ATTACHMENT A

Technical Annex to Supplement Schedule S

1. SCOPE

This attachment contains certain information required by 47 C.F.R. § 25.114 and other sections of the FCC's Part 25 rules that cannot be entered on Schedule S. It also provides information to support waiver of certain orbital debris mitigation requirements under 47 C.F.R. §§ 25.283(c) and 25.114(d)(14)(ii).

2. GENERAL DESCRIPTION

The ECHOSTAR-3 satellite will operate at the 86.4° W.L. orbital location on a regular basis in accordance with the United Kingdom's filings with the International Telecommunication Union ("ITU") for the IOMSAT-S21 network.[1].

The ECHOSTAR-3 satellite will operate 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, including uplink and downlink connectivity, is identical to that prescribed in the ITU's Region 2 BSS and associated feeder link Plan. Full frequency re-use is achieved through the use of dual orthogonal polarizations. The cross-polar isolation of the satellite's receive and transmit antennas exceeds 30 dB.

The satellite will transmit on all even channels and on odd channels 1, 5, 9, 13, 17, 21, 25 and 29. The maximum downlink EIRP level will be 54.9 dBW.

The satellite will be maintained with an east-west station-keeping tolerance of ±0.05 degree.

3. TT&C

[1] Additionally, as proposed in concurrently filed applications for special temporary authority ("STA"), the ECHOSTAR-3 satellite initially will operate at 86.4º W.L. on an STA basis in accordance with the United Kingdom's ITU filings for the USAT-S3 MOD-C and USAT-S3 MOD-D networks.

The telemetry, tracking and command ("TT&C") earth stations will be located at EchoStar's satellite control facilities in Gilbert, Arizona, and Blackhawk, South Dakota. The satellite's near-omnidirectional beams will be used for TT&C purposes.

A summary of the TT&C subsystem performance is given in Table 3-1 below.

Table 3-1: Summary of the TT&C Subsystem Performance

Parameter	Performance
On-Station Command Frequency	17,301.5 MHz
Uplink Flux Density	-60 to -80 dBW/m^2
Uplink Polarization	Linear (Vertical)
On-Station Telemetry Frequencies	12,201.0 MHz 12,203.0 MHz 12,699.0 MHz
Maximum Downlink EIRP	3.2 dBW
Downlink Polarization	Linear (Vertical)

4. ORBITAL DEBRIS MITIGATION PLAN

4.1 Spacecraft Hardware Design

The ECHOSTAR-3 satellite was designed and manufactured by Lockheed Martin and was launched in 1997.

EchoStar has assessed and limited the amount of debris released during normal operations. The satellite was designed to minimize debris generated after separation from the launch vehicle and to create no debris during normal on-station operations. All pyrotechnic devices onboard the satellite have been designed to retain all physical debris. In conjunction with the spacecraft manufacturer, EchoStar has assessed and limited the probability of the space station becoming a

source of debris by collisions with small debris or meteoroids smaller than one centimeter in diameter that could cause loss of control and prevent post-mission disposal. The possibility of collisions with small debris and meteoroids was taken into account as part of the satellite design. EchoStar has taken steps to limit the effects of such collisions through the use of shielding, the placement of components, and the use of redundant systems. In addition, all sources of stored energy are located within the body of the spacecraft, thereby providing protection from small orbital debris.

4.2 Minimizing Accidental Explosions

EchoStar and Lockheed Martin have assessed and limited the probability of accidental explosions during and after completion of mission operations. The satellite was designed to ensure that debris generation does not result from the conversion of energy sources on board the satellite into energy that fragments the satellite. The propulsion subsystem pressure vessels have been designed to provide high safety margins. EchoStar and Lockheed Martin have limited the probability of accidental explosions during mission operations by means of a failure mode verification analysis. All pressures, including those of the batteries, will be monitored by telemetry. At end-of-life and once the satellite has been placed into its final disposal orbit, the batteries will be left in a permanent state of discharge and all sources of stored energy (with the exception of the oxidizer and helium tanks) will be vented at the spacecraft's end-of-life by leaving all fuel lines open. Because of Lockheed Martin's design of the spacecraft bus, however, the small amount of oxidizer and helium remaining in their respective tanks cannot be vented at the spacecraft's end of life. Instead, this residual oxidizer and helium will be securely sealed and stored under conditions that would make a leak extremely unlikely, and an accidental, post-mission explosion more unlikely still.

