

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

In the Matter of)	
)	
SES AMERICOM, INC.)	File No. SAT-MOD-_____
)	Call Sign S2134
Application for Modification of AMC-2)	
Fixed-Satellite Space Station License)	

APPLICATION OF SES AMERICOM, INC.

SES Americom, Inc. (“SES Americom,” doing business as “SES WORLD SKIES”¹), hereby respectfully requests a modification of its license for the AMC-2 hybrid fixed-satellite service space station in order to reflect minor changes in the technical characteristics of the satellite’s C-band payload. Specifically, SES WORLD SKIES seeks to operate the C-band frequencies (including the C-band TT&C frequencies) on AMC-2 with polarizations that are the opposite of what was previously specified and to operate with a slightly higher C-band peak EIRP. Grant of the requested modification will serve the public interest by facilitating SES WORLD SKIES’ ability to make AMC-2 C-band capacity available to customers.

A completed FCC Form 312 is attached, and SES WORLD SKIES incorporates by reference the technical information previously provided in support of AMC-2.² In addition, SES WORLD SKIES is providing here technical information relating to the proposed

¹ SES WORLD SKIES is the commercial brand name for the integrated operations of two indirect subsidiaries of SES S.A.: SES Americom and New Skies Satellites B.V. (effective January 1, 2009). The brand name does not affect the underlying legal entities that hold Commission authorizations or U.S. market access rights.

² The most recent technical information submitted relating to AMC-2 is found in File No. SAT-MOD-20100324-00056 (the “March AMC-2 Modification”), grant-stamped June 21, 2010.

modification to the AMC-2 license on Schedule S and in narrative form pursuant to Section 25.114 of the Commission's Rules.

MODIFICATION

Earlier this year, the Commission granted SES WORLD SKIES' application for modification of the AMC-2 license to reassign the spacecraft from the nominal 101° W.L. orbital location to 78.95° W.L.³ In the March AMC-2 Modification, SES WORLD SKIES specified that the polarizations of the C-band transponders and TT&C frequencies at 78.95° W.L. would be reversed from the polarizations used at 101° W.L.⁴ Similarly, in the Schedule S supplied with the March AMC-2 Modification, SES WORLD SKIES provided specific polarization information that likewise indicated that the C-band polarizations at 78.95° W.L. would be the opposite of those used at 101° W.L.⁵

As required by Section 25.210(a)(3),⁶ the AMC-2 satellite is equipped with polarization switches that would permit SES WORLD SKIES to conform the C-band transponder and TT&C polarizations to those described in the March AMC-2 Modification. However, SES WORLD SKIES is concerned that switching the polarization could disrupt the operations of the spacecraft. The polarization switches are potential single points of failure. If a switch were to fail in an "in-between" configuration, it could jeopardize the ability to use either polarization of C-band frequencies on the satellite.

³ *See id.*

⁴ *See id.*, Technical Appendix at 2.

⁵ *See id.*, Schedule S, Item S9.

⁶ 47 C.F.R. § 25.210(a)(3).

In light of these concerns, SES WORLD SKIES has not switched the C-band frequency polarizations to conform to those specified in the March AMC-2 Modification and would prefer not to do so. SES WORLD SKIES has been granted special temporary authority to operate with the current configuration of the spacecraft, without switching the C-band polarization.⁷ In order to make AMC-2 C-band capacity available as needed to respond to future customer requirements, SES WORLD SKIES now seeks modification of the AMC-2 license to authorize long term operations without switching the C-band polarization.

SES WORLD SKIES also seeks to make a minor adjustment in the peak EIRP for the AMC-2 C-band payload. Specifically, SES WORLD SKIES proposes to increase the peak C-band EIRP from 42.0 dBW to 42.1 dBW.

Operation of AMC-2 at 78.95° W.L. as proposed herein will not harm other operators. SES WORLD SKIES submitted a two-degree spacing analysis with the March AMC-2 Modification showing that its planned operations were compatible with the applicable interference environment. The analysis did not rely on polarization diversity to reach this conclusion.⁸ As a result, the proposed operation will be consistent with the assumptions underlying the interference analysis in the March AMC-2 Modification, and the conclusions of that analysis remain valid.

⁷ See File No. SAT-STA-20101117-00238, grant-stamped Nov. 19, 2010 (the “AMC-2 STA”) (authorizing C-band operations with the opposite polarization sense from that authorized in the March AMC-2 Modification for a period of 30 days on a non-interference basis). Concurrently with the filing of the instant modification, SES WORLD SKIES is seeking an extension of the AMC-2 STA.

⁸ March AMC-2 Modification, Technical Appendix, Annex 3 at 33.

Furthermore, there are currently no U.S.-authorized C-band satellites in the orbital locations immediately adjacent to AMC-2 at 78.95° W.L.⁹ AMC-2 operations will conform to the terms of existing and future coordination agreements applicable to its operations at the nominal 79° W.L. orbital location.

