STEPTOE & JOHNSON LLP
ATTORNEYS AT LAW

Pantelis Michalopoulos
202.429.6494
pmichalo@steptoe.com

1330 Connecticut Avenue, NW
Washington, DC 20036-1795
Tel 202.429.3000
Fax 202.429.3902
steptoe.com

February 3, 2006

Via HAND DELIVERY

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street S.W.
Washington, D.C. 20554

Re: **EchoStar Satellite Operating Corporation**
File No. SAT-LOA-20051221-00267 (formerly SAT-MOD-20051221-00267)

Dear Ms. Dortch,

EchoStar Satellite Operating Corporation ("EchoStar") hereby reports that, while the parties are still working towards an agreement, as of 1.00 pm today, there is still no agreement between EchoStar and DIRECTV Enterprises, LLC ("DIRECTV") with respect to the operation of EchoStar 10 at 110.2° W.L. Attached is a copy of the submission made to the Commission by EchoStar yesterday. That submission sets forth certain EIRP reductions that would provide ample protection for DIRECTV-5.

Respectfully submitted,

Pantelis Michalopoulos /DCA

Pantelis Michalopoulos
Counsel for EchoStar Satellite Operating Corporation

Attachment

cc: Andrea Kelly, International Bureau
Robert Nelson, International Bureau
Chip Fleming, International Bureau
William Wiltshire, *Counsel for DIRECTV Enterprises, LLC*

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1330 Connecticut Avenue, NW
Washington, DC 20036-1795
Tel 202.429.3000
Fax 202.429.3902
steptoe.com

February 2, 2006

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street NW
Washington, DC 20554

Re: **EchoStar Satellite Operating Corporation, Reply to Comments Filed by DIRECTV Enterprises, LLC - File No. SAT-LOA-20051221-00267 (formerly SAT-MOD-20051221-00267)**

Dear Ms. Dortch:

On January 30, 2006, Echostar Satellite Operating Corporation ("EchoStar") filed a response to comments filed by DIRECTV Enterprises, LLC with respect to the above referenced file number.[1] At the time of the filing, EchoStar refrained from including a full technical analysis of DIRECTV's interference concerns in the hope that negotiations between EchoStar and DIRECTV would obviate the need for such an analysis. To date, those negotiations have not borne fruit, however. Accordingly, EchoStar hereby submits a more complete analysis of DIRECTV's claims of potential interference.

Moreover, while EchoStar remains hopeful that agreement will be reached by tomorrow, failure to reach agreement cannot be entirely foreclosed at this point. For that event, EchoStar also submits a reasonable proposal to limit the power of the EchoStar 10 satellite's frequencies 27, 29, and 31 on certain beams. That proposal would amply protect DIRECTV's operations at 110° W.L.

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[1] Reply Comments of EchoStar Satellite Operating Corporation, *filed in* SAT-MOD-20051221-00267 (filed Jan. 30, 2006) ("Reply Comments").

In its response, EchoStar argued that, in the absence of a standard to determine acceptable cross-polar C/I levels for DIRECTV, one important criterion is what each of the DBS providers has determined it can accept for its own operations. The attached Technical Annex confirms that, "[i]n the absence of . . . a rule it is useful to consider the typical levels of cross-polar interference that operators accept when that interference occurs within their own systems and use this as a measure of what could and should be accepted in the 110°W situation."[2] Specifically, the Technical Annex concludes that:

- DIRECTV appears to tolerate cross-polar C/I levels as low as 16.5 dB in its CONUS downlinks at the 101° W.L orbital position;
- EchoStar tolerates C/I levels as low as 16.3 dB from operation of the EchoStar 8 satellite, and 13.2 dB from operation of the EchoStar 10 satellite;
- DIRECTV's own data show that DIRECTV has allowed for C/I levels of 18.2 dB or less for the DIRECTV 5 satellite that is the subject of DIRECTV's asserted concerns.

The Technical Annex also examines another important criterion -- effect on availability. It concludes that, even taking at face value DIRECTV's own availability objective -- 99.75%, only 5 out of 18 "offending" EchoStar 10 beams result in link availabilities for DIRECTV 5 below that objective.[3] In two of those five cases, the availability for DIRECTV 5 is already below DIRECTV's 99.75% objective without taking into account any effect from EchoStar 10 whatsoever. Finally, the Technical Annex points out that DIRECTV's stated Eb/No requirement of 7 dB is unduly conservative, and could be improved by between 1 and 2 dB for a typical QPSK rate 6/7 transmission as currently used by DIRECTV.[4] This improvement would result in availability percentages that are significantly higher still, even taking into account the effect of all of EchoStar 10's beams.

In any event, to advance a reasonable resolution of these issues, EchoStar proposes certain power reduction measures that would further ameliorate DIRECTV's already tenuous interference concerns. In particular, the proposed EIRP reductions would ensure that the resulting availability for DIRECTV 5 is above 99.75% (except, of course, in those cases where it was below that percentage already) even accepting DIRECTV's overly conservative Eb/No requirement of 7dB.

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[2] Technical Annex at 2.

[3] *Id.* at 2-3.

[4] *Id.* at 16.

Please contact me if you have any questions.

Respectfully yours,

/s/
Pantelis Michalopoulos
Counsel for EchoStar Satellite Operating Corporation

Enclosures

cc:
Andrea Kelly, International Bureau
Robert Nelson, International Bureau
Chip Fleming, International Bureau
William M. Wiltshire, Counsel for DIRECTV Enterprises, LLC

Technical Annex

1. Introduction and Background

This Technical Annex has been prepared on behalf of EchoStar Satellite L.L.C. ("EchoStar") in response to the Comments of DIRECTV Enterprises L.L.C. ("DIRECTV") concerning the levels of cross-polar interference that will be caused by the EchoStar 10 satellite into DIRECTV's closely spaced satellites in the vicinity of 110°W.

