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

In the Matter of

COMPREHENSIVE REVIEW OF LICENSING AND OPERATING RULES FOR SATELLITE SERVICES

MB Docket No. 12-267

COMMENTS OF DIRECTV, LLC

In response to the Commission’s effort to update and streamline its regulation of space stations under Part 25 of its rules,1 DIRECTV, LLC (“DIRECTV”) submits these brief comments to highlight an issue it has encountered in connection with the development of its authorizations to launch and operate satellites in the 17/24 GHz Broadcasting Satellite Service ("17/24 GHz BSS"). Specifically, the issue relates to the timing of the information that must be submitted with respect to the off-axis gain characteristics of 17/24 GHz BSS satellite transmit antennas. As discussed below, DIRECTV submits that the Commission’s rules should be revised as set forth in Appendix 1 to better reflect the stage of satellite development at which such information is likely to be available, a change that could be made without undermining the important coordination function of the rules at issue.

Because the downlink transmissions from 17/24 GHz BSS spacecraft use the same frequencies as the uplink transmissions to Direct Broadcast Satellite (“DBS”) spacecraft, there is

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a potential for space path interference if such spacecraft are operated in close proximity. In order to facilitate the coordination of 17/24 GHz BSS systems with nearby DBS systems, the Commission established a coordination trigger based on the power flux density (“PFD”) experienced at the DBS space station, which it concluded would be “an effective, measurable, and technically-neutral approach to managing space path interference into DBS space station receiving antennas.”

The Commission further determined that implementation of an effective coordination process based on an off-axis PFD coordination trigger would require the establishment of an accurate determination of antenna off-axis gain performance from the transmitting 17/24 GHz BSS satellite toward the DBS satellite. Accordingly, it established a regime that requires submission of such off-axis gain information in both polarizations over a large angular range for at least three frequencies (low/middle/high).

Accordingly, Section 25.264 of the Commission’s rules provides that each applicant for a 17/24 GHz BSS space station authorization “must provide a series of tables or graphs with its application, that contain the predicted transmitting antenna off-axis gain information for each transmitting antenna in the 17.3-17.8 GHz frequency band.” Using that information, the applicant is required to provide a PFD calculation with its application to demonstrate that its proposed operations will not exceed the -117 dBW/m²/100 kHz coordination trigger at the

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2 See 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, 26 FCC Rcd. 8927, ¶ 10 (2011) ("17/24 GHz BSS 2nd R&O").

3 Id., ¶ 20.


5 47 C.F.R. § 25.264(a).
location of all prior-filed U.S. DBS space stations. In addition, no later than nine months before launch, each 17/24 GHz BSS licensee must (1) confirm the predicted transmitting antenna off-axis gain information previously provided with its application by submitting measured data generated “under conditions as close to flight configuration as possible;” and (2) provide PFD calculations based on this measured data, and if they exceed the coordination trigger, either coordinate its operations with the affected DBS operator(s) or adjust its operating parameters to fall below the trigger.

As the nation’s leading DBS provider, DIRECTV strongly supports the Commission’s efforts to prevent space path interference from 17/24 GHz BSS systems into DBS systems, and believes that the off-axis gain information plays a vital role in those safeguards. Nonetheless, as it has gone through the process of developing its own 17/24 GHz BSS authorizations, DIRECTV has discovered that the timing specified in the rules for submission of off-axis gain information can be problematic. In particular, it is difficult (if not impossible) to generate reliable predicted data at the application stage, at which point the applicant likely has not even issued a request for proposal to satellite manufacturers, much less contracted for or completed the final design of its proposed satellite. Similarly, because the transmitting antenna subassembly is generally not integrated with the satellite bus until approximately three (or fewer) months before launch, it can be difficult to generate the required measured data nine months or more before launch.

