10	600	0.04%
POR__100	-37	47.17	33.3	-111.8	41241	-10	600	0.12%
MTN__100	-36.8	37.55	33.3	-111.8	41259	-10	600	0.01%
SMR31100	-36.8	48.88	33.3	-111.8	41259	-10	600	0.18%

6 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)

Does not apply to Region 2 Plan.