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

Application of	)	
DIRECTV ENTERPRISES, LLC	)	Call Sign:
For Authorization to Launch and Operate DIRECTV 97W, a Ka-Band Space Station, at 97° WL	)	File No. SAT-LOA-_____

APPLICATION FOR AUTHORIZATION TO LAUNCH AND OPERATE DIRECTV 97W

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APPLICATION FOR AUTHORITY TO LAUNCH AND OPERATE DIRECTV 97W, A KA-BAND SATELLITE, AT 97° W.L.

I. BACKGROUND

Six years ago, DIRECTV Enterprises, LLC ("DIRECTV") became the first operator to offer direct-to-home ("DTH") satellite services to consumers using space stations operating on Ka-band frequencies. Since that time, DIRECTV has launched a total of seven Ka-band payloads at three orbital locations, which it uses to deliver high definition video programming to millions of subscribers across the United States. In this application, DIRECTV seeks authority to launch and operate a geostationary Ka-band satellite at the nominal 97° W.L. orbital location, which has recently become available for licensing.[1] Having demonstrated the viability of Ka-band for DTH services, DIRECTV intends to use this satellite to enhance those services for subscribers across the United States. Expeditious grant of this application will enable DIRECTV to extend its leadership in digital home video entertainment innovation.

1 *See* Public Notice, DA 11-1353, Rep. No. SAT-00797 (rel. Aug. 5, 2011).

II. GRANT OF THIS APPLICATION WOULD SERVE THE PUBLIC INTEREST

In April 2005, DIRECTV launched SPACEWAY-1, the first commercial Ka-band satellite intended to provide DTH service, to the nominal 103° W.L. orbital location. Later that year, DIRECTV launched the nearly identical SPACEWAY-2 satellite to the nominal 99° W.L. location. DIRECTV used these two satellites to inaugurate a new era of local HD programming via satellite, made possible by the new capacity created at Ka-band, advanced modulation and compression schemes, and a highly specialized pattern of spot beams designed to allocate spectrum efficiently to the markets being served. DIRECTV has built upon this success by launching five more Ka-band payloads: DIRECTV 8 and 9S to the nominal 101° W.L. location, DIRECTV 10 and DIRECTV 12 to the nominal 103° W.L. location, and DIRECTV 11 to the nominal 99° W.L. location. These Ka-band assets have enabled DIRECTV to maintain and extend its leadership in HD services, and to inaugurate 3D services as well.

Having demonstrated that Ka-band frequencies can be used for a DTH service – and, to this day, remaining as the only DTH operator to make such use of this spectrum – DIRECTV now seeks to expand these capabilities still further in order to support the ongoing transition to HD services. Transmitting programming in HD (and 3D) format requires significantly more capacity than transmitting the same programming in SD format. As more programmers migrate to HD and 3D, DIRECTV will need to make sure that its system has the additional capacity available to handle the demands of an increasingly robust slate of HD and 3D programming.

Granting this application will serve the public interest in several ways. First, the Commission will enable DIRECTV to continue to provide subscribers throughout the U.S. with access to the full panoply of HD programming available in the market as the

amount of such programming continues to increase. Second, the ability to keep pace with HD programming demands will make DIRECTV better able to compete against entrenched cable incumbents that dominate multichannel video services in this country. Third, the rich and varied HD services offered from this orbital location will give subscribers additional incentive to upgrade to digital television sets, further promoting the digital transition in the United States. And fourth, by providing an attractive platform for niche programming in HD format (*e.g.*, international, foreign language, minority-focused), DIRECTV will greatly increase the incentive programmers have to produce HD programming that might be of particular appeal to audiences underserved by existing HD fare.

For all of these reasons, DIRECTV submits that the Commission should grant this application as expeditiously as possible.

III. INFORMATION REQUIRED UNDER SEC. 25.114 OF THE COMMISSION'S RULES

1. Name, Address, and Telephone Number of Applicant

DIRECTV Enterprises, LLC
2230 East Imperial Highway
El Segundo, CA 90245
(310) 964-0700

2. Name, Address, and Telephone Number of Counsel

William M. Wiltshire
Wiltshire & Grannis LLP
1200 Eighteenth Street, N.W.
Washington, DC 20036
(202) 730-1300

3. Type of Authorization Requested

DIRECTV hereby applies for authority to launch and operate DIRECTV 97W, a geostationary Ka-band satellite that will operate at the nominal 97° W.L. orbital location.

4. General Description of Overall System Facilities, Operations and Services

DIRECTV 97W will consist of a geostationary satellite located at the nominal 97° W.L. orbital location and associated ground station equipment. DIRECTV 97W is designed to provide DTH service in the FSS Ka-band (18.3-18.8 GHz and 19.7-20.2 GHz (space-to-Earth) and 28.35-28.6 GHz and 29.25-30.0 GHz (Earth-to-space)). The on-station Telemetry, Tracking and Control ("TT&C") functions will be provided at the edges of these same frequency bands.

