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

In the Matter of	)	
EchoStar 77 Corporation	)	File No. SES-STA-2012____-_____
	)	Call Sign E050196
Application for Special Temporary Authority to Use Its Blanket Earth Station Authorization with QuetzSat-1 at 61.5° W.L.	)	

APPLICATION FOR SPECIAL TEMPORARY AUTHORITY

By this Application, and pursuant to Section 25.120(b)(4) of the Commission's rules,[1] EchoStar 77 Corporation ("EchoStar 77" and collectively with its affiliates, "EchoStar") requests 30-day special temporary authority ("STA") to use its blanket receive-only earth station authorization (Call Sign E050196) with QuetzSat-1, a UK-licensed Direct Broadcast Satellite ("DBS") satellite at 61.5º W.L. EchoStar also requests any necessary waiver of Sections 25.215 and 25.210(i)(1) of the Commission's rules[2] to permit QuetzSat-1 to operate with less than 30 dB cross-polarization isolation over certain small regions.

QuetzSat-1 was successfully launched on September 29, 2011, underwent in-orbit testing at the 67.1º W.L. orbital location, and has been maintained at that location by an affiliate of SES S.A. ("SES"). The use of QuetzSat-1 at the 61.5º W.L. orbital location will free up the EchoStar 15 satellite to move to, and begin providing service at, the 45º W.L. nominal orbital location, pending the successful launch and operational testing of EchoStar 16 later this year.

[1] 47 C.F.R. § 25.120(b)(4).

[2] *Id.* §§ 25.215, 25.210(i)(1).

The decision to move QuetzSat-1 to, and operate it at, 61.5º W.L. is being made to account for the delay in the scheduled launch of EchoStar 16.[3] EchoStar 16 was originally scheduled for launch to the nominal 61.5º W.L. orbital location in July 2012. EchoStar was counting on EchoStar 16 to relieve EchoStar 15 of its duties and allow for its redeployment to the 45º W.L. orbital location for service to Brazil.[4] In light of the delay, this temporary operation of QuetzSat-1 at 61.5º W.L. is needed to accomplish the goal of freeing up the EchoStar 15 satellite to move to, and begin providing service at, 45º W.L.

For the reasons set forth herein, the grant of this application is in the public interest, as it will allow EchoStar and DISH to continue providing service from 61.5º W.L. while implementing another satellite move *from* 61.5º W.L. to another orbital location—a move that is itself beneficial. The operation of QuetzSat-1 at 61.5º W.L. will also not cause harmful interference to any authorized user of the spectrum. Accordingly, the Commission should grant the requested STA.

I. BACKGROUND

After its successful launch on September 29, 2011, QuetzSat-1 completed operational testing at 67.1º W.L. An affiliate of SES has been holding QuetzSat-1 at that orbital location pending direction from EchoStar, which has contracted for the entire DBS service capacity of QuetzSat-1. EchoStar understands that QuetzSat-1 is currently operating under a U.K. Outer Space Act license and will be registered as a UK space object.[5] EchoStar understands that the

[3] *See* File Nos. SAT-LOA-20110902-00172 (filed Sept. 2, 2011); SAT-STA-20110902-00171 (filed Sept. 2, 2011); SAT-STA-20120315-00049 (filed Mar. 15, 2012). The launch of EchoStar 16 has been delayed due to the Proton M/Briz M launch vehicle failure.

[4] The delay has had, and may yet have, a number of effects on EchoStar's overall fleet and other planning, and may cause EchoStar and DISH to submit additional requests to the Commission.

[5] *See* SES Americom, Inc., File No. SES-STA-20120917-00826, at 1 n.1 (filed Sept. 17, 2012); Letter from Stephanie A. Roy, Counsel for EchoStar Broadcasting Corporation, and Daniel Mah,

U.K. Space Agency has indicated that it has no objection to the proposed temporary operation of QuetzSat-1 at 61.5° W.L.

