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

In the Matter of 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 BROADCASTING SATELLITE SERVICE OPERATING BI-DIRECTIONALLY IN THE 17.3-17.7 GHZ FREQUENCY BAND	IB Docket No. 06-123

REPLY COMMENTS OF DIRECTV, INC.

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SUMMARY

DIRECTV, Inc. ("DIRECTV") is encouraged by the level of commonality expressed by commenters in this proceeding on a variety of issues affecting the service and licensing rules for the Broadcasting Satellite Service ("BSS") in the 17.3-17.8 GHz and 24.75-25.25 GHz bands ("17/24 GHz BSS"). For example, most commenters propose four-degree spacing of orbital locations and the use of a first come, first served methodology for processing applications. Commenters uniformly proposed that the 17.7-17.8 GHz portion of the band be available for international services, and most also argued that this spectrum should be available for use domestically on a secondary or even primary basis, and for use in TT&C operations. Commenters generally favored imposing restrictions on new 17/24 GHz BSS feeder link earth stations in order to protect terrestrial services in the band and reduced requirements for cross-polarization isolation. Commenters also recognized that operators may need flexibility to differ from the service rules adopted in this proceeding. DIRECTV supports the proposals made in this regard, and also proposes that the Commission allow routine processing of any application that does not exceed the reference interference situation defined by those service rules.

Even on many issues where there were varying positions, there was underlying agreement. For example, all commenters that addressed the issue agreed that the Commission should adopt presumptive power flux density ("PFD") limits in this band to create an interference environment that is equally accommodating for both CONUS and spot beam operations. Although no two commenters proposed precisely the same PFD regime, the proposals fell within a fairly narrow range. DIRECTV continues to believe that its proposal, which incorporates achievable PFD levels into a "stepped" regime that

varies in accordance with the atmospheric attenuation characteristics of different regions, offers the best approach.

DIRECTV continues to believe that the 17/24 GHz BSS band holds great promise for the provision of innovative video offerings to consumers throughout the country. The record shows much agreement among the parties on some of the primary issues raised in this proceeding, and should provide the Commission with a solid foundation from which to develop and adopt service and licensing rules that will make this band available for productive use as quickly and efficiently as possible.

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REPLY COMMENTS OF DIRECTV, INC.

DIRECTV, Inc. ("DIRECTV"), the nation's leading Direct Broadcast Satellite ("DBS") service provider, hereby replies to comments concerning proposed service and licensing rules for the Broadcasting Satellite Service ("BSS") in the 17.3-17.8 GHz and 24.75-25.25 GHz bands ("17/24 GHz BSS").[1]

I. The Comments Reflect a General Consensus Regarding Orbital Spacing, Orbital Location, and Licensing

A. Background

In their initial comments, DIRECTV, Intelsat, and SES expressed similar views on the interrelated subjects of orbital separation, orbital location, and licensing regime. Namely, each suggested that applications for 17/24 GHz BSS satellite systems in the

[1] *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*, 21 FCC Rcd. 7426 (2006) ("*BSS NPRM*").

domestic arc should receive routine processing if they propose orbital locations spaced nominally four degrees apart and centered on slots used by Fixed-Satellite Service ("FSS") systems.[2] Each of these commenters also suggested that applications should be processed pursuant to the Commission's *Space Station Reform Order*, including the "first come, first served" licensing methodology.[3] This combination of rules, argued DIRECTV, Intelsat, and SES, would maximize the potential for combining offerings from multiple services, minimize the potential for interference between 17 GHz BSS and DBS satellites, and (most importantly) enable the rapid provision of 17/24 GHz BSS service to the public.

EchoStar, however, reached somewhat different conclusions than did the other commenters. In order to maximize the prospect for combining 17/24 GHz BSS service with its DBS offerings, EchoStar argued, 17/24 GHz BSS licenses should be nominally spaced at 4.5 degree (not 4 degree) intervals centered around DBS slots (not FSS slots) in the domestic arc – although EchoStar argued that operators should have the flexibility to operate at ± 0.4 degrees from these DBS centers in order to aid coordination with systems authorized by other administrations pursuant to the Region 2 BSS Plan.[4] In order to minimize the prospect of 17/24 GHz BSS/DBS interference, EchoStar argued, existing

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[2] DIRECTV Comments at 3-6; Intelsat Comments at 7 (noting that "a four-degree grid of orbital locations would overlap current Ku-band and Ka-band FSS orbital locations in the domestic arc, some of which are already being used for DTH services"); SES Comments at 10-14 (providing an orbital assignment plan that "permits collocation of 17/24 GHz and FSS satellites, rather than DBS spacecraft, in many locations").

[3] *See Amendment of the Commission's Space Station Licensing Rules and Policies*, 18 FCC Rcd. 10760 (2003) ("*Space Station Reform Order*"). DIRECTV and Intelsat also specified that existing applicants should be allowed to amend their applications to conform to service rules adopted in this proceeding yet keep their place in the queue. DIRECTV Comments at 16-17; Intelsat Comments at 6 (proposing a first come, first served regime in which applicants would receive a "one-time" opportunity to amend pending applications without losing their position in the queue").

[4] EchoStar Comments at 9.

DBS operators should automatically receive 17/24 GHz BSS licenses for orbital slots and channels corresponding to their DBS authorizations.[5] Any other 17/24 GHz BSS licenses, argued EchoStar, should be distributed by auction or through a processing round.[6]

For the reasons discussed below, DIRECTV continues to believe that the orbital spacing and licensing regime it proposed, which was supported by Intelsat and SES, would best serve the public interest.

B. Orbital Spacing and Location

As set forth in its comments, DIRECTV proposes that – for the portion of the geostationary arc between 83° W.L. and 123° W.L. – 17/24 GHz BSS orbital locations should presumptively be spaced four degrees apart. Four degree spacing centered on FSS slots over this limited portion of the arc offers a number of advantages. To begin with, both the Commission and commenters recognize the potential for space path interference from 17/24 GHz BSS space stations transmitting in the 17 GHz band into DBS space stations receiving in this band.[7] As EchoStar points out, this concern applies not only to DBS locations allocated to the United States, but also to coordinating 17/24 GHz BSS

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5 *Id*. at 10.

6 *Id*. at 13.

