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Federal Communications Commission  
Office of Secretary

Via HAND DELIVERY

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:

By this letter and the attached Supplemental Technical Annex, EchoStar Satellite L.L.C. ("EchoStar") hereby responds to the substance of two DIRECTV submissions made on February 3, 2006,<sup>1</sup> as well as to a DIRECTV letter filed February 13, 2006.<sup>2</sup> EchoStar also reports that, while the parties still have not reached agreement with respect to the operation of EchoStar 10 at the 110° W.L.

<sup>1</sup> See Response of DIRECTV Enterprises, LLC, filed in SAT-MOD-20051221-00267 (filed Feb. 3, 2006) ("DIRECTV Response"); Letter from William M. Wiltshire and Michael D. Nilsson, Counsel for DIRECTV Enterprises, LLC, to Marlene H. Dortch, Secretary, FCC, filed in SAT-LOA-20051221-00267 (formerly SAT-MOD-20051221-00267) (filed Feb. 3, 2006) ("Feb. 3 DIRECTV Letter").

<sup>2</sup> Letter from William M. Wiltshire and Michael D. Nilsson, Counsel for DIRECTV Enterprises, LLC to Marlene H. Dortch, Secretary, FCC, filed in SAT-LOA-20051221-00267 (formerly SAT-OD-20051221-00267) (filed Feb. 13, 2006) ("Feb. 13 DIRECTV Letter").

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orbital location, EchoStar will make an intensive new effort to reach agreement with DIRECTV over the next ten days.<sup>3</sup>

DIRECTV's demand for protection is excessive for the following reasons. *First*, DIRECTV's position is in essence that the cross-polar C/I levels for DIRECTV 5 should be left at the same level as would result from satellite operations nine degrees away or from a collocated CONUS satellite.<sup>4</sup> As the Supplemental Technical Annex explains, this position has an inevitable logical corollary: that there can be *no* spot beam operations on the three frequencies in question. *Any* spot beam operation would entail a difference in power with DIRECTV 5's CONUS operations that would result in cross-polar C/I below those to which DIRECTV demands protection.<sup>5</sup> DIRECTV specifically compares the cross-polar impact of EchoStar 10 to EchoStar 8 as if the latter were conducting spot beam operations on channels 27, 29 and 31.<sup>6</sup> In fact, as DIRECTV knows, this is not the case. While a spot beam satellite, EchoStar 8 performs only CONUS operations on these three channels. DIRECTV should not be heard when it calls for a restriction on spot beam power to the levels appropriate for the operation of a CONUS beam.<sup>7</sup> A rule preventing spot beam operations on three channels at 110° W.L. would run directly counter to the Commission's policy of promoting efficient and intensive use of DBS spectrum, the public interest in local-into-local service, and the same-dish mandate of SHVERA.

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<sup>3</sup> In this regard, EchoStar notes that DIRECTV has distorted the facts surrounding the negotiations between the parties. DIRECTV claims that it "has received no proposal from EchoStar other than the parameters provided in a February 3 *ex parte*." Feb. 13 DIRECTV Letter at 1. In fact, EchoStar submitted a confidential settlement proposal to DIRECTV on February 2.

<sup>4</sup> See DIRECTV Response at 8 ("DIRECTV seeks only protection to the level of inter-system interference that is the current industry norm . . ."); *id.* at 6 ("As the comparison of current and projected C/I levels in Exhibit 1 clearly shows, DIRECTV 5 achieves typical C/I levels in excess of 20 dB under the current inter-system interference environment -- a level that is common throughout the U.S. DBS orbital arc.").

<sup>5</sup> See Supplemental Technical Annex at 4-5 (analyzing necessary spot beam power levels and concluding that "cross-polar C/I levels [into DIRECTV 5], when spot beams satellites are used, will inevitably drop to values in the mid teens."); *id.* at 12 ("EchoStar has explained and demonstrated here that it is impossible to provide the high cross-polar C/I levels indicated by DIRECTV when a spot beam DBS satellite is used at the 110° W.L. orbital position.").

<sup>6</sup> DIRECTV Response at Exhibit 1.