As a result of the delay in the EchoStar 16 launch (due to the Proton M/Briz M launch vehicle failure) and the need to continue service to U.S. customers from 61.5º W.L. while inaugurating EchoStar 15's service from 45º W.L.,[6] EchoStar plans to instruct SES to relocate QuetzSat-1 to 61.5º W.L. EchoStar proposes to use QuetzSat-1 capacity to provide service to consumers through its blanket earth station license (Call Sign E050196).

Once QuetzSat-1 has moved to 61.5º W.L., traffic will be transferred from EchoStar 15 to QuetzSat-1.[7] This move will free EchoStar 15, which is currently at 61.65º W.L.,[8] to move to 45º W.L.[9] After EchoStar 16 is launched and tested, EchoStar plans to request that SES move

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Regulatory Counsel, SES Americom, Inc., to Marlene H. Dortch, Secretary, Federal Communications Commission (Aug. 24, 2012), *filed in* File Nos. SES-STA-20120412-00360, SES-STA-20110815-00955, SES-STA-20111021-01250, SES-MFS-20110926-01138, SES-MFS-20110926-01140, SES-MFS-20110926-01139, SES-STA-20110815-00956, SES-STA-20111021-01251, SES-AMD-20110809-00938, SES-MFS-20110707-00792, SES-AMD-20110809-00937, SES-MFS-20110707-00793, SES-STA-20120413-00364.

[6] EchoStar's business plan includes starting service at 45º W.L. as early as January 2013. As the Commission is aware, in August 2011, EchoStar's indirect and wholly owned subsidiary HNS Americas Comunicações Ltda. ("HNSA") won the rights to an authorization to provide Broadcast-Satellite Service ("BSS") to Brazil from the nominal 45º W.L. orbital location. HNSA executed the license agreement with Agência Nacional de Telecomunicações ("Anatel") in May 2012, and now holds the authorization. EchoStar and Anatel have agreed that HNSA will operate the EchoStar 15 satellite in accordance with Brazil's Region 2 BSS plan modifications filed for the 44.9º W.L. orbital location during an interim period while HNSA works to construct a satellite for the orbital location, consistent with HNSA's Brazilian authorization.

[7] QuetzSat-1's capacity is the same as that of EchoStar 15, and QuetzSat-1 will operate only under the frequencies authorized to EchoStar.

[8] Stamp Grant, File No. SAT-STA-20120531-00091 (granted June 12, 2012); Stamp Grant, File No. SAT-STA-20120711−00115 (granted July 18, 2012).

[9] *See* File No. SAT-MOD-20120814-00130 (filed Aug. 14, 2012).

QuetzSat-1 to 61.65º W.L., and also plans to move EchoStar 16 to 61.5º W.L. Once EchoStar 16 is at 61.5º W.L., EchoStar will transfer the traffic from QuetzSat-1 to EchoStar 16.

II. THIS APPLICATION IS LEGALLY AND TECHNICALLY COMPLETE

EchoStar is hereby submitting all of the technical information required by Part 25 of the Commission's rules[10] in the accompanying Technical Annex (Attachment A) and Schedule S screen shots (Attachment B). With respect to the geographic service requirements in Section 25.148(c) of the Commission's rules,[11] DBS service to Alaska and Hawaii is not technically feasible from the 61.5° W.L. orbital location, as the Commission recognized in its *Part 100 Order*.[12]

Waiver Requested. The operation of the QuetzSat-1 satellite is consistent with the technical requirements of Part 25 of the rules in all but one respect—the cross-polarization isolation over certain small regions is 26 dB, which is less than the minimum 30 dB required by Sections 25.215 (for DBS) and 25.210(i)(1) (for Fixed-Satellite Service) of the Commission's rules.[13] Accordingly, EchoStar hereby requests a waiver of Sections 25.215 and 25.210(i)(1) of the rules to the extent required.

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[10] 47 C.F.R. Part 25.

[11] *Id.* § 25.148(c).