DIRECTV believes that Section 25.264 should be revised to better reflect the likely periods during which reliable predicted and measured data will be available, as set forth in Appendix 1 hereto. Specifically, DIRECTV proposes that predicted transmitting antenna off-

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6 Id. at § 25.264(b).
7 Id. at § 25.264(c)-(e).
axis gain information and preliminary PFD calculations be submitted within two years after grant of the 17/24 GHz BSS authorization. That is also the date by which a licensee is already required to have completed a spacecraft’s Critical Design Review (“CDR”), a process that entails evaluation and modeling of spacecraft systems. If the PFD calculations based on the predicted data reveal that the satellite will exceed the coordination trigger, the licensee would still have time to modify the spacecraft’s design before proceeding to the construction phase (and seeking any Commission authorization required for such modification) or to negotiate coordination agreements with affected DBS operators.

Similarly, measured data intended to confirm the predicted transmitting antenna off-axis gain information previously provided, along with the PFD calculations based on that data, would be due no later than two months before launch. By that time, the antenna(s) should be integrated with the satellite bus and ready for testing in the actual operational configuration. While there may be other ways to generate measured data “under conditions as close to flight configuration as possible,” licensees should be given the option to conduct these measurements using the nearly-completed spacecraft, which simply is not available until closer to launch than nine months.

It is possible that the measured data will vary from the predicted data sufficiently to cause a 17/24 GHz BSS spacecraft to exceed the PFD trigger. Whether that discovery is made nine months or two months before launch, there is very little (if anything) the licensee can do to modify its satellite design to come back into compliance. If it cannot devise a way to meet the trigger while operating within the capabilities of its existing design (e.g., by using less power), the licensee would have to coordinate with affected DBS operators. For this reason, many licensees may prefer to submit their measured data nine months or more before launch, so that
any necessary coordination or modification can be finalized prior to launch. However, if a licensee is confident enough in its predicted data, or has no option but to generate measured data using the fully integrated spacecraft, it should have the option to submit this data closer to launch – so long as it accepts the fact that it may have to launch without full operational authority pending either license modification by the Commission or completion of coordination with affected DBS operators.

Moreover, adjusting the submission dates as described above would not undermine the rule’s safeguarding function. Licensees would still have to submit predicted and measured data, use that data to determine compliance with the PFD trigger, and take appropriate action if the trigger is exceeded. Indeed, generating predictive information in close coordination with the manufacturer working on a finalized construction contract is almost certain to result in better data than predictions generated at the application stage, when neither a contract nor a manufacturer may have been finalized, which would lead to more accurate PFD calculations in the early stages of satellite design. To the extent an applicant has already proceeded through CDR before seeking an authorization from the Commission, it would be free to submit that data and the related PFD calculations at any time. Moreover, as proposed in Appendix 1 hereto, the amended rule would actually require an applicant that filed within one year of anticipated launch to provide both predicted off-axis antenna gain information and the related PFD calculations along with its application.

DIRECTV submits that the proposed revisions to Section 25.264 would better reflect the timing of spacecraft design and testing while still providing appropriate safeguards against space

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8 Under the Commission’s rules, each 17/24 GHz BSS licensee must have a construction contract in place within one year of licensing. See 47 C.F.R. § 25.164(a)(1).
path interference to nearby DBS spacecraft. Accordingly, DIRECTV urges the Commission to adopt the changes reflected in Appendix 1.

Respectfully submitted,

/s/

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APPENDIX 1

Proposed Amendments to Section 25.264: Requirements to facilitate reverse-band operation in the 17.3-17.8 GHz band of 17/24 GHz Broadcasting-satellite Service and Direct Broadcast Satellite Service space stations.

(a) Each applicant for a space station license in the 17/24 GHz broadcasting-satellite service (BSS) space station authorization holder must provide a series of tables or graphs with its application within 24 months of the date its authorization is issued, that contain the predicted transmitting antenna off-axis gain information for each transmitting antenna in the 17.3-17.8 GHz frequency band. . . .