The EchoStar 10 satellite is a high power, high spectral efficiency spot beam satellite that provides a massive amount of local-into-local broadcasting capacity to the US consumer, as explained in the FCC application. Spot beam satellites of this type must operate at relatively high downlink EIRP levels in order to overcome the high levels of intra-system interference generated by the large number of geographically separated co-frequency spot beam downlinks. However, spot beam satellites of this type only operate on a subset of the DBS channels at a particular orbital location, and typically the remaining DBS channels at the same orbital location are used with CONUS coverage beams. Therefore, inevitably, there is a high level of intra-system interference caused by the spot beam downlink transmissions into the collocated cross-polar CONUS transmissions. Normally, the channels in both polarizations in this scenario are under the control of the same operator, who will elect to tolerate the relatively high self-interference levels. However, there is a unique situation at the 110°W orbital position, where EchoStar and DIRECTV are each licensed to use frequencies on three channels that are partly co-frequency but crosspolar with each other, leaving only the polarization discrimination to provide the necessary interference isolation. In this case, the normal trade-off between the performance of the spot beam satellite and the interference into the CONUS downlinks does not come under the control of a single entity. So, in this case, DIRECTV is objecting to a level of cross-polar interference that would normally be accepted if it were "intra-system" interference, but because the interference arises from an EchoStar satellite, DIRECTV claims that it is not acceptable.

Because of the unique licensing situation at 110°W there is no FCC rule regarding the appropriate level of cross-polar interference from collocated satellite downlinks. In the absence of such a rule it is useful to consider the typical levels of cross-polar interference that operators accept when that interference occurs within their own systems and use this as a measure of what could and should be accepted in the 110°W situation. In this technical annex we explore several examples of this, as follows:

- At the 101°W orbital position, DIRECTV operates the D4S spot beam satellite on channels that are cross-polar with CONUS downlink transmissions from its D8 satellite. In sum, DIRECTV appears to tolerate cross-polar C/I levels as low as 16.5 dB in its CONUS downlinks at the 101°W orbital position. This is addressed in Section 2 below.

- At the 110°W orbital position, EchoStar operates both spot beam satellites (including EchoStar 10 in the future) on channels that are cross-polar with CONUS downlink transmissions from its EchoStar 8 satellite. In sum, EchoStar tolerates C/I levels as low as 16.3 dB from operation of the EchoStar 8 satellite, and 13.2 dB from operation of the EchoStar 10 satellite. This is addressed in Section 3 below.

- The DIRECTV satellite that would be affected by EchoStar 10 at the 110°W orbital position is D5. Although actually designed for use at the 110°W orbital position, this satellite was originally deployed by DIRECTV at the 119°W orbital position in 2000, and subsequently was relocated to 110°W in 2005. In its May 2000 FCC application for this satellite, DIRECTV provides specific data concerning the cross-polar C/I allowance. DIRECTV's own data show that DIRECTV has allowed for C/I levels of 18.2 dB or less. This is addressed in Section 4 below.

Another approach to assessing the acceptable interference levels is to consider the resulting availability of the affected DIRECTV satellite downlinks. The conclusions

from this analysis are stark. Even taking at face value DIRECTV's own availability objective, only five out of 18 potentially interfering EchoStar 10 beams result in link availabilities for D5 below that objective. In two of the five cases, the results for D5 are already below that objective using the baseline assumption in DIRECTV's link budgets and without any additional effect from EchoStar 10. This is explored in Section 5 of this technical annex. Section 6 includes proposals for reductions in certain EchoStar 10 spot beam EIRP levels to mitigate the interference into DIRECTV's D5 satellite. These reductions in EIRP are based on the dual considerations of the DIRECTV link performance and the impact on the EchoStar-10 service capability.

2. DIRECTV's Self-Interference from its Spot Beam Satellite at 101°W

The analysis of the cross-polar self-interference that DIRECTV experiences at the 101°W orbital position is summarized in Table 2-1 below, based on DIRECTV's FCC and ITU filings at this orbital location. The victim channels are assumed to be operating in a D8 CONUS downlink beam. The cross-polar interference sources consist of a spot beam downlink on the D4S satellite in approximately half the channel and a CONUS downlink on the D8 satellite in approximately the other half of the channel.[1] The cross-polar guard band is correctly accounted for. Each row of the table represents the situation at each D4S spot beam peak, and accurately takes account of the D8 CONUS EIRP at that geographic location. For some spot beams there are several rows because different EIRP levels are used in different channels in the D5 satellite. The receive earth station cross-polar discrimination ("XPD") is assumed to be 22 dB. The resulting total cross-polar C/I values are given in the right-most column of Table 2-1, and range from 16.5 dB to 23.1 dB.

Based on this analysis we conclude that DIRECTV tolerates cross-polar C/I levels as low

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[1] This mixed CONUS+Spot interference situation exists because DIRECTV does not operate spot beams on adjacent channels at this orbital location as can be determined from the spot beam channels given in Table 2-1.

as 16.5 dB in its CONUS downlinks at the 101°W orbital position.