[12] *See* Policies and Rules for the Direct Broadcast Satellite Service, *Report and Order*, 17 FCC Rcd. 11331, 11358-59 ¶ 55 (2002).

[13] 47 C.F.R. § 25.215 ("Space station antennas operating in the Direct Broadcast Satellite Service must be designed to provide a cross-polarization isolation such that the ratio of the on-axis co-polar gain to the cross-polar gain of the antenna in the assigned frequency band shall be at least 30 dB within its primary coverage area."); *id*. § 25.210(i) ("Space station antennas in the Fixed-Satellite Service . . . must be designed to provide a cross-polarization isolation such that the ratio of the on axis co-polar gain to the cross-polar gain of the antenna in the assigned frequency band shall be at least 30 dB within its primary coverage area.").

Commission rules may be waived if there is good cause to do so.[14] Here, there is good cause, and the International Bureau has already granted similar waivers when the impact on neighboring satellite networks is negligible, and the only party suffering increased interference is the satellite operator itself.[15] The Bureau explained in one case, "[l]icensees may use cross-polarization isolation different from that specified for the Region 2 BSS Plan if they demonstrate that such a difference does not result in interference to other operational or planned systems, including U.S. licensed systems."[16]

This is the case here. All beams on QuetzSat-1 have cross-polarization performance that meets or exceeds 30 dB over most of the broadcast coverage area. There are small regions, however, where the cross-polarization may reach, in the worst case, 26 dB. The 4.0 dB shortfall creates insubstantial amounts of self-interference that have already been factored into the link budgets submitted with Schedule S.

The shortfall will not create any interference to adjacent, co-frequency DBS orbital slots. The shortfall will occur in small areas over the Western States, and to a lesser extent the Northeast, in locations near the edge of the usable coverage area. Regardless, EchoStar has taken into account the worst case cross-polarization performance that may occur on the spacecraft. The impact of the cross-polarization shortcoming on DISH's subscribers will be

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

[15] *See, e.g.*, DIRECTV Enterprises LLC, *Order and Authorization*, 20 FCC Rcd. 15778, 15779 ¶ 7 (2005) ("*DIRECTV*") (waiving Section 25.215 when the cross-polarization isolation of DIRECTV 5's DBS antennas was typically 27 dB over the satellite's primary coverage area); *see also* EchoStar Satellite Operating Corporation, *Order and Authorization*, 21 FCC Rcd. 14780, 14783 ¶ 8 (2006); Star One S.A., *Order*, 19 FCC Rcd. 16334, 16339 ¶ 12 (2004); New Skies Satellites N.V., *Order*, 17 FCC Rcd. 10369, 10376-77 ¶ 19 (2002).

[16] *DIRECTV*, 20 FCC Rcd. at 15779 ¶ 7.

negligible. Accordingly, consistent with past precedent, a waiver of Sections 25.215 and 25.210(i)(1) of the Commission's rules is warranted here.

III. GRANT OF THIS APPLICATION IS IN THE PUBLIC INTEREST

The Commission has a long-standing policy of granting STA where such authorization will serve the public interest, convenience, and necessity and will not cause harmful interference.[17] The requested operations meet both of these tests.

The requested STA serves the public interest because it will ensure uninterrupted service to EchoStar customers from 61.5º W.L. while EchoStar moves the EchoStar 15 satellite to 45º W.L. Moreover, the requested authority will allow earlier productive use of an additional slot (45º W.L.)—use that will include a new potential avenue for U.S. programming service to reach a large South American audience.

While QuetzSat-1 is at 61.5º W.L., EchoStar will ensure that operations do not cause harmful interference to any nearby satellite.