<sup>7</sup> See, e.g., Feb. 13 DIRECTV Letter at 2 ("All DIRECTV asks is that EchoStar decrease the power of its spot beams using those channels so that they operate at levels more comparable to DIRECTV 5."). However, a "spot beam" operating at the power level of an older model CONUS satellite (such as DIRECTV 5) is essentially not a spot beam any more.

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*Second*, DIRECTV is trying to constrain EchoStar based on the low power levels of DIRECTV 5, an old satellite that DIRECTV has chosen to consign to its relative "Siberia" of three channels at 110° W.L.<sup>8</sup> This is a location where DIRECTV has the least amount of spectrum compared to its 101° W.L. and 119° W.L. slots, and it is perfectly understandable for DIRECTV to want to deploy older satellites at this slot prior to decommissioning. But such a choice should not become a basis for hampering the operation of adjacent channels on a state-of-the-art spot beam satellite.

*Third*, the "problem" of which DIRECTV complains is partly of its own creation. The alleged interference would be significantly ameliorated if DIRECTV were using receive dishes that comply with the ITU's cross-polarization discrimination value of 25 dB.<sup>9</sup> This is a respectable decision, and one that EchoStar too has made. But DIRECTV is now improperly attempting to leverage that business decision into a reason to restrict the spot beam power levels of the EchoStar 10 satellite.

*Fourth*, DIRECTV claims incorrectly that EchoStar used the wrong cross-polar interference and link availability values for the DIRECTV 5 satellite.<sup>10</sup> As the Supplemental Technical Annex shows,<sup>11</sup> EchoStar used the only values available for the relevant parameters -- those cited by DIRECTV in its original application for DIRECTV 5 in 2000. DIRECTV faults EchoStar for not using the more relevant values used in its 2005 application. The problem is that there are no such values. The 2005 application makes no mention of assumed link availability and does not separately identify the cross-polar C/I allowance. If DIRECTV raised its own expectations for the satellite's performance, it did not tell the Commission. In any event, the asserted increase in required availability to 99.9% is totally implausible: many of the DIRECTV 5 links produce availabilities well below the 99.9% level without any additional interference impact from the EchoStar 10 satellite. In other words, if that were DIRECTV's true goal, it would be impossible to achieve regardless of the EchoStar 10 satellite.

*Fifth*, DIRECTV also claims that the EchoStar 10 satellite would prevent the DIRECTV 5 satellite from using MPEG-4/8PSK compression and modulation technology with code rates up to ¾. As the Supplemental Technical Annex shows, a look at the applicable specification for the technology in

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<sup>8</sup> *Id.* at 8.

<sup>9</sup> *See id.* at 7-8.

<sup>10</sup> *See* Feb. 3 DIRECTV Letter at 1 ("First, although EchoStar recognizes that DIRECTV currently operates the DIRECTV satellite at 110° W.L. under the parameters requested in an application filed in may 2005.[sic] Nonetheless, its analysis chooses to focus on parameters requested for operation of the satellite five years earlier at a different orbital location.").

<sup>11</sup> Supplemental Technical Annex at 9-10.

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question shows this is simply not so.<sup>12</sup> The availability results for DIRECTV 5 would allow the satellite fully to achieve the Eb/No value given in the specification.

Finally, DIRECTV argues that the interference an operator accepts from its own system is irrelevant, because that operator also receives benefits elsewhere on its system that counter-balance the harm.<sup>13</sup> An effect from use of overlapping frequencies is either harmful interference or it is not, however. The answer does not change depending on who receives the benefits from that effect. DIRECTV does not cite any Commission precedent in support of this proposition. In fact, DIRECTV is pressing a new rule on the Bureau: that what an operator tolerates from itself is irrelevant in evaluating whether a third-party's operation causes it harm. The Bureau does not have authority from the Commission to enunciate such a rule,<sup>14</sup> and nor would it make sense from a policy standpoint. The levels of interference that an operator already accepts are highly relevant to determining what levels of interference are harmful.