Table 2-1 – DIRECTV Self-Interference from its Spot Beam Satellite at 101°W

D4S Beam	Long	Lat	Peak GAIN (dBi)	Peak POWER (dBW)	Peak EIRP (dBW)	D4S Channels Used					Rx Earth Station XPD (dB)	DTV-8 CONUS EIRP (dBW)	Δ EIRP (dB)	BW Adv. (dB)	X-POL C/I from D4S Spot (dB)	DTV-4S CONUS EIRP (dBW)	Δ EIRP (dB)	X-POL C/I from D4S CONUS	TOTAL X-POL C/I (dB)
TS01	-68.7	44.3	43.2	12.6	55.8	28					22.0	53.6	2.2	4.05	23.8	52.4	-1.2	27.2	22.2
TS02	-77.7	34.8	49.4	13.6	63.0	28					22.0	55.3	7.7	4.05	18.4	54.7	-0.6	26.7	17.8
TS03	-81.9	27.8	49.4	13.4	62.8	20	28				22.0	56.9	5.9	4.05	20.2	57.4	0.5	25.5	19.1
TS04	-80.4	41.2	49.3	13.1	62.4	28					22.0	54.2	8.2	4.05	17.9	53.0	-1.2	27.3	17.4
TS05	-87.1	43.7	49.0	12.3	61.3	18					22.0	52.2	9.1	4.05	17.0	52.1	-0.1	26.2	16.5
TS05	-87.1	43.7	49.0	8.8	57.8	28					22.0	52.2	5.6	4.05	20.5	52.1	-0.1	26.2	19.4
TS06	-87	34.4	49.6	14.4	64.0	18					22.0	55.0	9.0	4.05	17.0	54.9	-0.1	26.2	16.5
TS06	-87	34.4	49.6	12.1	61.7	28					22.0	55.0	6.7	4.05	19.3	54.9	-0.1	26.2	18.5
TS07	-94.5	39	48.4	8.3	56.7	28					22.0	53.2	3.5	4.05	22.6	52.8	-0.4	26.4	21.1
TS08	-95.6	29.6	48.7	12.6	61.3	28					22.0	55.3	6.0	4.05	20.1	53.0	-2.3	28.4	19.5
TS09	-105	40.1	44.7	11.8	56.5	4	12				22.0	52.6	3.9	4.05	22.2	50.9	-1.7	27.7	21.1
TS10	-121.5	46.3	45.8	9.2	55.0	18					22.0	51.4	3.6	4.05	22.5	48.7	-2.7	28.8	21.5
TS10	-121.5	46.3	45.8	9.7	55.5	28					22.0	51.4	4.1	4.05	22.0	48.7	-2.7	28.8	21.1
TS11	-116.8	34.1	47.7	12.4	60.1	18	28				22.0	52.8	7.3	4.05	18.8	49.3	-3.5	29.6	18.4
TS12	-72.8	41.3	48.2	13.0	61.2	4	12				22.0	54.4	6.8	4.05	19.2	53.0	-1.4	27.4	18.6
TS12	-72.8	41.3	48.2	12.6	60.8	20					22.0	54.4	6.4	4.05	19.6	53.0	-1.4	27.4	19.0
TS13	-82.5	41.3	48.2	12	60.2	4	12				22.0	53.8	6.4	4.05	19.6	53.0	-0.8	26.9	18.9
TS13	-82.5	41.3	48.2	12.2	60.4	20					22.0	53.8	6.6	4.05	19.4	53.0	-0.8	26.9	18.7
TS14	-81.4	34.6	48.4	14.9	63.3	4					22.0	55.8	7.5	4.05	18.6	55.4	-0.4	26.5	17.9
TS14	-81.4	34.6	48.4	12.8	61.2	12					22.0	55.8	5.4	4.05	20.7	55.4	-0.4	26.5	19.7
TS14	-81.4	34.6	48.4	13.5	61.9	20					22.0	55.8	6.1	4.05	20.0	55.4	-0.4	26.5	19.1
TS15	-81.1	25.7	48	13.3	61.3	12	26				22.0	56.3	5.0	4.05	21.1	57.4	1.1	25.0	19.6
TS16	-112	37	48.3	8.5	56.8	12					22.0	52.2	4.6	4.05	21.4	50.1	-2.1	28.2	20.6
TS16	-112	37	48.3	8.9	57.2	20					22.0	52.2	5.0	4.05	21.0	50.1	-2.1	28.2	20.3
TS17	-90.9	38.4	48.4	8.7	57.1	20					22.0	53.5	3.6	4.05	22.4	53.4	-0.1	26.1	20.9
TS18	-97.2	31.8	48.4	10.9	59.3	12					22.0	54.8	4.5	4.05	21.6	52.4	-2.4	28.5	20.8
TS18	-97.2	31.8	48.4	12.6	61	20					22.0	54.8	6.2	4.05	19.9	52.4	-2.4	28.5	19.3
TS19	-111.9	34.2	47.2	12.3	59.5	20					22.0	53.3	6.2	4.05	19.9	50.3	-3.1	29.1	19.4
TS20	-122.6	39.2	45.4	9.4	54.8	4					22.0	51.4	3.4	4.05	22.6	48.7	-2.7	28.7	21.7
TS20	-122.6	39.2	45.4	7.6	53	12					22.0	51.4	1.6	4.05	24.4	48.7	-2.7	28.7	23.1
TS20	-122.6	39.2	45.4	10.6	56	20					22.0	51.4	4.6	4.05	21.4	48.7	-2.7	28.7	20.7
TS21	-75.3	41.4	47.1	15	62.1	18					22.0	54.56	7.5	4.05	18.5	53.1	-1.5	27.5	18.0
TS21	-75.3	41.4	47.1	12.1	59.2	26					22.0	54.56	4.6	4.05	21.4	53.1	-1.5	27.5	20.5
TS22	-84.3	32.1	47.3	15.3	62.6	26					22.0	55.83	6.8	4.05	19.3	55.83	0.0	26.1	18.5

3. EchoStar's Self-Interference from its Spot Beam Satellites at 110°W and 119°W

The analysis of the cross-polar self-interference that EchoStar experiences at the 110°W and 119°W orbital positions is summarized in Tables 3-1, 3-2 and 3-3 below.

Table 3-1 shows the current situation at 119°W where the EchoStar 7 spot beams operate cross polar to the EchoStar 7 CONUS beam. The analysis is similar to that described in Section 2 above. Note the different "Bandwidth Advantage" factors account for the situations where there is partial or full (allowing for the guard band) overlap between the spot and CONUS channels. The resulting total cross-polar C/I values are given in the right-most column of Table 3-1, and range from 14.6 dB to 20.2 dB in CONUS with a lower value in Alaska.

Table 3-2 shows the current situation at 110°W where the EchoStar 8 spot beams operate cross polar to the EchoStar 8 CONUS beam. The analysis is identical to that described above for EchoStar 7 at 119°W. The resulting total cross-polar C/I values are given in the right-most column of Table 3-2, and range from 16.3 dB to 21.4 dB in CONUS with lower values in Alaska and Puerto Rico.