IV. APPLICATION FEES

The Commission's Rules do not designate any specific charges for the type of application being filed in the DBS service. EchoStar is submitting the application fee for a VSAT modification, which the Commission has accepted for similar networks and applications, including an almost identical request made by EchoStar in April 2011.[18]

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[17] *See, e.g.,* Newcomb Communications, Inc., *Order and Authorization*, 8 FCC Rcd. 3631, 3633 (1993); Columbia Communications Corp., *Order*, 11 FCC Rcd. 8639, 8640 (1996); American Telephone & Telegraph Co., *Order*, 8 FCC Rcd. 8742 (1993).

[18] *See* Letter from Mark Stephens, Chief Financial Officer, FCC, to Pantelis Michalopoulos, File No. SES-MFS-20110314-00288 (Apr. 4, 2011) (granting the fee waiver request for a modification application to add EchoStar 6, operating as a Mexican-licensed satellite, as a point of communication); *see also* Letter from Mark Stephens, Chief Financial Officer, FCC to Pantelis Michalopoulos, File No. SES-ASG-20110228-00560 (Apr. 18, 2011) (granting the fee

V. 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 77 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.

VI. CONCLUSION

For the foregoing reasons, EchoStar 77 respectfully requests the grant of its application for special temporary authority to operate its blanket earth station (Call Sign E050196) with QuetzSat-1 at 61.5° W.L.

Respectfully submitted,

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waiver request for the *pro forma* assignment of a blanket earth station to operate with EchoStar 4 and EchoStar 8, Mexican-licensed satellites); Letter from Mark Stephens, Chief Financial Officer, FCC to Pantelis Michalopoulos, File No. SES-ASG-20071108-01575 (Apr. 4, 2008) (granting the fee waiver request for the *pro forma* assignment of blanket earth station license).

QUETZSAT-1

ATTACHMENT A

Technical Information to Supplement Schedule S

A.1 Scope

This Attachment contains additional information required by Part 25.114(c) and other sections of the FCC Part 25 rules that cannot be entered into the Schedule S submission.

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

The Quetzsat-1 satellite will operate at the 61.5º W.L. orbital location in the 17.3-17.8 GHz BSS feeder uplink band (ITU Appendix 30A) and the 12.2-12.7 GHz BSS downlink band (ITU Appendix 30). The satellite's frequency plan is identical to that prescribed in the ITU's Region 2 BSS Plan. The satellite will provide BSS services to CONUS. Full frequency re-use is achieved through the use of dual orthogonal polarizations.

All beams on the QUETZSAT-1 satellite have cross-polarization performance over most of the coverage area on the uplink and on the downlink that meets or exceeds 30 dB. However, there are small regions where the cross-polarization performance is about 4 dB poorer, and a waiver is requested.

A.3 Space Station Antenna Gain Contours [Part 25.114(d)(3)]

The QUETZSAT-1 antenna gain contours for the receive and transmit beams, as required by § 25.114(d)(3), are provided in GXT format and embedded in the associated Schedule S submission.

A.4 Services to be Provided

The satellite will provide a range of DBS services to millions of small and inexpensive subscriber receive-only earth terminals.

There will be one wideband digitally modulated signal transmitted in each of the active transponders, supporting a range of information data rates depending on the order of the modulation (e.g., QPSK, 8PSK) and the type and degree of FEC coding used. Representative link budgets, which include details of the transmission characteristics, performance objectives and earth station characteristics, are provided in the associated Schedule S form. The representative modulation/coding schemes provided in the associated Schedule S submission are as follows:

a) QPSK, Turbo rate 7/8 inner coding (24 MHz bandwidth).

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

c) 8PSK, Turbo rate 3/4 inner coding (25.8 MHz bandwidth).

Note that the 25.8 MHz carriers will be transmitted in the 24 MHz channels. These emissions can be accommodated within the useful bandwidth of the channel filters.