SES WORLD SKIES notes that as revised, the polarization sense of the C-band communications payload will be inconsistent with the framework set forth in Commission orbital assignment orders, in which two-degree adjacent C-band spacecraft have alternating polarization plans.¹⁰ That framework is designed to facilitate coordination of analog TV/FM signals among adjacent C-band satellites.¹¹ However, because neither of the orbital locations adjacent to 79° W.L. is currently occupied by a satellite with a C-band payload, SES WORLD SKIES seeks authority to provide analog video using the AMC-2 C-band payload with its current polarization subject to terms and conditions designed to ensure that its operations do not constrain future adjacent operations.

Specifically, SES WORLD SKIES requests that the Commission authorize the use of AMC-2 C-band capacity at 78.95° W.L. for analog video service as long as there is no U.S.-authorized C-band satellite operating at either the nominal 77° W.L. or 81° W.L. orbital

⁹ SES WORLD SKIES notes that the Venesat-1 satellite operates at 78° W.L. under a Uruguayan ITU network filing that is lower in priority than the U.S. ITU filing at the nominal 79° W.L. location. Coordination discussions with the Venesat-1 operator are in progress to ensure that operations at 78° W.L. will not negatively impact the co-frequency operations of AMC-2 at 78.95° W.L.

¹⁰ See, e.g., *Assignment of Orbital Locations to Space Stations in the Domestic Fixed-Satellite Service*, Order and Authorizations, 11 FCC Rcd 13788, 13796-98 (IB 1996) (identifying polarization senses for C-band satellites authorized in 1996).

¹¹ See, e.g., *Star One S.A.*, Order, DA 10-1957 (IB rel. Oct. 13, 2010) at ¶ 22 (the requirement for a C-band polarization switch “mitigates potential interference between adjacent FSS systems transmitting analog television signals”).

locations. At such time as a future U.S.-authorized satellite with a C-band payload is deployed to either of those locations, SES WORLD SKIES requests authority to provide C-band analog video services on AMC-2 only if those services have been successfully coordinated with the adjacent satellite network or networks. Grant of such authority as conditioned will serve the public interest by allowing SES WORLD SKIES the flexibility to use AMC-2 as needed for C-band analog television signals without affecting the rights of future adjacent satellite systems.

For the foregoing reasons, SES WORLD SKIES seeks a modification of its license to operate AMC-2 at 78.95° W.L. in the C-band frequencies to reflect the polarization and peak EIRP changes discussed herein.

Respectfully submitted,

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Dated: December 15, 2010

TECHNICAL APPENDIX

IN SUPPORT OF AMC-2 AT 78.95°W.L.

TECHNICAL APPENDIX

1.0 Overall Description (§25.114(d)(1))

This technical appendix is submitted in support of the AMC-2 modification application of SES Americom, Inc. (“SES Americom,” doing business as SES WORLD SKIES) seeking changes in the polarization of C-band frequencies and minor adjustments to the C-band peak EIRP values. SES WORLD SKIES hereby incorporates by reference the technical information it has already provided with respect to AMC-2,¹ and provides here technical information relating to the changes proposed in the polarization and EIRP levels for AMC-2 at 78.95°W.L. No changes are proposed in the Ku-band parameters and operational modes described in the March AMC-2 Modification.

The revisions described here are:

- a) Reversal of the C-band communications and TT&C polarizations described in the March AMC-2 Modification from vertical to horizontal, and horizontal to vertical.
- b) A slight change of peak C-band EIRP from 42.0 dBW to 42.1 dBW.

2.0 Schedule S (§25.114(c))

The Schedule S database included with this filing reflects the changes to the C-band operations proposed herein. Because no changes are proposed with respect to AMC-2 Ku-band operations, the attached Schedule S does not provide information concerning the AMC-2 Ku-band payload.² This section describes changes in the Schedule S relating to the proposed operation of AMC-2 at 78.95°W.L. and addresses some items not covered in the Schedule S.

1. *Transponder frequency plan.* Table 1 shows the frequency and polarization plan of the modified system. The polarizations of transponders are reversed from what was described in the March AMC-2 Modification.
2. *Telemetry and Telecommand (TT&C) frequencies and beams.* The proposed polarizations of the TT&C carriers are reversed from what is described in the March AMC-2 Modification.

¹ The most recent technical information submitted relating to AMC-2 is found in File No. SAT-MOD-20100324-00056 (the “March AMC-2 Modification”), grant-stamped June 21, 2010.

² Information relating to AMC-2 Ku-band operations is provided in the Schedule S that was filed with the March AMC-2 Modification.

A global horn antenna (“GBLR”) is used for receiving telecommand carriers. The communication antennas are used for transmitting telemetry carriers for normal operation. Table 2 shows the TT&C carrier frequencies and polarizations.