The Supplemental Technical Annex also addresses and clarifies two points made by DIRECTV in its Response. *First*, it explains EchoStar's reference to a 23.3 dB cross-polar C/I level in its original application. DIRECTV quotes that reference out of context in its Response.<sup>15</sup> The main point of the discussion in which this C/I figure appears was to demonstrate numerically that the satellite antenna cross polar discrimination shortfall would have a negligible impact (0.47 dB) on the overall cross-polar C/I levels.<sup>16</sup> The 23.3 dB C/I figure was simply a reference calculation made on the assumption that the EIRP levels of the wanted and interfering satellites were the same. The purpose of this calculation was to put into perspective the relatively small impact of the satellite antenna cross-polar discrimination. Clearly, it was not meant to indicate that the precise situation of zero EIRP difference exists across the entire service area. *Second*, DIRECTV incorrectly asserts that accommodation of DIRECTV's three DBS channels at 110° W.L. would impact only 10% of the EchoStar 10 capacity.<sup>17</sup>

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<sup>12</sup> *Id.* at 10-11.

<sup>13</sup> Feb. 3 DIRECTV Letter at 2.

<sup>14</sup> *See, e.g.*, 47 C.F.R. § 0.261(b)(1)(iii) ("the Chief, International Bureau, shall not have authority: (1) to act on any application, petition, pleading, complaint, enforcement matter, or other request that . . . (iii) cannot be resolved under outstanding precedents and guidelines after consultation with appropriate Bureaus or Offices.").

<sup>15</sup> *See* DIRECTV Response at 4 (quoting EchoStar Application at Attachment A, p.14, filed in SAT-MOD-20051221-00267 (filed Dec. 21, 2005)).

<sup>16</sup> Supplemental Technical Annex at 7.

<sup>17</sup> DIRECTV Response at 8-9 (" . . . any accommodation required to protect DIRECTV 5 would have no effect on 90% of EchoStar 10's frequencies.").



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In fact, the EchoStar 10 satellite is only equipped to operate on ten downlink channels, and constraints on the operation of three of those channels would affect approximately 30% of the capacity of the satellite -- a fact acknowledged by DIRECTV in its February 13 letter.<sup>18</sup>

In sum, the FCC should balance the real impact on DIRECTV (which is best determined through a link availability assessment) with the real limitations on EchoStar 10 service that would result if high C/I requirements are dictated. EchoStar has already proposed significant reductions in certain spot beam EIRP levels, which would significantly improve the resulting C/I levels into DIRECTV. For these additional reasons, EchoStar respectfully requests that the Commission accept this proposal and allow EchoStar 10 to operate accordingly.

Please contact the undersigned if you have any questions regarding this filing.

Respectfully yours,



Pantelis Michalopoulos  
*Counsel for EchoStar Satellite Operating Corporation*

Attachment (Supplemental Technical Annex)

cc:

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

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<sup>18</sup> See, e.g., EchoStar Application at Attachment A, p.2. See also Feb. 13 Letter at 2.

## Supplemental Technical Annex

### 1. Background

This Supplemental Technical Annex has been prepared on behalf of EchoStar Satellite L.L.C. ("EchoStar") in response to the Response of DIRECTV Enterprises L.L.C. ("DIRECTV") dated February 3, as well as DIRECTV's letter to the FCC also dated February 3, both concerning the levels of cross-polar interference that will be caused by the EchoStar 10 satellite into DIRECTV's closely spaced satellite in the vicinity of 110°W.

Understandably, DIRECTV would like to have no neighbour at all at the 110° nominal orbital position, and DIRECTV makes the point that it benefits nothing from any additional interference caused by the EchoStar 10 satellite compared to the current situation of the EchoStar 8 satellite. However, cross-polar effects from a collocated EchoStar satellite operating on channels 27, 29 and 31 is an inevitable fact of life, which was fully known at the time the licenses for this orbital position were granted by the Commission. The question that both parties, and the Commission, have to address here is what is the appropriate level of cross-polar interference in this unique situation, given the evolving nature of the DBS industry and the need to use spot beam satellites for local-into-local service?

In its February 2 submission to the FCC on this matter, EchoStar provided the results of its detailed availability impact on the D5 satellite due to the proposed interference levels from the EchoStar 10 satellite, and included proposals for significant reductions in the EIRP levels of many of the EchoStar beams in order to minimize the impact on DIRECTV. The results showed almost insignificant decreases in the availability of the DIRECTV links, using DIRECTV's own link budget assumptions, and even those decreases occurred over very limited geographic areas corresponding to the beam peaks of the EchoStar 10 spot beams. In almost all cases the resulting availability was in excess

of the 99.75% level indicated in DIRECTV's own link budgets for the D5 satellite, and greater than 99.85% in many cases.