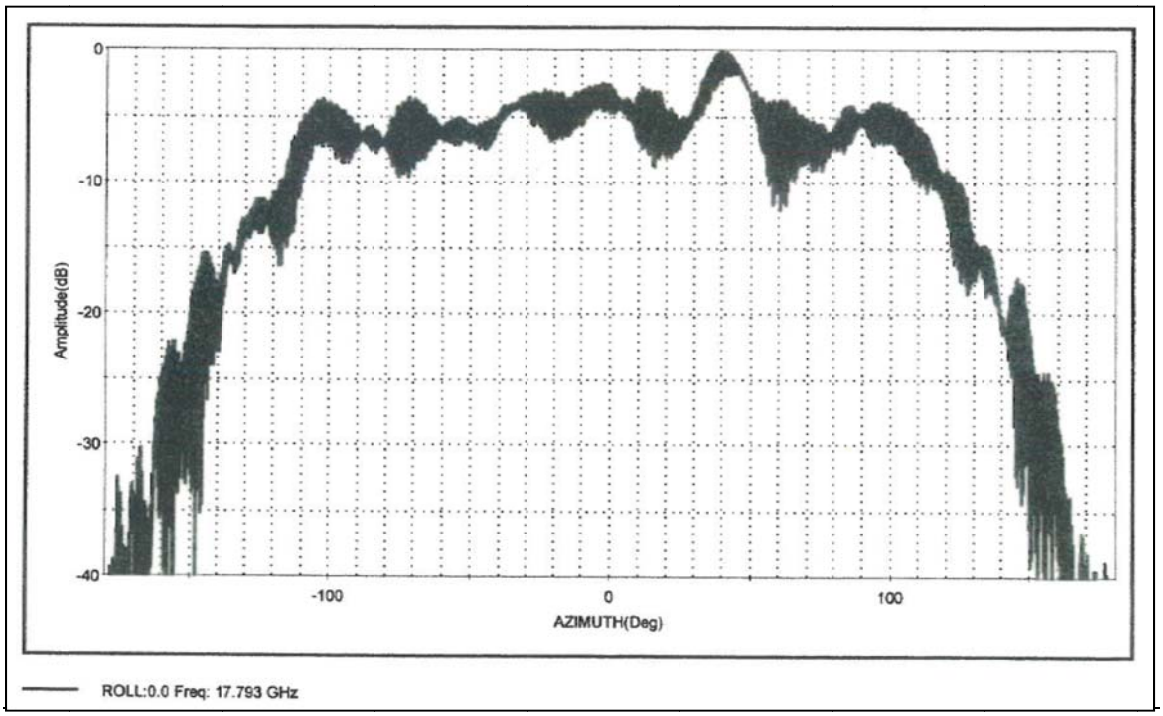
A.5 TT&C Characteristics [Part 25.114(c)(4)(i) and Part 25.114(c)(9)]

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

The QUETZSAT-1 TT&C sub-system provides for communications during pre-launch, transfer orbit and on-station operations, as well as during spacecraft emergencies. The TT&C sub-system will operate at the edges of the uplink and downlink frequency ranges during all phases of the mission.

During drift and on-station emergencies, the TT&C signals are received and transmitted by the satellite using a combination of antennas on the satellite that create a near omni-directional gain pattern. During normal on-station operation, transmit telemetry carriers are transmitted through the downlink communication transmit antenna. During normal on-station operation, the command signals are received via a large-coverage horn (near-omni) antenna on the Earth (+Z) face of the spacecraft. Figure A.5-1 shows the gain characteristics of the +Z horn receive antenna.

Figure A.5-1. Gain Characteristics of +Z Omni Receive Antenna Used for Command Signals; Maximum Antenna Gain: 3.0 dBi



There are three command receivers, two with center frequencies at 17793.0 MHz, and one at 17797.0 MHz. There are three dual telemetry transmitters: one at 12692.0/12693.0 MHz and two at 12694.5/12698.5 MHz. A summary of the TT&C sub-system characteristics is given in Table A.5-1.

