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## BY ELECTRONIC FILING AND U.S. MAIL

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

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Re: DIRECTV Enterprises LLC  
FCC File Nos. SAT-AMD-20080321-00077; SAT-AMD-20080114-00014;  
SAT-LOA-2006-0908-00100 (Call Sign S2712);  
SAT-AMD-20080114-00013 (Call Sign S2711)  
Spectrum Five LLC  
FCC File No. SAT-LOI-20081119-00217 (Call Sign S2778)

Dear Ms. Dortch:

DIRECTV's January 2008 amended application to provide Broadcast Satellite Service ("BSS") from the nominal 103° W.L. orbital location<sup>1</sup> suffers from a fundamental flaw: the application attempts to use link budget calculations to establish DIRECTV's compliance with the Commission's maximum power flux density ("PFD") limits. No other 17/24 GHz BSS applicant has applied this defective methodology, and for a simple reason: the two concepts are diametrically opposed to one another. DIRECTV attempted to boost its own power levels—which would degrade the signals of neighboring satellites—by surreptitiously substituting *maximum*-loss link budget calculations in place of *minimum*-loss PFD calculations. This methodology, which establishes compliance with PFD limits only during particular weather conditions, was not a mistake, and a careful review of all of DIRECTV's applications in the Reverse Band reveals that this unsanctioned methodology was used throughout.<sup>2</sup> DIRECTV's

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<sup>1</sup> *Application of DIRECTV Enterprises, LLC To Amend Its Application for Authorization To Launch and Operate DIRECTV RB-2, a Satellite in the 17/24 GHz Broadcasting Satellite Service at 103° W.L.* (Jan. 14, 2008), FCC File No. SAT-AMD-20080114-00014 ("DIRECTV 103° W.L. Amendment"), *accepted for filing*, Public Notice, *Satellite Space Applications Accepted for Filing*, Rpt. No. SAT-00535, 2008 WL 2627669, at \*3 (rel. July 2, 2008) ("IB Acceptance Notice").

<sup>2</sup> *See, e.g., Application of DIRECTV Enterprises, LLC To Amend Its Application for Authorization To Launch and Operate DIRECTV RB-1, a Satellite in the 17/24 GHz Broadcasting Satellite Service at 99° W.L.*, FCC File No. SAT-AMD-20080114-00013, Ex. B, at 12 (Jan. 14, 2008), *accepted for filing*, IB Acceptance Notice, 2008 WL 2627669, at \*2; *Application of DIRECTV Enterprises, LLC To Amend Its Application for Authorization To Launch and Operate DIRECTV RB-3, a Satellite in the 17/24 GHz Broadcasting Satellite Service at 107° W.L.*, FCC File No. SAT-AMD-20080114-00015, Ex. B, at 12 (Jan. 14, 2008), *accepted for filing (corrected)*, Public Notice, *Satellite Space Applications Accepted for Filing*, Rpt. No. SAT-00537, 2008 WL 2714535, at \*1 (rel. July 11, 2008); *Application of DIRECTV Enterprises, LLC To Amend Its Application for Authorization To Launch and*

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proposed space station would be in flagrant violation of § 25.208(w) of the Commission's rules,<sup>3</sup> making DIRECTV's application defective and subject to immediate dismissal.

Spectrum Five LLC ("Spectrum Five") demonstrated the flaws in DIRECTV's use of link budgets in its ex parte submission on January 12, 2009.<sup>4</sup> DIRECTV'S response of February 19, 2009, is remarkable in that it utterly fails to dispute the scientific analysis presented by Spectrum Five.<sup>5</sup> Unfortunately for DIRECTV, the scientific facts are incontrovertible. DIRECTV's use of link budget calculations results in its proposed space station exceeding the Commission's PFD limits. The International Bureau ("the Bureau") must simply determine whether DIRECTV's amended application of January 2008 "provide[d] a demonstration"<sup>6</sup> of meeting the relevant PFD limits "for all conditions."<sup>7</sup>

A 17/24 GHz BSS space station must not exceed § 25.208(w)'s PFD limits under *any* conditions—rain or shine, hot or cold, wet or dry. For this reason, § 25.208(w)—as modified by § 25.140(b)(4)(iii)—establishes maximum PFD limits that apply "for all conditions, including clear sky."<sup>8</sup> Spectrum Five's January 12 submission accordingly confirmed two fatal defects in DIRECTV's attempt to "demonstrat[e]"<sup>9</sup> compliance with these rules. First, DIRECTV's application calculated "clear sky" PFD levels based on the effects of clouds. As DIRECTV has already conceded,<sup>10</sup> a "clear sky" is one without clouds. This error rendered DIRECTV's

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*Operate DIRECTV RB-4, a Satellite in the 17/24 GHz Broadcasting Satellite Service at 111° W.L.*, FCC File No. SAT-AMD-20080114-00016, Ex. B, at 12 (Jan. 14, 2008), *accepted for filing*, IB Acceptance Notice, 2008 WL 2627669, at \*1; *Application of DIRECTV Enterprises, LLC To Amend Its Application for Authorization To Launch and Operate DIRECTV RB-5, a Satellite in the 17/24 GHz Broadcasting Satellite Service at 119° W.L.*, FCC File No. SAT-AMD-20080114-00017 (Jan. 14, 2008), *accepted for filing*, IB Acceptance Notice, 2008 WL 2627669, at \*1, *dismissed*, Public Notice, *Actions Taken*, Rpt. No. SAT-00569, 2008 WL 5205209 (rel. Dec. 12, 2008) ("IB Dismissal Notice"); *see also* Petition for Declaratory Ruling To Serve the U.S. Market from the 118.8° W.L. Orbital Location in the 17/24 Broadcasting Satellite Service Band, *In re Spectrum Five LLC*, FCC File No. SAT-LOI-20081113-00216, at 3, 9-12 (Nov. 13, 2008) (describing the flaws in the nominal 119° application).

<sup>3</sup> 47 C.F.R. § 25.208(w).

<sup>4</sup> Letter from Howard W. Waltzman, Counsel for Spectrum Five, LLC, to Marlene H. Dortch, Sec'y of the FCC (Jan. 12, 2009), FCC File No. SAT-AMD-20080114-00014 ("Spectrum Five Jan. 12 Opposition"); *see also* Order, *In re DIRECTV Enters., LLC, Application for 17/24 GHz BSS Satellite at 102.825° W.L.*, DA 09-204, para. 3, n.2 (rel. Feb. 9, 2009) ("IB Feb. 9 Order") (considering Spectrum Five's January 12 submission as an informal objection).

<sup>5</sup> Letter from William M. Wiltshire, Counsel for DIRECTV Enters., LLC, to Marlene H. Dortch, Sec'y of the FCC (Feb. 19, 2009), FCC File Nos. SAT-AMD-20080114-00013 and -00014 ("DIRECTV Feb. 19 Response").

<sup>6</sup> § 25.114(d)(15)(i).

<sup>7</sup> § 25.208(w).

<sup>8</sup> *Id.*; *see also* § 25.140(b)(4)(iii) (requiring BSS space stations operating off-grid to adjust their maximum PFD levels accordingly).

<sup>9</sup> *See* § 25.114(d)(15)(i) (requiring each applicant to "provide a demonstration that the proposed space station will comply with the power flux density limits set forth in § 25.208(w) of this part").

<sup>10</sup> *See* Letter from William M. Wiltshire, Counsel to DIRECTV Enters. LLC, to Marlene H. Dortch, Sec'y of the FCC, at 2 (Dec. 8, 2008), FCC File No. SAT-AMD-20080114-00014 ("DIRECTV Dec. 8 Ex Parte").