7 *See* DIRECTV Comments at 22-23 ("DIRECTV believes that such interference presents a significant problem to the extent that DBS and 17/24 GHz BSS satellites are located in close proximity. In fact, difficulties in accommodating such operations were an important factor in DIRECTV's conclusion that an orbital spacing plan for 17/24 GHz BSS should not start from a premise of collocation with existing U.S. DBS slots."); EchoStar Comments at 10 ("Specifically, the presence of RBW satellites at or near the same orbital location as a DBS satellite could significantly constrain the DBS operator's ability to use its uplink frequencies. At worst, DBS service to millions of American could be disrupted by harmful interference from RBW satellites into the receive antennas of conventional DBS satellites."); Intelsat Comments at 7 ("Full overlap with the DBS locations . . . may not be desirable in any event because of space path interference issues."); SES Comments at 13-14 (suggesting that an 0.2-0.3 degree spacing is necessary between 17/24 GHz BSS and DBS satellites).

operations with the 12/17 GHz assignments of other administrations under the ITU Region 2 Plan. Table 1, below, shows the orbital locations presumptively available under DIRECTV's proposal, as well as the locations assigned under the Region 2 plan in the relevant portion of the arc.[8]

Available Orbital location, deg. W	Nearby R2 Assignment Location, deg. W	Administration
83	82 ± 0.2	CAN
87	87.2	BOL/BAH
91	91 ± 0.2	CAN
95	94/94.8	ARG/EQA
99	99.2	PRG
103	103.2/103.8	CLM/VEN
107		
111	110 ± 0.2	USA
115	115.2	BOL/CLM/EQA/PRU/VEN
119	119 ± 0.2	USA
123		

Table 1. Proposed Orbital Assignment Plan

Since these Region 2 assignments are part of an international plan, they endure in perpetuity and therefore create ongoing regulatory exposure for non-coordinated 17/24 GHz BSS systems. Almost none of these assignments have yet been licensed (much less brought into use), and it would be very difficult for a 17/24 GHz BSS operator to coordinate successfully in such a vacuum.

DIRECTV's analysis indicates that 17/24 GHz BSS satellites cannot operate at the same location as 12/17 GHz BSS satellites without exceeding relevant coordination triggers. As shown in Appendix A, which assesses interference from two representative

[8] SES proposed that the same orbital locations be available between 83º W.L. and 115º W.L., although it proposed slightly different locations outside that portion of the arc. *See* SES Comments at 14, Table 1.

17/24 GHz BSS satellites into adjacent Region 2 assignments, separation of at least 0.2 degrees (with appropriate station-keeping taken into account) is necessary/sufficient to avoid triggering coordination. SES reached a similar conclusion is its comments as well.[9]

While the presumptive orbital assignment plan proposed by DIRECTV does in fact achieve this minimum separation between 17/24 GHz BSS orbital slots and virtually all Region 2 assignments, it may not be possible or desirable to avoid collocation between 17/24 GHz BSS and traditional BSS (U.S. and other Region 2) altogether. For example, at least EchoStar believes that collocating 17/24 GHz BSS and existing DBS systems may permit operators to capture operational efficiencies similar to those cited by DIRECTV and SES in favor of BSS/FSS collocation,[10] (*e.g.* use of a single feed antenna for reception of both 17 GHz and Ku or Ka-band signals), while space path interference can be minimized if the same operator controls the licenses for both frequency bands.[11] DIRECTV's four-degree spacing proposal does not prevent EchoStar from capturing the efficiencies it pursues, but at the same time it preserves similar efficiencies desired by DIRECTV and SES.

Indeed, spacing on existing FSS slots (as proposed by DIRECTV, Intelsat, and SES) places a 17/24 GHz BSS satellite at 91° W.L. and 119º W.L., which are existing DBS orbital locations used by Telesat Canada and EchoStar/DIRECTV, respectively. Moreover, four degree spacing includes a location available at 111° W.L., which is very close to the 110.2° W.L. position in which the EchoStar 10 satellite operates.

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[9] *Id.* at 13-14 (suggesting that 0.2-0.3 degree spacing is necessary between 17/24 GHz BSS and DBS satellites).

[10] *See* Echostar Comments at 8-9; DIRECTV Comments at 9; SES Comments at 18-19.

[11] *BSS NPRM* ¶ 73.

Accordingly, although the orbital spacing plan proposed by DIRECTV, Intelsat, and SES has been designed to maximize the opportunities for collocation with FSS satellites, it also accommodates EchoStar's desire for collocation at one of the DBS slots from which it currently operates, and comes very close to achieving this at another. While allowing EchoStar to realize all of the benefits of 17/24 GHz BSS-DBS collocation, however, four degree spacing avoids the large majority of 12/17 GHz slots assigned under the Region 2 Plan by the required minimum amount, and provides multiple opportunities for BSS-FSS collocation – neither of which EchoStar's DBS-centric proposal would achieve.

C. Orbital and Operational Flexibility

DIRECTV recognizes that 17/24 GHz BSS operators may need flexibility within the nominal four-degree spacing regime to optimize their systems and services, and believes that such flexibility should be accommodated so long as the overall integrity and stability of the interference environment is preserved. Accordingly, DIRECTV proposes that in adopting rules for this service, the Commission define a "reference interference" baseline. Applicants would then be allowed to receive routine processing even if they deviate from the standardized parameters established in the service rules, so long as they make offsetting changes to preserve this overall environment and create no additional interference, beyond the reference situation, to other licensees in the band. For purposes of establishing this baseline, the reference situation would assume four-degree spacing and the use of receive antennas that comply with the ITU Recommendation BO.1213

pattern.[12] DIRECTV also anticipates that the Commission will adopt some form of PFD limits for the band – the final key component in defining the reference situation. Thus, for example, a 17/24 GHz BSS applicant should receive routine processing if it proposes to locate a satellite offset from one of the orbital locations available under the four-degree spacing regime – but only if it also adjusts its power and other parameters so that it would not increase interference to any other operator as compared to the reference situation.

Of course, 17/24 GHz BSS applicants should also have the flexibility to receive routine processing if they obtain the consent of adjacent systems through coordination to operate outside of the "reference situation" parameters.[13] And they can operate outside the domestic arc (*i.e.*, at least 4º below 83° W.L. or above 123° W.L.) with even more flexibility with regard to orbital spacing and power levels. But the concept of a reference interference baseline for systems within the CONUS arc creates opportunities for individual flexibility, eliminates the burden and delay of unnecessary coordination, and maintains the stability of the overall environment for all 17/24 GHz BSS operators.

D. Licensing

DIRECTV, Intelsat, and SES also agreed that the Commission should use its first come, first served procedures to process 17/24 GHz BSS applications.[14] EchoStar, by

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[12] At 17.5 GHz, the off-axis gain of this reference pattern is the same for both 45 cm and 60 cm receive antennas with respect to adjacent satellites located four degrees away, so both size antennas would receive the same absolute level of interference from adjacent satellites .

[13] As discussed below in more detail, an operator seeking to exceed established PFD triggers by up to 3 dB would need to coordinate only with its immediately adjacent systems, while an operator seeking to exceed the PFD triggers by 3-6 dB would need to coordinate with systems two slots away.

[14] DIRECTV Comments at 17; Intelsat Comments at 2-6; SES Comments at 23. DIRECTV and Intelsat each also agreed that existing applicants should retain their place in the queue. *See* DIRECTV Comments at 17 ("consistent with past practice, existing applicants should be allowed to amend their pending applications to conform to the rules adopted in this proceeding without losing their place in the processing queue"); Intelsat Comments at 6 ("applicants should be provided with a one-time opportunity to amend pending applications without losing their position in the queue"). EchoStar, for

contrast, argued in favor of either auctions or processing rounds.[15] DIRECTV is concerned that such an approach could both mire the 17/24 GHz BSS service in legal controversy and significantly delay the licensing process.