Table 3-3 shows the imminent situation at 110°W when the EchoStar 10 spot beams will be operating cross polar to the EchoStar 8 CONUS beam. The analysis is very similar to that described above for EchoStar 7 and -8, except only the worst case interference for each EchoStar 10 spot beam is shown. The resulting total cross-polar C/I values are given in the right-most column of Table 3-3, and range from 13.2 dB to 19.4 dB in CONUS with lower values in Alaska and Hawaii.

Table 3-1 – EchoStar Self-Interference from EchoStar 7 Spot Beams into EchoStar 7 CONUS beam at 119°W

E-7 Spot Beam	Location	Peak EIRP (dBW)	E-7 Channels Used			Rx Earth Station XPD (dB)	E-7 CONUS EIRP (dBW)	Δ EIRP (dB)	BW Adv. (dB)	X-POL C/I from Spot (dB)	X-POL C/I from CONUS (dB)	TOTAL X-POL C/I (dB)
E7-1	Honolulu, HI	51.0	9			22.0	45.0	6.0	4.06	20.1	26.1	19.1
E7-2	Anchorage, AK	55.6	9			22.0	42.5	13.1	4.06	13.0	26.1	12.8
E7-3	Seattle-Portland	56.0	1	3		22.0	50.9	5.1	1.05	18.0		18.0
E7-4	San Franc-Sacremento	55.9	5	7		22.0	50.5	5.4	1.05	17.7		17.7
E7-5	LA-San Diego	57.6	1	3		22.0	50.8	6.8	1.05	16.3		16.3
E7-6	Phoenix-Tucson	55.9	5	7		22.0	51.4	4.5	1.05	18.6		18.6
E7-7	Salt Lake City	55.7	9			22.0	51.1	4.6	4.06	21.5	26.1	20.2
E7-8	Mexico City	57.1	9			22.0	N/A					
E7-9	Tulsa-Wichita-Kansas City	60.2	1	3		22.0	53.6	6.6	1.05	16.5		16.5
E7-10	San Antonio-Houston	60.7	5	7		22.0	54.0	6.7	1.05	16.4		16.4
E7-11	Chicago- St. Louis	62.0	5	7		22.0	53.5	8.5	1.05	14.6		14.6
E7-12	New Orleans-Birmingham	63.2	9			22.0	54.6	8.6	4.06	17.5	26.1	16.9
E7-13	Boston-NYC-Philadelphia	60.2	1	3		22.0	55.6	4.6	1.05	18.5		18.5
E7-14	Raleigh-Savannah-Greenville	61.4	5	7		22.0	56.0	5.4	1.05	17.7		17.7
E7-15	Miami- West Palm Beach	60.7	1	3		22.0	54.7	6.0	1.05	17.1		17.1

Table 3-2 – EchoStar Self-Interference from EchoStar 8 Spot Beams into EchoStar 8 CONUS beam at 110°W

E-8 Spot Beam	Location	Peak EIRP (dBW)	E-8 Channels Used			Rx Earth Station XPD (dB)	E-8 CONUS EIRP (dBW)	Δ EIRP (dB)	BW Adv. (dB)	TOTAL X-POL C/I (dB)	X-POL C/I from CONUS (dB)	TOTAL X-POL C/I (dB)
E8-1	Boston-Philadelphia-WDC	60.3	4	6		22.0	53.8	6.5	1.05	16.6		16.6
E8-2	Tampa-Orlando	60.3	2	6		22.0	55.4	4.9	4.06	21.2	26.1	19.9
E8-3	Miami-West Palm Beach	58.1	10			22.0	55.2	2.9	4.06	23.2	26.1	21.4
E8-4	Buffalo-Detroit-Cincinnati	60.5	2	8	10	22.0	53.7	6.8	1.05	16.3		16.3
E8-5	Nashville-Indianapolis	61.1	4	6		22.0	54.4	6.7	1.05	16.4		16.4
E8-6	Minneaplois-Omaha	58.8	2	8	10	22.0	53.1	5.7	1.05	17.4		17.4
E8-7	Houston-Dallas-Tyler	61.1	8	10		22.0	54.6	6.5	1.05	16.6		16.6
E8-8	Austin-San Antonio	59.9	2			22.0	52.0	7.9	4.06	18.2	26.1	17.5
E8-9	Denver-Cheyenne	56.1	4			22.0	51.8	4.3	4.06	21.8	26.1	20.4
E8-10	Alburquerque-El Paso	57.3	6			22.0	51.8	5.5	4.06	20.6	26.1	19.5
E8-11	San Diego- Las Vegas	57.8	2			22.0	51.5	6.3	4.06	19.8	26.1	18.8
E8-12	Seattle-Spokane	58.5	6			22.0	52.0	6.5	4.06	19.6	26.1	18.7
E8-13	San Franc-Sacremento	57.6	8	10		22.0	52.0	5.6	1.05	17.5		17.5
E8-14	Anchorage, AK	52.5	8			22.0	39.0	13.5	4.06	12.6	26.1	12.4
E8-15	Honolulu, HI	48.1	4			22.0	42.0	6.1	4.06	20.0	26.1	19.0
E8-16	Puerto Rico	51.6	4			22.0	39.0	12.6	4.06	13.5	26.1	13.2

Table 3-3 – EchoStar Self-Interference from EchoStar 10 Spot Beams into EchoStar 8 CONUS beam at 110°W

