

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

Application of	)	
	)	
	)	
DIRECTV ENTERPRISES, LLC	)	Call Sign: S2712
	)	
For Minor Modification	)	File No. _____
of the DIRECTV RB-2	)	
Satellite in the 17/24 GHz Broadcasting	)	
Satellite Service at 103° W.L.	)	
	)	

APPLICATION FOR MINOR MODIFICATION

DIRECTV Enterprises, LLC (“DIRECTV”) hereby requests that the Commission modify its license for DIRECTV RB-2, a geostationary satellite in the 17/24 GHz Broadcasting Satellite Service (“BSS”) authorized to operate at the nominal 103° W.L. orbital location.¹ This modification has two aspects. First, DIRECTV proposes to expand the current coverage area of DIRECTV RB-2 to include Puerto Rico. The minor modification to the coverage area of the satellite will enhance DIRECTV’s ability to provide service in this U.S. territory,² but will not create harmful interference to any other satellite system. Second, DIRECTV provides post-mission disposal plans for this satellite, in satisfaction of a condition in its authorization.³ Accordingly, the proposed modification will serve the public interest while having no countervailing effects.

¹ See *DIRECTV Enterprises, LLC*, 24 FCC Rcd. 9393 (Int’l Bur. 2009) (“DRB-2 Authorization”).

² Note that service to Puerto Rico is currently provided by a DIRECTV affiliate, DIRECTV Latin America, using leased satellite capacity.

³ See DRB-2 Authorization, ¶ 39.

I. CHANGES TO PREVIOUS TECHNICAL INFORMATION

In this Application, DIRECTV seeks neither additional spectrum nor additional orbital resources, but only a slight modification to the coverage area of the satellite to include coverage of the U.S. territory of Puerto Rico. In accordance with Section 25.117(d)(1) of the Commission's rules, DIRECTV identifies in this Application, Technical Annex, and associated Schedule S, only those items of information that have changed from its station license and associated application(s). DIRECTV hereby certifies that the remaining information in its station license and associated application(s) has not changed.

The only aspect of the satellite's operations that will change as a result of adding this new coverage area is the predicted gain contours and peak EIRP. Accordingly, new contours are included in an accompanying Schedule S, along with any other technical parameters that have changed. In addition, a set of downlink gain contours are included in the Technical Annex attached hereto along with accompanying sample link budgets.

II. POST-MISSION DISPOSAL INFORMATION

Consistent with the requirements of Section 25.283(a) of the Commission's rules, at the end of the operational life of the satellite, DIRECTV will maneuver DIRECTV RB-1 into a disposal orbit with an altitude no less than that calculated using the IADC formula:

$$36,021 \text{ km} + (1000 \cdot C_R \cdot A/m)$$

where C_R is the solar pressure radiation coefficient of the spacecraft, and A/m is the Area to mass ratio, in square meters per kilogram, of the spacecraft. The relevant values for the DIRECTV RB-1 satellite are:

$$C_R = 1.24$$

$$A = 112 \text{ m}^2$$

$$m = 3550 \text{ kg}$$

Inserting these values into the equation yields the following results:

$$36,021 \text{ km} + (1000 * 1.24 * (112/3550)) = 36,060 \text{ km}$$

Since geostationary altitude is generally considered to be 35,786 km,⁴ this yields a desired disposal orbit of at least 274 km above the geostationary arc. DIRECTV intends to boost DIRECTV RB-1 to at least this height, and in fact will target a height of approximately 300 km above geostationary altitude.

DIRECTV currently intends to allocate and reserve approximately 10 kg of propellant for final orbit raising maneuvers to this altitude. This value was determined through a detailed launch vehicle propellant budget analysis. In addition, DIRECTV has assessed fuel gauging uncertainty, and this budgeted propellant provides an adequate margin of fuel reserve to ensure that the disposal orbit will be achieved despite such uncertainty.

DIRECTV also notes that the only satellite network request for coordination located within ± 0.15 degrees of 102.825° W.L. published by the ITU is that for USASAT-70W, which was submitted to the ITU on behalf of DIRECTV. In addition, the only currently operating satellite within ± 0.10 degrees of 102.825° W.L. is DIRECTV 10 located at 102.815° W.L., and DIRECTV will ensure safe operations of DIRECTV RB-2 with its own satellite. Accordingly, this completes physical coordination of the satellite with operators of space stations with potentially overlapping stationkeeping volumes, as required under the DRB-2 Authorization.⁵

⁴ *Mitigation of Orbital Debris*, 19 FCC Rcd. 11567, ¶ 65 (2004).