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“demonstration” of compliance incomplete,<sup>11</sup> and thus requires dismissal of the application.<sup>12</sup> Second, even after removing cloud effects, DIRECTV’s application relied on technically indefensible estimates drawn from its link budgets. Link budgets calculate the *maximum* possible atmospheric loss, so as to guarantee that even in the face of high losses, the signal will remain available. By contrast, to comply with the Commission’s maximum PFD limits, DIRECTV should have calculated the *minimum* possible atmospheric loss, so as to guarantee that even when losses are slight, the signal at the earth’s surface will not be too strong. Because DIRECTV inappropriately substituted a maximum measure for a minimum measure, its compliance with PFD limits is highly dependent on whether that maximum is reached, which in turn depends on local weather conditions. The calculations in Spectrum Five’s previous submission, which DIRECTV does not challenge, showed that the proposed satellite would routinely and substantially violate the PFD limits.<sup>13</sup> Indeed, the analysis in the attached Technical Appendix shows that even if DIRECTV had properly followed its own methodology, it would have found that its satellite would violate applicable PFD limits *at least 90% of the time*.<sup>14</sup>

Although the Bureau afforded DIRECTV an opportunity to address such arguments,<sup>15</sup> nothing in DIRECTV’s February 19 response refutes Spectrum Five’s contentions. Instead, DIRECTV relentlessly pursues a straw man—whether the term “clear sky” is synonymous with “free space,” a position on which Spectrum Five has never relied—and begs the Bureau’s indulgence by requesting another opportunity to amend its application, even while refusing to admit that such an amendment would be necessary. In fact, no such indulgence is proper here. There is no reasonable interpretation of “for all conditions” that permits a satellite to exceed the PFD limits at the earth’s surface *almost all of the time*. And no other satellite operator shares DIRECTV’s alleged confusion.

Rather than obey the Commission’s rules, DIRECTV has chosen to flout them, proposing a space station whose compliance would be as variable and as unpredictable as the weather. DIRECTV now has the temerity to ask the Bureau to waive the requirements of the first-come, first-served system and to grant DIRECTV a second chance to design a compliant satellite, even as it refuses to admit the error it seeks to correct.<sup>16</sup> The Bureau should refuse DIRECTV’s unwarranted request and dismiss the application as defective.

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<sup>11</sup> § 25.114(d)(15)(i).

<sup>12</sup> See § 25.112(a)(2), (b) (providing that an application that “does not substantially comply with the Commission’s rules” is unacceptable for filing and must be dismissed).

<sup>13</sup> Spectrum Five Jan. 12 Opposition at 9.

<sup>14</sup> See *infra* App. A. As the analysis in that Technical Appendix indicates, DIRECTV’s other 17/24 GHz BSS applications suffer from the same flaws.

<sup>15</sup> IB Feb. 9 Order, para. 3, n.2.

<sup>16</sup> DIRECTV Feb. 19 Response, at 4-5.

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**I. The “clear sky” rule forbids reliance on variable weather conditions.**

Section 25.208(w) of the Commission’s rules establishes maximum PFD levels at the earth’s surface “for all conditions, including clear sky.” The Commission has described the losses under “clear-sky” conditions as “the intrinsic atmospheric attenuation due to gases and water vapor . . . , without additional attenuation due to tropospheric precipitation, such as rain or snow.”<sup>17</sup> This “intrinsic” attenuation caused by the atmosphere itself is the loss “which is *always present* as a link attenuation”—due to the oxygen and water vapor always present in the atmosphere—as opposed to loss caused by particular weather conditions (such as cloud cover, elevated temperatures, or high humidity) that may or may not be present at different times and in different places.<sup>18</sup> Even were there any residual ambiguity in the term “clear sky,” the context provided by § 25.208(w)—“for all conditions, including clear sky”—eliminates it. While the earth is always surrounded by “hundreds of miles of atmosphere,”<sup>19</sup> that atmosphere is not always at the same temperature or humidity, as weather conditions may vary. Yet satellite operators must avoid interference at the earth’s surface and comply with the relevant PFD limits, in DIRECTV’s own words, “at all times . . . , even when there is not a cloud in the sky.”<sup>20</sup>

DIRECTV erroneously equates its own inflated link budget estimates with “the intrinsic atmospheric attenuation due to gasses and water vapor.”<sup>21</sup> DIRECTV estimated PFD levels at the earth’s surface by calculating signal strength in a vacuum (i.e., in “free space”) and then subtracting a significant amount attributed to “atmospheric attenuation.”<sup>22</sup> In its initial petition criticizing this calculation, Spectrum Five did not address whether “clear sky” and “free space” had the same meaning, but rather argued that DIRECTV’s estimate of “atmospheric attenuation” was inherently unreliable, due to its potential inclusion of “highly variable effects due to moisture and clouds in the atmosphere.”<sup>23</sup> Because DIRECTV’s unexplained estimate appeared

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<sup>17</sup> Notice of Proposed Rulemaking, *In re Establishment of Policies & Serv. Rules for the Broad. Satellite Serv. at the 17.3-17.7 GHz Frequency Band & at the 17.7-17.8 GHz Frequency Band Internationally, & at the 24.75-25.25 GHz Frequency Band for Fixed Satellite Servs. Providing Feeder Links to the Broad.-Satellite Serv. & for the Broad. Satellite Serv. Operating Bidirectionally in the 17.3-17.7 GHz Frequency Band*, 21 F.C.C.R. 7426, para. 49 n.126 (rel. June 23, 2006) (“BSS NoPR”).

<sup>18</sup> See Petition for Declaratory Ruling, *In re Spectrum Five LLC, Petition for Declaratory Ruling to Serve the U.S. Market from the 119.0° W.L. Orbital Location in the 17/24 Broadcasting Satellite Service Band*, Ex. A (Technical Narrative), at 15 (filed Sep. 10, 2008), FCC File No. SAT-LOI-20080910-00178 (emphasis added). DIRECTV inappropriately presents this language as contradicting Spectrum Five’s interpretation of the “clear sky,” when in fact the two are precisely in accord. See DIRECTV Feb. 19 Response at 4 n.11.

<sup>19</sup> DIRECTV Feb. 19 Response at 2.

<sup>20</sup> *Id.*

<sup>21</sup> BSS NoPR para. 49 n.126.

<sup>22</sup> DIRECTV 103° W.L. Amendment, App. B, at 12.

<sup>23</sup> See Petition for Declaratory Ruling To Serve the U.S. Market from the 103.15° W.L. Orbital Location in the 17/24 Broadcasting Satellite Service Band at 6, *In re Spectrum Five LLC* (Nov. 19, 2008), FCC File No. SAT-LOI-20081119-00217 (“Spectrum Five 103.15° W.L. Petition”).