The DIRECTV 97W satellite is capable of supporting 48 Ka-band transponders (24 LHCP and 24 RHCP) providing coverage via a national beam. The national coverage beam is designed to provide coverage to all 50 states (CONUS, Alaska and Hawaii) and will carry national HD programming material. All national programming material will be distributed from the DIRECTV broadcast centers in Los Angeles, CA (LABC) and Castle Rock, CO (CRBC). Using these uplink facilities, the DIRECTV 97W system and associated ground Ka-band assets will be capable of transmitting over 200 channels of HD programming.

5. Operational Characteristics

5.1 Frequency and Polarization Plan

Details of the DIRECTV 97W frequency/channelization and polarization plan, including the TT&C frequencies, are included in the accompanying Schedule S, which is hereby incorporated by reference as if fully set forth herein. The emission designator for transmissions in the uplink and downlink will be 36M0G7W. The allocated bandwidth for these emissions is 36 MHz.

The interconnection capability of each national programming uplink channel to its corresponding downlink channel for the DIRECTV 97W national coverage transponders

is shown in the accompanying Schedule S. Note that because of the national coverage design the uplink and downlink channels can only be used once.

5.2 Communications Payload

5.2.1 Uplink Transmissions

The maximum receive antenna gain, receive system noise temperature, and maximum G/T of the DIRECTV 97W satellite are all specified in the accompanying Schedule S. Note that the G/T will decrease, dB-for-dB, from the maximum as the uplink location moves away from beam peak. All uplink channels are to be transmitted from either the LABC or the CRBC.

The DIRECTV 97W uplink channels will be routed to the appropriate band-limiting input multiplexer ("IMUX") comprising the receive channel filters to limit the bandwidth of received signals. The specified performance of these filters is shown in Table 5-1. The received signals will then be frequency translated to the desired output channel frequency. The filtered and frequency translated signals will be amplified by channel amplifiers with selectable fixed/Automatic Level Control (ALC) modes prior to final amplification. The fixed gain mode will have at least 20 dB of gain adjustment with a step size of 1 dB. The ALC will hold the output level constant over an input dynamic range of at least 15 dB and will have a minimum output level adjustment of 10 dB in 0.5 dB increments.

Parameter	Frequency (F_c)	Specification
Insertion Loss Variation	±9 MHz	0.15 dB_{p-p}
	±11.6 MHz	0.19 dB_{p-p}
	±14.4 MHz	0.40 dB_{p-p}
	±18.0 MHz	1.14 dB_{p-p}
Out of Band Rejection	±22.8 MHz	3.0 dB
	±35.5 MHz	30.0 dB
	±56.3 MHz	30.0 dB

Table 5-1. Response Characteristic of Representative DIRECTV 97W IMUX Channel Filter

5.2.2 Downlink Transmissions

The national coverage downlink beam uses dual-combined output amplifiers (TWTAs) with a per amplifier output power of 130 Watts (*i.e.*, 260 Watts combined). The resultant output power from these amplifier assemblies, when combined with the transmit antenna gain, results in a maximum EIRP of 59 dBW. The peak transmit antenna gain and associated contours are specified in the accompanying Schedule S (see also Section 7.2).

DIRECTV 97W will employ output multiplexer ("OMUX") filters to limit the bandwidth of transmitted signals. The specified performance for these filters is shown in Table 5-2.

Parameter	Frequency (F_c)	Specification
Insertion Loss Variation	±9 MHz	0.10 dB_{p-p}
	±11.6 MHz	0.15 dB_{p-p}
	±14.4 MHz	0.22 dB_{p-p}
	±18.0 MHz	0.38 dB_{p-p}
Out of Band Rejection	±26.3 MHz	3.0 dB
	±33.3 MHz	25.0 dB

Table 5-2. Response Characteristic of Representative DIRECTV 97W OMUX Channel Filter

5.3 TT&C Subsystem

The TT&C subsystem provides redundant telemetry, tracking, and command channels for the spacecraft. The principal functions of the subsystem are:

1. Reception and amplification of the radio frequency command uplinks and demodulation of baseband for subsequent signal processing and command distribution.

2. Modulation, up-conversion, amplification, and transmission of all telemetry data.

3. Reception and retransmission of ground-station-generated ranging signals.

The subsystem is configurable to accommodate the unique requirements of pre-launch, orbit raising, and on-station orbit operations. Access at initial spacecraft acquisition and

major orbit-raising maneuvers will be via the wide-beam (+Z) and narrow-beam (-Z) omni antennas. Normal on-station commands will be received through the receive communications antenna, while on-station telemetry will be transmitted through the transmit communications antenna. The command and telemetry frequencies and antenna polarizations are shown in the accompanying Schedule S. The minimum cross-polarization isolation for the on-station command and telemetry antennas will be 30 dB.

The telemetry and command link performance is summarized in the link budget analysis in Appendix A. The antenna patterns for the TT&C subsystem are discussed in Section 7.3. The emission designators associated with the TT&C subsystem are 1M30F9D for command and 106KG9D for telemetry, with associated allocated bandwidths of 1.3 MHz and 106 kHz for each of these emissions, respectively.