E-10 Spot Beam	Location	Peak EIRP (dBW)	E-10 Channels Used					Rx Earth Station XPD (dB)	E8 CONUS EIRP (dBW)	Δ EIRP (dB)	BW Adv. (dB)	X-POL C/I from Spot (dB)	X-POL C/I from CONUS (dB)	TOTAL X-POL C/I (dB)	Comments
E10-1	Central Fl	61.7			27	29	31	22.0	55.6	6.1	4.06	20.0	26.1	19.0	
E10-2	NC	61.5		27	29			22.0	54.7	6.8	4.06	19.3	26.1	18.4	
E10-3	FL	61.1						22.0	55.6	5.5	1.05				
E10-4	NY	62.4	4	12			26	22.0	54.7	7.7	1.05				
E10-5	WDC	63.7			31			22.0	54.5	9.2	1.05	13.9		13.9	
E10-6	Greenville, SC	62.5			26			22.0	55.3	7.2	1.05				
E10-7	Pensacola	61.8						22.0	55.6	6.2	4.06	19.9	26.1	18.9	
E10-8	Maine	61.0						22.0	53.0	8.0	1.05				
E10-9	Cleveland	61.9	27	29	31										DTV only
E10-10	Kentucky	62.8				27		22.0	53.7	9.1	4.06	17.0	26.1	16.5	
E10-11	Alabama	61.9	26	29	31										DTV only
E10-12	New Orleans	61.2						22.0	55.3	5.9	1.05				
E10-13	Detroit	62.0	12			26		22.0	53.7	8.3	1.05				
E10-14	Indiana	61.5						22.0	53.7	7.8	4.06	18.3	26.1	17.6	
E10-15	Arkansas	62.4		27				22.0	53.7	8.7	4.06	17.4	26.1	16.8	
E10-16	Houston	61.8						22.0	54.7	7.1	4.06	19.0	26.1	18.2	
E10-17	San Antonio	61.2	27	29											DTV only
E10-18	Green Bay	58.9						22.0	52.7	6.2	4.06	19.9	26.1	18.9	
E10-19	Illinois	61.3	26	27	29	31									DTV only
E10-20	St. Louis	62.9						22.0	54.2	8.7	4.06	17.4	26.1	16.8	
E10-21	Dallas	61.7		29	31			22.0	54.1	7.6	4.06	18.5	26.1	17.8	
E10-22	San Antonio	60.3						22.0	54.8	5.5	1.05				
E10-23	Wisconcin	62.0	18					22.0	53.5	8.5	1.05				
E10-24	Iowa	62.1			31			22.0	54.0	8.1	1.05				
E10-25	Oklahoma	62.9						22.0	54.1	8.8	4.06	17.3		17.3	
E10-26	Oklahoma-Texas	62.1	26	31											DTV only
E10-27	Texas	61.1						22.0	53.0	8.1	4.06	18.0	26.1	17.3	
E10-28	Minnesota	59.4						22.0	52.2	7.2	4.06	18.9	26.1	18.1	
E10-29	Nebraska	62.3	27	29											DTV only
E10-30	Denver-Cheyenne	64.0						22.0	51.8	12.2	4.06	13.9	26.1	13.8	
E10-31	Alburquerque	61.9	27	29											DTV only
E10-32	North Dakota - Minnesota	62.1						22.0	52.2	9.9	4.06	16.2	26.1	15.7	
E10-33	North Dakota	63.2	26												
E10-34	Salt Lake City	60.7		26				22.0	51.5	9.2	4.06	16.9	26.1	16.4	
E10-35	Phoenix	62.0						22.0	52.2	9.8	1.05				
E10-36	Montana	61.2						22.0	51.0	10.2	4.06	15.9	26.1	15.5	
E10-37	Montana	62.0	29	31											DTV only
E10-38	Nevada	62.6						22.0	50.0	12.6	4.06	13.5	26.1	13.2	
E10-39	S. California	61.0	27	29	31										DTV only
E10-40	Spokane	59.0						22.0	52.0	7.0	1.05				
E10-41	Washington-Idaho	58.2						22.0	49.0	9.2	4.06	16.9	26.1	16.4	
E10-42	Central California	56.4						22.0	52.0	4.4	1.05				
E10-43	San Franc-Sacremento	59.4			26	31		22.0	52.0	7.4	1.05				
E10-44	Oregon	60.0	27	29											DTV only
E10-45	Seattle	57.6						22.0	52.0	5.6	4.06	20.5	26.1	19.4	
E10-46	Alaska	57.2				26	27	22.0	39.0	18.2	4.06	7.9	26.1	7.8	
E10-47	Hawaii	52.0	4	12			27	22.0	42.0	10.0	1.05				

= Double sided XPND 24
= Double sided XPND 19
= Single sided E8

4. DIRECTV D5 Link Budget Allowance for Cross-Polar Interference

The DIRECTV satellite that would be affected by EchoStar 10 at the 110°W orbital position is D5. This satellite was originally designed to operate at the 110°W orbital position, but was actually deployed first by DIRECTV at the 119°W orbital position in 2000, and subsequently was relocated to 110°W in 2005. In its May 2000 FCC application for this satellite, DIRECTV provides specific data concerning the cross-polar C/I allowance. Table 2 of Appendix A of DIRECTV's May 5, 2000 FCC application provides the link budget for the satellite, and is reproduced as Appendix 1 to this document. In this DIRECTV link budget there is an allowance for an item referred to as "crosspol interference", and which is quite separate from adjacent satellite interference which is a separate line item in the link budget. This parameter is given values ranging from 17.1 dB to 18.9 dB, with a value of 18.2 dB assigned for the critical case of a downlink rain fade. From this it can be inferred that DIRECTV's operations using the D5 satellite allow for cross-polar interference levels at least down to a C/I of 18.2 dB.

5. Assessment of Interference in Terms of Impact on Link Availability

Additional insight can be obtained into the levels of cross-polar C/I that can be tolerated by DIRECTV by examining the service availability of the D5 downlinks. To ensure the most accurate results we have used DIRECTV's own link budget for D5, as referred to in Section 4 above.[2] The results are given in Table 5-1, where a pair of columns in the table relates to each of the 18 EchoStar 10 CONUS beams that overlap the DIRECTV licensed channels at 110°W. Each of these beams is labelled in terms of its approximate geographic area and its beam number (e.g., "Central FL Beam 1"). These beam numbers can be directly related to the transmit beam numbers in the EchoStar 10 FCC application.

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[2] EchoStar considers that this link budget is extremely conservative in that it uses an Eb/No objective of 7 dB, which is approximately 2 dB higher than a typical QPSK, rate 6/7 transmission requires.