As recognized in the *BSS NPRM*, the D.C. Circuit's *Northpoint* opinion vacated and remanded the Commission's decision to use auctions to assign DBS licenses, in light of the ORBIT Act's prohibition on the auction of spectrum used for international and global satellite services.[16] In its comments, EchoStar argued that the D.C. Circuit's *Northpoint* holding was *not* that the ORBIT Act always and in all circumstances prohibits the auction of BSS spectrum.[17] Intelsat views the matter differently.[18] Regardless of who is right, attempting to use an auction methodology for BSS licensing would likely be an invitation to relitigate the *Northpoint* case. This would not be the best way to "promote prompt commencement of services in this newly allocated band."[19] Moreover, any suggestion that the service could be "made domestic" (and therefore eligible for auction)

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its part, would achieve similar results by reserving DBS-collocated orbital for DBS operators – meaning that EchoStar and DIRECTV (two of the four existing applicants for 17/24 GHz BSS licenses) would automatically receive licenses. EchoStar Comments at 10-11.

15 EchoStar Comments at 13-18.

16 *BSS NPRM* ¶ 9 (*citing Northpoint Technology, Ltd. and Compass Systems, Inc. v. Federal Communications Commission*, 412 F.3d 145 (D.C. Cir. 2005) ("*Northpoint*"). Open-Market Reorganization for the Betterment of International Telecommunications Act, Pub. L. No. 106-180, 114 Stat. 48 (2000), *as amended*, Pub. L. No. 107-233, 116 Stat. 1480 (2002), *as amended*, Pub. L. No. 108-228, 118 Stat. 644 (2004), *as amended*, Pub. L. No. 108-371, 118 Stat. 1752 (2004).

17 EchoStar Comments at 14. *See Northpoint* 412 F.3d at 156 ("Therefore, while the Commission's construction of section 647 of the ORBIT Act may not be prohibited by the statutory text (and may even represent a wise policy choice), it is an unreasonable construction on this record and the auction premised on it is unauthorized. Accordingly, we grant Northpoint's petition, vacate Part III.A of the *DBS Auction Order* and remand this matter to the Commission for further consideration consistent with this opinion.").

18 Intelsat Comments at 4.

19 *BSS NPRM* ¶ 1.

by requiring 17/24 GHz BSS satellites to devote a fixed percentage of capacity to serving the United States is itself problematic. Most 17/24 GHz BSS applicants – including DIRECTV – seek to use all internationally allocated 17/24 GHz BSS spectrum for the provision of international services (subject, of course, to local licensing requirements).[20] DIRECTV fails to see how denying these operators the ability to offer such services would serve the public interest.

Nor would assigning 17/24 GHz BSS licenses through processing rounds be desirable.[21] The Commission has already confirmed the legality of the first come, first served methodology in its *Space Station Reform Order*.[22] It found that the system is consistent with ensuring applicant qualification.[23] And it found that first come, first served likely would not encourage speculation (and that, if it did, any incremental increase in speculation was fully justified by the other benefits of the methodology).[24] Nothing has happened since 2003 to upset these determinations – if anything, experience over the last three years suggests that the first come, first served methodology *dis*courages speculation.

Most importantly, the Commission found – and no commenter has provided reason to think otherwise – that processing rounds take an enormous amount of time.

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[20] DIRECTV Comments at 33.

[21] EchoStar Comments at 15-18.

[22] *Space Station Reform Order*, 18 FCC Rcd. at 10800-01.

[23] *Id.* at 10803 (noting that the Commission would "consider an applicant's qualifications before granting it a license" and that "the first-come, first-served procedure allows us to deny applications when appropriate, including but not limited to concerns raised in petitions to reject that application").

[24] *Id.* at 10797 ("[W]e disagree with parties who argue that a first-come, first-served procedure will necessarily increase the incentives for filing speculative satellite applications . . . [and] conclude that the mere possibility of some speculation in a first-come, first-served procedure does not by itself justify rejection of the first-come, first-served procedure for satellite applications.").

Indeed, the last processing round before the *Space Station Reform Order* (for Ka-band satellites) took nearly four years to complete.[25] As the Commission found,[26] and as several commenters have confirmed,[27] this raises costs for satellite customers and service providers, encourages speculative applications, and encourages strategic behavior by applicants. The Commission should not return to an outmoded and cumbersome licensing regime.

II. The Commission Should Establish "Stepped" Downlink PFD Limits for 17/24 GHz BSS Downlink Transmissions

Every commenter that addressed the issue favored the adoption of PFD limits for 17/24 GHz BSS operations. However, none of the specific proposals matched any of the others. For a variety of reasons, DIRECTV continues to believe that its proposal for a "stepped" regime based on achievable power levels that would preserve the possibility of both CONUS and spot beam operations would best serve the public interest.

A. Stepped Downlink PFD Limits are Preferable to Uniform Nationwide Limits

In its comments, DIRECTV described how spot beam operations can cause unacceptably high interference into adjacent satellite co-frequency CONUS beam operations. In particular, it noted that, "[w]hile DBS CONUS patterns from adjacent satellites . . . allow fairly straightforward prediction of interference, EIRP differences of

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[25] *See* Public Notices, Rep. No. SPB-105, DA 97-2201, and Rep. No. SPB-106, DA 97-2202 (rel. Oct. 15, 1997); *Second Round Assignment of Geostationary Satellite Orbit Locations to Fixed Satellite Service Space Stations in the Ka-Band*, 16 FCC Rcd. 14389 (Int'l Bur. 2001).

[26] *Space Station Reform Order*, 18 FCC Rcd. at 10793 (discussing comparative speed of processing rounds and first come, first served methodology); *id.* at 10778 (discussing speculative applications and strategic behavior).

[27] *See, e.g.*, Intelsat Comments at 4 (citing materials suggesting that first come, first served processing allows the FCC to more quickly act on satellite applications).

as much as 10 dB or more can result from DBS spot and DBS CONUS beams from neighboring orbital locations."[28] Such differentials are normally not a significant problem with DBS satellites separated by nine degrees, because the off-axis discrimination of consumer receive antennas is sufficient to overcome the EIRP imbalance. Closer-spaced 17/24 GHz BSS satellites, by contrast, would not allow the same amount of off-axis discrimination. Any imbalance between spot beam and CONUS operations can thus be expected to have a much more significant impact on quality of service to 17/24 GHz BSS consumers than would a corresponding imbalance in the DBS service.