⁵ See DRB-2 Authorization, ¶ 38.

III. THE PROPOSED MODIFICATION WOULD SERVE THE PUBLIC INTEREST

The predicted antenna gain contour submitted in connection with the DIRECTV RB-2 authorization includes coverage of CONUS+Alaska+Hawaii, and DIRECTV requests that it be authorized to add the territory of Puerto Rico to the coverage area of this satellite. This modification will enable DIRECTV or one of its affiliates to enhance the services provided to Puerto Rico significantly, by both increasing the number of channels available and by providing more of those channels in high definition format. As a result, this change will allow DIRECTV to enhance competition, offering Puerto Rican consumers an even more robust multichannel video alternative to incumbent cable systems.

Moreover, DIRECTV's proposal will achieve this benefit without causing harmful interference to any other operator. In fact, with the changes proposed for the downlink antenna pattern, the peak EIRP over CONUS will decrease from the previously authorized 63 dBW/36 MHz channel to approximately 58 dBW/36 MHz channel, and the peak EIRP over Puerto Rico will be approximately 54 dBW. A figure illustrating the downlink antenna gain contours for the proposed revised downlink antenna pattern is shown in the attachment to this application.

The allowable PFD levels in the 17.3-17.7 GHz band are defined in Section 25.208(w) of the Commission's rules on a regional basis for all conditions, including clear sky, and for all methods of modulation as:

- (1) In the region of the contiguous United States, located south of 38° North Latitude and east of 100° West Longitude: -115 dBW/m²/MHz;
- (2) In the region of the contiguous United States, located north of 38° North Latitude and east of 100° West Longitude: -118 dBW/m²/MHz;

- (3) In the region of the contiguous United States, located west of 100° West Longitude: -121 dBW/m²/MHz; and
- (4) For all regions outside of the contiguous United States including Alaska and Hawaii: -115 dBW/m²/MHz.

The maximum CONUS downlink EIRP for the revised DIRECTV RB-1 transmit antenna will be approximately 58.0 dBW/36 MHz channel. DIRECTV calculates the maximum power flux density/MHz on the Earth's surface from this emission as: Max EIRP/channel minus spreading loss in direction of max gain minus bandwidth correction factor, or 58.0 dBW/36MHz – 162.4 (dB-m²) – 10log(36) = -120 dBW/m²/MHz. This maximum would occur at beam peak, over Florida, and as can readily be seen from the gain contours in the attachment, this necessarily means that the revised DIRECTV RB-1 would easily comply with the allowable PFD levels defined in Section 25.208(w), with at least 4 dB of margin throughout the CONUS coverage area. Since the maximum EIRP over Puerto Rico is approximately 4 dB less than the maximum over CONUS, the maximum PFD would also be approximately 4 dB less and would again easily comply with the requirements of Section 25.208(w).

For the foregoing reasons, DIRECTV submits that grant of the proposed minor modification would serve the public interest and respectfully requests that the Commission expeditiously grant this request.

IV. WAIVER PURSUANT TO SECTION 304 OF THE COMMUNICATIONS ACT

In accordance with Section 304 of the Communications Act of 1934, as amended, 47 U.S.C. § 304, DIRECTV 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.

Respectfully submitted,

DIRECTV ENTERPRISES, LLC

By: /s/
Romulo Pontual
Executive Vice President

ENGINEERING CERTIFICATION

The undersigned hereby certifies to the Federal Communications Commission as follows:

- (i) I am the technically qualified person responsible for the engineering information contained in the foregoing Application,
- (ii) I am familiar with Part 25 of the Commission's Rules, and
- (iii) I have either prepared or reviewed the engineering information contained in the foregoing Application, and it is complete and accurate to the best of my knowledge and belief.

Signed:

/s/

Jack Wengryniuk

July 26, 2011

Date

TECHNICAL ATTACHMENT

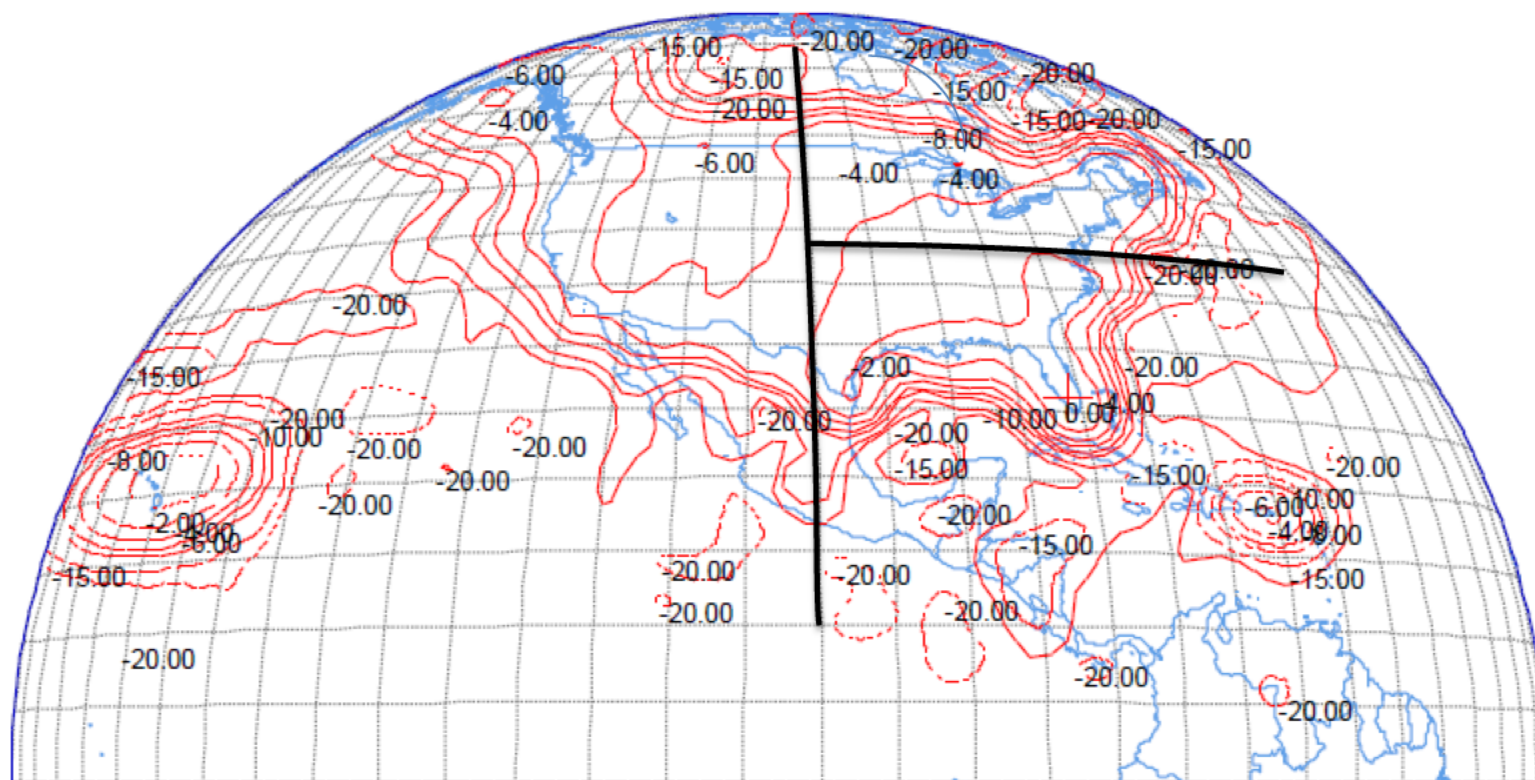


Figure A-1. Downlink Gain Contours for DIRECTV RB-2

Table A-1. DIRECTV RB-2 Link Budget – Downlink to Miami

	Clear Sky	Rain Up and Rain Dn
Uplink		
Transmit power, dBW	12.2	17.2
Transmit losses, dB	1.2	1.2
Ground antenna gain, dB	65.2	65.2
Antenna pointing loss, dB	0.5	0.5
Free space loss, dB	211.5	211.5
Atmospheric loss, dB	1.0	1.0
Uplink rain loss, dB	0.0	5.0
Satellite G/T, dB/K	17.5	17.5
Bandwidth, dB-Hz	74.8	74.8
Boltzmann's constant, dBW/Hz K	-228.6	-228.6
Uplink C/N (thermal), dB	34.5	34.5
C/I (x-pol, NPR), dB	25.0	25.0
Total Uplink C/(N+I), dB	24.5	24.5
Downlink		
Satellite EIRP, dBW/36 MHz	58.0	58.0
Free space loss, dB	208.7	208.7
Gaseous	0.4	0.4
Cloud	0.6	0.6
Scintillation	0.4	0.4
Downlink rain loss, dB	0.0	5.8
Rain temp increase, dB	0.0	4.0
Rain + Atmos Loss, dB	1.2	6.9
Rcv. antenna pointing loss, dB	1.0	1.0
Antenna wetting + noise increase, dB	0.0	1.0
Ground G/T, dB/K	17.9	17.9
Bandwidth, dB-Hz	74.8	74.8
Boltzmann's constant, dBW/Hz K	-228.6	-228.6
Total Downlink C/N, dB	18.8	8.1
Totals		
Uplink C/N (thermal), dB	24.5	24.5
Downlink C/N (thermal), dB	18.8	8.1
x-pol interference, dB	20.0	20.0
Aggregate C/I from ASI	18.0	18.0
Aggregate C/I from TX E/S	43.3	43.3
Adjacent Channel C/I, dB	25.0	25.0
Co-frequency C/I, dB	99.0	99.0
Total C/(N+I), dB	13.4	7.2
Required C/(N+I), dB	4.7	4.7
Margin, dB	8.7	2.5