For each pair of columns the left hand one provides the reference link budget according to the D5 FCC application (with a C/I allowance for cross-polar interference of 18.2 dB), appropriately modified to refer to the geographic location corresponding to the beam peak of the EchoStar 10 spot beam.[3] In this reference column the link availability is calculated based on the available link margin. The right hand column of each pair provides a modified calculation of the availability with the actual C/I resulting from the "as-filed" EchoStar 10 satellite. For example, for the first beam the C/I is reduced from 18.2 to 16.7 dB and the resulting link availability decreases from 99.851% to 99.841%. It should be noted that the reference DIRECTV link budget for D5 states a link availability objective of 99.75%. Therefore, in this example of interference from EchoStar 10 beam 1, the resulting D5 link availability still exceeds the availability objective by a considerable margin.

From a review of all the results in Table 5-1 the following observations can be made:

- From the total of 18 beams, only <u>five</u> result in link availabilities below 99.75%. These are beams 11, 15, 21, 29 and 31. In two of these five cases the results are already below 99.75% even in the reference link budget (i.e., without EchoStar 10 interference).

- From the total of 18 beams, only <u>six</u> result in link availabilities below 99.80%. These are beams 11, 15, 17, 21, 29 and 31. In four off these six cases the results are already below 99.80% even in the reference link budget (i.e., without EchoStar 10 interference).

- From the total of 18 beams, only <u>13</u> result in link availabilities below 99.85%. These are beams 1, 2, 10, 11, 15, 17, 19, 21, 24, 26, 29, 31 and 37. In nine off these 13 cases the results are already below 99.85% even in the reference link

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[3] Note that this analysis is worst case in that it refers to the situations only at the beam peaks of the EchoStar 10 spot beams. The interference situation rapidly improves away from these beam peaks, and so the calculated interference level occurs only over a relatively small geographic area.

budget (i.e., without EchoStar 10 interference).

From the overall results in Table 5-1 it can be concluded that the D5 satellite downlinks are not uniformly susceptible to interference over the CONUS service area, when considered in terms of the resulting link availability. This is not surprising, and the same situation exists for all DBS satellites, because the different EIRP levels achievable with a satellite antenna across CONUS do not perfectly match the rain attenuation statistics. Therefore, regions of CONUS exist where there is effectively excess EIRP relative to the service availability requirements, and this excess EIRP provides greater robustness to interference. It is equally important to note that EchoStar's ability to improve the interference into DIRECTV's three channels at 110°W is not identical for every EchoStar 10 spot beam, because of the vagaries of the geographic shapes of the DMA service areas and their associated rain attenuation characteristics. Therefore, it is not appropriate to define an interference criterion for this situation solely in terms of a fixed C/I level. Rather it is necessary to consider both the availability of the DIRECTV D5 links, and the ability EchoStar has to reduce its EIRP in certain EchoStar 10 spot beams, when attempting to reach a mutually agreeable coordination situation at 110°W.

Table 5-1 – Assessment of EchoStar 10 Interference Impact on DIRECTV D5 Downlink Availability

D5 Link Budgets		Central FL Beam 1		NC Beam 2		WDC Beam 5		CLV Beam 9		KY Beam 10	
Link Parameters		Rain Down (according to FCC Application for D5)	Rain Down (with actual Echo-X C/I)	Rain Down (according to FCC Application for D5)	Rain Down (with actual Echo-X C/I)	Rain Down (according to FCC Application for D5)	Rain Down (with actual Echo-X C/I)	Rain Down (according to FCC Application for D5)	Rain Down (with actual Echo-X C/I)	Rain Down (according to FCC Application for D5)	Rain Down (with actual Echo-X C/I)
Uplink:											
Carrier Frequency	(MHz)	17,550	17,550	17,550	17,550	17,550	17,550	17,550	17,550	17,550	17,550
Transmit EIRP	(dBW)	77.9	77.9	77.9	77.9	77.9	77.9	77.9	77.9	77.9	77.9
Ground pointing loss	(dB)	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Uplink path loss	(dB)	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7
Atmospheric loss	(dB)	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Uplink rain loss	(dB)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T	(dB/K)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Bandwidth	(dB-Hz)	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8
Boltzmann's constant	(dB)	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6
Uplink C/N (thermal)	(dB)	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7
Downlink:											
Carrier Frequency	(MHz)	12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200
Satellite EIRP	(dBW)	55	55	54	54	55	55	54	54	53	53
Downlink path loss	(dB)	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8
Atmospheric loss	(dB)	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Availability (DTV: 99.75%)	**(%)**	**99.851%**	**99.841%**	**99.830%**	**99.809%**	**99.919%**	**99.916%**	**99.916%**	**99.897%**	**99.841%**	**99.826%**
Downlink rain loss	(dB)	-3.972	-3.823	-3.269	-3.059	-3.971	-3.900	-3.269	-2.911	-2.617	-2.479
Rain temp increase	(dB)	-3.6	-3.5	-3.3	-3.2	-3.6	-3.6	-3.3	-3.1	-3.0	-2.9
Rain temp increase	(K)	161.8	158.1	142.8	136.5	161.8	160.0	142.8	131.9	122.2	117.4
Ground receive pointing loss	(dB)	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Ground G/T (45 cm antenna)	(dB/K)	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4
Bandwidth	(dB-Hz)	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8
Boltzmann's constant	(dB)	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6
Downlink C/N (thermal)	(dB)	8.7	8.9	8.7	9.0	8.7	8.8	8.7	9.2	8.7	8.9
Totals:											
Uplink C/N (thermal)	(dB)	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7
Downlink C/N (thermal)	(dB)	8.7	8.9	8.7	9.0	8.7	8.8	8.7	9.2	8.7	8.9
Crosspol interference C/I	(dB)	18.2	16.7	18.2	16.1	18.2	17.4	18.2	15.1	18.2	16.6
Adjacent satellite interference C/I	(dB)	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8
Total C/(N+I)	(dB)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Total (Eb/(N+I)o	(dB)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Required (Eb/(N+I)o (high info rate)	(dB)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Margin	(dB)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