3. *PFD limits in C-band.* The C-band PFD values are provided in Section S8 of Schedule S, and Section 3.0 below (Table 3) demonstrates that these values comply with §25.208.
4. *Conversion of G/T values to Saturation Flux Density values.* No change.
5. *Transponder frequency response of C-band transponders.* No change.

Table 1. C-band frequency and polarization plan

Channel	Receive Frequency (MHz)	Polarization	Transmit Frequency (MHz)	Polarization
1	5945	H	3720	V
2	5965	V	3740	H
3	5985	H	3760	V
4	6005	V	3780	H
5	6025	H	3800	V
6	6045	V	3820	H
7	6065	H	3840	V
8	6085	V	3860	H
9	6105	H	3880	V
10	6125	V	3900	H
11	6145	H	3920	V
12	6165	V	3940	H
13	6185	H	3960	V
14	6205	V	3980	H
15	6225	H	4000	V
16	6245	V	4020	H
17	6265	H	4040	V
18	6285	V	4060	H
19	6305	H	4080	V
20	6325	V	4100	H
21	6345	H	4120	V
22	6365	V	4140	H
23	6385	H	4160	V
24	6405	V	4180	H

Table 2: C-band TT&C carrier frequencies and polarizations

Carrier type	Center frequency (MHz)	Bandwidth (kHz)	Channel ID	Beam ID
Telecommand (H-pol)	6423.5	800	TC	GBLRH
Telemetry (H-pol)	3700.5	300	TM1	CTH
Telemetry (V-pol)	4199.5	300	TM2	CTV

3.0 PFD limits in C-band (§25.114(d)(5) and §25.208)

Table 3 demonstrates that the PFD values in C-band from AMC-2 at 78.95°W.L. comply with §25.208. Table 4 shows that the maximum PFD values in Telemetry carriers are below the allowable limits.

Table 3: Maximum PFD values and margins relative to permissible limits of §25.208 (Max. PFD computed in a carrier bandwidth of 2 MHz representing TV/FM)

	Elevation angle (degrees)	Max. EIRP (dBW)	Max. PFD (dBW/m ² /4 kHz)	Permissible max PFD (dBW/m ² /4 kHz) from §25.208	Margin (dB)
V-Pol	5	38.4	-154.91	-152	2.9
	10	38.8	-154.51	-149.5	5.0
	15	39.4	-153.91	-147	6.9
	20	40	-153.31	-144.5	8.8
	25	40.6	-152.71	-142	10.7
H-Pol	5	38.45	-154.86	-152	2.9
	10	38.7	-154.61	-149.5	5.1
	15	39.1	-154.21	-147	7.2
	20	39.6	-153.71	-144.5	9.2
	25	40	-153.31	-142	11.3

Table 4: Maximum PFD values in telemetry carriers, and margins relative to permissible limits of §25.208

	Elevation angle (degrees)	Max. EIRP (dBW)	Max. PFD (dBW/m ² /4 kHz)	Permissible max PFD (dBW/m ² /4 kHz) from §25.208	Margin (dB)
TM2/V-pol	5	14.3	-170.8	-152.0	18.8
	10	14.7	-170.4	-149.5	20.9
	15	15.3	-169.8	-147.0	22.8
	20	15.9	-169.2	-144.5	24.7
	25	16.5	-168.6	-142.0	26.6
	Global max		18.0	-167.1	-142.0
TM1/H-pol	5	14.4	-170.7	-152.0	18.7
	10	14.6	-170.5	-149.5	21.0
	15	15.0	-170.1	-147.0	23.1
	20	15.5	-169.6	-144.5	25.1
	25	15.9	-169.2	-142.0	27.2
	Global max		16.7	-168.4	-142.0

4.0 Satellite Antenna Gain Contours (§25.114(d)(3))

Annex 1 shows the typical antenna gain contours for 4 different cases: transmit and receive beams in H- and V-polarizations.³ The peak EIRP and G/T values in different beams are shown in Table 5.

1. CRV.gxt (V-pol, receive beam)
2. CTV.gxt (V-pol, transmit beam)
3. CRH.gxt (H-pol, receive beam)
4. CTH.gxt (H-pol, transmit beam)

Table 5: Maximum EIRP and G/T values

Beam	File name in Schedule S	Max. EIRP, dBW	Max. G/T, dB/K
CRV (C-band, V-pol, receive beam)	CRV.gxt		4.05
CTV (C-band, V-pol, transmit beam)	CTV.gxt	42.1	
CRH (C-band, H-pol, receive beam)	CRH.gxt		5.82
CTH (C-band, H-pol, transmit beam)	CTH.gxt	40.8	

5.0 Emission Designators and Link Budgets (§25.114(d)(4))

Tables 6 and 7 show the emission designators and typical link budgets. The TT&C link budgets are shown in Tables 8 and 9.