Table A-2. DIRECTV RB-2 Link Budget – Downlink to Chicago

	Clear Sky	Rain Up and Rain Dn
Uplink		
Transmit power, dBW	12.2	17.2
Transmit losses, dB	1.2	1.2
Ground antenna gain, dB	65.2	65.2
Antenna pointing loss, dB	0.5	0.5
Free space loss, dB	211.5	211.5
Atmospheric loss, dB	1.0	1.0
Uplink rain loss, dB	0.0	5.0
Satellite G/T, dB/K	17.5	17.5
Bandwidth, dB-Hz	74.8	74.8
Boltzmann's constant, dBW/Hz K	-228.6	-228.6
Uplink C/N (thermal), dB	34.5	34.5
C/I (x-pol, NPR), dB	25.0	25.0
Total Uplink C/(N+I)	24.5	24.5
Downlink		
Satellite EIRP, dBW/36 MHz	54.0	54.0
Free space loss, dB	208.8	208.8
Gaseous	0.4	0.4
Cloud	0.7	0.7
Scintillation	0.5	0.5
Downlink rain loss, dB	0.0	2.9
Rain temp increase, dB	0.0	3.3
Rain + Atmos Loss, dB	1.3	4.0
Rcv. antenna pointing loss, dB	1.0	1.0
Antenna wetting + noise increase, dB	0.0	1.0
Ground G/T, dB/K	17.9	17.9
Bandwidth, dB-Hz	74.8	74.8
Boltzmann's constant, dBW/Hz K	-228.6	-228.6
Total Downlink C/N, dB	14.7	7.6
Totals		
Uplink C/N (thermal), dB	24.5	24.5
Downlink C/N (thermal), dB	14.7	7.6
x-pol interference, dB	20.0	20.0
Aggregate C/I from ASI	17.0	17.0
Aggregate C/I from TX E/S	43.3	43.3
Adjacent Channel C/I, dB	25.0	25.0
Co-frequency C/I, dB	99.0	99.0
Total C/(N+I), dB	11.5	6.8
Required C/(N+I)	4.7	4.7
Margin, dB	6.8	2.1

Table A-3. DIRECTV RB-2 Link Budget – Downlink to Los Angeles

	Clear Sky	Rain Up and Rain Dn
Uplink		
Transmit power, dBW	12.2	17.2
Transmit losses, dB	1.2	1.2
Ground antenna gain, dB	65.2	65.2
Antenna pointing loss, dB	0.5	0.5
Free space loss, dB	211.5	211.5
Atmospheric loss, dB	1.0	1.0
Uplink rain loss, dB	0.0	5.0
Satellite G/T, dB/K	17.5	17.5
Bandwidth, dB-Hz	74.8	74.8
Boltzmann's constant, dBW/Hz K	-228.6	-228.6
Uplink C/N (thermal), dB	34.5	34.5
C/I (x-pol, NPR), dB	25.0	25.0
Total Uplink C/(N+I), dB	24.5	24.5
Downlink		
Satellite EIRP, dBW/36 MHz	52.0	52.0
Free space loss, dB	208.8	208.8
Gaseous	0.4	0.4
Cloud	0.2	0.2
Scintillation	0.3	0.3
Downlink rain loss, dB	0.0	1.6
Rain temp increase, dB	0.0	2.1
Rain + Atmos Loss, dB	0.8	2.2
Rcv. antenna pointing loss, dB	1.0	1.0
Antenna wetting + noise increase, dB	0.0	1.0
Ground G/T, dB/K	17.9	17.9
Bandwidth, dB-Hz	74.8	74.8
Boltzmann's constant, dBW/Hz K	-228.6	-228.6
Total Downlink C/N, dB	13.2	8.6
Totals		
Uplink C/N (thermal), dB	24.5	24.5
Downlink C/N (thermal), dB	13.2	8.6
x-pol interference, dB	20.0	20.0
Aggregate C/I from ASI	18.0	18.0
Aggregate C/I from TX E/S	43.3	43.3
Adjacent Channel C/I, dB	25.0	25.0
Co-frequency C/I, dB	99.0	99.0
Total C/(N+I), dB	10.9	7.7
Required C/(N+I), dB	4.7	4.7
Margin, dB	6.2	3.0