Table A.5-1. TT&C Characteristics

Command/Ranging Frequencies	17793.0 MHz 17797.0 MHz
Uplink Flux Density	Between -90 and -78 dBW/m² during normal on-station mode.
Satellite Receive Antenna Type	Omni antenna during all mission modes.
Polarization of Satellite Receive Antenna	RHCP
Telemetry/Ranging Frequencies	12692.0 MHz 12693.0 MHz 12694.5 MHz 12698.5 MHz
Satellite Transmit Antenna Types	Omni antenna during transfer orbit and on-station emergencies; Shaped reflector communications antenna during on-station mode.
Polarization of Satellite Transmit Antennas	RHCP

A.6 Satellite Transponder Frequency Responses [Part 25.114(c)(4)(vii)]

The worst case receive and overall channel filter response performance is given in Table A.6-1 below. Table A.6-2 shows input section narrow-band out-of-band response.

Table A.6-1. Typical Receiver and Overall Filter Responses (In-Band)

Frequency offset from channel center	Max. p-p gain variations	
	Receive	Overall
CF±6.0 MHz	0.3	0.45
CF±7.7 MHz	0.45	0.67
CF±9.6 MHz	0.61	0.90
CF±12 MHz	1.52	1.92
CF±13 MHz	2.93	3.43

Table A.6-2. Narrow-Band Receive Out-of-band Response

Offset from center frequency	Maximum response, dB
CF±16.5 MHz	-3
CF±29.2 MHz	-30

A.7 Cessation of Emissions [Part 25.207]

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

A.8 Orbital Debris Mitigation Plan

A.8.1 Spacecraft Hardware Design

The QUETZSAT-1 operator has assessed and minimized the amount of debris released during normal operations. The satellite was 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. The possibility of collisions with debris or micrometeoroids smaller than one centimeter was taken into account and the design of the spacecraft limits the effects of such collisions through the use of shielding, placement of components and the use of redundant systems to maintain spacecraft control. In addition, all sources of stored energy are located within the body of the spacecraft, providing protection from orbital debris.

A.8.2 Minimizing Accidental Explosions

The QUETZSAT-1 satellite's propulsion system can vent its oxidizer and hydrazine tanks and can also vent the helium tanks following the transfer orbit phase of the mission. However, the Helium tanks cannot be fully emptied. Nonetheless, during and after the satellite's operational life time, the risk of burst of the Helium tanks is mitigated to a negligible level for the following reasons:

1. The remaining pressure in the Helium tanks (29.5 bar max) is significantly lower than the design burst pressure (414 bars) and the actual measured burst pressure (508.8 bars reached during qualification test); a margin of 1725% with respect to the qualification test and almost 1400% over the design.

Furthermore, the main parameter which can increase the pressure is the temperature: To get the tanks to a pressure above the design rupture pressure (414 bars), the tank temperature would have to increase to above 4350° C (5470° C for real burst pressure) whereas thermal analysis guarantees an operating temperature lower than 32° C; a margin of 1400% (degree K comparison) with respect to the qualification and 1780% with respect to actual burst pressure

These margins of the actual pressure and temperature versus either the design or qualification limits indicate that that there is no risk of rupture.

2. Design of Helium tanks: the tank is designed to be "leak before burst." It is made of a titanium liner and overwrapped with carbon fiber. So whatever the cause of the unexpected loss of pressure, the tank will leak but not burst and in such a way that it will not generate debris.

3. In addition, the Helium tanks are surrounded by panels in the satellite which protect them from thermal flux and external debris.

Based on above technical design considerations, there is no risk of debris due to burst of the unvented tanks on the satellite.

A.8.3 Safe Flight Profiles

In considering current and planned satellites that may have a station-keeping volume that overlaps the QUETZSAT-1 satellite, the lists of Commission licensed satellite networks, as well as those that are currently under consideration by the Commission have been reviewed. In addition, networks for which a request for coordination has been published by the ITU in the vicinity of 61.5° W.L. have also been reviewed.