(5) Over a greater angular measurement range, if necessary, to account for any planned spacecraft orientation bias or change in operating orientation relative to the reference coordinate system. The applicant authorization holder must also explain its reasons for doing so.

(6) Each 17/24 GHz BSS space station applicant that files its application within one year of the anticipated launch date of its space station must provide the predicted transmitting antenna off-axis gain information discussed in this paragraph (a) with its application.

(b) Each applicant for a space station license in the 17/24 GHz BSS space station authorization holder must provide power flux density (pfd) calculations with its application within 24 months of the date its authorization is issued that are based upon the predicted off-axis transmitting antenna gain information submitted in accordance with paragraph (a) of this section, as follows:

(1) The pfd calculations must be provided at the location of all prior-filed U.S. DBS space stations where the applicant's pfd level exceeds the coordination trigger of \(-117\) dBW/m\(^2\)/100 kHz in the 17.3-17.8 GHz band. In this rule, the term prior-filed U.S. DBS space station refers to any Direct Broadcast Satellite service space station application that was filed with the Commission (or authorization granted by the Commission) prior to the filing of the authorization holder’s 17/24 GHz BSS application containing the predicted off-axis transmitting antenna gain information. The term prior-filed U.S. DBS space station does not include any applications (or authorizations) that have been denied, dismissed, or are otherwise no longer valid. Prior-filed U.S. DBS space stations may include foreign-licensed DBS space stations seeking authority to serve the United States market, but do not include foreign-licensed DBS space stations that have not filed applications with the Commission for market access in the United States.

(2) The pfd calculations must take into account the maximum permitted longitudinal station-keeping tolerance, orbital inclination and orbital eccentricity of both the 17/24 GHz BSS and DBS space stations, and must:

(i) Identify each prior-filed U.S. DBS space station at whose location the coordination threshold pfd level of \(-117\) dBW/m\(^2\)/100 kHz is exceeded; and

(ii) Demonstrate the extent to which the applicant’s authorization holder’s transmissions in the 17.3-17.8 GHz band exceed the threshold pfd level of \(-117\) dBW/m\(^2\)/100 kHz at those prior-filed U.S. DBS space station locations.
(3) If the calculated pfd level is in excess of the threshold level of $-117 \text{ dBW/m}^2/100 \text{ kHz}$ at the location of any prior-filed U.S. DBS space station, the applicant authorization holder must also provide with its application calculation a certification that all affected DBS operators acknowledge and do not object to the applicants authorization holder’s higher off-axis pfd levels. No such certification is required in cases where the DBS and 17/24 GHz BSS assigned operating frequencies do not overlap.

(4) Each 17/24 GHz BSS space station applicant that files its application within one year of the anticipated launch date of its space station must provide the pfd calculations discussed in this paragraph (b) with its application.

(c) No later than 92 months prior to launch, each 17/24 GHz BSS space station applicant or authorization holder must confirm the predicted transmitting antenna off-axis gain information provided in accordance with §25.114(d)(15)(iv) by submitting measured transmitting antenna off-axis gain information over the angular ranges, measurement frequencies and polarizations described in paragraphs (a)(1) through (5) of this section. The transmitting antenna off-axis gain information should be measured under conditions as close to flight configuration as possible.

(d) No later than 92 months prior to launch, each 17/24 GHz BSS space station applicant or authorization holder must provide pfd calculations based upon the measured transmitting antenna off-axis gain information that is submitted in accordance with paragraph (c) of this section as follows:

(1) The pfd calculations must be provided:

(i) At the location of all prior-filed U.S. DBS space stations as defined in paragraph (b)(1) of this section, where the applicant's pfd level in the 17.3-17.8 GHz band exceeds the coordination trigger of $-117 \text{ dBW/m}^2/100 \text{ kHz}$; and