³ Because the changes proposed herein do not affect the antenna gain characteristics of the global horn antenna, SES WORLD SKIES is not submitting new data for that antenna in Annex 1 or in the Schedule S being filed with the instant modification. Instead, SES WORLD SKIES incorporates by reference the global horn antenna gain information provided in the March AMC-2 Modification. See March AMC-2 Modification, Technical Appendix, Annex 1, Figure 9. In that application, SES WORLD SKIES requested and received a waiver of the requirement in Section 25.114(d)(3) to file gain information for the global horn antenna in .gxt format. See March AMC-2 Modification, grant-stamp at ¶ 7.

Table 6: Link budgets for 7 typical C-band carriers

	H_C	I_C	J_C	K_C	L_C	M_C
Parameter	Digital TV MCPC, 40 MBPS, QPSK, ¾ RS	Digital TV SCPC, 8 MBPS, QPSK ¾ RS	Digital TV MCPC, 60 MBPS, 8PSK, 2/3 RS	Digital TV, MCPC, 110 MBPS, 16QAM, 7/8 RS	56 Kbps, SCPC, QPSK, ¾ RS	1.544 Mbps, SCPC, QPSK, ¾ RS
Carrier designation	36M0G7W	6M95G1W	36M0G7W	36M0G7W	100KG1D	1M60G1D
Throughput rate, Mbps	40	8	60	110	0.056	2
Symbol rate, MHz	28.8	5.8	32.6	34.1	0.037	1.0
FEC rate	0.69	0.69	0.61	0.81	0.75	0.75
Uplinks:						
Transmit Power (dBW)	17.1	9.6	25.1	25.1	-3.4	11.8
Transmit Loss (dB)	0.5	0.5	0.5	0.5	0.5	0.5
Antenna diameter (m)	10	10	10	10	4.5	4.5
Antenna Gain (dBi)	54.4	54.4	54.4	54.4	47.4	47.4
Ground Station EIRP (dBW)	71.0	63.5	79.0	79.0	43.5	58.7
Uplink Rain Loss (dB)	1	1	1	1	1	1
Free Space Loss (dB)	200.1	200.1	200.1	200.1	200.1	200.1
Satellite G/T (dB/K)	0	0	0	0	0	0
Data Rate (dB-Hz)	76	69.0	77.8	80.4	47.5	61.9
Boltzmann's Constant (dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Eb/No (dB)	22.5	22.0	28.7	26.1	23.5	24.3
Eb/Io (dB)	18	18	18	18	18	18
Total Eb/(No + Io) (dB) For 10-7	16.7	16.5	17.6	17.4	16.9	17.1

(Table continued on the next page)

Table 6: Link budgets for 7 typical C-band carriers (cont'd)

	H_C	I_C	J_C	K_C	L_C	M_C
Parameter	Digital TV MCPC, 40 MBPS, QPSK, 3/4 RS	Digital TV SCPC, 8 MBPS, QPSK 3/4 RS	Digital TV MCPC, 60 MBPS, 8PSK, 2/3 RS	Digital TV, MCPC, 110 MBPS, 16QAM, 7/8 RS	56 Kbps, SCPC, QPSK, 3/4 RS	1.544 Mbps, SCPC, QPSK, 3/4 RS
Carrier designation	36M0G7W	6M95G1W	36M0G7W	36M0G7W	100KG1D	1M60G1D
Downlinks:						
Satellite Carrier EIRP (dBW)	38	28	38	40	8	25.2
Downlink Rain Loss (dB)	0.5	0.5	0.5	0.5	0.5	0.5
Free Space Loss (dB)	196.3	196.3	196.3	196.3	196.3	196.3
Ground station antenna dia, m	3.8	6	10	10	6	6
Ground Station G/T (dB/K)	21.8	25.2	33.2	33.2	23.0	23.0
Eb/No (dB)	15.6	16.0	25.2	24.6	15.3	18.1
C/IM		18			18	18
Eb/IMo (dB)		16.6			16.2	16.2
C/I	16.0	16.0	20.0	22.0	16.0	16.0
Eb/Io (ASI)	14.6	14.6	17.3	16.9	14.2	14.2
Eb/Io (dB)	14.6	12.5	17.3	16.9	12.1	12.1
Eb/(No + Io) (dB)	12.1	10.9	16.7	16.2	10.4	11.1
Total UP/DOWN C/(N+I) (dB)	13.5	12.3	19.3	21.3	12.2	12.9
Total UP/DOWN Eb/(No+Io) (dB)	10.8	9.8	14.1	13.8	9.5	10.2
Required Eb/No (dB)	5.4	5.4	7.2	11.5	5.4	5.4
Required C/N (dB)	6.8	6.8	9.9	16.6	7.2	7.2
Margin (dB)	5.4	4.4	6.9	2.3	4.1	4.8