In its latest response DIRECTV chose not to address the availability impact of the EchoStar 10 interference, but discussed only the cross-polar C/I levels. In this supplemental technical annex EchoStar will also address only the cross-polar C/I levels despite the fact that the analysis of the resulting availability is the true way to understand the interference impact on DIRECTV. Nevertheless, EchoStar's previous availability analysis still stands and EchoStar would urge the Commission to continue to take careful note of those results.

## 2. C/I Assessment

The calculation of the cross-polar C/I levels is particularly simple. The only two parameters involved are:

- the cross-polar discrimination of the DIRECTV receiving earth stations, and
- the difference in EIRP levels between the DIRECTV and the EchoStar satellite at various geographic locations across the service area.<sup>1</sup>

For the analysis below we will assume full overlap of the EchoStar and DIRECTV channels, which implies a 1.05 dB bandwidth factor (due to the guard band between the channels).

The resulting C/I is therefore given by

$$C/I \text{ (dB)} = XPD_{\text{DIRECTV}} + EIRP_{\text{DIRECTV}} - EIRP_{\text{EchoStar}} + 1.05$$

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<sup>1</sup> The bandwidth overlap factor is also relevant but is a constant at either 1.05 dB or 4.06 dB, depending on whether there is half or full overlap. This in turn depends on which of the three channels (27, 29 and 31) are used in the particular beams of the EchoStar 10 satellite.

where:

$XP_{DIRECTV}$  is the cross-polar discrimination of the DIRECTV receive earth stations, assumed by DIRECTV to be 22 dB,

$EIRP_{DIRECTV}$  is the EIRP of the DIRECTV satellite which varies across the service area, and

$EIRP_{EchoStar}$  is the EIRP of the EchoStar satellite which also varies across the service area.

The above equation can therefore be written as

$$C/I \text{ (dB)} = 23.05 \text{ dB} + \Delta EIRP \text{ (dB)}$$

where

$\Delta EIRP$  is the difference in EIRP, in dB, between the DIRECTV and EchoStar satellites, and which varies across the service area.

From this equation a simple truth emerges. Fundamentally, the worst case C/I cannot be better than 23.05 dB unless the EchoStar satellite EIRP is less than the DIRECTV satellite EIRP level at all points in the service area.

### **3. Current Operational C/I Levels at the 110°W Orbital Position**

DIRECTV provides in its Exhibit 1 a summary of its calculation of the C/I levels at 110°W. This shows that the current EchoStar 8 satellite causes C/I levels of between 19.4 and 25.1 dB across CONUS, at the beam peak locations of the EchoStar 10 satellite.<sup>2,3</sup> Although the EchoStar 8 satellite includes some spot beam capability, it

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<sup>2</sup> Beam locations 46 and 47 are not included in the range cited here as they serve areas outside of CONUS (Alaska and Hawaii) and there are other special considerations in these parts of the service areas.



should be noted that EchoStar 8 is not capable of operating spot beams in the channels that overlap in frequency with those licensed to DIRECTV at 110°W, and EchoStar 8 only operates on the overlapping channels in its CONUS coverage beam. Therefore the C/I levels given in DIRECTV's Exhibit 1, as cited above, occur only as a result of the interaction of EchoStar's *CONUS beam operations* at 110°W, and have nothing to do with the use of spot beams. This is a very important point as it demonstrates that, even with two CONUS coverage satellites in operation at 110°W, the C/I levels drop to below 20 dB in some geographic locations. This is indicative of the inevitable fluctuations and differences in EIRP levels between two different satellites, albeit with a very similar CONUS coverage objective.

#### **4. Necessary Peak EIRP Levels of Spot Beam DBS Satellites**

Spot beam DBS satellites are the only way to provide comprehensive local DBS programming to the US public. These satellites conserve power and re-use frequencies in a manner that is totally different from a CONUS coverage satellite. Such satellites are already in use by both DIRECTV and EchoStar and they are an inevitable part of the future of the US DBS industry. The Commission already recognizes this and should continue to promote the use of these advanced technology satellites.