6. Orbital Locations

The DIRECTV 97W satellite will operate at the nominal 97^{o} W.L. orbital location, which has recently become available for licensing in the Ka-band. In order to ease physical coordination of this spacecraft, DIRECTV seeks authority to operate at 97.1° W.L (*see also* Section 18 and GSO Orbit tab of Schedule S).

7. Predicted Spacecraft Antenna Gain Contours

7.1 Uplink Beams

The satellite will receive communications signals from the DIRECTV broadcast centers in Castle Rock, CO and Los Angeles, CA in the 28.35-28.6 GHz and 29.25-30.0 GHz frequency bands using both RHCP and LHCP (*see also* Sections 5.1 and 5.2.1). Typical DIRECTV 97W receive antenna gain contours are provided in GXT format in the accompanying Schedule S and are also included in Appendix B. All uplink beams will have a minimum cross-polarization isolation of 30 dB.

7.2 Downlink Beams

The national coverage beam for DIRECTV 97W will cover CONUS, Alaska, and Hawaii using both RHCP and LHCP. The peak transmit gain, and the antenna gain contour in GXT format, are given in the accompanying Schedule S. The gain contour for CONUS plus Alaska and Hawaii is also graphically depicted in Appendix B. The downlink beam will have a minimum cross-polarization isolation of 30 dB. (*See also* discussion in Sections 5.1 and 5.2.2.)

7.3 TT&C Beams

The TT&C coverage during transfer orbit and on-station contingency will be provided by the wide angle TT&C antennas, which will be oriented around the nominal +Z direction and the nominal –Z direction. The TT&C on-station coverage will be provided by the receive communications antenna for command and by the transmit communications antenna for telemetry. The receive antenna pattern for on-station command and the transmit antenna beam pattern for on-station telemetry are given in GXT format in the accompanying Schedule S (*see also* Sections 7.1 and 7.2 above). The wide beam TT&C antenna coverage pattern is shown in Appendix B as Figure B-4.

8. Service Description, Link Description and Performance Analysis, Earth Station Parameters

8.1 Service Description

As discussed more fully in Section II of this application, DIRECTV will use the DIRECTV 97W satellite to transmit HD digital video and audio entertainment, and educational and informational programming to customers throughout the United States who will receive this programming using small dish antennas.

8.2 Link Performance

A representative link budget is shown in Appendix A as Table A-1. This analysis assumes a DIRECTV receive antenna size of 65 cm and also includes the interference contribution for adjacent satellite interference from neighboring Ka-band satellites nominally spaced two degrees away.[2] Note that an availability of 99.7% has been assumed for this link budget.

Representative link budgets for the telemetry and command links are shown in Appendix C as Tables C-1 and C-2, respectively.

8.3 Earth Station Parameters

There are essentially two types of earth stations that will be used with the DIRECTV 97W satellite – feeder-link earth stations and subscriber terminals. The feeder-link stations will be relatively large transmit antennas, typically 8 to 9.1 meters, that track the satellite electronically and are used for transmitting national HD programming material from the DIRECTV broadcast sites to the satellite. The subscriber terminals are effectively 65 cm receive antennas that are installed at the customers' premises and have fixed pointing, which is optimized at installation, although in some areas these antennas may need to be somewhat larger (approximately 1 meter).

9. Satellite Orbit Characteristics

The DIRECTV 97W satellite will be maintained in geosynchronous orbit at its nominal orbital location with a North-to-South drift tolerance of ± 0.05 degrees and an East-to-West drift tolerance of ± 0.05 degrees. The antenna axis attitude will be maintained so as to keep the beam pointing error to within 0.1 degrees.

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[2] Note that the DIRECTV receive antennas have off-axis performance somewhat better than that specified in Section 25.209 of the Commission's rules.

10. Power Flux Density

The national downlink beam of DIRECTV 97W will be operated so as to generate a maximum downlink EIRP of 59 dBW per 36 MHz channel, and to thereby comply with the Ka-Band blanket licensing coordination threshold of –118 dBW/m^2/MHz. Operation with this EIRP complies with the Commission's requirements as is demonstrated by virtue of the fact that, for a 36 MHz digital carrier, a satellite downlink EIRP of 59 dBW results in a maximum PFD of -118.9 dBW/m^2/MHz on the surface of the Earth (*i.e.*, 59 dBW – 162.3 dB-m^2 – 10*log (36) dB-MHz). In all cases the upper bound on system and individual link availability is determined by –118 dBW/m^2/MHz, *i.e.* the downlink PFD coordination threshold established in Section 25.138 of the Commission's rules.

The satellite will also comply with the downlink PFD limits established in Section 25.208 of the Commission's rules, which are as follows:

- -115 dB (W/m^2) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;
- -115 + 0.5 (d-5) dB (W/m^2) in any 1 MHz band for angles of arrival d (in degrees) between 5 and 25 degrees above the horizontal plane; and
- -105 dB (W/m^2) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

The analysis above illustrates that the DIRECTV 97W operations will result in a PFD on the surface of the Earth that is within the Commission's requirements.