Table 7: Link budgets for TV/FM in C-band

Parameter	Typical TV/FM link
Carrier designation	36M0F3F
Noise bandwidth (MHz)	36.0
Uplinks:	
Transmit Power (dBW)	20.7
Transmit Loss (dB)	0.5
Antenna diameter	6.1
Antenna Gain (dBi)	49.8
Ground Station EIRP (dBW)	70.0
Uplink Rain Loss (dB)	1
Free Space Loss (dB)	200.1
Satellite G/T (dB/K)	0
Boltzmann's Constant (dBW/K-Hz)	228.6
C/N (dB)	21.9
C/I ASI (dB)	22.0
C/(N+I), dB	19.0
Downlinks:	
Satellite Carrier EIRP (dBW)	38
Downlink Rain Loss (dB)	0.5
Free Space Loss (dB)	196.3
Ground station antenna dia (m)	6
Ground Station G/T (dB/K)	23.0
C/N (dB)	17.2
C/I (dB)	18.0
C/(N+I) (dB)	14.6
C/(N+I), Up & DL, dB	13.2
C/(N+I) required (dB)	11
Margin (dB)	2.2

Table 8: Command carrier link budget (C-band, uplink)

Uplink Flux Density	dBW/m ²	-80
Isotropic Aperture	dB-m ²	-37.6
Coupler loss	dB	-0.3
Polarization loss	dB	-0.1
S/C antenna gain	dB	3
Scattering interf. loss	dB	-1
Cable VSWR Loss	dB	-5.2
Circuit losses	dB	-7
Received input power	dBW	-128.2
Required input power	dBW	-138
Margin	dB	9.8

Table 9: Budget for C-band telemetry (downlink)

S/C EIRP	dBW	14.3
Path Loss	dB	-196.9
Rain Loss	dB	-1.1
Polarization loss	dB	-0.3
Ground station pointing loss	dB	-0.5
Ground station G/T	dB/K	31
Boltzmann constant	dB-Hz K/W	228.6
Carrier to noise density	dB-Hz	75.12
Modulation loss	dB	-4.8
1/bitrate (4096 BPS Telemetry)	dB-bps	-36.1
Implementation loss	dB	-3
Received Eb/No	dB	31.22
Required Eb/No	dB	11.3
Eb/No margin	dB	13.16

6.0 Two Degree Spacing Analysis (§25.114(d)(7) and §25.140(b)(2))

Annex 3 to the Technical Appendix for the March AMC-2 Modification demonstrated the compatibility of AMC-2 at 78.95° W.L. 1.95 degrees away from other spacecraft. The changes proposed herein do not affect that analysis.⁴

7.0 Mitigation of Orbital Debris (§25.114(d)(14))

The information required under Section 25.114(d)(14) of the Commission's Rules was provided with the March AMC-2 Modification and is unchanged.

⁴ The analysis did not take into account polarization diversity, and any effect of the small proposed increase in peak C-band EIRP from 42.0 to 42.1 dBW on the interference environment will be negligible.

ANNEX 1

COVERAGE MAPS

Fig 1. Transmit beam CTH
C-band, H-pol, Antenna peak gain: 30.3 dB, peak EIRP: 40.8 dBW