One of the fundamental characteristics of spot beam DBS satellites is the fact that they have high peak EIRP levels over a relatively small geographic area compared to a CONUS satellite beam. This is true regardless of whether the spot beam satellite belongs to EchoStar or DIRECTV. The two main reasons for this are as follows:

- a) Each spot beam is designed to cover one or more DMAs (Designated Market Areas). These DMAs are defined based on local market considerations and the result is that the geographic shape of the DMA is often unsuited to being served

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<sup>3</sup> There will likely be other locations in the CONUS service area where the C/I from EchoStar-8 falls below 19.4 dB.

by a near-circular satellite spot beam. This inevitably results in some parts of the DMA being at low relative EIRP levels in the spot beam, as much as 9 dB or so below beam peak in some instances. Therefore, in order to provide adequate service at these low relative EIRP levels, the peak EIRP of the spot beam inevitably has comparatively high EIRP .

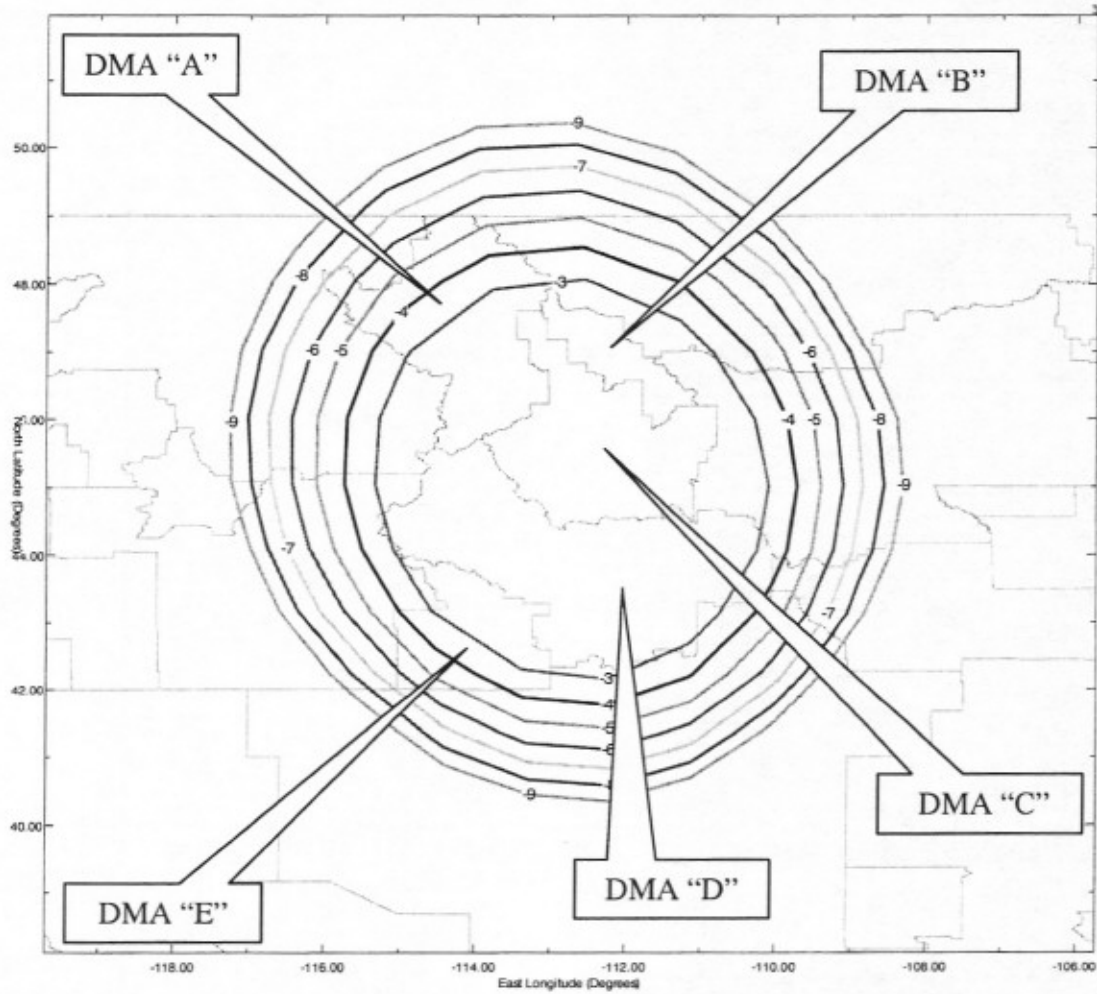
- b) The high level of spatial frequency re-use in a spot beam DBS satellite results in relatively high levels of intra-system interference levels resulting from the co-frequency operation of many beams. In the EchoStar 10 satellite some channels are re-used spatially up to 15 times. This effect results in worst case intra-system C/I levels, which usually occur at the edge of a beam, that are below 10 dB in many cases. Additional EIRP, over and above what would be required from a CONUS coverage DBS satellite, is required to overcome these high intra-system interference levels. This further increases the need for relatively high beam peak EIRP levels in a spot beam DBS satellite compared to a CONUS beam one.