Lockheed has taken a number of measures to avoid an explosion. Specifically, first, it has built hardy tanks that are extremely unlikely to leak. The tanks are all-titanium pressure vessels that have been inspected, tested and qualified to the stringent requirements of the MIL-STD-1522A (Standard General Requirements for Safe Design and Operation of Pressurized Missile and Space Systems) and the EWR-127-1 (Eastern and Western Range Safety Requirements). Given the small amount of oxidizer and helium that will remain in the oxidizer tanks, the tanks would

have to be heated above 165° F (or 76° C) in order for their designed pressure tolerances to be exceeded. Such temperatures are highly unlikely to be experienced, and Lockheed's worst-case analysis shows that temperatures will be less than 95° F (or 35° C) at end-of-life, resulting in a maximum pressure well below the pressure tolerance of the tanks.[2] Similarly, the helium pressurant tanks that are sealed after the final propulsion system re-pressurization will retain a small residual of gaseous helium, but as with the oxidizer tanks, the worst case pressures are well below the design margin leaving little-to-no chance of explosions or leaks. Second, Lockheed has designed and constructed the tanks in accordance with stringent technical standards to leak rather than burst in the case of any flaw in the materials. The tanks have accordingly been qualified as leak-before-burst pressure vessels.[3]

The helium tanks were also built under the stringent MIL-STD-1522A (Standard General Requirements for Safe Design and Operation of Pressurized Missile and Space Systems) and the EWR-127-1 (Eastern and Western Range Safety Requirements). The maximum designed operating pressure of the helium tanks is 4500 psia at 30°C, still with a burst factor of 1.5:1 for additional safety margin. Based on manufacturer maximum expected temperatures of 35°C at disposal orbit, worst case helium tank pressures are predicted to be approximately 500 psia, far below the designed operational maximum pressures. The estimated total remaining mass of helium is expected to be 0.226 kg after final spacecraft re-pressurization. Like the oxidizer tanks, the helium tanks by design are sealed off from the rest of the system upon the final propulsion system re-pressurization and therefore cannot be fully vented during end of mission maneuvers. However, because of the relatively low pressure at EOL, the possibility of helium tanks leaking or bursting is extremely unlikely.

For all of these reasons, the secure storage of the residual oxidizer and helium in this manner is no less safe than the venting of the oxidizer or residual helium. The residual oxidizer and helium amounts are listed in the table below.

[2] *See id.* at 1.
[3] *See id.* at 1-2.

Tank	*Volume (in^3)*[4]	*Liquid/ Gas*	*He (kg), End of Life*	*Internal T_{max} (C), Disposal Orbit*	*Internal P_{max} (psia), Disposal Orbit*
Oxidizer Tank #1	20,049	He	1.83 (amount remaining b/w the 2 oxidizer tanks)	35°	295
Oxidizer Tank #2	20,047	He		35°	295
Oxidizer Tank #1	20,049	N_2O_4	21.99 (amount remaining b/w the 2 oxidizer tanks)	35°	295
Oxidizer Tank #2	20,047	N_2O_4		35°	295
Pressurant Tank #1	4,157	He	0.226 (amount remaining b/w the 2 pressurant tanks)	20°	269[5]
Pressurant Tank #2	4,156	He		20°	269

EchoStar offers further explanation of the above table as follows:

- The 0.226 kg of helium was calculated using the spacecraft manufacturer's estimate of the mass of helium remaining in the tanks following the first re-pressurization of the hydrazine tanks, coupled with an estimate of the mass of helium required to bring the hydrazine and helium tanks near equilibrium during the final re-pressurization of the hydrazine tank prior to end-of-life maneuvers.

- The 35 degrees Celsius maximum internal temperature for the helium tanks in the disposal orbit is taken from the spacecraft manufacturer's prediction of the worst case temperature for the spacecraft in this orbit.

- The 500 pounds per square inch area ("psia") maximum internal pressure for the helium tanks in the disposal orbit is also taken from the spacecraft manufacturer's operations manual for the satellite; the pressure was not calculated using the figures contained in the above table. Notably, EchoStar estimates that the average pressure in the tanks will be well below the maximum estimated by the manufacturer. Specifically, calculations using the ideal gas law, an average temperature of 20° Celsius, and the above-referenced helium mass and tank volumes produce an estimated average pressure for the helium tanks of approximately 269 psia.

[4] One cubic inch (in^3) is equivalent to 1.6387×10^{-5} cubic meters.

[5] This pressure is well below the burst pressure for the helium tanks. The spacecraft manufacturer's documentation for the satellite states that "The maximum expected operating pressure (MEOP) of each pressurant tank is 4500 psia with a 1.5:1 burst factor of safety."