AL Beam 11		ARK Beam 15		San Antonio Beam 17		IL Beam 19		Dallas Beam 21		IA Beam 24		OK/TX Beam 26	
Rain Down (according to FCC Application for D5)	Rain Down (with actual Echo-X C/I)	Rain Down (according to FCC Application for D5)	Rain Down (with actual Echo-X C/I)	Rain Down (according to FCC Application for D5)	Rain Down (with actual Echo-X C/I)	Rain Down (according to FCC Application for D5)	Rain Down (with actual Echo-X C/I)	Rain Down (according to FCC Application for D5)	Rain Down (with actual Echo-X C/I)	Rain Down (according to FCC Application for D5)	Rain Down (with actual Echo-X C/I)	Rain Down (according to FCC Application for D5)	Rain Down (with actual Echo-X C/I)
17,550	17,550	17,550	17,550	17,550	17,550	17,550	17,550	17,550	17,550	17,550	17,550	17,550	17,550
77.9	77.9	77.9	77.9	77.9	77.9	77.9	77.9	77.9	77.9	77.9	77.9	77.9	77.9
-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
-208.7	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7
-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8
-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6
27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7
12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200
53	53	52	52	53	53	53	53	52	52	53	53	52	52
-205.8	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8
-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
99.782%	**99.718%**	**99.700%**	**99.635%**	**99.810%**	**99.769%**	**99.862%**	**99.818%**	**99.736%**	**99.531%**	**99.860%**	**99.850%**	**99.841%**	**99.821%**
-2.617	-2.239	-2.019	-1.785	-2.617	-2.332	-2.617	-2.222	-2.019	-1.395	-2.617	-2.509	-2.018	-1.884
-3.0	-2.7	-2.6	-2.4	-3.0	-2.8	-3.0	-2.7	-2.6	-2.0	-3.0	-2.9	-2.6	-2.5
122.2	108.8	100.4	91.0	122.2	112.2	122.2	108.1	100.4	74.2	122.2	118.5	100.4	95.0
-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4
-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8
-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6
8.7	9.3	8.7	9.1	8.7	9.2	8.7	9.3	8.7	9.9	8.7	8.9	8.7	8.9
27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7
8.7	9.3	8.7	9.1	8.7	9.2	8.7	9.3	8.7	9.9	8.7	8.9	8.7	8.9
18.2	14.8	18.2	15.6	18.2	15.4	18.2	14.7	18.2	13.3	18.2	16.9	18.2	16.5
21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8
8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

NEB Beam 29		ALBQ Beam 31		MT Beam 37		S. Cal Beam 39		SF/SAC Beam 43		OR Beam 44	
Rain Down (according to FCC Application for D5)	Rain Down (with actual Echo-X C/I)	Rain Down (according to FCC Application for D5)	Rain Down (with actual Echo-X C/I)	Rain Down (according to FCC Application for D5)	Rain Down (with actual Echo-X C/I)	Rain Down (according to FCC Application for D5)	Rain Down (with actual Echo-X C/I)	Rain Down (according to FCC Application for D5)	Rain Down (with actual Echo-X C/I)	Rain Down (according to FCC Application for D5)	Rain Down (with actual Echo-X C/I)
17,550	17,550	17,550	17,550	17,550	17,550	17,550	17,550	17,550	17,550	17,550	17,550
77.9	77.9	77.9	77.9	77.9	77.9	77.9	77.9	77.9	77.9	77.9	77.9
-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
-208.7	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7	-208.7
-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8
-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6
27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7
12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200
52	52	51	51	51	51	52	52	53	53	53	53
-205.8	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8	-205.8
-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
99.821%	**99.674%**	**99.789%**	**99.492%**	**99.952%**	**99.802%**	**99.991%**	**99.982%**	**99.965%**	**99.967%**	**99.971%**	**99.966%**
-2.019	-1.395	-1.477	-0.834	-1.477	-0.631	-2.019	-1.440	-2.617	-2.705	-2.617	-2.411
-2.6	-2.0	-2.1	-1.4	-2.1	-1.1	-2.6	-2.1	-3.0	-3.0	-3.0	-2.8
100.4	74.2	77.8	47.2	77.8	36.5	100.4	76.2	122.2	125.2	122.2	115.0
-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4
-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8	-73.8
-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6
8.7	9.9	8.7	10.0	8.7	10.5	8.7	9.8	8.7	8.6	8.7	9.0
27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7
8.7	9.9	8.7	10.0	8.7	10.5	8.7	9.8	8.7	8.6	8.7	9.0
18.2	13.3	18.2	12.9	18.2	12.1	18.2	13.5	18.2	19.7	18.2	16.0
21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8
8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

6. EchoStar Proposal to Reduce Interference

EchoStar has investigated ways it can reduce the interference into DIRECTV's three channels at 110°W, by making EIRP reductions in certain of the EchoStar 10 spot beams. These proposals are given in Table 6-1 below, showing the original C/I based on the as-filed EchoStar-10 parameters, the proposed EIRP reduction in the relevant channels, the resulting improved C/I and the resulting D5 link availability.

Table 6-1 – EchoStar Proposal to Reduce EIRP in Certain EchoStar 10 Spot Beams

E-10 Spot Beam	Original C/I (dB)	EIRP Reduction (dB)	Resulting C/I (dB)	Resulting D5 Availability	Notes
1	16.7	1.3	18.0	99.85%	
2	16.1	1.9	18.0	99.82%	
5	17.4	1.5	18.9	99.92%	
9	15.1	1.7	16.8	99.90%	
10	16.6	2.4	19.0	99.85%	
11	14.8	2.2	17.0	99.77%	
15	15.6	1.6	17.2	99.69%	Note 1
17	15.4	1.5	16.9	99.80%	
19	14.7	2.4	17.1	99.85%	
21	13.3	2.6	15.9	99.69%	Note 2
24	16.9	2.1	19.0	99.87%	
26	16.5	1.4	17.9	99.84%	
29	13.3	2.0	15.3	99.77%	
31	12.9	2.1	15.0	99.70%	Note 3
37	12.1	2.5	14.6	99.92%	
39	13.5	1.6	15.1	99.99%	
43	19.7	0.0	19.7	99.97%	
44	16.0	1.5	17.5	99.97%	