Most commenters explicitly recognized this possibility. Regardless of other differences in their proposals, no commenter addressing the issue proposed that spot beams be subject to a higher downlink PFD limit than CONUS beams.[29] Yet the PFD limits proposed by some commenters are so high that, as a practical matter, the EIRP disparity between CONUS and spot beams that now exists in the DBS service would continue for years to come in the 17/24 GHz BSS service, which presumably will be more closely spaced.

SES, for example, proposes a uniform PFD limit of -113 dBW/m^2/MHz throughout the country, arguing that such higher power is needed to ensure sufficient reliability in the worst case cities. Indeed, SES justifies this power limit on the grounds

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[28] DIRECTV Comments at 10-11.

[29] *See* SES Comments at 17 (proposing uniform -113 dBW/MHz/m^2 PFD limit); Intelsat Comments at 10 (proposing uniform -115 dBW/MHz/m^2 PFD limit); EchoStar Comments, Technical Annex at 15-17 ("The use of spot beams generally implies higher peak EIRP than for a CONUS coverage beam . . . .").

that it would "protect broad area coverage" from spot beam operations.[30] But *no* existing or planned satellite can achieve -113 dBW/m^2/MHz throughout CONUS. Indeed, DIRECTV calculates that a CONUS beam designed to achieve a uniform PFD of -113 dBW/m^2/MHz across the entire service area would need satellite transmit power greater than 3 kW per transponder.[31] As a point of reference, this required 17 GHz transmit power is *more than seven times* the 12 GHz transmit power available on DIRECTV's newest and most advanced DBS satellite.[32]

This creates what might be thought of as a "virtual" spot beam/CONUS disparity. A 17/24 GHz BSS satellite could generate spot beams that achieve -113 dBW/m^2/MHz at the Earth's surface, while an adjacent satellite would not have sufficient power to generate a CONUS beam of comparable power. Thus, under SES's proposal, spot beams would pose a significant interference challenge to adjacent CONUS beams – exactly the problem highlighted by DIRECTV and implicitly recognized by others.

The Commission could, of course, address this problem by adopting a much lower nationwide PFD limit (comparable to the -118 dBW/m^2/MHz established for the Ka-band) that both CONUS and spot beam satellites could generate. But this "lowest common denominator" approach would be unnecessarily restrictive, denying flexibility to

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30 SES Comments at 18 ("SES Americom recognizes that a spot beam would have to limit peak power to comply with this limit but believes that it is more important to protect the ability to use 17/24 GHz BSS spectrum for broad area coverage").

31 DIRECTV has calculated this figure as follows: -113 dBW/m^2/MHz = 65 dBW/36 MHz EIRP; flat CONUS beam TX Gain = 32 dBi, 2 dB output losses means TX Power = 35 dBW, or 3.2 kW. Even a standard CONUS pattern with 35 dBi peak gain would need transmit power greater than 1.5 kW to achieve the -113 dBW/m^2/MHz pfd level.

32 DIRECTV 9S has triple-combined 150 watt TWTAs resulting in transmit output power of 23.9 dBW after output losses. *See* FCC File No. SAT-RPL-20050322-00070, Application Narrative at A-12.

spot beams and ignoring standard CONUS beam design, which places greater power in areas of the country more susceptible to atmospheric attenuation.

DIRECTV thus suggested graduated or "stepped" geographic power limits for both spot and CONUS beams (Figure 1 below).[33] This would place spot and CONUS beams on a more equal footing, because in no geographic area would spot beams be permitted to operate at power levels far greater than that practicably unattainable by CONUS beams. It would also maximize efficiency of both spot and CONUS beams by allowing higher power operation in areas that need it most.

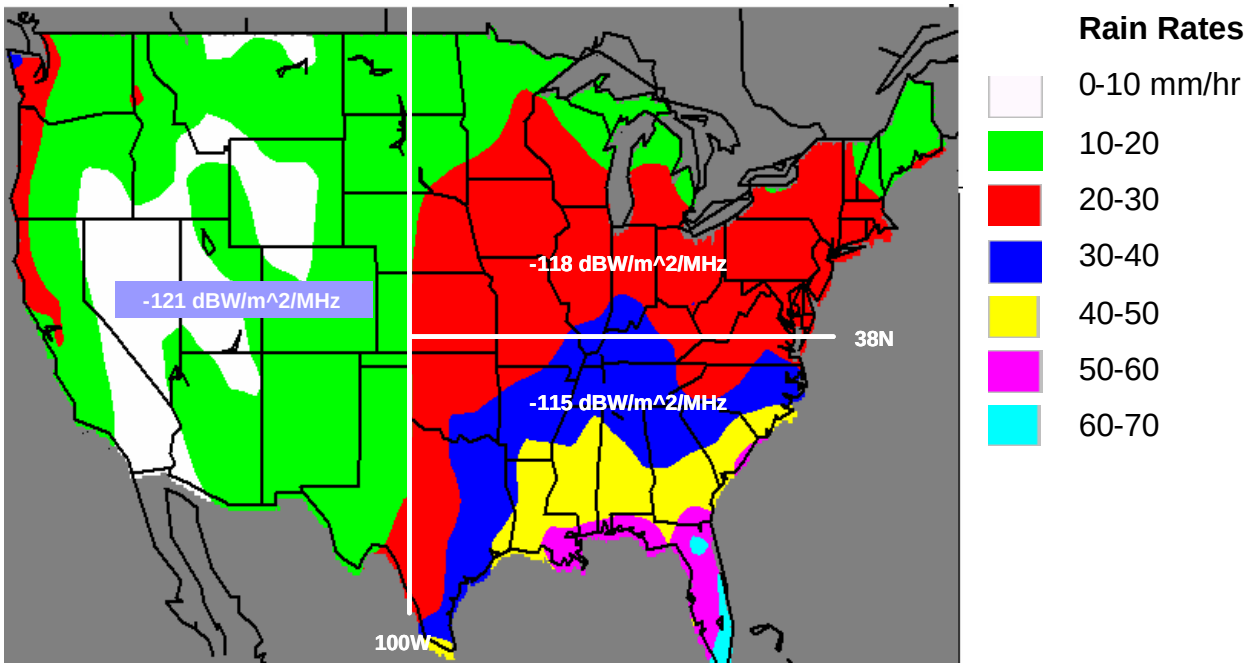

Figure 1. DIRECTV's Proposed "Stepped" Power Limits

[33] DIRECTV would likewise prefer stepped PFD limits to the Commission's original proposal, endorsed by Intelsat, of uniform -115 dBW/m^2/MHz PFD limits. Intelsat Comments at 10.

To demonstrate the different power levels needed in different parts of the countries, Figure 2 below, shows the rain plus atmospheric attenuation for five cities (Miami, New York, Chicago, Seattle and Los Angeles) for 99.7%, 99.8%, and 99.9% availabilities. The attenuation numbers were calculated using Recommendation ITU-R P.618-8 and an assumed satellite location of 100° W.L. It is clear that the amount of attenuation that must be overcome increases significantly for availabilities ranging from 99.7% to 99.9%, especially for the high-rain locations.