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to depend on such variable weather conditions, Spectrum Five argued that this estimate should be excluded from the analysis entirely.<sup>24</sup>

In response to Spectrum Five's prodding, DIRECTV finally explained the basis for its "atmospheric attenuation" estimate in December,<sup>25</sup> revealing that the estimate indeed incorporated adjustments for clouds and conceding that the use of cloud effects "would not be appropriate for use in a calculation based on 'clear sky' conditions."<sup>26</sup> As Spectrum Five has pointed out,<sup>27</sup> this concession is fatal to DIRECTV's application: because Commission rules required DIRECTV to "provide a demonstration" of compliance in its amended application in January 2008,<sup>28</sup> not in an ex parte presentation eleven months later. DIRECTV's latest submission does not dispute this obligation to provide a complete demonstration of compliance. Instead, it asserts in passing that "'clear sky' conditions include atmospheric effects – . . . even clouds."<sup>29</sup> This position would hardly merit reply even if DIRECTV had not previously conceded the contrary, and even if the context did not require compliance "for all conditions."<sup>30</sup> Certainly, the ordinary meaning of "clear sky" requires "[a] sky free of clouds."<sup>31</sup> DIRECTV violated the Commission's rules by submitting an application that demonstrates compliance only in cloudy weather, and not "for all conditions, including clear sky."<sup>32</sup>

In addition to relying on cloud effects, DIRECTV's amended application incorporated adjustments for gaseous losses and scintillation fading drawn from DIRECTV's link budgets.<sup>33</sup> Spectrum Five's opposition of January 12, 2009, explained what was wrong with such calculations, and, in particular, with the use of *maximum* loss figures from link budgets in place of the *minimum* loss figures appropriate for intrinsic attenuation.<sup>34</sup> Because these link budgets assume extreme conditions of high temperatures and humidity, DIRECTV employed a

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<sup>24</sup> See *id.* at 3 (stating that "DIRECTV improperly relies on weather and atmospheric conditions to radically boost power levels"); *id.* at 9 ("Clear sky conditions, without doubt, do not include weather variable effects due to cloud cover and increased humidity levels in the atmosphere. From an interference standpoint, clouds over Miami have nothing to do with the interference level experienced by a subscriber in sunny Los Angeles receiving a signal from an adjacent satellite. . . . Applying PFD limits with atmospheric loss presumes that clouds and other moisture effects in the atmosphere will limit interference in all places at all times. However, these atmospheric effects are weather related and will vary significantly over time and location."); see also Letter from Howard W. Waltzman, Counsel for Spectrum Five, LLC, to Marlene H. Dortch, Sec'y of the FCC, at 5 (Dec. 19, 2008), FCC File No. SAT-AMD-20080114-00014 ("Spectrum Five Dec. 19 Letter") (arguing that DIRECTV's estimate "includes variable effects due to clouds and increased humidity in the atmosphere").

<sup>25</sup> See DIRECTV Dec. 8 Ex Parte.

<sup>26</sup> *Id.* at 2.

<sup>27</sup> Spectrum Five Jan. 12 Opposition at 6-7.

<sup>28</sup> § 25.114(d)(15)(i).

<sup>29</sup> DIRECTV Feb. 19 Response at 3.

<sup>30</sup> § 25.208(w).

<sup>31</sup> Am. Meteorological Soc'y, Glossary of Meteorology (2d ed. 2000), <http://amsglossary.allenpress.com/glossary/browse?s=c&p=38>.

<sup>32</sup> § 25.208(w).

<sup>33</sup> See DIRECTV Dec. 8 Ex Parte at 2; Spectrum Five Jan. 12 Opposition at 4.

<sup>34</sup> See Spectrum Five Jan. 12 Opposition at 4, 6-9.

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scientifically indefensible methodology for determining maximum PFD levels at the earth's surface for *all* weather conditions.<sup>35</sup> Indeed, DIRECTV's figures are completely dependent on variable weather conditions. DIRECTV's link budgets estimate atmospheric losses during the hottest and most humid 0.4% of the year, and do not accurately reflect signal strength during the other 99.6% of the year.<sup>36</sup> By relying on its link budgets, DIRECTV guaranteed that its proposed space station would routinely and substantially exceed the maximum PFD limits during cooler and drier conditions. In fact, as the Technical Appendix demonstrates, DIRECTV's proposed space station should be expected to exceed applicable PFD limits more than 90% of the time.<sup>37</sup> As a result, DIRECTV cannot pretend that its satellite would comply with the PFD limits "for all conditions, including clear sky."<sup>38</sup>

## **II. The Commission's rules contain no ambiguity entitling DIRECTV to a second chance.**

Despite having had more than a month since Spectrum Five's January 12 submission to rebut these arguments, DIRECTV offers no response to them whatsoever. DIRECTV does not rescind its prior concession that reliance on cloud effects was in violation of the rules, nor does it contest Spectrum Five's conclusion that the proposed 103° W.L. space station would, under perfectly typical weather conditions, routinely and substantially exceed the maximum PFD limits at the earth's surface. Instead, DIRECTV rests only on an unsupported claim of "ambiguity." There is nothing ambiguous in the phrase "for all conditions," nor in § 25.208(w)'s quantified power limits, and DIRECTV should be denied the opportunity to remedy this glaring and fatal defect in its application.

### **A. The Commission's requirement of compliance "for all conditions, including clear sky" is not ambiguous.**

DIRECTV's only arguments for ambiguity rest on a claim that Spectrum Five has somehow altered its position since last November. But Spectrum Five's position has always been consistent: that compliance with maximum PFD limits "for all conditions" cannot depend on *variable* weather conditions, such as cloud cover or increased humidity.<sup>39</sup> Before DIRECTV explained the basis for its loss estimates, Spectrum Five argued that the mysterious "attenuation" term should be struck altogether;<sup>40</sup> once DIRECTV described its methodology in more detail, Spectrum Five showed how that methodology was irremediably flawed.<sup>41</sup>

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<sup>35</sup> See generally *id.*

<sup>36</sup> See *id.* at 8.

<sup>37</sup> See App. A.

<sup>38</sup> § 25.208(w).

<sup>39</sup> See sources cited *supra* notes 23-24.

<sup>40</sup> See *id.*

<sup>41</sup> See generally Spectrum Five Jan. 12 Opposition.

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More generally, ambiguity does not depend on the actions of private parties, but on the language used by the *Commission*. A regulation is not ambiguous if “a regulated party acting in good faith would be able to identify, with ascertainable certainty, the standards with which the agency expects parties to conform.”<sup>42</sup> As the Commission has stated, “[i]t is well established that any applicant who ‘either ignores or fails to understand clear and valid rules of the Commission respecting the requirements for an application assumes the risk that the application will not be acceptable for filing.’”<sup>43</sup> The Commission has also repeatedly affirmed that the text of an order must be read in the context of the regulation.<sup>44</sup> Here, the context of § 25.208(w)—including the term “clear sky” within “all conditions”—and that section’s obvious purpose of preventing excessive interference regardless of the weather both forbid reliance on variable weather conditions in establishing compliance with PFD limits.

DIRECTV has never before suggested that § 25.208(w) is so ambiguous as to require clarification. It has never indicated what part of “clear sky” suggests that DIRECTV could incorporate cloud effects, or why it thought figures drawn from maximum-loss link budgets would be appropriate for a minimum-loss analysis “for all conditions.” Indeed, DIRECTV offers *no reasonable alternative interpretation* of § 25.208(w) under which its unacceptable methodology could possibly have been thought acceptable. As the Commission has previously held in such circumstances, DIRECTV’s cry of “not fair”<sup>45</sup> rings hollow when it has no alternative reading to suggest.<sup>46</sup>

Nor has any other applicant found § 25.208(w) difficult to comprehend. While DIRECTV claims that “additional guidance . . . would be helpful to all 17/24 GHz BSS

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<sup>42</sup> *Trinity Broad. Co. of Fla. v. FCC*, 211 F.3d 618, 628 (D.C. Cir. 2000) (quoting *Gen. Elec. Co. v. EPA*, 53 F.3d 1324, 1329 (D.C. Cir. 1995)).

<sup>43</sup> Order on Reconsideration, *In re Burlington Cablevision, Inc.*, 13 F.C.C.R. 772, 777 (1998) (quoting *Ranger v. FCC*, 294 F.2d 240, 242 (D.C. Cir. 1961)).