The situation described in (a) above is shown by the example in Figure 2-1 below. This shows EchoStar 10 spot beam 37 superimposed on the DMA map. This beam has been designed to have the capability to serve five DMAs, labelled here as A, B, C, D and E. The EIRP contours are shown in 1 dB steps from -3 to -10 dB. The edge of DMA "A" extends out to approximately the -7.5 dB relative EIRP contour level, but by the time an allowance for best case beam pointing has been included this is equivalent to the -9.5 dB relative EIRP level. There are many other similar examples in the different beams of the EchoStar 10 system.

For the example beam shown in Figure 2-1 the minimum EIRP at the edge of DMA "A" is approximately 49.5 dBW, taking account of the rain effects at this location in CONUS and other link degradations, in order to give an acceptable link availability with modest throughput. This implies the beam peak EIRP for this beam would need to be  $49.5 + 9.5 = 59$  dBW. This compares with the DIRECTV D5 EIRP at this location which is approximately 51 dBW. Therefore the  $\Delta$ EIRP in this case (at the beam peak) is -8.0 dB,

and so the resulting  $C/I$  (according to the equation presented above) is  $23.05 - 8.0 = 15.05$  dB. This clearly demonstrates that cross-polar  $C/I$  levels, when spot beams satellites are used, will inevitably drop to values in the mid teens.

Figure 2-1 Example EchoStar 10 Spot Beam 37 Covering Five DMAs



**5. EchoStar's Reference to a 23.3 dB C/I Level**

In its latest pleading DIRECTV makes much ado about EchoStar's reference to a 23.3 dB C/I level in the EchoStar 10 FCC application. This reference was from a portion of the EchoStar application that addresses the waiver request for the 1.7 dB shortfall in satellite antenna cross-polar discrimination.<sup>4</sup> The purpose of the discussion at this point in the document was to demonstrate numerically that the satellite antenna XPD shortfall has negligible impact (0.47 dB) on the overall cross-polar C/I levels, because they are dominated by the much lower receive earth station XPD levels.<sup>5</sup> A reference calculation was made assuming that the EIRP levels of the wanted and interfering satellites were the same. Clearly this was not meant to indicate that this precise situation of zero EIRP difference exists across the entire service area. It was just a reference calculation in order to put in perspective the relative impact of the satellite antenna XPD. EchoStar is confident that this did not mislead the DIRECTV engineers or the Commission staff, as DIRECTV has suggested it did.

**6. DIRECTV's Receive Earth Station XPD Performance**

DIRECTV has indicated a cross-polar discrimination level for its receive earth stations of only 22 dB. As noted in Section 2 above, this performance parameter is absolutely key in determining the cross-polar C/I levels. The reference receive earth station mask given in ITU Appendix 30 gives an XPD value of 25 dB. If DIRECTV's receive earth stations met the ITU mask then the cross-polar C/I levels would be 3 dB better than DIRECTV is currently calculating. Presumably when DIRECTV chose to deploy such non-conforming

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<sup>4</sup> Such waiver requests are perfectly normal with DBS satellites of this type, both EchoStar's and DIRECTV's. This waiver request does not significantly affect the overall cross-polar interference levels from EchoStar 10 into DIRECTV's satellite at 110°W.