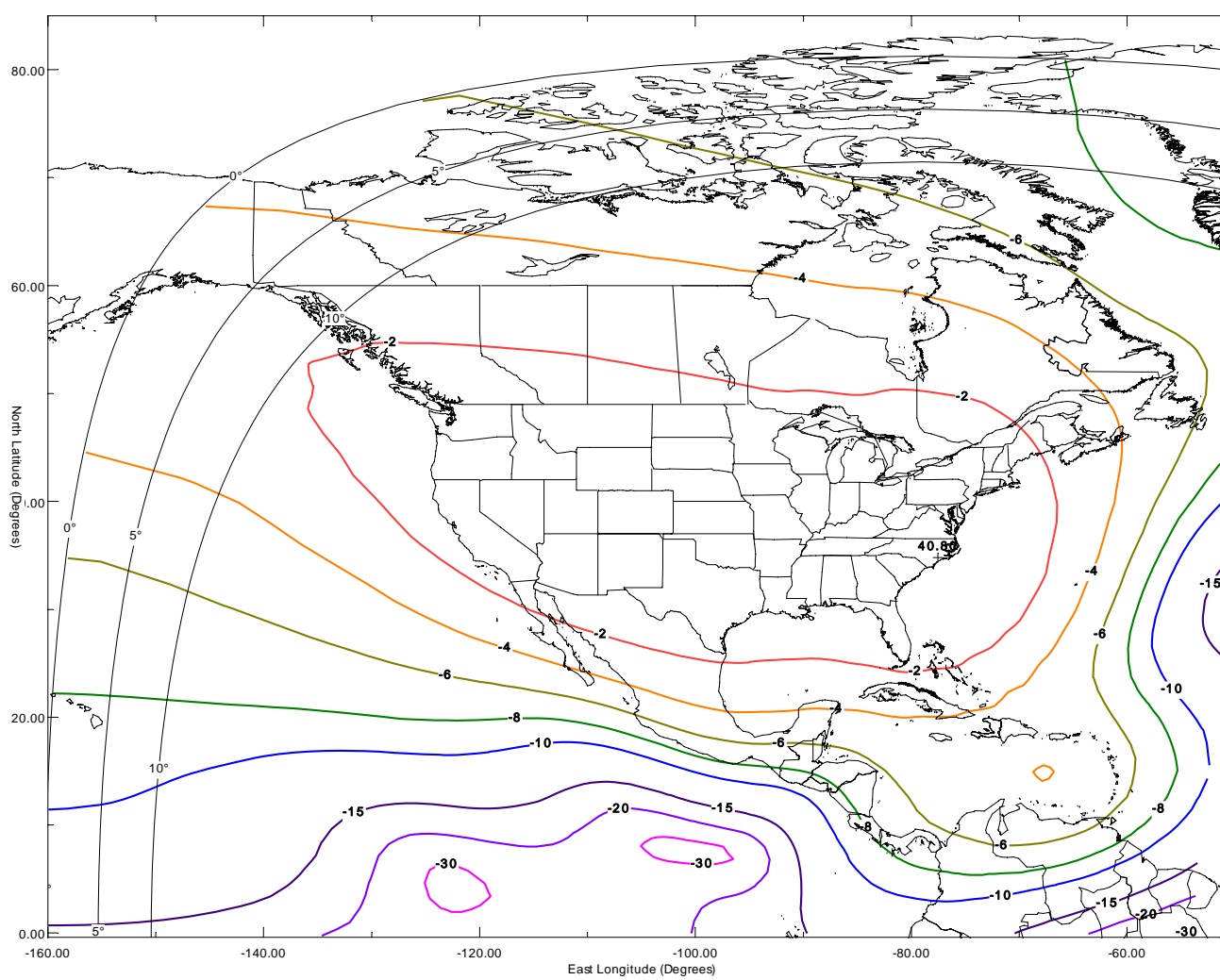


Fig 2. Receive beam CRV
C-band, V-pol, Antenna peak gain: 31.3 dB, peak G/T: 4.05 dB/K