<sup>44</sup> See, e.g., Letter from Peter H. Doyle, Chief, Audio Div., Media Bureau, to Matinee Radio, LLC (Aug. 22, 2005), 20 F.C.C.R. 13,713, 13,715 (“Properly read in context, it can be seen that there is no ambiguity and that Matinee’s reading is in error.”); Memorandum Opinion and Order, *In re Colo. Christian Univ.*, 16 F.C.C.R. 4326, 4328 (2001) (rejecting an interpretation “necessarily founded on a strained and selective parsing” of the Commission’s rules); Memorandum Opinion and Order, *In re Broadwave Albany LLC*, 16 F.C.C.R. 893, 897 (2001) (“Although, as Pegasus points out, the scope of the word ‘case’ is subject to some ambiguity, we believe that, in context, Northpoint reasonably concluded that the term included the applications as well as the waiver requests.”); cf. Order, *In re Rules and Regulations Implementing the Telephone Consumer Protection Act of 1991*, 7 F.C.C.R. 8660, 8662 (1992) (“We do not believe that the concerns regarding potential ambiguities in interpretation and burdens of compliance represent a special set of circumstances warranting deviation from the Commission’s rules, particularly in light of the clear statutory intent . . .”).

<sup>45</sup> DIRECTV Feb. 19 Response at 4.

<sup>46</sup> See Memorandum Opinion and Order, Third Report and Order, and Third Further Notice of Proposed Rulemaking, *In re Amendment of Parts 13 and 80 of the Commission’s Rules Concerning Communications*, 21 F.C.C.R. 10,282, 10,294-95 (2006) (“[W]e do not believe the current rule is ambiguous, and the petitioners do not offer specific language that they believe would be preferable to what the rule now says.”).

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applicants,”<sup>47</sup> unsurprisingly, DIRECTV appears to be the *only* 17/24 GHz BSS applicant in need of help. Indeed, DIRECTV had urged the Commission to adopt these very PFD limits, both on its own and together with other applicants.<sup>48</sup> These other applicants, however, have properly avoided any reliance on variable conditions—or, equivalently, on link budget calculations—in demonstrating their compliance.<sup>49</sup> The Commission’s rule on this point is “self-explanatory, and it [is] the responsibility of the applicant to demonstrate compliance with [it].”<sup>50</sup>

**B. No alleged ambiguity in the Commission’s rules would justify the waiver DIRECTV seeks.**

In certain unusual cases, when a regulation is genuinely ambiguous and the balance of equities requires it, the Commission has allowed a party to correct its application to conform to newly clarified rules. Here, however, the regulation is not ambiguous, and the equities are not in DIRECTV’s favor. The purpose of the first-come, first-served system is to promote the rapid development of satellite service for consumers, not to permit operators with defective applications to delay compliance until the last possible moment.

The Commission designed the first-come, first-served application system to provide service to the public “much sooner than is often possible under [previous] licensing procedures,” noting that “[c]ustomers should not have to wait for months or years while applicants identify and discuss their concerns with each other” before licenses are granted.<sup>51</sup> A crucial element of this system is “the requirement that applications must be substantially complete when filed,” which “enable[s] the Commission to establish satellite licensees’ operating rights clearly and quickly, and as a result, allow[s] licensees to provide service to the public much sooner than

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<sup>47</sup> DIRECTV Feb. 19 Response at 4.

<sup>48</sup> See Joint Proposal of DIRECTV, EchoStar and Intelsat for BSS in the 17/24 GHz Band 7 (Mar. 14, 2007), in Letter from William M. Wiltshire, Counsel for DIRECTV, Inc., to Marlene H. Dortch, Sec’y of the FCC (Mar. 15, 2007), IB Docket No. 06-123 (proposing a -115 dB/m<sup>2</sup>/MHz PFD limit in the southeastern United States); see also Comments of DIRECTV, Inc., at 10-14, 34, *In re Establishment of Policies and Service Rules for the Broadcasting Satellite Service at the 17.3-17.7 GHz Frequency Band and at the 17.7-17.8 GHz Frequency Band Internationally, and at the 24.75-25.25 GHz Frequency Band for Fixed Satellite Services Providing Feeder Links to the Broadcasting-Satellite Service and for the Broadcasting Satellite Service Operating Bi-directionally in the 17.3-17.7 GHz Frequency Band*, IB Docket No. 06-123 (Oct. 16, 2006) (“DIRECTV PFD Comments”) (suggesting that “satellite downlink transmissions meet the PFD limits already established in Article 21 of the ITU Radio Regulations for FSS systems operating in the 17.7-19.7 GHz band”).

<sup>49</sup> See Letter from Bruce D. Jacobs & Tony Lin, Counsel to Pegasus Dev. DBS Corp., to Marlene H. Dortch, Sec’y of the FCC, at 4 n.10 (Oct. 16, 2008), FCC File Nos. SAT-AMD-20080908-00166; SAT-AMD-20080321-00080; SAT-AMD-20080114-00017; SAT-AMD-20051118-00024; SAT-LOA-19970605-00051 (Call Sign S2244) (citing the applications of Pegasus, Intelsat, EchoStar, and Spectrum Five).

<sup>50</sup> Report and Order, *In re Responsibility of the Federal Communications Commission to Consider Biological Effects of Radiofrequency Radiation When Authorizing the Use of Radiofrequency Devices*, 100 F.C.C.2d 543, 1985 WL 260091, at \*9.

<sup>51</sup> First Report and Order and Further Notice of Proposed Rulemaking, *In re Amendment of the Commission’s Space Station Licensing Rules and Policies*, 18 F.C.C.R. 10,760, 10,767 (rel. May 19, 2003).



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might be possible under our previous licensing procedures.”<sup>52</sup> The Bureau has therefore concluded that “[f]inding incomplete applications acceptable for filing is not consistent with the rules and policies adopted by the Commission in the First Space Station Reform Order and only serves to create uncertainty and inefficiencies in the licensing process.”<sup>53</sup> Section 25.116(b)(5) of the Commission’s rules provides that “[a]mendments to ‘defective’ space station applications . . . will not be considered;”<sup>54</sup> and as the Commission has ruled in the past, new filings “cannot be used to reinstate an initial application or maintain a previous position in the queue.”<sup>55</sup> Even after an application has been accepted for filing, it must be dismissed if it is defective under the Commission’s rules.<sup>56</sup>

The balance of the equities is clearly in favor of dismissing DIRECTV’s application. By relying on link budget figures, DIRECTV attempted to demonstrate compliance based on much higher predictions of atmospheric loss than can reasonably be justified “for all conditions.” No reasonable interpretation of “for all conditions, including clear sky”—assuming that there is more than one—would have permitted satellites that typically, routinely, and substantially exceed the PFD limits, including more than 90% of the time. DIRECTV cannot plausibly claim that it was merely confused about what the Commission might mean by “all conditions;” and DIRECTV had no right to insist that other satellite operators accept excessive interference for its own benefit simply because the weather has changed. Having adopted and relied on an entirely implausible interpretation of § 25.208(w), DIRECTV is not entitled to a second bite at the apple.<sup>57</sup> Moreover, DIRECTV makes its request to the Commission most unwillingly, having first insisted for thirteen months that its satellite was in compliance with the PFD limits, and only requesting a clarification after that position was publicly exposed as untenable.

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<sup>52</sup> Public Notice, *International Bureau Clarifies Direct Broadcast Satellite Space Station Application Processing Rules*, DA 04-195, 19 F.C.C.R. 1346, 1346-47 (rel. Jan. 28, 2004).

<sup>53</sup> *Id.*

<sup>54</sup> § 25.116(b)(5).