<sup>5</sup> In the cited text from the EchoStar 10 FCC application the receive earth station XPD was assumed to be 25 dB (as per ITU Appendix 30), and it should be noted that with DIRECTV's even lower receive earth station XPD performance of 22 dB, the relative impact of the satellite XPD shortfall is even less than 0.47 dB.



receive earth stations operating with the 110°W satellite it was fully aware of the consequences in terms of potential cross-polar interference from EchoStar's future satellites. There could not have been the expectation that the EchoStar satellite EIRP would never be higher than the DIRECTV satellite EIRP at all points in the service area. In other words, DIRECTV cannot now claim that its needs high levels of cross-polar interference protection when it willingly deployed earth stations that do not conform to ITU standards and hence significantly aggravate this interference situation.

**7. DIRECTV's D5 Satellite is a Very Low Power Satellite**

The D5 satellite is one of DIRECTV's lowest EIRP level satellites. As noted in Section 2 above, the EIRP of the DIRECTV satellite at 110°W is a key factor in determining the cross-polar C/I levels. It would therefore be inappropriate to significantly hamper the capability of the EchoStar 10 satellite because of DIRECTV's continued use of an old-generation satellite design at this orbital location.

**8. Significant Proportion of EchoStar 10's Capacity is Affected**

DIRECTV states in its latest pleading that any constraints on channels 27, 29 and 31 for EchoStar should not be a problem because, according to DIRECTV, these three channels amount to only 10 % of the EchoStar 10 capacity, and EchoStar is otherwise unconstrained in the remaining 26 channels. This is completely wrong. The EchoStar 10 satellite is only able to operate on ten downlink channels, and constraints in three of those channels will affect approximately 30% of the EchoStar 10 capacity.

**9. Additional Points Raised by DIRECTV in its February 3 Letter to the FCC**

DIRECTV makes three points in its February 3 letter to the FCC on this matter. Each of these points is addressed in the sub-sections below.

## 9.1 EchoStar's Reference to the Original D5 Application

DIRECTV asserts that EchoStar should have made reference to the May 2005 FCC application of DIRECTV concerning the D5 satellite move to the 110°W orbital location (from its operation at a Canadian orbital position) rather than the original 2000 application for the D5 satellite. DIRECTV states that its 2005 application uses different and more relevant parameters than its 2000 application (for the same satellite), and cites the differences in link availability and allowance for cross-polar C/I as evidence of this.

Unfortunately, what DIRECTV now states concerning its 2005 application is not evident from reading that application. DTV states that its 2005 application assumed a link availability of 99.9% and a C/I allowance for cross-polar interference of 22.9 dB. We have been unable to find these data in the 2005 FCC application for D5. The link budget given in Table A-1 of that application makes no mention of assumed link availability and does not separately identify the cross-polar C/I allowance.<sup>6</sup> It is for this precise reason that EchoStar chose to use the data from the original 2000 D5 application in the previous EchoStar analysis. Essentially, there were no relevant data available in the 2005 application on which to base the analysis.

The latest data DIRECTV now claims concerning the assumed link availability (99.9%) and cross-polar C/I allowance (22.9 dB) for the D5 satellite appear to be wishful thinking in more ways than one. As EchoStar demonstrated in its previous analysis of the availability of the D5 links, many of the example links only produce availabilities well below the 99.9% level without any additional interference impact from the EchoStar 10 satellite. This leads one to question how the availability objective can be as high as

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<sup>6</sup> The DIRECTV link budget does state an overall C/I allowance of 17.4 dB for "Total inter- and intra-system C/I, dB (incl. x-pol, ASI, ACI, ABI)", but does not specify how this overall allowance is apportioned between the different interference components, and therefore does not state the allowance for cross-polar C/I. There is no mention in the 2005 D5 application of an allowance of 22.9 dB for cross-polar C/I as DIRECTV now states.