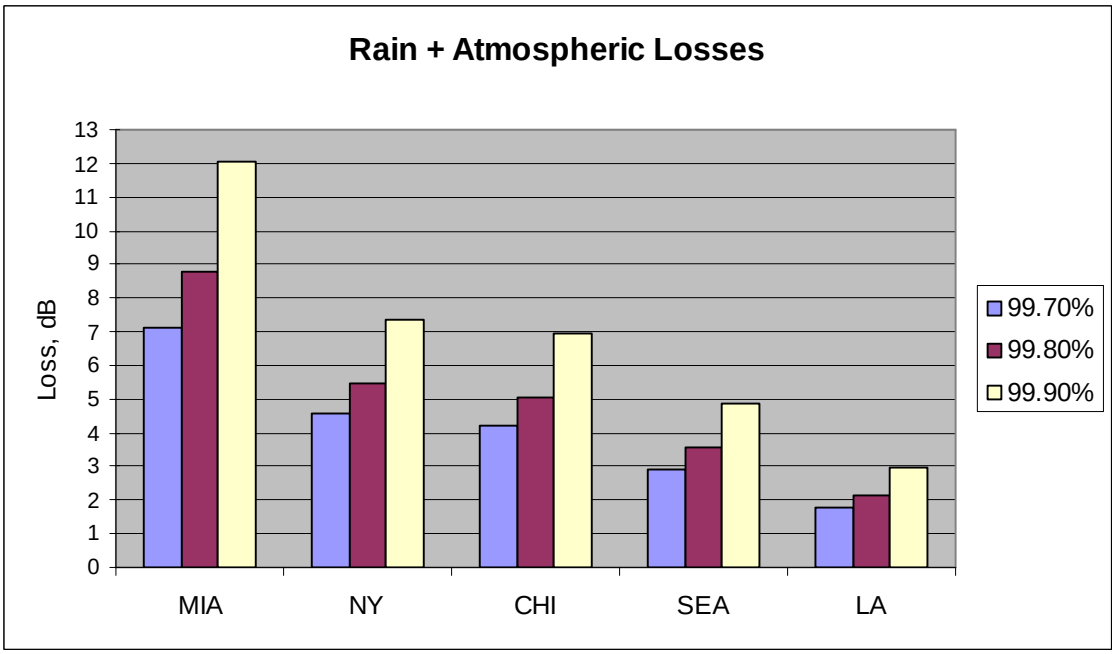

Figure 2. Rain + Atmospheric Attenuation for US Cities at Various Availabilities

But even the use of stepped PFD values cannot solve the spot beam/CONUS beam interference problem if the power differentials across the country are too high. Thus, although EchoStar proposed stepped PFD limits for the same reasons advanced by DIRECTV,[34] EchoStar, like SES, proposes maximum PFD levels (as high as -113

[34] EchoStar Comments, Tech. Annex at 16.

dBW/m^2/MHz) that satellites can achieve in their spot beam operations, but cannot be matched with CONUS beams. Accordingly, just like SES's proposal, EchoStar's proposed PFD regime would essentially codify the disparity between satellite spot beams and adjacent satellite CONUS beams.

In this regard, it is instructive to evaluate the PFD levels that would be required to meet SES's target criteria of achieving 99.9% availability serving 45 cm antennas.[35]

DIRECTV has calculated the PFD values that would be required in various cities to achieve availabilities from 99.7% to 99.9%, with 45 cm and 60 cm receive antennas. Links were calculated for a modulation and code rate of 8PSK 3/5 with a required C/(N+I) of 7.7 dB (including all link degradations).[36] Table 2 and Figure 3 provide the results for 45 cm antennas and Table 3 and Figure 4 provide the results for 60 cm antennas, with DIRECTV's proposed PFD limits superimposed on both Figures.

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[35] SES suggests that its availability and dish size criteria are "comparable to [those of] DBS" – which implies that, as is the case with DBS, operators can meet such criteria without significant interference problems. SES Comments at 7. Yet the comparison is inapt for two reasons. First, rain and atmospheric attenuation is much higher in the 17 GHz (BSS) band than the 12 GHz (DBS) band. For this reason, 17/24 GHz BSS satellites could only reach 99.9 percent availability to 45 cm antennas if they were to operate at much higher power or with much more error correction coding. Second, 17/24 GHz BSS satellites will (under all formulations) be more closely spaced than are DBS satellites. This means that they will receive more interference from adjacent satellites.

[36] A modulation and code rate of 8PSK 3/5 was chosen because it has nearly the same required C/(N+I) as DIRECTV's 12 GHz DBS links using legacy QPSK 6/7 modulation and coding (7.6 dB).

	Miami	New York	Chicago	Seattle	Los Angeles
DTV proposed pfd limit	**-115**	**-118**	**-118**	**-121**	**-121**
PFD for 99.7%	-115.2	-118.4	-118.9	-120.8	-122.7
PFD for 99.8%	-113.3	-117.2	-117.7	-119.9	-122.0
PFD for 99.9%	-109.8	-114.9	-115.4	-118.2	-120.7

Table 2. PFD Values (dBW/m^2/MHz) to Meet 99.7%-99.9% Availability with 45 cm Receive Antenna

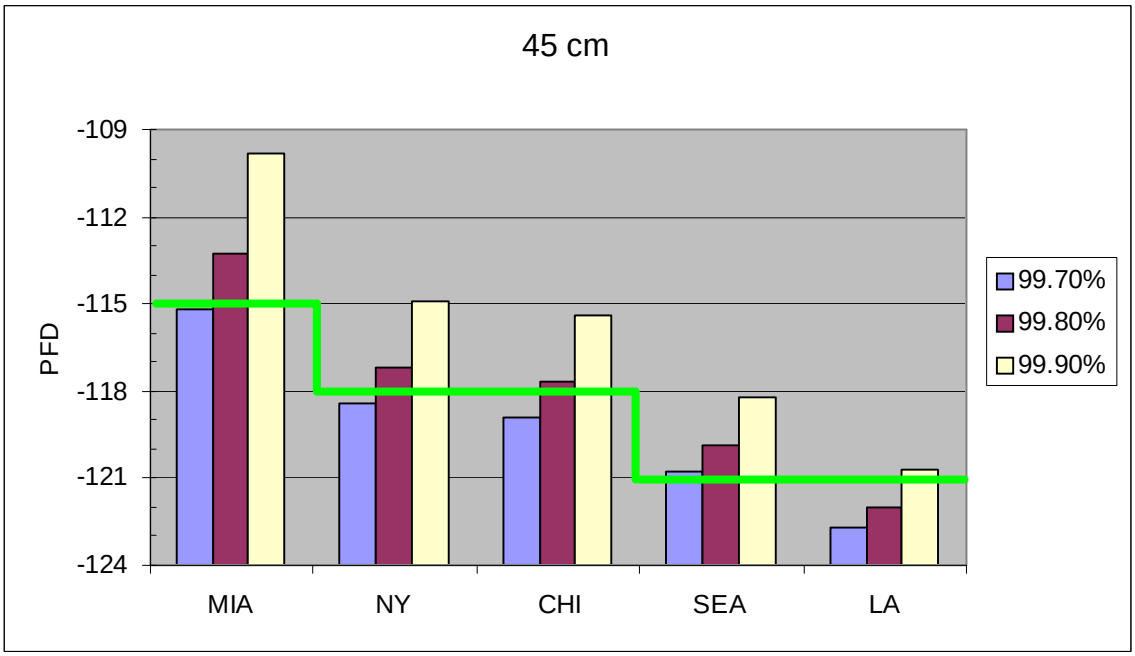

Figure 3. PFD Values (dBW/m^2/MHz) to Meet 99.7-99.9% Availability with 45 cm Receive Antenna