Table A-4. DIRECTV RB-2 Link Budget – Downlink to Juneau

	Clear Sky	Rain Up and Rain Dn
Uplink		
Transmit power, dBW	12.2	17.2
Transmit losses, dB	1.2	1.2
Ground antenna gain, dB	65.2	65.2
Antenna pointing loss, dB	0.5	0.5
Free space loss, dB	211.5	211.5
Atmospheric loss, dB	1.0	1.0
Uplink rain loss, dB	0.0	5.0
Satellite G/T, dB/K	17.5	17.5
Bandwidth, dB-Hz	74.8	74.8
Boltzmann's constant, dBW/Hz K	-228.6	-228.6
Uplink C/N (thermal), dB	34.5	34.5
C/I (x-pol, NPR), dB	25.0	25.0
Total Uplink C/(N+I), dB	24.5	24.5
Downlink		
Satellite EIRP, dBW/36 MHz	51.0	51.0
Free space loss, dB	209.3	209.3
Gaseous	0.5	0.5
Cloud	0.7	0.7
Scintillation	0.9	0.9
Downlink rain loss, dB	0.0	3.3
Rain temp increase, dB	0.0	3.4
Rain + Atmos Loss, dB	1.6	4.6
Rcv. antenna pointing loss, dB	1.0	1.0
Antenna wetting + noise increase, dB	0.0	1.0
Ground G/T, dB/K	23.2	23.2
Bandwidth, dB-Hz	74.8	74.8
Boltzmann's constant, dBW/Hz K	-228.6	-228.6
Total Downlink C/N, dB	16.1	8.7
Totals		
Uplink C/N (thermal), dB	24.5	24.5
Downlink C/N (thermal), dB	16.1	8.7
x-pol interference, dB	20.0	20.0
Aggregate C/I from ASI	16.3	16.3
Aggregate C/I from TX E/S	43.3	43.3
Adjacent Channel C/I, dB	25.0	25.0
Co-frequency C/I, dB	99.0	99.0
Total C/(N+I), dB	11.9	7.6
Required C/(N+I), dB	4.7	4.7
Margin, dB	7.2	2.9

Table A-5. DIRECTV RB-2 Link Budget – Downlink to San Juan, PR

	Clear Sky	Rain Up and Rain Dn
Uplink		
Transmit power, dBW	12.2	17.2
Transmit losses, dB	1.2	1.2
Ground antenna gain, dB	65.2	65.2
Antenna pointing loss, dB	0.5	0.5
Free space loss, dB	211.5	211.5
Atmospheric loss, dB	1.0	1.0
Uplink rain loss, dB	0.0	5.0
Satellite G/T, dB/K	17.5	17.5
Bandwidth, dB-Hz	74.8	74.8
Boltzmann's constant, dBW/Hz K	-228.6	-228.6
Uplink C/N (thermal), dB	34.5	34.5
C/I (x-pol, NPR), dB	25.0	25.0
Total Uplink C/(N+I), dB	24.5	24.5
Downlink		
Satellite EIRP, dBW/36 MHz	54.0	54.0
Free space loss, dB	208.9	208.9
Gaseous	0.2	0.2
Cloud	0.2	0.2
Scintillation	0.3	0.3
Downlink rain loss, dB	0.0	4.9
Rain temp increase, dB	0.0	3.5
Rain + Atmos Loss, dB	0.6	5.3
Rcv. antenna pointing loss, dB	1.0	1.0
Antenna wetting + noise increase, dB	0.0	1.0
Ground G/T, dB/K	17.9	17.9
Bandwidth, dB-Hz	74.8	74.8
Boltzmann's constant, dBW/Hz K	-228.6	-228.6
Total Downlink C/N, dB	15.3	6.0
Totals		
Uplink C/N (thermal), dB	24.5	24.5
Downlink C/N (thermal), dB	15.3	6.0
x-pol interference, dB	20.0	20.0
Aggregate C/I from ASI	14.0	14.0
Aggregate C/I from TX E/S	43.3	43.3
Adjacent Channel C/I, dB	25.0	25.0
Co-frequency C/I, dB	99.0	99.0
Total C/(N+I), dB	10.6	5.1
Required C/(N+I), dB	4.7	4.7
Margin, dB	5.9	0.4