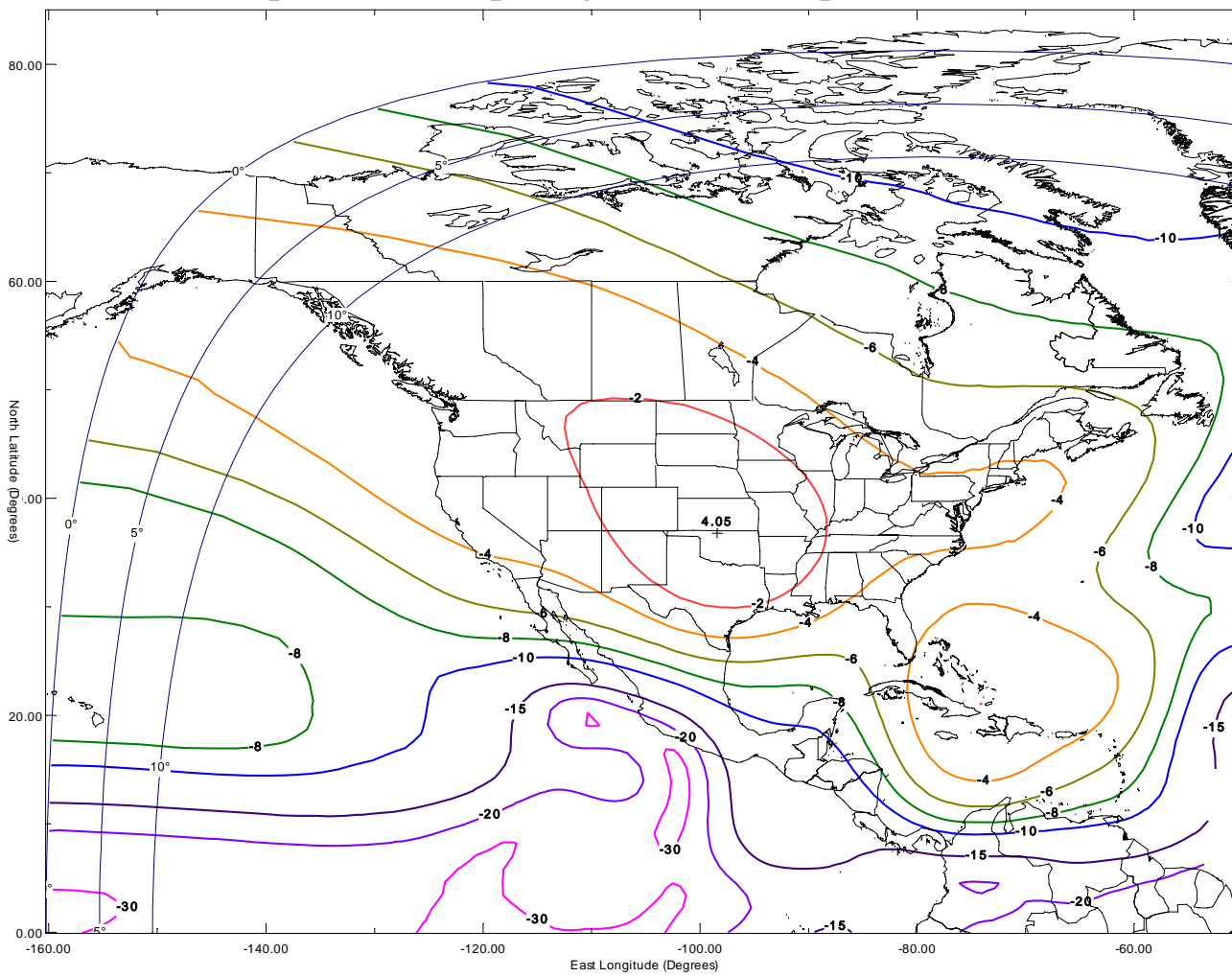


Fig 3. Transmit beam CTV
C-band, V-pol, Antenna peak gain: 31.0 dB, peak EIRP: 42.1 dBW