Residual Helium Cannot Be Vented:

Prior to end-of-life maneuvers, the helium will be used to re-pressurize the hydrazine tank. Once the pressure in the hydrazine tank is in equilibrium with the pressure in the helium tanks, no further helium can migrate from the helium tanks to the hydrazine tank, and the helium tanks will be isolated from the rest of the spacecraft via latch valve in accordance with the spacecraft manufacturer's recommendation. There is no manufacturer recommended mechanism to vent the residual helium from the helium tanks themselves after the final re-pressurization of the hydrazine tank.

The Commission may waive its rules for "good cause shown," including in cases where compliance would impose an undue hardship and the policy underlying the rule will still be served.[6] These circumstances are met here. First, the ECHOSTAR-3 satellite is incapable of alteration at this stage. It was designed and launched before the adoption of the Commission's current orbital debris mitigation rules. The Commission is well aware of the limitations of the Lockheed Martin A2100 spacecraft.[7] The bus design makes it impossible to vent the residual oxidizer and helium at the satellite's end of life. At the same time, it is extremely unlikely that the oxidizer or helium tanks will leak or burst. This means that the chance of accidental explosions has been minimized, consistent with the purpose of Sections 25.283(c) and 25.114(d)(14)(ii) of the Commission's rules.[8] For these reasons, the Commission has repeatedly granted waivers of Sections 25.283(c) and 25.114(d)(14)(ii) of the Commission's rules for satellites based on the A2100 bus.[9]

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[6] *See* 47 C.F.R. § 1.3; *WAIT Radio v. FCC*, 418 F.2d 1153, 1157 (D.C. Cir. 1969); *see also* Stamp Grant, IBFS File No. SAT-STA-20080219-00048, SAT-STA-20080229-00054 (Mar. 12, 2008) (explaining that "waiver is granted because modification of the [Lockheed Martin A2100] spacecraft would present an undue hardship, given the late stage of satellite construction.").

[7] *See supra* n. 7.

[8] *See* 47 C.F.R. § 25.114(d)(14)(ii) (addressing the discharge of energy sources in the context of requiring satellite operators to assess and limit "the probability of accidental explosions during and after completion of mission operations"); *WAIT Radio*, 418 F.2d at 1157 (noting that a waiver may be granted when it would not undermine the purpose of the rule); *Intelsat North America LLC*, 22 FCC Rcd. 11989 ¶ 6 (2007).

[9] Stamp Grants, SES Americom, Inc., File No. SAT-MOD-20121224-00221, Call Sign S2181, at condition 5 (Mar. 22, 2013); SES Americom, Inc., File No. SAT-MOD-20111220-00243, Call Sign S2162, at condition 7 (June 28,

Based upon the foregoing, the Commission should grant the requested waiver.

4.3 Safe Flight Profiles

In considering current and planned satellites that may have a station-keeping volume that overlaps the ECHOSTAR-3 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 published by the International Telecommunication Union ("ITU") within ±0.15° of 86.4° W.L. have been reviewed.

Based on these reviews, EchoStar concludes that there are no operational or planned satellites that could have a station-keeping overlap with the ECHOSTAR-3 satellite. Telesat Canada operates the NIMIQ 1 satellite nominally at 86.5° W.L. with an east-west station-keeping tolerance of ±0.05 degrees. SES Satellites (Gibraltar) Limited ("SES") utilizes the payload of the NIMIQ 1 satellite. EchoStar will maintain the ECHOSTAR-3 satellite at the 86.4° W.L. orbital location, with an east-west station-keeping tolerance of ±0.05 degrees, thereby ensuring there is no possibility of station-keeping volume overlap between the two satellites.

Based on the preceding, EchoStar concludes that there is no requirement to physically coordinate the ECHOSTAR-3 satellite with another satellite operator at the present time.

4.4 Post Mission Disposal

Upon mission completion, the ECHOSTAR-3 satellite will be maneuvered to a disposal orbit at least 270 km above its operational geostationary orbit.[10] Based on data from the satellite manufacturer, less than 12 kg of fuel will be required to achieve this. Accordingly, 12 kg of fuel

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2012); Intelsat License LLC, File No. SAT-RPL-2012021600018, Call Sign S2854, at condition 4 (May 25, 2012); New Skies Satellites B.V., File No. SAT-MPL-20120215-00017, Call Sign S2463, at condition 7 (May 25, 2012); SES Americom, Inc., File No. SAT-MOD-20110718-00130, Call Sign S2445, at condition 2 (Oct. 13, 2011); EchoStar Satellite Operating Corp., File No. SAT-LOA-20071221-00183, at condition 4 (Mar. 12, 2008).