<sup>55</sup> Order on Reconsideration, *In re Applications of PanAmSat Licensee Corp. for Authority To Construct, Launch, and Operate a Hybrid Satellite in its Separate International Communications Satellite System*, DA 03-3633, 18 F.C.C.R. 23,916, para. 7 (rel. Nov. 13, 2003).

<sup>56</sup> Order on Reconsideration, *The Establishment of Policies and Service Rules for the Broadcasting-Satellite Service at the 17.3-17.7 GHz Frequency Band and at the 17.7-17.8 GHz Frequency Band Internationally, and at the 24.75-25.25 GHz Frequency Band for Fixed Satellite Services Providing Feeder Links to the Broadcasting-Satellite Service and for the Satellite Services Operating Bi-directionally in the 17.3-17.8 GHz Frequency Band*, IB Docket No. 06-123, FCC 07-174, 22 F.C.C.R. 17,951, para. 37 n.69 (rel. Sept. 28, 2007); *see also id.* para. 37 (“The Bureau will dismiss as defective any amended applications that are not substantially complete.” (emphasis added)).

<sup>57</sup> *Cf.* Memorandum Opinion and Order, *In re Application of Lamoille Broadcasting and Communications General Partnership for Construction Permit for a New FM Station on Channel 239A in Morrisville, Vermont*, 7 F.C.C.R. 2700, 2702 (1992) (finding “no equities in this case which warrant a finding of unfairness, ambiguity, or lack of adequate notice”).

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DIRECTV attempts to analogize its situation to that of Spectrum Five's "tweener" application,<sup>58</sup> which the Bureau granted subject to a coordination requirement.<sup>59</sup> But this analogy fails because DIRECTV's showing of how it would meet the FCC's rules was deficient and Spectrum Five's was not. Spectrum Five was obligated to establish its ability to coordinate, consistent with the relevant International Telecommunication Union ("ITU") rules, with Direct Broadcast Service ("DBS") space stations with higher ITU priority.<sup>60</sup> The Commission found that Spectrum Five satisfied this standard by providing a method comprised of multiple technical solutions to achieve coordination.<sup>61</sup> In contrast, DIRECTV was required to "provide a demonstration"<sup>62</sup> of compliance with § 25.208(w)'s PFD limits and failed to do so. Simply put, § 25.208(w) "provides well-settled criteria for evaluating the potential for interference into adjacent [17/24 GHz] operators, whereas similar technical performance rules do not exist for DBS" operators.<sup>63</sup> DIRECTV now asks the Bureau to absolve its rule violation and correct it via condition. Doing so would eviscerate any need for applicants to satisfy "well-settled criteria," and undermine the Commission's choice—at DIRECTV's own urging—to use PFD limits to "obviate the need for time-consuming coordination among systems."<sup>64</sup>

### III. Conclusion

Because DIRECTV attempted to use link budget estimates in determining its power levels, DIRECTV's space station would exceed the Commission's maximum PFD limits a significant portion of the time. The Bureau cannot permit DIRECTV to impose such an excessive level of interference on other space stations, and the Bureau should not permit DIRECTV to assert "ambiguity" in the face of unambiguous language ("for all conditions") and quantifiable PFD limits.

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<sup>58</sup> Petition for a Declaratory Ruling, *In re Spectrum Five LLC, Petition for Declaratory Ruling to Serve the U.S. Market Using BSS Spectrum from the 114.5° W.L. Orbital Location* (Mar. 12, 2005), FCC File No. SAT-LOI-20050312-00062 ("Spectrum Five 114.5° W.L. Petition").

<sup>59</sup> Order and Authorization, *In re Spectrum Five LLC, Petition for Declaratory Ruling to Serve the U.S. Market Using Broadcast Satellite Service (BSS) Spectrum from the 114.5° W.L. Orbital Location*, DA 06-2439 (rel. Nov. 29, 2006), FCC File Nos. SAT-LOI-20050312-00062 and -00063 ("IB 114.5° W.L. Order").

<sup>60</sup> The relevant rule in the tweener context, § 25.114(d)(13)(i), requires applicants to show that their "proposed system[s] could operate satisfactorily if all assignments in the [Region 2 Plan] were implemented." In the absence of Commission rules establishing power limits for tweener satellites, this rule essentially requires compliance with the coordination policies of the International Telecommunication Union. See § 25.148(f).

<sup>61</sup> See Spectrum Five 114.5° Petition at 9 (noting "that the system exceeds the Appendix 30, Annex 1 limits in certain instances, but can be successfully coordinated with affected systems through a variety of mitigation techniques"); IB 114.5° W.L. Order para. 29 (noting that Spectrum Five had "shown a willingness" to coordinate, and also noting "Spectrum Five's stated willingness to tolerate additional interference and use larger-than-average DBS receive dishes"); Memorandum Opinion and Order, *In re EchoStar Satellite Operating Corp., Application to Construct, Launch, and Operate a Direct Broadcast Satellite at the 86.5° W.L. Orbital Location*, 23 F.C.C.R. 3252, 3255-56 (rel. Feb. 25, 2008).

<sup>62</sup> § 25.114(d)(15)(i).

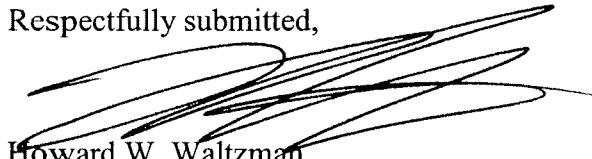
<sup>63</sup> IB 114.5 Order para. 30 n.102.

<sup>64</sup> DIRECTV PFD Comments at 10.

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DIRECTV was obliged to submit an acceptable application the first time around, not after more than a year of substantial time and effort from the Commission as well as from other applicants who did comply with the rules. As the Commission and the D.C. Circuit have recognized, and as Spectrum Five has previously noted, “diligent applicants have a legitimate expectation that the [procedural] rules will be enforced,” as well as an “‘equitable interest’ in . . . the Commission enforcing its filing and notice rules.”<sup>65</sup> DIRECTV does not deserve a waiver from the requirements of the first-come, first-served process when the proper application of the rules to its proposal was never in doubt.

Respectfully submitted,



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<sup>65</sup> See *Fla. Inst. of Tech. v. FCC*, 952 F.2d 549, 554 (D.C. Cir. 1992); *Bachow Commc'ns, Inc. v. FCC*, 237 F.3d 683, 687 (D.C. Cir. 2001) (citing *McElroy Elecs. Corp. v. FCC*, 86 F.3d 248, 257 (D.C. Cir. 1996)); see also Spectrum Five Dec. 19 Letter at 7-8.

## APPENDIX A TECHNICAL APPENDIX

Section 25.114(d)(15)(i) of the Commission's rules requires each applicant to "provide a demonstration that the proposed space station will comply with the power flux density limits set forth in § 25.208(w) of this part."<sup>1</sup> Section 25.208(w), in turn, restricts each space station's radiated power to avoid excessive interference, requiring that "power flux density at the Earth's surface" not exceed certain levels "for all conditions, including clear sky, and for all methods of modulation."<sup>2</sup> In particular, DIRECTV was obliged to show that its space station would not exceed a PFD of -115 dBW/m<sup>2</sup>/MHz in the southeastern United States.<sup>3</sup>

Section 25.140(b)(4)(iii) further requires that a 17/24 GHz BSS space station not produce more interference to neighboring satellites than if it were located at an Appendix F grid location.<sup>4</sup> In practice, if the PFD levels of a proposed "offset" space station exceed those contained in § 25.208(w) as modified to account for the decreased discrimination from the nearest adjacent "on grid" location, the power transmitted by that space station must be reduced by the amount of the decrease in discrimination due to the offset location. This power reduction can be precisely calculated from the orbital position of the satellite (including "station keeping effects") and the user location at which the maximum PFD exists. Applicants are required to "provide the appropriate technical showing to support [their] request."<sup>5</sup>

This technical appendix concludes that DIRECTV's proposed space stations do not comply with the Commission's requirements. DIRECTV's estimates of atmospheric losses are drawn from calculations intended for link budgets, which are incapable of accurately determining maximum PFD levels at the earth's surface. DIRECTV never defends its use of link budget calculations, which undermines its entire PFD calculation methodology. As described below, moreover, even if properly applied, these procedures show that DIRECTV's proposed 103° W.L. space station would violate the Commission's rules at least *90% of the time*. Thus, DIRECTV's methodology is not only inappropriate for determining compliance with maximum PFD limits: it actually indicates that the proposed space station would *almost always* be in violation of Commission rules.