	Miami	New York	Chicago	Seattle	Los Angeles
DTV proposed pfd limit	**-115**	**-118**	**-118**	**-121**	**-121**
PFD for 99.7%	-117.9	-121.1	-121.6	-123.5	-125.4
PFD for 99.8%	-116.1	-119.9	-120.4	-122.6	-124.8
PFD for 99.9%	-112.5	-117.6	-118.1	-120.8	-123.4

Table 3. PFD Values (dBW/m^2/MHz) to Meet 99.7%-99.9% Availability with 60 cm Receive Antenna

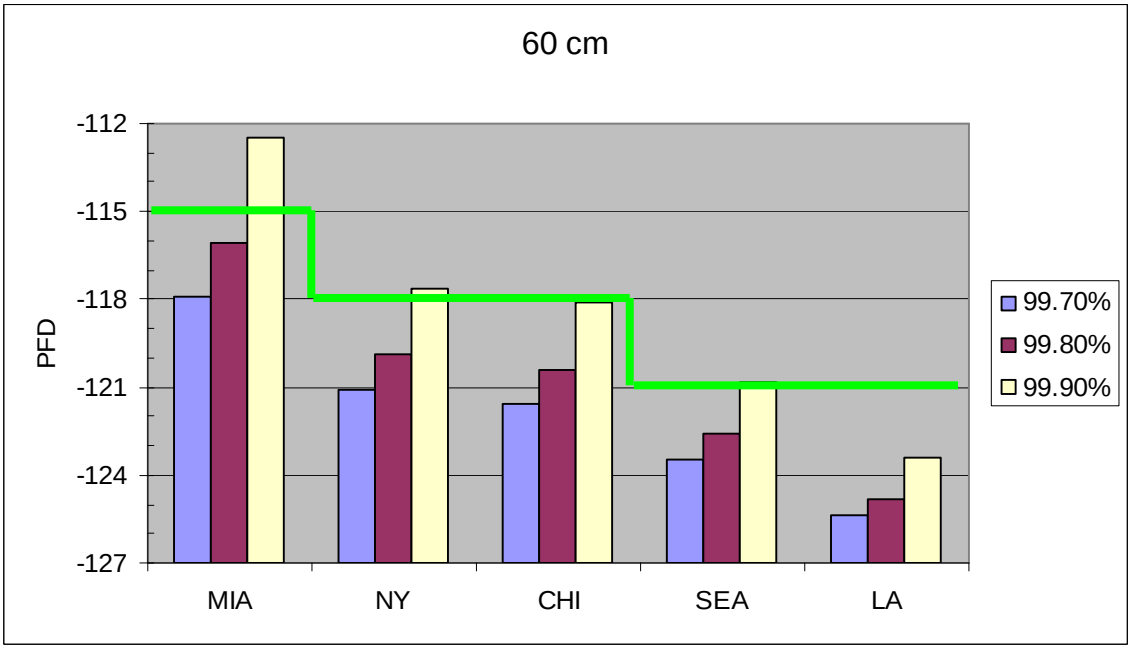

Figure 4. PFD Values (dBW/m^2/MHz) to Meet 99.7-99.9% Availability with 60 cm Receive Antenna

These tables and figures illustrate three important points. First, a 17/24 GHz BSS satellite would have to operate at dramatically higher PFD levels than even SES proposes in order to support a reasonable coding scheme at 99.9% availability (see last row of Table 2). Second, the amount of power necessary to support 99.9% availability with the same coding rate in Los Angeles (dry) and Miami (rainy) differs by nearly 11 dB – though the PFD limit that SES proposes is the same for both locations.[37] Thus, SES's proposed PFD limit will not achieve the stated availability objective in some parts of the country, and will be dramatically overpowered in other parts of the country thereby creating the potential for large EIRP disparities.

Third, DIRECTV's proposed stepped PFD limits coupled with 60 cm antennas will indeed achieve 99.9% availability across much of the country. These proposed PFD limits will also support 99.7% to 99.9% availability across many parts of the country even for 45 cm antennas, should a 17/24 GHz BSS operator choose to deploy such receive equipment. Accordingly, the Commission need not heed SES's stated concern that "[f]orcing a new entrant using the 17/24 GHz band to employ larger dishes would preclude the entity from effectively competing for the significant portion of the customer base for whom dish size is an important issue."[38]

The stepped PFD levels (to match varying rain attenuation characteristics across CONUS) proposed by DIRECTV are achievable by spot beams today, and should be achievable by CONUS beams in the near future. This allows room for technological

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[37] Rain and atmospheric effects are more severe at 17 GHz than at 12 GHz, so rainy areas will require even more power to overcome the additional losses. Therefore, it is necessary to weight the power distribution to favor the eastern U.S.

[38] SES Comments at 6.

advances in satellite power, while not unduly disadvantaging operators deploying CONUS beams. At the same time, they will permit any 17/24 GHz BSS operator to compete in the marketplace with the offerings of both new entrants and incumbent DBS operators alike. For these reasons, DIRECTV's proposal is superior to the alternatives presented by the other commenters.

B. The Commission Should Adopt EchoStar's Coordination Arc Proposal

Although often discussed as PFD "limits," DIRECTV's proposal is better characterized as a series of "triggers," such that systems operating below specified levels qualify for routine processing while those proposing to operate above them would be subject to greater scrutiny, including requirements of coordinating with neighboring satellites and providing a more complete interference analysis.[39] This is how the PFD levels work today for Ka-band satellite applicants.[40]

As discussed above, however, DIRECTV proposes that 17/24 GHz BSS applicants should be able to operate outside the confines of the service rules, so long as doing so would not increase interference relative to the reference situation. In addition, an applicant may seek to operate in a way that *does* change the reference interference environment, so long as it has coordinated its proposed operations with affected systems. For this purpose, EchoStar's comments suggest a useful principle to bound the coordination obligation.[41] In the Ka-band, with two-degree spacing, satellite operators that propose to exceed specified PFD levels must obtain the agreement not only of

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[39] DIRECTV Comments at 13.