11. Arrangement for Tracking, Telemetry, and Control

DIRECTV has not yet contracted for the construction of the DIRECTV 97W satellite, and therefore has not yet finalized arrangements for tracking, telemetry and control. DIRECTV does, however, currently maintain a fleet of eleven satellites as part of its existing business, and it is envisioned that TT&C for DIRECTV 97W would be handled in a manner similar to that of DIRECTV's existing satellites. DIRECTV will

evaluate its options and take all necessary steps to ensure that proper arrangements are in place, well before satellite launch, to control the DIRECTV 97W satellite through its launch and transfer orbit phase and into and during the operational lifetime phase of the satellite mission, including post-operation disposal.

12. Physical Characteristics of the Space Station

DIRECTV has not yet contracted for the construction of the DIRECTV 97W satellite and therefore has not yet settled upon exact specifications for the physical characteristics of the satellite. Accordingly, the payload envelope has been sized to allow more than one spacecraft currently available with extensive heritage and fully qualified technology to serve as the design platform. With this proviso, DIRECTV anticipates that the key spacecraft characteristics for DIRECTV 97W could be as summarized in the appropriate sections of the accompanying Schedule S.

13. Spacecraft Bus Subsystem

As discussed in Section 12 above, DIRECTV has not yet contracted with a manufacturer for the construction of the DIRECTV 97W satellite and DIRECTV does not wish to show a preference by providing data specific to any one manufacturer. As such, it is difficult to discuss any specific characteristics of what may comprise the spacecraft bus subsystem beyond that already included in the accompanying Schedule S.

DIRECTV will provide the Commission with any and all required spacecraft bus characteristics once a final spacecraft provider has been selected and a final satellite design has been adopted.

14. Common Carrier Status

DIRECTV intends to operate DIRECTV 97W on a non-broadcast, non-common carrier basis. DIRECTV may sell and/or lease a portion of its capacity on a non-common carrier basis for complementary business purposes.

15. Schedule

DIRECTV will contract for, begin construction of, and launch and operate DIRECTV 97W in accordance with any Commissions imposed satellite construction milestones, such as those specified in Section 25.164 of the Commission's rules.

16. Public Interest Considerations

See Section II above.

17. Interference Analysis

The link budget included in Appendix A demonstrates that the DIRECTV 97W satellite design described in this application will operate successfully within the two-degree spacing environment established by the Commission's policy and implementing rules. Additionally, the proposed DIRECTV 97W satellite will remain in compliance with the relevant technical rules established by the Commission.

At Ka-band, in order to achieve maximum compatibility between diverse networks, the Commission established coordination thresholds for earth station EIRP off-axis levels and spacecraft downlink PFD in the *18 GHz Order*.[3] These operational thresholds are the outcome of the blanket licensing parameters coordinated by industry for Ka-band earth terminals. This DIRECTV 97W proposal is fully compatible with this aspect of the *18 GHz Order*. For U.S. service from 97° W.L., the system complies with

3 *Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Station in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite Service Use*, 15 FCC Rcd. 13430 (2000) ("18 GHz Order").

the established –118 dBW/m^2/MHz PFD threshold, as well as the PFD limitations established in Section 25.208 of the Commission's rules.

The interference analysis that is included in this application was performed in conjunction with the end-to-end link performance analysis. A link budget, including both uplink and downlink, is presented in Appendix A. The analysis therein includes the aggregate effects of adjacent satellite interference in demonstrating that the system will operate at acceptable C/(N+I) levels.

To properly account for all interference from adjacent operating satellite systems, aggregate interference from earth terminals and satellites associated with pairs of satellites at 2, 4, 6, and 8 degrees of orbit separation were included. The budget used a level of assumed interference that accounted for the maximum level permissible under the off-axis coordination and downlink PFD threshold directives. On the downlink, the adjacent pairs of satellites at 2, 4, 6, and 8 degrees of orbit separation were each assumed to produce co-coverage interference at a level equivalent to that of the PFD coordination threshold value of –118 dBW/m^2/MHz and the aggregate effect of this downlink interference was included. The uplink adjacent satellite interference analysis assumed earth stations communicating with adjacent satellites at the specified orbital separations and further assumed that each earth station was transmitting the maximum allowable off-axis EIRP density. The aggregate adjacent system interference that results from these assumptions was included in the link budget. The DIRECTV 97W transmit earth station off-axis EIRP compliance is demonstrated through the calculations included in Table A-2.

18. Orbital Debris Mitigation

DIRECTV intends to incorporate the material objectives set forth in this application into the technical specifications established for procurement and construction of DIRECTV 97W. DIRECTV will include provisions for review of orbit debris mitigation as part of the preliminary design review and critical design review for the spacecraft, and for incorporation of these objectives, as appropriate, into its test plan, including a formal analysis of orbital debris risks associated with the TT&C, propulsion, and power generation and storage systems. Because this mitigation statement is necessarily forward looking, the process of procuring, designing, building, and testing may result in minor changes to the parameters discussed herein. If appropriate, DIRECTV will modify this mitigation statement to reflect such changes.