99.9%.<sup>7</sup> Similar comments apply to DIRECTV's idealized 22.9 dB cross-polar C/I allowance. DIRECTV's own assessment of the existing cross-polar C/I levels from the EchoStar 8 satellite at 110°W show that the levels drop to 19.4 dB in some cases, and probably less if a comprehensive analysis was performed.<sup>8</sup> This appears to be much more consistent with DIRECTV's 2000 application, which allowed for C/I levels as low as 18.2 dB, rather than the extraordinarily high level of 22.9 dB now suggested by DIRECTV. Clearly a minimum cross-polar C/I objective of 22.9 dB is completely inconsistent with the current operational situation at the 110°W orbital position, and would not be achievable with any realistic future scenario of DIRECTV and EchoStar satellites at this location.

Therefore, EchoStar's use of the original 2000 D5 application as the basis of its availability analysis of the DIRECTV links was not an attempt to select the data that best served its purpose. Rather, the data used by EchoStar were the *only* available and relevant D5 data that was available for this analysis.

## 9.2 Eb/No Objective for DIRECTV links

Throughout EchoStar's entire availability analysis an Eb/No objective of 7 dB (as stated by DIRECTV in its 2000 D5 application) was assumed for the DIRECTV links. Therefore all of EchoStar's availability results for the DIRECTV links are based on this Eb/No objective. In addition EchoStar did make one observation in its assessment of the results, in Section 6 of its previous Technical Annex, as follows:

"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

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<sup>7</sup> In fact, only six of the 18 links examined achieve 99.9% availability or greater even without the additional EchoStar 10 interference. Many of the links that fail to meet 99.9% availability do so by a very large amount, with values in the 99.7% to 99.8% occurring in many of the links.

<sup>8</sup> DIRECTV's analysis that concluded the minimum C/I level of 19.4 dB was based only on the EchoStar 10 beam peak locations, which bear no relation to the worst case EIRP levels of the EchoStar 8 CONUS beam.

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.

In response to this DIRECTV has stated that DIRECTV would not be able to operate the D5 satellite with MPEG-4/8PSK technology with code rates up to  $\frac{3}{4}$  in the presence of the EchoStar 10 interference. However, DIRECTV fails to support this bold assertion with any facts, and we show below that this claim is simply not true.

The latest available DVB-S2 specification (ETSI EN 302 307 V1.1.1 (2005-03)) lists the error performance in Section 6 (page 33). For 8PSK with rate  $\frac{3}{4}$  coding the  $E_s/N_0$  value given in this specification is 7.91 dB for a spectral efficiency of 2.228124. This corresponds to an  $E_b/N_0$  of 4.43 dB and a  $C/N$  of 7.91 dB.<sup>9</sup> This compares very favorably with the  $C/N$  objective used in EchoStar's availability analysis of the DIRECTV D5 links, which was 8.0 dB, as given in the original DIRECTV D5 link budget. Therefore, all of EchoStar's previous availability results would appear to be compatible with DIRECTV's use of MPEG-4/8PSK technology with code rates up to  $\frac{3}{4}$ , and DIRECTV's concerns about EchoStar 10 "spoiling" the evolution of DBS services on the D5 satellite are unfounded.

### 9.3 DIRECTV's Philosophical Approach to Intra versus Inter System Interference

The essence of DIRECTV's argument here is that inter-system interference must be kept to the absolute minimum possible value because the "victim" system sees none of the benefits of a rationale overall apportionment of interference. Clearly such a unilateral view of this issue would be inconsistent with overall Commission objectives of optimizing the overall use of the spectrum.

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<sup>9</sup> Assuming that the symbol rate is equal to the noise bandwidth, which is a common approach in dealing with the relationships between these parameters.



## **10. Conclusions**

EchoStar has explained and demonstrated here that it is impossible to provide the high cross-polar C/I levels indicated by DIRECTV when a spot beam DBS satellite is used at the 110°W orbital position. Any DBS operator must accept the reality of the situation and the fact that the interference environment changes as DBS technology progresses. DIRECTV has deployed receive earth stations with relatively poor XPD performance and must accept the consequences of this. The FCC should balance the real impact on DIRECTV (which is best determined through a link availability assessment) with the real limitations on EchoStar 10 service that would result if high C/I requirements are dictated. EchoStar has already proposed significant reductions in certain spot beam EIRP levels which have significantly improved the resulting C/I levels into DIRECTV. EchoStar urges the Commission to accept this proposal and allow the EchoStar 10 satellite to operate accordingly.

**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/\_\_\_\_\_  
\_\_\_\_\_

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