(ii) At the location of any subsequently-filed U.S. DBS space station where the applicant's authorization holder’s pfd level in the 17.3-17.8 GHz band exceeds the coordination trigger of $-117 \text{ dBW/m}^2/100 \text{ kHz}$. In this rule, the term subsequently-filed U.S. DBS space station refers to any Direct Broadcast Satellite service space station application that was filed with the Commission (or authorization granted by the Commission) after the 17/24 GHz BSS operator submitted the predicted data required by paragraphs (a) through (b) of this section, but prior to the time the 17/24 GHz BSS operator submitted the measured data required in this paragraph. Subsequently-filed U.S. DBS space stations may include foreign-licensed DBS space stations seeking authority to serve the United States market. The term does not include any applications (or authorizations) that have been denied, dismissed, or are otherwise no longer valid, nor does it include foreign-licensed DBS space stations that have not filed applications with the Commission for market access in the United States.

(2) The pfd calculations must take into account the maximum permitted longitudinal station-keeping tolerance, orbital inclination and orbital eccentricity of both the 17/24 GHz BSS and DBS space stations, and must:

(i) Identify each prior-filed U.S. DBS space station at whose location the coordination threshold pfd level of $-117 \text{ dBW/m}^2/100 \text{ kHz}$ is exceeded; and

(ii) Demonstrate the extent to which the applicant's or licensee's transmissions in the 17.3-17.8 GHz band exceed the threshold pfd level of $-117 \text{ dBW/m}^2/100 \text{ kHz}$ at those prior-filed U.S. DBS space station locations.
(e) If the pfd level calculated from the measured data submitted in accordance with paragraph (d) of this section is in excess of the threshold pfd level of $-117 \text{ dBW/m}^2/100 \text{ kHz}$:

1. At the location of any prior-filed U.S. DBS space station as defined in paragraph (b)(1) of this section, then the 17/24 GHz broadcasting-satellite operator must either:
   - (i) Coordinate its operations that are in excess of the threshold pfd level of $-117 \text{ dBW/m}^2/100 \text{ kHz}$ with the affected prior-filed U.S. DBS space station operator, or
   - (ii) Adjust its operating parameters so that at the location of the prior-filed U.S. DBS space station, the pfd level of $-117 \text{ dBW/m}^2/100 \text{ kHz}$ is not exceeded.

2. At the location of any subsequently-filed U.S. DBS space station as defined in paragraph (d)(1) of this section, when the pfd level submitted in accordance with paragraph (d) of this section, is also in excess of the pfd level calculated on the basis of the predicted data submitted in accordance with paragraph (a) of this section that were on file with the Commission at the time the DBS space station application was filed, then the 17/24 GHz broadcasting-satellite operator must either:
   - (i) Coordinate with the affected subsequently-filed U.S. DBS space station operator all of its operations that are either in excess of the pfd level calculated on the basis of the predicted antenna off-axis gain data, or are in excess of the threshold pfd level of $-117 \text{ dBW/m}^2/100 \text{ kHz}$, whichever is greater, or
   - (ii) Adjust its operating parameters so that at the location of the subsequently-filed U.S. DBS space station, either the pfd level calculated on the basis of the predicted off-axis transmitting antenna gain data, or the threshold pfd level of $-117 \text{ dBW/m}^2/100 \text{ kHz}$, whichever is greater, is not exceeded.

3. No coordination or adjustment of operating parameters is required in cases where the DBS and 17/24 GHz BSS operating frequencies do not overlap.

(f) The 17/24 GHz BSS applicant or license authorization holder must modify its license authorization, or amend its application, as appropriate, based upon new information:

1. If the pfd levels submitted in accordance with paragraph (d) of this section, are in excess of those submitted in accordance with paragraph (b) of this section at the location of any prior-filed or subsequently-filed U.S. DBS space station as defined in paragraphs (b)(1) and (d)(1) of this section, or

2. If the 17/24 GHz BSS operator adjusts its operating parameters in accordance with paragraphs (e)(1)(ii) or (e)(2)(ii) of this section.