EchoStar currently operates three satellites within the 61.5° W.L. cluster. The orbital locations for operational satellites and Commission-authorized satellites in the vicinity of 61.5° W.L. are summarized below:

- The ECHOSTAR-12 satellite operates nominally at 61.35° W.L. with an east-west station-keeping tolerance of ±0.05°.
- The QUETZSAT-1 satellite will operate nominally at 61.50° W.L. with an east-west station-keeping tolerance of ±0.05°.
- The ECHOSTAR-15 satellite operates nominally at 61.65° W.L. with an east-west station-keeping tolerance of ±0.05°. Once ECHOSTAR-15 traffic is transferred to QUETZSAT-1, it is planned to move the ECHOSTAR-15 satellite to 44.9° W.L. pending Commission approval.[1]
- The ECHOSTAR-3 satellite operates nominally at 61.8° W.L. with an east-west station-keeping tolerance of ±0.05°.
- The ECHOSTAR-16 satellite is planned for launch to the 61.50° W.L. location tentatively in November 2012. Upon successful launch, and after in-orbit testing, the satellite will be located at 61.50° W.L., and the QUETZSAT-1 satellite will be temporarily relocated to 61.65° W.L. while the traffic transfer occurs. The application to relocate QUETZSAT-1 from 61.50° W.L. to 61.65° W.L. will be submitted upon confirmation of ECHOSTAR-16's launch date. During the traffic transfer, there will be no overlap between the satellite's positions, therefor adequate separation between the satellites to avoid any possibility of collisions. After traffic transfer, the QUESTZAT-1 satellite is planned to be moved elsewhere.

Based on the above, there is no possibility of station-keeping volume overlap between existing satellites and the QUETZSAT-1 satellite since there will always be a minimum separation of 0.05° between them.

There are no pending applications before the Commission to use an orbital location ±0.15° from 61.5° W.L. and we are not aware of any satellite with an overlapping station-keeping volume with the QUETZSAT-1 satellite that is the subject of an ITU filing and that is either in orbit or progressing towards launch.

[1] *See* SAT-MOD-20120814-00130 (regarding EchoStar Satellite Operating Corporation's request to operate the ECHOSTAR-15 satellite at 44.9° W.L.).

Based on the preceding, it is concluded that physical coordination of the QUETZSAT-1 satellite with another party is not required at the present time.

A.8.4 Post Mission Disposal Plan

At the end of the operational life of the QUETZSAT-1 satellite, the satellite will be maneuvered to a disposal orbit with a minimum perigee of 300 km above the normal GSO operational orbit. This proposed disposal orbit altitude is based on the following calculation, as required in § 25.283:

Total Solar Pressure Area "A" = 115 m^2

"M" = Dry Mass of Satellite = 2430 kg

"CR" = Solar Pressure Radiation Coefficient (worst case) = 1.3

Therefore, the Minimum Disposal Orbit Perigee Altitude:

= 235 km + 1000 x CR x A/m

= 235 km + 1000 x 1.3 x 115 / 2430

= 296.5 km

= 296.5 km above GSO (35,786 km)

Thus, the designed disposal orbit of 300 km above GSO exceeds the required minimum by a margin of 3.5 km. Maneuvering the satellite to the disposal orbit will require 29 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.

A.9 Interference Analysis [Part 25.214(d)(13)]

The analyses of the QUETZSAT-1 satellite network with respect to the limits in Annex 1 to Appendices 30 and 30A are given in Appendices 1 and 2 to this document. Appendix 1 shows that the QUETZSAT-1 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 ITU Region 2 BSS networks that were deemed to be affected (see Annex 1 to Appendix 1).

It is important to note that none of the networks deemed to be affected are Original Plan networks. There are a number of networks that are modifications to the ITU Region 2 Plan, but none of these have been implemented except for the UK's INTELSAT KUEXT 304.5 at 55.5° W.L. Because QuetzSat-1 is expected to be deployed at 61.5° W.L. for a limited period, we consider only this operational network in more detail. While the INTELSAT KUEXT 304.5 network includes multiple beams, only one beam is actually in use. This beam (named "SPOT") is unaffected by the QUETZSAT-1 satellite network.[2]

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[2] The OEPM degradation to beam SPOT is lower than that allowed by the coordination agreement between the United Kingdom and United States for their respective operations at 55.5° W.L. and 61.5° W.L.