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<sup>1</sup> 47 C.F.R. § 25.114(d)(15)(i).

<sup>2</sup> § 25.208(w) (emphasis added).

<sup>3</sup> § 25.208(w)(1).

<sup>4</sup> § 25.140(b)(4)(iii).

<sup>5</sup> Order on Reconsideration, *The Establishment of Policies and Service Rules for the Broadcasting-Satellite Service at the 17.3-17.7 GHz Frequency Band and at the 17.7-17.8 GHz Frequency Band Internationally, and at the 24.75-25.25 GHz Frequency Band for Fixed Satellite Services Providing Feeder Links to the Broadcasting-Satellite Service and for the Satellite Services Operating Bi-directionally in the 17.3-17.8 GHz Frequency Band*, IB Docket No. 06-123, FCC 07-174, 22 F.C.C.R. 17,951, para. 35 (rel. Sept. 28, 2007).

**I. DIRECTV's Use of Atmospheric Loss Terms in Link Budgets and PFD Calculations for Its Nominal 103° W.L. 17/24 GHz Space Station Application**

In its nominal 103° W.L. application, as amended on January 14, 2008,<sup>6</sup> DIRECTV attempted to demonstrate compliance with applicable PFD limits as follows:

[T]he maximum downlink EIRP for DIRECTV RB-2 will be 63.0 dBW/36 MHz channel. DIRECTV calculates the maximum power flux density/MHz on the Earth's surface from this emission as: Max EIRP/channel minus spreading loss in direction of max gain minus atmospheric attenuation (at 17.5 GHz) minus bandwidth correction factor, or 63.0 dBW/36MHz – 162.4 (dB-m<sup>2</sup>) – 1.1 dB (atmospheric) – 10log(36) = -116.1 dBW/m<sup>2</sup>/MHz.

DIRECTV explained its methodology for demonstrating compliance with the PFD limits in an ex parte submission dated December 8, 2008:

In its [17/24 GHz BSS] applications, DIRECTV used figures from its link budgets to calculate PFD levels. The “clear sky” figures in those link budgets include line items for free space loss, gaseous, cloud, and scintillation.<sup>7</sup>

DIRECTV described these factors as “reflect[ing] a conservative approach to *link budgets*”—though not to PFD levels—“recognizing the critical importance of assessing atmospheric losses in evaluating satellite system performance.”<sup>8</sup> In the same submission, DIRECTV further asserted that the procedures used to determine these parameters were derived from industry-standard International Telecommunication Union (“ITU”) documents, and emphasized the importance of including accurate estimates in the Reverse Band frequency range:

The importance of these factors is reflected by the adoption of a series of International Telecommunication Union Recommendations on the subject. *See, e.g.*, Rec. ITU-R P.618-9 (“Propagation data and prediction methods required for the design of Earth-space telecommunication systems”) (citing related and supporting ITU-R Recommendations). As highlighted in these ITU-R Recommendations, accounting for propagation impairments (including absorption in atmospheric gases) is particularly

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<sup>6</sup> *Application of DIRECTV Enterprises, LLC To Amend Its Application for Authorization To Launch and Operate DIRECTV RB-2, a Satellite in the 17/24 GHz Broadcasting Satellite Service at 103° W.L.*, FCC File No. SAT-AMD-20080114-00014 (Jan. 14, 2008) (“DIRECTV 103° W.L. Amendment”), *accepted for filing*, Public Notice, *Satellite Space Applications Accepted for Filing*, Rpt. No. SAT-00535, 2008 WL 2627669, at \*3 (rel. July 2, 2008) (“IB Acceptance Notice”).

<sup>7</sup> *See* Letter from William M. Wiltshire, Counsel for DIRECTV Enters., LLC, to Marlene H. Dortch, Sec’y of the FCC, at 3 (Dec. 8, 2008), FCC File No. SAT-AMD-20080114-00014 (“DIRECTV Dec. 8 Ex Parte Letter”).

<sup>8</sup> *Id.* (emphasis added).

important for systems operating at frequencies above 10 GHz, which are more susceptible to such impairments.<sup>9</sup>

Also in its December 8 submission, DIRECTV modified its PFD analysis to eliminate the component relating to clouds, which it described as “not . . . appropriate for use in a calculation based on ‘clear sky’ conditions.”<sup>10</sup> DIRECTV estimated the remaining atmospheric loss as 0.74 dB,<sup>11</sup> composed of two components, one representing gaseous atmospheric loss (0.44 dB) and the second representing scintillation effects (0.3 dB).<sup>12</sup> Its new attempted demonstration of compliance read as follows:

Adjusting the atmospheric attenuation to account only for gaseous and scintillation effects (and not clouds) reduces that input from 1.1 dB to 0.74 dB. Using this slightly reduced value in the formula yields a PFD of  $63.0 \text{ dBW}/36\text{MHz} - 162.37 \text{ (dB-m}^2) - 0.74 \text{ dB (atmospheric)} - 10\log(36) = -115.67 \text{ dBW/m}^2/\text{MHz}$ . This is still 0.18 dB less than the maximum allowable PFD under Section 25.208, and therefore complies with the Commission's rules.<sup>13</sup>

In other words, after DIRECTV removed the effects of clouds, it had only a 0.18 dB margin with respect to the maximum PFD limits, assuming a new attenuation factor of 0.74 dB. Thus, if any decrease in the atmospheric loss term occurred which caused that value to drop below 0.56 dB (0.74 dB – 0.18 dB), then the demonstration would no longer be valid and the PFD would exceed the PFD limit of § 25.208(w). Because the loss components used by DIRECTV included 0.44 dB for gaseous terms and 0.3 dB for scintillation, the PFD “margin” would vanish if any of the following three possibilities occurred:

1. The gaseous component dropped below 0.26 dB;
2. The scintillation component dropped below 0.12 dB; or
3. The sum of gaseous and scintillation terms dropped below 0.56 dB.<sup>14</sup>

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<sup>9</sup> *Id.* at 2.

<sup>10</sup> *Id.*

<sup>11</sup> *Id.* at 3.

<sup>12</sup> *Id.* at 3 & n.14; *see also* DIRECTV 103° W.L. Amendment, App. A.

<sup>13</sup> DIRECTV Dec. 8 Ex Parte at 3.