Spacecraft Hardware Design

DIRECTV has assessed and limited the amount of debris released in a planned manner during normal operations. DIRECTV 97W will not be a source of debris during launch, drift, or operating mode, as DIRECTV does not intend to release debris during the planned course of operations of the satellite.

DIRECTV will also consider the possibility of DIRECTV 97W becoming a source of debris by collisions with small debris or meteoroids that could cause loss of control of the spacecraft and prevent post-mission disposal. As such, DIRECTV will take steps to address this possibility by incorporating redundancy, shielding, separation of components, and other physical characteristics into the satellite's design. For example, omni-directional antennas will be mounted on opposite sides of the spacecraft, and either will be sufficient to support orbit raising. The command receivers and decoders, telemetry encoders and transmitters, and the bus control electronics will be fully

redundant, physically separated, and located within a shielded area to minimize the probability of the spacecraft becoming a source of debris due to a collision. DIRECTV will continue to review these aspects of on-orbit operations with the spacecraft manufacturer and will make such adjustments and improvements as appropriate to assure that its spacecraft will not become a source of debris during operations or become derelict in space due to a collision.

Minimizing Accidental Explosions

DIRECTV will contract for an overall spacecraft design that limits the probability of accidental explosion. The key areas reviewed for this purpose will include leakage of propellant and mixing of fuel and oxidizer as well as battery pressure vessels. The basic propulsion design (including component and functional redundancy, and the placement of fuel tanks inside a central cylinder which provides a high level of shielding), propulsion subsystem component construction, preflight verification through both proof testing and analysis, and quality standards will be designed to ensure a very low risk of propellant leakage and fuel and oxidizer mixing that can result in subsequent explosions. During the mission, batteries and various critical areas of the propulsion subsystem will be continually monitored (for both pressure and temperature) to preclude conditions that could result in the remote possibility of explosion and subsequent generation of debris.

After DIRECTV 97W reaches its final disposal orbit, all on-board sources of stored energy will be depleted, all fuel line valves will be left "open," any pressurized system will be vented, and all batteries will be left in a permanent discharge state. The solar cells will be slewed away from the sun to minimize power generation.

Through this process, DIRECTV will assess and limit the possibility of accidental explosions during mission operations and assure that all stored energy at the end of the satellite's operation will be removed.

Safe Flight Profiles

DIRECTV will assess and limit the probability of DIRECTV 97W becoming a source of debris by collisions with large debris or other operational space stations through detailed and conscientious mission planning. DIRECTV has reviewed the list of licensed systems and systems that are under consideration by the Commission for the 97.1° W.L. orbital location it has requested. In addition, in order to address non-U.S. licensed systems, DIRECTV has reviewed the list of satellite networks in the vicinity of 97.1° W.L. for which a request for coordination has been submitted to the ITU. Only those networks that are operating, or are planned to be operating, within ± 0.2° have been taken into account in this review.

As a consequence of this review, it has been determined that only one other system has been licensed by the Commission for, and is currently operating at, the nominal 97° W.L. location: Galaxy 19 at 97.0° W.L. Accordingly, DIRECTV intends to operate DIRECTV 97W at the 97.1º W.L. position, such that there is no overlap of the station-keeping volumes of this DIRECTV spacecraft with Galaxy 19 at that position.

With regard to ITU filings within ±0.2 degrees of 97.1° W.L., the ITU has published requests for coordination for the following satellite networks:

- United Kingdom UKSAT-13, IOMSAT-9A, and INMARSAT-KA 97W networks at 97° W.L.;
- Papua New Guinea NEW DAWN 13 and RAGGIANA-5 networks at 97° W.L.; and
- Malaysia MEASAT-ROUTE-4B network at 97.2° W.L.

DIRECTV can find no evidence that satellite construction contracts have been awarded for any of these networks, nor does the most recently available Federal Aviation Administration Commercial Space Station Report show any pending satellite launches for these networks.

Given the current absence of a construction contract for DIRECTV 97W, it is difficult to assess what satellites will actually be operating at the nominal 97° W.L. position at the time that the satellite is to be launched. As such, DIRECTV will certainly revisit this issue once a satellite construction contract is in place.

Frequency and physical coordination during orbital drift cannot be undertaken until the spacecraft and launch vehicle manufacturers are selected and a launch plan has been developed. No pre-operational orbits requiring special temporary authority are currently anticipated.

Post-Mission Disposal

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 97W into a disposal orbit with an altitude no less than that calculated using the IADC formula:

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

Based on its experience with other satellites in its fleet, DIRECTV anticipates that, once the satellite's actual characteristics have been determined, this calculation will lead to a disposal orbit with a minimum perigee of somewhat less than 300 km above the normal GSO operational orbit.[4] Accordingly, DIRECTV currently anticipates that it will

[4] For example, the disposal orbit perigee calculated for the DIRECTV 12 satellite was approximately 289 km above GSO orbit altitude, which DIRECTV rounded up to 300 km to provide adequate margin.

maneuver DIRECTV 97W to an altitude 300 km above GSO orbit at the end of its operational life, which should provide additional margin above the results of the IADC formula.