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

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)*

Using the transmission parameters of the QUETZSAT-1 satellite network, an MSPACE analysis was performed utilizing the Region 2 BSS Plan as contained in IFIC 2726. The results of the analysis are contained in Annex 1 to this Appendix.

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 and 3 BSS network is the Russian INTERSPUTNIK-47.5W-B network at 47.5° W.L., which is greater than 10.57 degrees from the 61.5° 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 QUESTZSAT-1 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:

-148 dB(W/(m^2 · 4 kHz))	for $\theta \leq 5°$
$-148 + 0.5\,(\theta - 5)$ dB(W(m^2 · 4 kHz)	for $5° < \theta \leq 25°$
-138 dB(W/(m^2 · 4 kHz))	for $25° < \theta \leq 90°$

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 QUETZAT-1 satellite network. The analysis shows that there are no affected administrations.

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 § 4.2.3 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:

-186.5 dB(W/(m^2 · 40 kHz))	for $0° \leq \theta < 0.054°$
$-164.0 + 17.74 \log \theta$ dB(W/(m^2 · 40 kHz))	for $0.054° \leq \theta < 2.0°$
$-165.0 + 1.66\,\theta^2$ dB(W/(m^2 · 40 kHz))	for $2.0° \leq \theta < 3.59°$
$-157.5 + 25 \log \theta$ dB(W/(m^2 · 40 kHz))	for $3.59° \leq \theta < 10.57°$
-131.9 dB(W/(m^2 · 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 QUESTZSAT-1 satellite causes lower PFD levels over all territories in Regions 1 and 3 than those caused by USA Original Plan networks at 61.5° W.L. and therefore the satellite 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)*

The analysis shows that there are no affected adjacent networks.

Annex 1 to Appendix 1 to Attachment A

QUETZSAT-1 MSPACE Results

Admin	Orbital Position (°W)	Network	Max. OEPM Degradation (dB)
B	**61.0**	**B-SAT-3Q**	**0.830**
G	**55.5**	**INTELSAT KUEXT 304.5**	**0.627**
G	**66.3**	**USAT-S5 MOD-A**	**0.427**
G	**67.0**	**USAT-67W**	**0.270**
HOL	**58.0**	**NSS-BSS 58W**	**3.163**
HOL	**59.0**	**NSS-BSS 59W**	**1.443**
RUS	**47.5**	**INTERSPUTNIK-47.5W-B**	**0.391**

Appendix 2 to
Attachment A (Technical Information to Supplement Schedule S)

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 QUETZSAT-1 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	38.8	-78.6	38210	-0.8	600	0.18%
MCO-BSS-40.5W	-40.5	35.9	33.3	-111.8	38588	-5.1	600	0.05%
GMB30200	-37.2	47.69	33.3	-111.8	38800	-6.7	600	0.52%
IRL21100	-37.2	48.08	33.3	-111.8	38788	-6.7	600	0.56%
NGR11500	-37.2	38.47	33.3	-111.8	38788	-6.7	600	0.06%
DBL-G4-37.2W	-37.2	35	33.3	-111.8	38788	-6.7	330	0.05%
AND34100	-37	48.88	33.3	-111.8	38800	-6.8	600	0.66%
GUI19200	-37	42.29	33.3	-111.8	38800	-6.8	600	0.15%
POR__100	-37	47.17	33.3	-111.8	38800	-6.8	600	0.45%
MTN__100	-36.8	37.55	33.3	-111.8	38813	-6.9	600	0.05%
SMR31100	-36.8	48.88	33.3	-111.8	38813	-6.9	600	0.65%

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.