[40] 47 C.F.R. § 25.138(a)(6).

[41] EchoStar Comments, Tech. Annex at 17.

immediately adjacent operators, but also of those up to six degrees away, creating a ± 6º coordination arc.[42] EchoStar points out that, in bands with greater than two-degree spacing, it may not be necessary to coordinate with three sets of operators on each side of a non-compliant satellite.

EchoStar proposes instead that an operator seeking to exceed the PFD levels established for the 17/24 GHz BSS band by up to 3 dB would need to coordinate only with the operator in the immediately adjacent location on each side, while an operator seeking to exceed the PFD levels by 3-6 dB would also need to coordinate with the next set of orbital locations as well. Assuming a four-degree spacing regime, this amounts to a ± 4º coordination arc for proposals exceeding the PFD level by up to 3 dB, and a ± 8º coordination arc for proposals exceeding these levels by 3-6 dB. Under EchoStar's proposal, no system could exceed the PFD levels by more than 6 dB.[43]

Although DIRECTV has proposed different PFD levels than EchoStar, it nonetheless supports the coordination arc concepts suggested by EchoStar for cases that do not qualify for routine processing. That is, if an operator proposes to exceed the PFD levels and cannot demonstrate that doing so will not increase interference as compared to the reference situation, it must coordinate with adjacent systems over the portion of the geostationary arc specified by EchoStar. However, while DIRECTV thinks it unlikely that an operator would be able to coordinate operations at up to 6 dB more power than contemplated under the Commission's rules, it should be allowed to do so if it can reach agreement over a ± 8º coordination arc.

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[42] 47 C.F.R. § 25.138(b).

[43] EchoStar Comments, Tech. Annex at 17.

IV. Other Technical Issues

A. 24 GHz Feeder Link Issues

1. Off-Axis EIRP

DIRECTV and SES agreed with the Commission's proposal to adopt rules similar to those in Section 25.138, under which transmitting BSS earth stations in the 24 GHz band would have to meet a specific off-axis EIRP mask regardless of their on-axis absolute EIRP or antenna performance in order to qualify for routine processing.[44] DIRECTV also argued that the Commission should use off-axis EIRP limits of the same magnitude as used for the Ka-band (appropriately scaled to a 1 MHz resolution rather than 40 KHz).[45]

EchoStar agreed with this general approach, but proposed peak EIRP density levels approximately 6.4 dB higher than those proposed by the Commission.[46] There is no evidence, however, that such power levels are necessary to establish reliable satellite links. In addition, allowing so much power to be directed other than at the target satellite increases the difficulty not only of coordinating with co-primary terrestrial systems, but also of accommodating proposed decreases in orbital spacing for other 17/24 GHz BSS systems that may otherwise be desirable.

2. Antenna Testing

Section 25.115 requires applicants for Ka-band feeder link earth stations to submit *with their applications* a full set of antenna test patterns, which is often difficult because

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[44] DIRECTV Comments at 15; SES Comments at 15-16.

[45] DIRECTV Comments at 15.

[46] EchoStar Comments, Tech. Annex at 18-19 (proposing that the tentatively assumed peak EIRP density of 5.6 dBW/Hz be increased to 12.0 dBW/Hz).

the large feeder link antennas are assembled on site and it is simply not practical (or necessary) to test these antennas on a range.[47] In its comments, Intelsat asserts that the Commission should *not* require 17/24 GHz BSS applicants to provide such data with their applications, arguing that providing measured radiation patterns for antennas that have not yet been built is not practicable.[48] DIRECTV agrees with this assessment.

In order to address this concern, Intelsat proposes that applicants be required to submit data similar to that required for Earth Stations on Vessels ("ESVs"), which include "charts and tables for a production earth station antenna."[49] While this would be an improvement over the rules in the Ka-band, DIRECTV believes that an even better model can be found in a proposal recently submitted by the Satellite Industry Association in the *Biennial Review* docket.[50] Under this proposal – based on existing rules for large C- and Ku-band antennas – 17/24 GHz BSS feeder link antennas would be tested as they are built, using in-orbit satellite resources, with the earth station operator responsible for certifying *after licensing* that the tests were satisfactorily performed, as part of its notification to the Commission that construction has been completed.[51]

3. 24 GHz Feeder Link Sharing with 24 GHz FS

In its comments, DIRECTV observed that, because no FS service is offered in large parts of the United States, and because only a limited number of BSS feeder link

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47 *See* 47 U.S.C. 25.115(e) (referencing 47 U.S.C. § 25.138).

48 Intelsat Comments at 11.

49 *Id*. at 11; 47 C.F.R. § 25.221(b)(1).

50 *See* Comments of the Satellite Industry Association at 12-13, IB Docket No. 06-154 (filed Sept. 1, 2006).

51 *See* 47 C.F.R. §§ 25.132(d) and (e).

earth stations will be deployed, it should be possible to locate such earth stations in areas where they will not interfere with FS operations.[52] Others presented similar views.[53] DIRECTV also argued that, in (presumably rare) cases of conflict, the Commission ought to use its normal procedures for coordination between earth stations and terrestrial operations – but only where an FS operator is located within the -114 dBW/m2/MHz PFD contour of a BSS feeder link earth station.[54]

FiberTower Corporation ("FiberTower") agrees that it should be possible to locate BSS earth stations in areas that do not interfere with FS operations.[55] It notes its current 24 GHz operations are limited to 77 of the top 100 markets and that, while those markets cover 90 percent of the United States population, they cover only 10 percent of the United States geography.[56]

It is thus surprising that FiberTower would take the position, as it apparently has, that coordination between 24 GHz BSS feeder link earth stations and FS operators would be hopelessly complicated.[57] FiberTower states that current technical assumptions for BSS and FS are outdated, and implies that updating these assumptions would take

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52 DIRECTV Comments at 28-31.

53 *See* EchoStar Comments, Tech. Annex at 20-21 (noting that "the relatively small number of 24 GHz feeder link earth stations should result in no significant interference problems occurring in practice"); SES Comments at 23 (arguing that "the provisions of Sections 25.203, 25.204, and 25.209 of the Commission's rules provide a reasonable framework for sharing with fixed services in the 24 GHz band").

54 DIRECTV has fashioned this provision on Part 101.509 of the Commission's rules.

55 FiberTower Comments at 5.

56 *Id.* at 2.