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 applied to the parameters of one of DIRECTV's most recently designed satellites. 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.

III. ITU COST RECOVERY

DIRECTV is aware that, as a result of the actions taken at the 1998 Plenipotentiary Conference, as modified by the ITU Council in 2005, processing fees are now charged by the ITU for satellite network filings. As a consequence, Commission applicants are responsible for any and all fees charged by the ITU. DIRECTV hereby states that it is aware of this requirement and accepts responsibility to pay any ITU cost recovery fees associated with this application. Invoices for such fees may be sent to the contact representative listed in the accompanying FCC Form 312.

IV. CONCLUSION

In summary, the satellite proposed in this application will provide DIRECTV with a highly capable spacecraft that will support a significant amount of additional high quality HD multichannel video programming for millions of Americans. This new capability will expand opportunities for a diverse array of HD programming, advance the HDTV transition, and enhance DIRECTV's ability to offer a powerful alternative to

incumbent cable operators. For these reasons, DIRECTV submits that the proposed satellite will serve the public interest and respectfully requests that the Commission expeditiously grant this application.

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) He is the technically qualified person responsible for the engineering information contained in the foregoing Application,

(ii) He is familiar with Part 25 of the Commission's Rules, and

(iii) He has either prepared or reviewed the engineering information contained in the foregoing Application, and it is complete and accurate to the best of his knowledge and belief.

Signed:

/s/

Jack Wengryniuk
Senior Director
DIRECTV Engineering

August 9, 2011
Date

APPENDIX A

DIRECTV 97W LINK BUDGET ANALYSIS

Downlink to New York	**Clear Sky**	**Rain Up/Dn**
Uplink		
Transmit power, dBW	9.3	14.3
Transmit losses, dB	1.2	1.2
Ground antenna gain, dB	66.9	66.9
Antenna pointing loss, dB	0.5	0.5
Free space loss, dB	213.3	213.3
Atmospheric loss, dB	0.7	1.3
Uplink rain loss, dB	0.0	5.0
Satellite G/T, dB/K	18.0	18.0
Bandwidth, dB-Hz	74.8	74.8
Boltzmann's constant, dBW/Hz K	-228.6	-228.6
Thermal C/N	32.3	31.8
NPR C/I, dB	25.3	21.5
Total Uplink C/(N+I)	**24.5**	**21.1**
Downlink		
Satellite EIRP, dBW/36 MHz	55.0	55.0
Free space loss, dB	209.4	209.4
Gaseous	0.9	0.9
Cloud	0.0	0.8
Scintillation	0.5	0.5
Downlink rain loss, dB	0.0	3.5
Rain temp increase, dB	0.0	3.7
Rain + Atmos Loss, dB	1.4	5.3
Rcv. antenna pointing loss, dB	0.8	0.8
Antenna wetting + noise increase, dB	0.0	1.0
Ground G/T, dB/K	18.5	18.5
Bandwidth, dB-Hz	74.8	74.8
Boltzmann's constant, dBW/Hz K	-228.6	-228.6
Total Downlink C/N	**15.8**	**7.3**
Totals	**Clear Sky**	**Rain Up/Dn**
Uplink C/N (thermal), dB	24.5	21.1
Downlink C/N (thermal), dB	15.8	7.3
X-pol interference, dB	20.0	20.0
Aggregate C/I from ASI	17.3	17.3
Aggregate C/I from TX E/S	31.8	31.8
Adjacent Channel C/I, dB	20.0	20.0
Co-frequency C/I, dB	99.0	99.0
Total C/(N+I), dB	**11.6**	**6.3**
Required C/(N+I), dB	**4.7**	**4.7**
Margin, dB	**6.9**	**1.6**

Table A-1. DIRECTV 97W Link Budget - National Coverage

Deg (orbital)	Deg. topo (theta)	25.209 Gain	FL EIRP, dBW/36 MHz	FL EIRP, dBW/40 kHz	25.138 allowable EIRP/40 kHz	Margin, dB
2.0	2.2	20.4	28.5	-1.0	9.9	10.9
4.0	4.4	12.9	21.0	-8.5	2.4	10.9
6.0	6.6	8.5	16.6	-12.9	-2.0	10.9
8.0	8.8	8.0	16.1	-13.4	-2.6	10.8