<sup>14</sup> By means of illustration, DIRECTV's application to provide service from the nominal 99° W.L. orbital location, *see Application of DIRECTV Enterprises, LLC To Amend Its Application for Authorization To Launch and Operate DIRECTV RB-1, a Satellite in the 17/24 GHz Broadcasting Satellite Service at 99° W.L.*, FCC File No. SAT-AMD-20080114-00013 (Jan. 14, 2008), *accepted for filing*, IB Acceptance Notice, 2008 WL 2627669, at \*2, was generated through the same methodology. It too attempted to demonstrate compliance with Commission rules by incorporating the same 1.1 dB adjustment for “atmospheric attenuation,” *id.* Ex. B, at 12, and calculated this adjustment in precisely the same fashion, based on link budget estimates of 0.6 dB cloud effects, 0.4 dB gaseous losses, and 0.3 dB scintillation fading. *Id.* app. A, at A-1.

## II. Recommendation ITU-R P.618-9

### A. Calculation of Loss Value Based on Outage Parameter ( $p$ ) for Use in Link Budgets

ITU-R P.618-9 is the industry standard for predicting the propagation parameters in planning satellite communication systems. However, its use in link budget calculations does not make it equally appropriate for use in establishing compliance with PFD limits.

Link budget calculations are used by space station operators to provide user satisfaction by guaranteeing the percentage of time during which the DBS system will be available for viewing. By estimating the maximum signal loss due to atmospheric conditions for all but a very small percentage of the year (referred to as the outage parameter, or “ $p$ ”), the link budget assures availability during the rest of the year. For example, typical values of  $p$  for a DBS system range from 0.1-0.5%, representing 8-40 hours of signal loss per year and an “availability” (equal to  $1 - p$ ) of 99.5-99.9%. Link budget calculations estimate the maximum signal loss present during that 99.5% of the year, assuring end users that any higher levels of signal loss would be restricted to the other 0.5%.

The principal factor in determining propagation loss is the presence of rain in the propagation path, and the associated attenuation and system impact are predicted by ITU-R P.618-9. Major outage periods are associated with rain effects and the presence of high humidity in the atmosphere. Link budget calculations, therefore, represent only a very small fraction of “all conditions”—in particular, the periods of highest humidity (water vapor content in the atmospheric) and highest temperature.

### B. Prediction of Atmospheric Loss Values Using ITU-R P.618-9

ITU-R P.618-9 procedures also predict the value of non-precipitation losses in the propagation path. When the effects of rain and clouds are eliminated, the total atmospheric attenuation (dB) represents the combined effects of gaseous loss and scintillation fading, and requires one or more of the following input parameters:

$A_G ( p )$  : gaseous attenuation due to water vapor and oxygen for a fixed probability (dB), as estimated by Recommendation ITU-R P.676

$A_S ( p )$  : attenuation due to tropospheric scintillation for a fixed probability (dB)

where  $p$  is the probability of the attenuation being exceeded in the range 50% to 0.001%.<sup>15</sup>

ITU-R P.618-9 provides a detailed procedure for calculating gaseous loss and scintillation fading, and in turn references ITU-R 676-4 for the calculation of the attenuation from atmospheric gases. These calculations require three input values: dry air pressure (hPa),

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<sup>15</sup> Int’l Telecomm. Union, Recommendation ITU-R P.618-9, Propagation Data and Prediction Methods Required for the Design of Earth-Space Telecommunications Systems § 2.5 (2007) (“ITU-R P.618-9”).

temperature (°C), and water vapor partial pressure (hPa), which is determined from humidity and temperature. The gaseous loss consists of two terms: (1) a “dry atmosphere” term, consisting of attenuation caused primarily by absorption by oxygen molecules and which is relatively independent of temperature, and (2) a water vapor term, which is a strongly dependent on relative humidity and temperature. As ITU-R P.618-9 states,

Attenuation by atmospheric gases which is entirely caused by absorption depends mainly on frequency, elevation angle, altitude above sea level and water vapor density (absolute humidity) . . . .  
At a given frequency the oxygen contribution to atmospheric absorption is relatively constant. However, both water vapor density and its vertical profile *are quite variable. Typically, the maximum gaseous attenuation occurs during the season of maximum rainfall.*<sup>16</sup>

The ITU-R 676-4 methodology used by DIRECTV can be used to predict the gaseous components of atmospheric loss for any specific combination of temperature, humidity, and pressure, not just the conditions that DIRECTV assumed in its link budgets. The link budget values are one specific set of these parameters which correspond to long-term averages for a particular availability. For example, DIRECTV’s link budget used an outage parameter of 0.4% to estimate the maximum gaseous loss that would occur during 99.6% of the time, thus guaranteeing 99.6% availability. The assessment of atmospheric loss terms for PFD calculations, however, must consider gaseous loss over a far wider range of conditions than the restrictive circumstances of the link budget.

### C. Predictions of Gaseous Loss Values Appropriate to PFD Calculations

The DIRECTV 17/24 GHz documents discuss atmospheric loss components as if they were immutable constants (gaseous component = 0.44 dB, scintillation fade = 0.3 dB). As discussed above, however, these specific values are calculated for a very restricted set of conditions (high humidity, high temperature) and, in fact, vary with local weather conditions. To determine the *minimum* value of these loss terms, a wider range of conditions must be examined than the restrictive range considered in the link budget calculations.

The appropriate temperature and humidity ranges of interest for the region of maximum PFD (i.e., South Florida) span temperatures in the range of 30° F to 95° F (-1° C to 35° C) and humidity between 40% and 99%. For example, on December 2, 2008, the National Weather Service reported that humidity in Miami reached a low of 42%, and temperatures ranged between 55° and 67° F.<sup>17</sup> The components of gaseous loss due to “dry” air (largely oxygen absorption) and water vapor vary as shown below. When the humidity and temperature are high (≈99% and 90° F respectively, as in the link budget calculation for South Florida), the gaseous loss will also be high (0.44 dB). This is made up of two components, 0.07 dB for the oxygen term (“dry air”) and 0.37 dB for the water vapor term. In winter, when the temperatures are cool