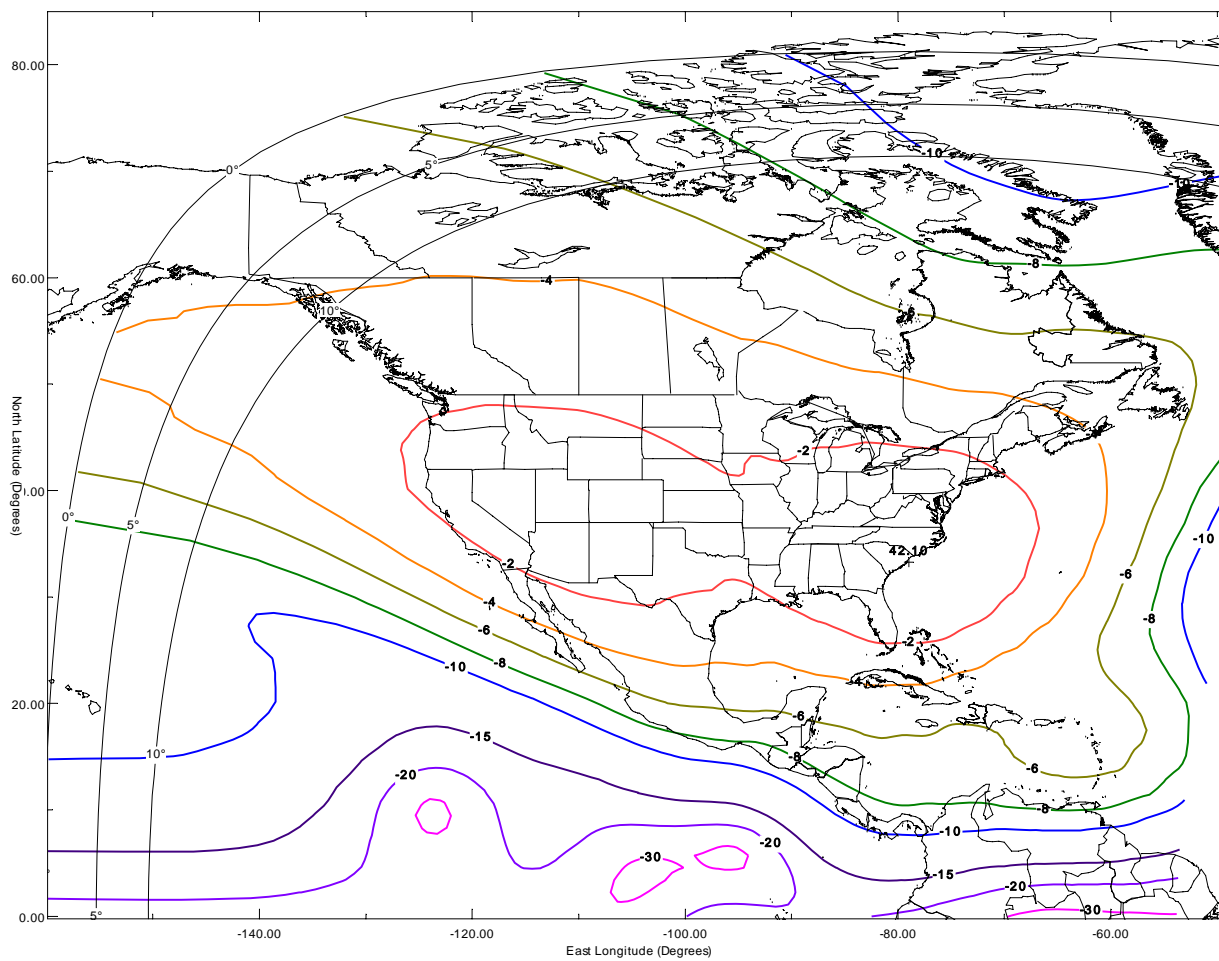
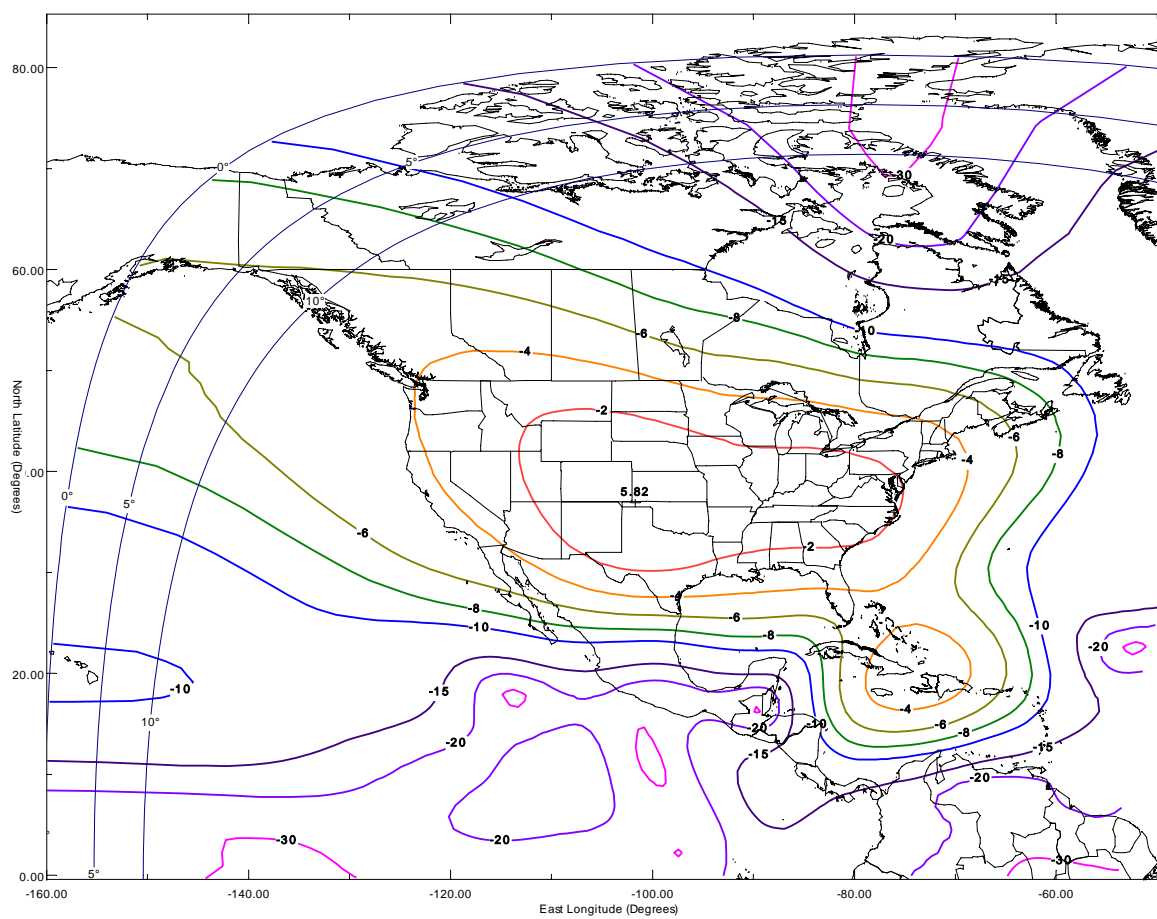


Fig 4. Receive beam CRH
C-band, H-pol, Antenna peak gain: 32.9 dB, peak G/T: 5.82 dB/K



Engineering Declaration

Declaration of Krish Jonnalagadda

I, Krish Jonnalagadda, hereby certify under penalty of perjury that I am the technically qualified person responsible for preparation of the technical information contained in the foregoing exhibit; that I am familiar with the technical requirements of Part 25; and that I either prepared or reviewed the technical information contained in the exhibit and that it is complete and accurate to the best of my knowledge, information and belief.

/s/ Krish Jonnalagadda_____

Manager, Spectrum Development

SES Americom, Inc.

Dated: December 15, 2010