Table A-2. DIRECTV 97W Compliance with 25.138 Off-axis EIRP

APPENDIX B

ANTENNA BEAM CONTOURS

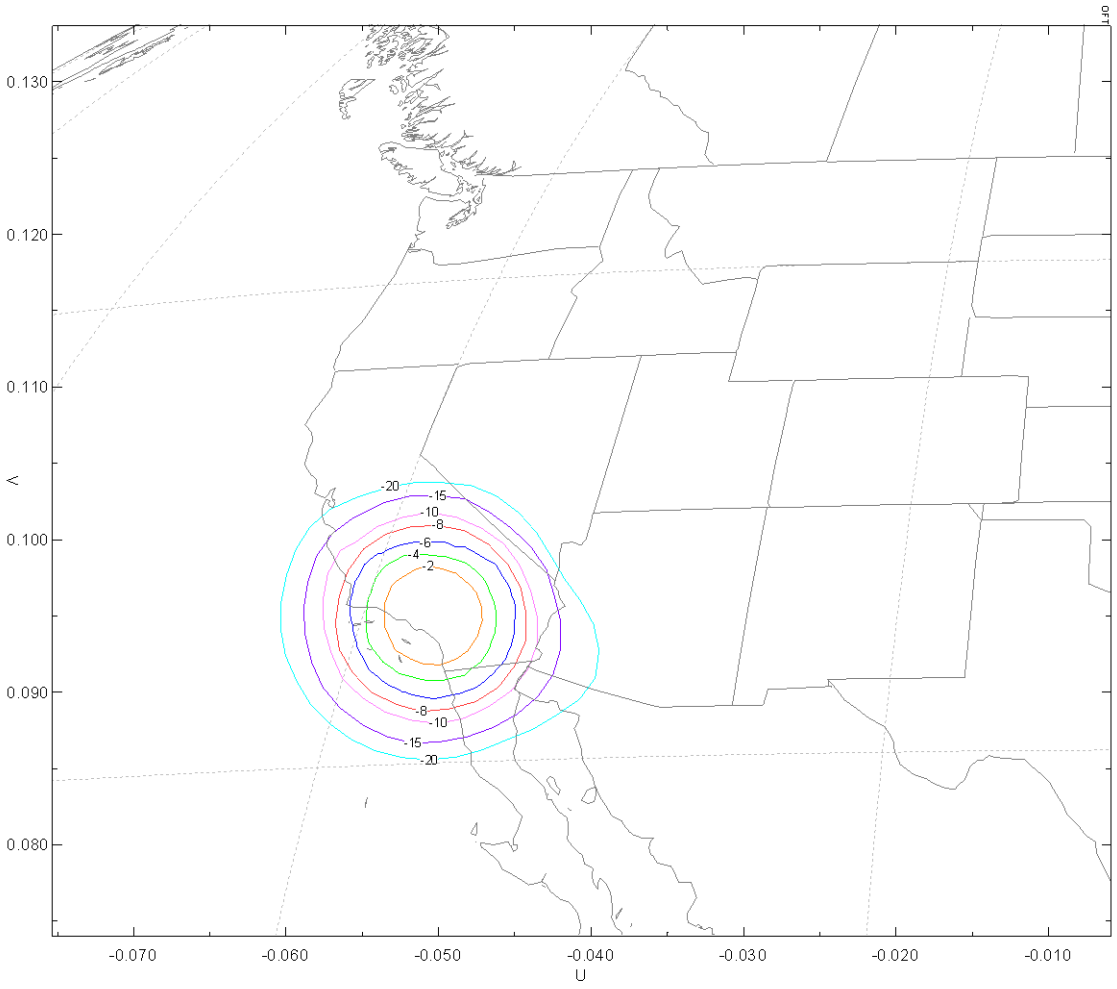

Figure B-1. DIRECTV 97W Los Angeles Broadcast Center Receive Beam

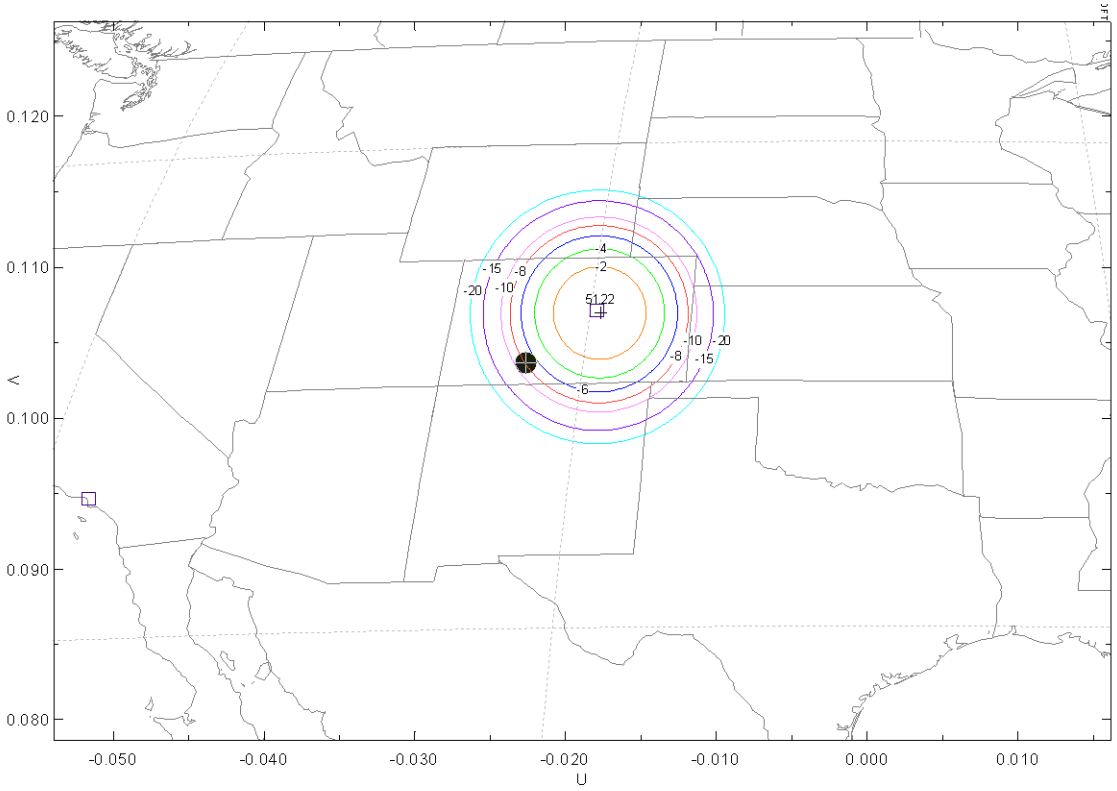

Figure B-2. DIRECTV 97W Castle Rock Broadcast Center Receive Beam

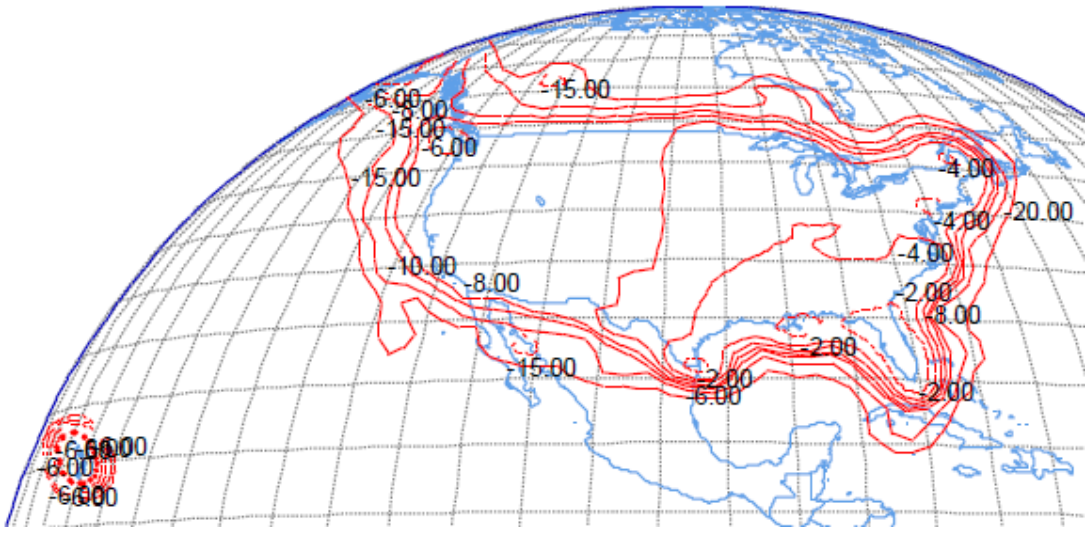

Figure B-3. DIRECTV 97W National Coverage Transmit and Telemetry Beam

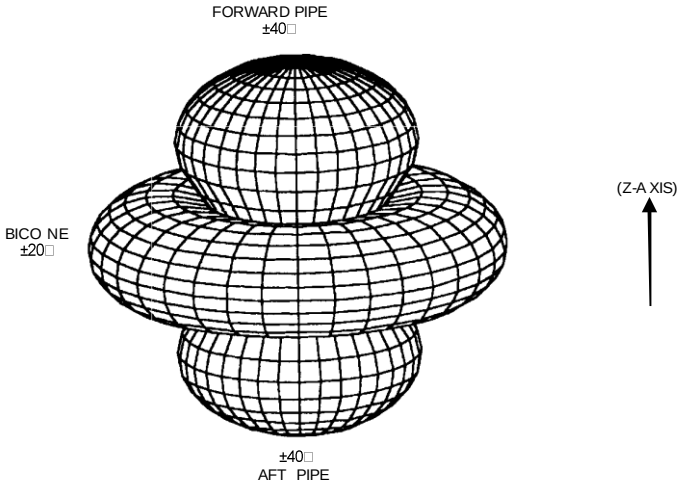

Figure B-4. DIRECTV 97W Wide Beam TT&C Antenna Coverage

APPENDIX C

TT&C LINK BUDGETS

Frequency	19701	MHz
Transmit power	-10.0	dBW
Transmit losses	5.0	dB
Antenna gain at EOC in CONUS	30.3	dBi
EIRP	15.3	dBW
Spec.	12.0	dBW
Margin	3.3	dB

Table C-1. DIRECTV 97W On-Station Telemetry Link Budget

Frequency	29998	MHz
Flux density at S/C	-90.5	dBW/m^2
Isotropic area	-51.0	dB-m^2
Antenna gain	38.5	dB
Receive losses	19.0	dB
Command receiver input power	-92.5	dBm
Command receiver threshold	-122.0	dBm
Margin	29.5	dB

Table C-2. DIRECTV 97W On-Station Command Link Budget