[10] The ECHOSTAR-3 satellite was launched in 1997. Pursuant to the Commission's rules, a calculation of the satellite's disposal orbit according to the IADC formula is not required. *See Mitigation of Orbital Debris*, Second Report and Order, 19 FCC Rcd 11567, ¶ 81(2004) ("we will grandfather all on orbit GEO spacecraft that were launched as of the release of the *Notice* in this proceeding").

will be reserved at the end of the satellite's life. The fuel reserve will be calculated using two 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. EchoStar has assessed fuel gauging uncertainty and has provided an adequate margin of fuel to address such uncertainty.

5. INTERFERENCE ANALYSES

The ECHOSTAR-3 satellite at 86.4° W.L. will operate under the UK Administration's IOMSAT-S21 ITU filing. Accordingly, EchoStar, through the UK Administration, is responsible for coordination of the ECHOSTAR-3 satellite following the Appendix 30 and 30A coordination procedures.

The analyses of the ECHOSTAR-3 satellite network at 86.4° W.L. with respect to the limits in Annex 1 to Appendices 30 and 30A are given in Appendices 1 and 2 to this attachment. The results of these analyses are discussed below. Note that the analyses were performed against IFIC 2697; a rather old IFIC in which the IOMSAT-S21 network was published. Networks that have since expired and been suppressed by the ITU were ignored in the analyses.

The Appendices show that the ECHOSTAR-3 satellite network meets all the ITU criteria in Annex 1, except for § 4.2.3(c) of Article 4 of Appendices 30 and 30A. With respect to § 4.2.3(c), the MSPACE analysis shows that there are ten adjacent Region 2 BSS networks that are deemed to be affected. Nine of these networks are original Plan networks. The tenth network is Mexico's QUETZSAT-77 network; a modification to the Plan. Of these ten satellite networks, only Mexico's is operational.

All of the nine Plan networks were identified as being potentially affected when the IOMSAT-S21 network was published, but none of the responsible administrations commented within the requisite four-month period, therefore coordination with these networks is not required. Further, the OEPM degradations caused by the ECHOSTAR-3 satellite network into these nine networks are lower than those caused by the IOMSAT-S21 network.

With respect to the Mexican network at 77° W.L., EchoStar has an agreement with the operator of the QUETZSAT-77 satellite network.

Based on the preceding, EchoStar concludes that coordination of the ECHOSTAR-3 satellite network with another operator / administration is not required.

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 Technical Annex:
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)*

The MSPACE analysis was performed utilizing the Region 2 BSS Plan as contained in IFIC 2792. This is the IFIC in which the later-filed USAT-S3 MOD-D network was published. The USAT-S3 MOD-C network was published in an earlier IFIC. The results of the analysis are contained in Appendix 1-A below.

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 GIMs Appendix 30 PFD tool was used to assess compliance with this Section. Using the antenna gain contours and power levels of the beams of the ECHOSTAR-3 satellite, the GIMS PFD tool showed that no administrations are affected. Accordingly, the ECHOSTAR-3 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/(m2 · 4 kHz))	for $\theta \leq 5°$
$-148 + 0.5\,(\theta - 5)$ dB(W(m2 · 4 kHz)	for $5° < \theta \leq 25°$
-138 dB(W/(m2 · 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 ECHOSTAR-3 satellite network. Using this tool, the results show that the PFD limits are not exceeded over the territory of any administration and therefore the ECHOSTAR-3 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 § 4.2.3 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 ITU's GIBC software tool was used to assess compliance with this Section. The results show that no administrations are affected and therefore the ECHOSTAR-3 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 $\Delta T / T$ resulting from the proposed modification is greater than the value of $\Delta T / T$ 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 $\Delta T / T$ 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. Accordingly, no Region 1 space stations can be affected and the ECHOSTAR-3 satellite network is compliant with this Section.

Annex 1 to Appendix 1 to Attachment A

ECHOSTAR-3 at 86.4° W.L. MSPACE Results

Admin	Orbital Position (°W)	Network	Max. OEPM Degradation (dB)
BAH	87.20	BAHIFRB1	1.240
JMC	92.30	CRBEC001	0.252
DOM	83.30	DOMIFRB2	0.288
GRD	79.30	GRD00003	0.451
GUY	84.70	GUY00201	0.583
PRU	85.80	PRU00004	19.421
SUR	84.70	SURINAM2	0.766
TRD	84.70	TRD00001	10.970
VCT	79.30	VCT00001	0.346
MEX	77.00	QUETZSAT-77	0.540

Appendix 2 to Technical Annex:
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 $\Delta T / T$ corresponding to 6%, where $\Delta T / T$ 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 feederlink carriers. (WRC-03)*

The analysis shows that there are no affected Region 1 or Region 3 networks.

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.