Note 1: This link only achieves 99.70% availability with C/I of 18.2 dB
Note 2: This link only achieves 99.736% availability with C/I of 18.2 dB
Note 3: This link improves to 99.78% availability with more accurate satellite EIRP of 51.5 dBW

Note that the resulting availability levels in the D5 links are generally high, with six out of the 18 beams equal to or greater than 99.9%, ten out of the 18 beams equal to or greater than 99.85%, and 15 out of the 18 beams greater than 99.75%. For two of the three beams with availabilities below 99.75% it should be noted that these do not achieve the stated 99.75% availability level

even with the DIRECTV link budget assumptions, and the additional effect of the EchoStar 10 cross-polar interference is not significantly affecting this situation. For the third beam with availability less than 99.75% it is noted that the satellite EIRP level used in the results given in Table 5-1 above was rounded down to the nearest integer dBW level, and in the case of this particular beam the actual D5 EIRP is more than 0.5 dB higher. When this is accurately taken into account the availability for this case increases to 99.78%.

It should also be noted that all the availabilities results given in Table 6-1, and Table 5-1 in the previous section, are based on the stated Eb/No requirement in the DTV links of 7 dB. EchoStar believes this value is very conservative and could be improved by between 1 and 2 dB for a typical QPSK rate 6/7 transmission as currently used by DIRECTV. If this factor was taken into account the availabilities calculated would be significantly higher than those shown here.

7. Conclusions

The cross-polar interference mechanism at 110°W that DIRECTV is referring to in its Comments is one that is normally allocated a relatively low C/I level in a system link budget (typically between 15 and 20 dB). This has been demonstrated using several independent approaches in this document (see Section 2, 3 and 4). Providing such a generous C/I allowance for this interference mechanism is necessary in order to allow the natural evolution of the DBS industry and the effective introduction of the vital capabilities offered by spot-beam satellites. Both EchoStar and DIRECTV currently operate mixed spot and CONUS beam collocated satellites and therefore readily accept the low C/I's due to this interference mechanism. Furthermore, both operators employ low-cost receive dishes with relatively poor cross-polar discrimination which further aggravates this interference mechanism, but they readily accept the overall interference situation because it constitutes the best overall optimized way of operating a complex and evolving DBS system. It should also be noted that this interference is at its worst level only over a small geographic area corresponding to the center of the spot beams.

The effect of EchoStar 10 on the DIRECTV channels at 110°W in all but a very small number of beams is almost inconsequential in terms of the DIRECTV link availability.

Nevertheless, in a spirit of cooperation EchoStar has carefully analyzed ways it can reduce its EIRP in all of the overlapping spot beams, and proposed significant reductions in Section 6 of this document. These reductions will be burdensome for EchoStar but will allow the EchoStar 10 satellite to offer the basic level of service for which it was designed. With these reductions the interference into DIRECTV should be acceptable, particularly when considered in terms of the link availabilities. Any further reductions in the EchoStar 10 EIRP levels will significantly impact the service that the satellite can provide, yet make negligible difference to DIRECTV's operations at 110°W.

Therefore, EchoStar urges the Commission to permit EchoStar 10 to be operated according to the reduced EIRP levels given in this document.

Appendix 1

DIRECTV Link Budget from May 5, 2000 FCC Application for D5

(see next page)

Table 2. DIRECTV 5 Link Budget - CONUS (Chicago)

UPLINK	Clear	Rain Up	Rain Down
Transmit EIRP, dBW	77.9	90.0	77.9
Ground pointing loss, dB	-0.3	-0.3	-0.3
Uplink path loss, dB	-208.7	-208.7	-208.7
Atmospheric loss, dB	-0.1	-0.1	-0.1
Uplink rain loss, dB	0.0	-20.0	0.0
Satellite G/T, dB/K	4.1	4.1	4.1
Bandwidth, dB-Hz	-73.8	-73.8	-73.8
Boltzmann's constant, dBW	228.6	228.6	228.6
Uplink C/N (thermal), dB	27.7	19.8	27.7
DOWNLINK			
Satellite EIRP, dBW	52.1	52.1	52.1
Downlink path loss, dB	-205.7	-205.7	-205.7
Atmospheric loss, dB	-0.1	-0.1	-0.1
Downlink rain loss, dB (99.75% avail.)	0.0	0.0	-1.9
Rain temp increase, dB	0.0	0.0	-1.8
Ground receive pointing loss, dB	-0.3	-0.3	-0.3
Ground G/T (45 cm antenna), dB/K	12.4	12.4	12.4
Bandwidth, dB-Hz	-73.8	-73.8	-73.8
Boltzmann's constant, dBW	228.6	228.6	228.6
Downlink C/N (thermal), dB	13.2	13.2	9.5
TOTALS			
Uplink C/N (thermal), dB	27.7	19.8	27.7
Downlink C/N (thermal), dB	13.2	13.2	9.5
Crosspol interference, dB	18.9	17.1	18.2
Adjacent satellite interference, dB	21.8	21.8	21.8
Total C/(N+I), dB	11.6	10.7	8.6
Total Eb/(N+I)o	10.6	9.7	7.6
Required Eb/(N+I)o (high info rate)	7.0	7.0	7.0
Margin, dB	3.6	2.7	0.6

CERTIFICATION OF PERSON RESPONSIBLE

FOR PREPARING ENGINEERING INFORMATION

I hereby declare under penalty of perjury that I am the technically qualified person responsible for preparation of the engineering information contained in the foregoing submission, 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 pleading, and that it is true and correct to the best of my knowledge and belief.

_____/s/_____

Richard J. Barnett, PhD, BSc
Telecomm Strategies, Inc.
6404 Highland Drive
Chevy Chase, Maryland 20815
(301) 656-8969

Dated: February 2, 2006