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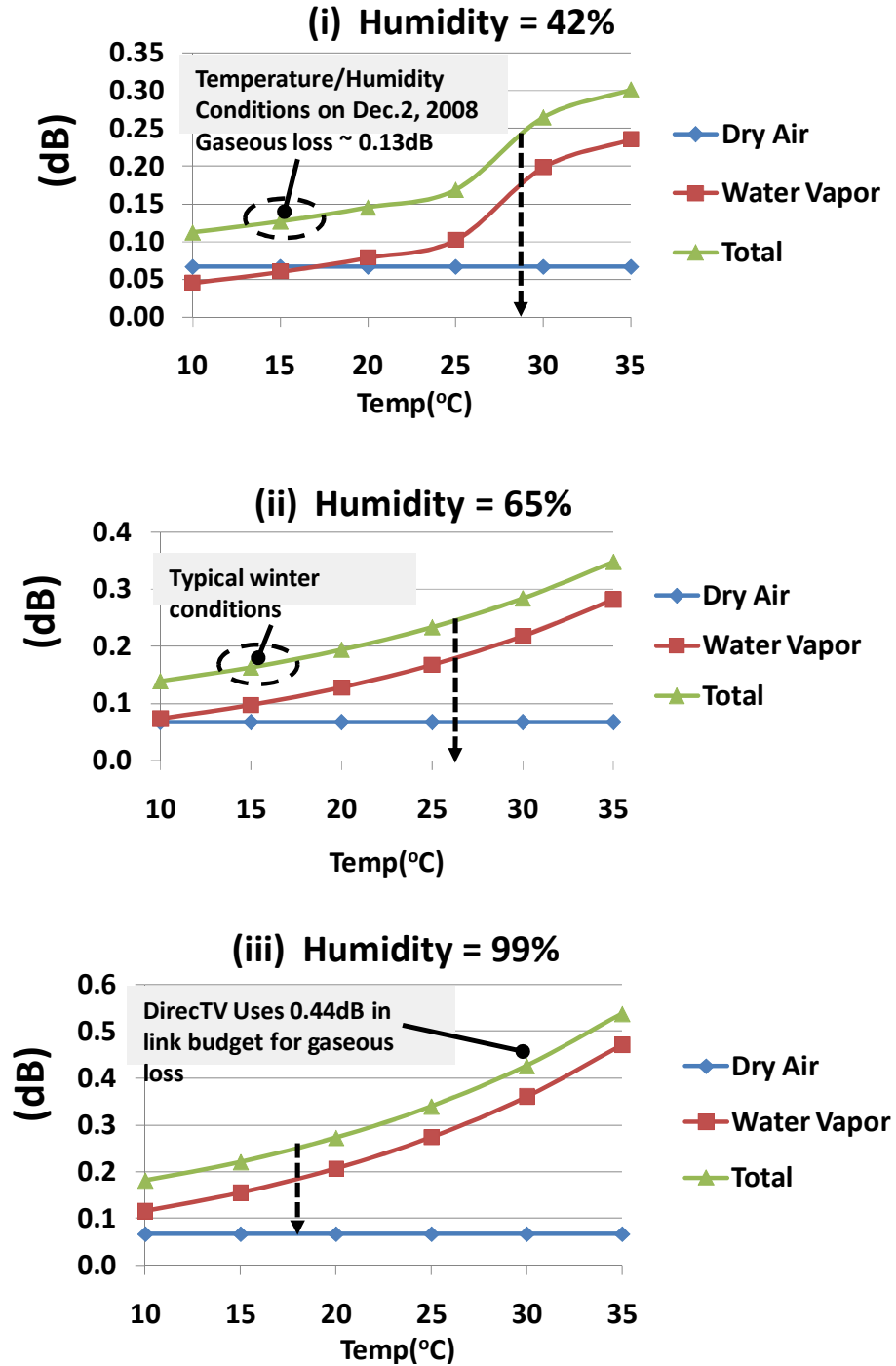
<sup>16</sup> *Id.* § 2.1 (emphasis added).

<sup>17</sup> See National Weather Serv. Forecast Office, Miami-South Florida, <http://www.nws.noaa.gov/climate/index.php?wfo=mfl> (Archived Data / Dec. 2) (last viewed Jan. 12, 2009); *accord* Weather Underground, History for Miami, FL (Dec. 2, 2008), <http://www.wunderground.com/history/airport/KMIA/2008/12/2/DailyHistory.html>.



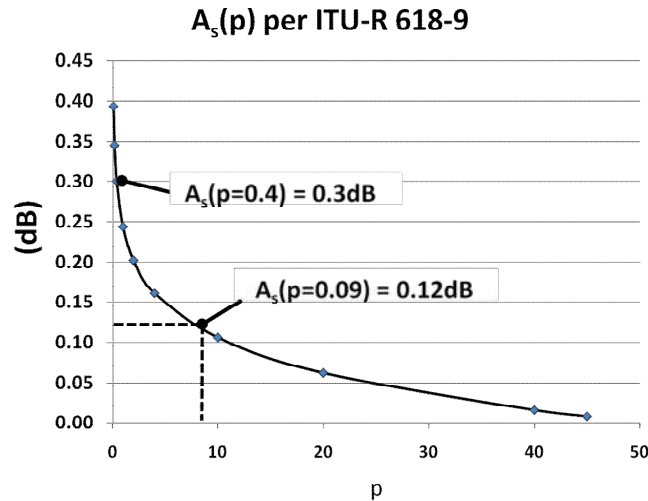
and the humidity is low (as on this past December 2), the dry air term is still 0.07 dB but the water vapor term has been reduced to 0.06 dB—a total gaseous loss of only 0.13 dB. Under these conditions, the total gaseous loss has fallen 0.31 dB from DIRECTV's estimate, to a level well below the 0.26 dB threshold that puts the total PFD over the Commission's limit. Thus, changes in the gaseous loss alone can cause DIRECTV's satellite to produce excess PFD in violation of the Commission's rules. (Note that although the lowest atmospheric loss occurs at the lowest level of humidity, for a humidity level of 65%—a typical value occurring year-round in Miami—the total loss is less than the 0.26 dB threshold for all temperatures below 27° C (80° F).)

## Gaseous Term Components



### C. Predictions of Scintillation Loss Values Appropriate to PFD Calculations

Scintillation fading results from rapid fluctuations in the earth's atmosphere (like the twinkling of a star). Because link budgets are designed to ensure the availability of a strong signal over time, ITU-R P.618-9's procedures calculate scintillation fading on the basis of long-term averages, for "periods of a month or longer."<sup>18</sup> (On a shorter time-scale, these fluctuations may for short periods even produce an "enhancement" or increased signal level.<sup>19</sup>) The ITU 618-9 calculation methodology used by DIRECTV allows the prediction of the scintillation fade level as a function of the availability, or equivalently of the outage parameter  $p$ . For DIRECTV's link budget calculations,  $p$  is very small (0.4%), capturing the severe fluctuations that occur over very small time periods. When the average value of the scintillation term is calculated over much longer intervals, then the loss due to scintillation fading goes down dramatically. In fact, given any particular absolute starting level at  $p = 0.4\%$ , the behavior over longer intervals is completely defined by the statistics of the modeling, as shown below:



If the scintillation term is 0.3 dB for  $p = 0.4\%$  (as it is in the DIRECTV link budget), then increasing the outage parameter to  $\approx 9\%$  causes the scintillation loss to fall to 0.12 dB, the threshold at which the drop in scintillation loss alone will cause DIRECTV's satellite to produce excess PFD.<sup>20</sup> In other words, DIRECTV's own methodology estimates that for at least 90% of the time, the maximum loss due to scintillation fading will not exceed 0.12 dB, and thus that DIRECTV's satellite would violate the relevant PFD limits over 90% of the time.

<sup>18</sup> See ITU-R P.618-9 § 2.4.

<sup>19</sup> See P. Garcia del Pino et al., Tropospheric Scintillation Measurements on a Ka-Band Satellite Link in Madrid, 29 URSI Gen. Assembly (URSI2008/paper, Aug. 2008).

<sup>20</sup> For values of  $p > 45\%$ , the scintillation term is less than 0.02 dB and becomes a negligible factor in the PFD analysis.

Additionally, even when  $p$  is set to a value less than 9%, the exact value of the scintillation term will vary with temperature and humidity, like the gaseous loss term. However, DIRECTV treats the 0.3 dB value for scintillation loss as a constant, not as a variable that depends on weather conditions. The PFD analysis, on the other hand, is not concerned with only the 0.4% of the time that scintillation fading is at its highest value, but rather with all 100% of the time. This fact alone means that DIRECTV's application cannot meet the Commission's PFD limits under § 25.208(w); DIRECTV's calculations cannot guarantee that its space station would meet those limits at *all* times and "for all conditions." For the scintillation parameter, just like the atmospheric loss, DIRECTV's extension of link margin calculations into the PFD arena results in a fundamentally flawed methodology that cannot be defended.


## **II. Summary and Conclusions**

A proper evaluation of the atmospheric loss parameters used by DIRECTV in its nominal 103° W.L. application conclusively reveals that the proposed space station would exceed maximum PFD limits over 90% of the time. DIRECTV's claims of compliance are based on a methodology that is technically defective and that cannot be cured.

**CERTIFICATE OF SERVICE**

I, Howard W. Waltzman, hereby certify that on this 25th day of February, 2009, I caused to be delivered a true copy of the foregoing by first-class United States mail, postage prepaid, upon the following:

William M. Wiltshire  
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Howard W. Waltzman