57 *See id.* at 4 (arguing that "the record [regarding sharing] is quite incomplete," "significant information is needed," and that "numerous questions need answering"); *id.* at 6 (suggesting that the Commission should determine the numbers of BSS feeder link earth stations prior to setting any rules regarding coordination with FS); *id.* at 7 (discussing whether EIRP limits ought to be determined on a "clear air" basis or in the presence of precipitation).

considerable time and effort.[58] The only way to avoid such effort, FiberTower argues, is to (1) set up an "exclusion zone" of at least 100 miles from the periphery of all FS license areas, within which 24 GHz BSS feeder link earth stations would not be permitted under any circumstances;[59] and (2) limit the entire satellite industry to only five such earth stations nationwide.[60]

Such a draconian rule is entirely unnecessary. The Commission's rules already establish interference protection criteria between 24 GHz Fixed Service ("24GFS") and Digital Electronic Message Service ("DEMS") systems. In particular, the rules state:

> The Commission recommends that coordination is not necessary if the power flux density (pfd) at the boundary of the relevant adjacent area is lower than -114 dBW/m^2 in any 1 MHz. This value can be changed and agreed upon by both coordinating parties. Licensees should be able to deploy with a pfd up to -94 dBW/m^2 in any 1 MHz at the boundary of the relevant adjacent area without negatively affecting the successful operations of the adjacent area licensee.[61]

This rule governs geographic sharing at the service area boundaries of two co-primary services in the 24 GHz band. It establishes both a straightforward method for determining if coordination is required (*i.e.*, -114 dBW/m^2/MHz at the FS licensed area boundary) and a PFD level up to which coordination should be achievable (*i.e.*, -94 dBW/m^2/MHz at the FS licensed area boundary). There is absolutely no reason why the rule could not work the same way here.

Suppose, for example, that a nine-meter 24 GHz BSS feeder link earth station were radiating at the maximum EIRP level proposed by the Commission in the *BSS*

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58 *Id.* at 2.

59 *Id.* at 7-9.

60 *Id.* at 9.

61 47 C.F.R. § 101.509(e).

NPRM (*i.e.*, 5.6 dBW/Hz). Assuming a minimum elevation angle of 30 degrees for the feeder link earth station towards the BSS satellites, and that the earth station just complied with the antenna design requirements of Section 25.209, the *maximum* required separation distance between such an earth station and a 24GFS service area boundary to meet the *worst case* FS protection criteria would be 50.2 miles.[62] Thus, so long as the earth station were placed more than 50.2 miles from the boundary, no coordination would ever be needed. It is likely that the actual separation required would be far less due to obstructions in the topography (*e.g.*, hills, trees, buildings) between the BSS feeder link site and the FS service area boundary and/or because of improved feeder link antenna sidelobe performance beyond that specified in Section 25.209.

Now suppose a satellite operator wanted to erect this feeder link earth station within the 50.2 mile (or smaller) "coordination zone."

[62] *See id.*

Feeder Link Antenna Parameters	
Max EIRP density (dBW/Hz)	5.6
Antenna size (m)	9.0
Antenna gain	65.2
Max power density into antenna (dBW/MHz)	0.4
Min elevation angle (deg)	30.0
Max antenna gain towards horizon (dBi) (§25.209)	-4.9
Max EIRP density towards horizon (dBW/MHz)	-4.6
Required Separation from 24 GHz License Area	
Max pfd for no coordination (dBW/m^2/MHz)	-114.0
Required spreading loss between FL and 24 GHz license area (dB-m^2)	109.4
Required separation distance (assuming clear line of sight) (km)	83.7
Required separation distance (miles)	**50.2**
Max coordinatable pfd (dBW/ m^2/MHz)	-94.0
Required spreading loss between FL and 24 GHz license area (dB- m^2)	89.4
Required separation distance (assuming clear line of sight) (km)	8.4
Required separation distance (miles)	**5.0**

Table 4. Required Separation Distances from BSS Feeder Link to FS Service Area

As shown in Table 4, so long as the earth station and the 24GFS service area boundary were no less than five miles apart, the PFD level at the service boundary should not "negatively affect successful operations of" the FS licensee under the proposed rule. Co-frequency 24GFS and DEMS systems have operated under these coordination rules for years. There is no reason to think that BSS and FS systems could not do so as well.

By contrast, FiberTower's proposal is inconsistent with the very concept of co-primary services. BSS and FS services will have equal rights to the 24 GHz band. As such, it is inappropriate to place the burden of coordination wholly on BSS, or to place an outright limit on the number of stations that can be deployed regardless of coordination.

The Commission should reject FiberTower's proposal and instead simply extend its existing rules to cover coordination with 24 GHz BSS feeder link earth stations.

B. 17 GHz Feeder Link Coordination

DIRECTV and EchoStar agree that licensed and operating DBS feeder link earth stations must be grandfathered under any rules adopted in this proceeding to address interference from such earth stations into future 17/24 GHz BSS receive antennas.[63] SES implicitly supports this position as well.[64] Each of these commenters, however, recognizes that *new* DBS feeder link earth stations will need to limit the power of their emissions toward the horizon in order to limit interference into 17/24 GHz BSS subscriber terminals.[65]

In its comments, DIRECTV suggested that the Commission should establish a "coordination zone" around new DBS feeder link earth stations, within which the DBS operator would have to coordinate with 17/24 GHz BSS consumer earth terminals.[66] EchoStar, by contrast, proposed that, if a new DBS feeder link earth station meets specified EIRP criteria, 17/24 GHz BSS antennas within a predetermined zone would become secondary to the feeder link operation.[67] Both of these proposals recognize that, once 17/24 GHz BSS systems begin to deploy, new DBS feeder link earth stations must

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63 DIRECTV Comments at 21; EchoStar Comments, Tech Annex at 21.

64 SES Comments at 19. Intelsat does not address this issue, but agrees with the Commission's proposal to use the method in Annex 3 of Appendix 7 for the analysis of reverse band interference form DBS feeder links into the 17.3-17.8 GHz band to BSS receive earth stations. Intelsat Comments at 11.

65 *Id.*

66 DIRECTV Comments at 20-21.

67 EchoStar Comments, Tech. Annex at 21-22.

provide some level of protection to their subscribers. Yet because the practical implications of these two approaches differ, their implementation must differ as well.

Specifically, because DIRECTV's proposal contemplates coordination with affected terminals, the power levels that define the zone of impact can be set relatively high. This may result in a large impact zone (say 10 km around the feeder link site), but subscribers would be protected by the coordination requirement. By contrast, EchoStar's proposal requires 17/24 GHz BSS terminals to simply accept interference (rather than triggering coordination). Accordingly, any EIRP limits associated with this proposal must be correspondingly tighter to ensure that the zone of affected subscribers is reasonably small (say 1 km around the feeder link site).

As was suggested by both Echostar and SES, interference from new DBS feeder link stations can also be minimized to the extent they are located in sparsely populated areas, where 17/24 GHz BSS receive antennas are unlikely to be deployed. Thus, as an alternative to the proposals outlined above, the Commission could instead require that new DBS feeder link earth stations be located in a locality with no more than a specified maximum population density. So long as the density level chosen did not unnecessarily constrain the number and suitability of areas available for construction, such a requirement would minimize the impact of these new earth stations while still affording DBS licensees sufficient flexibility in building their uplink facilities. For example, as shown in the map below, counties identified by the Census Bureau as having a population density of fewer than 10 people per square mile comprise a significant portion of CONUS.

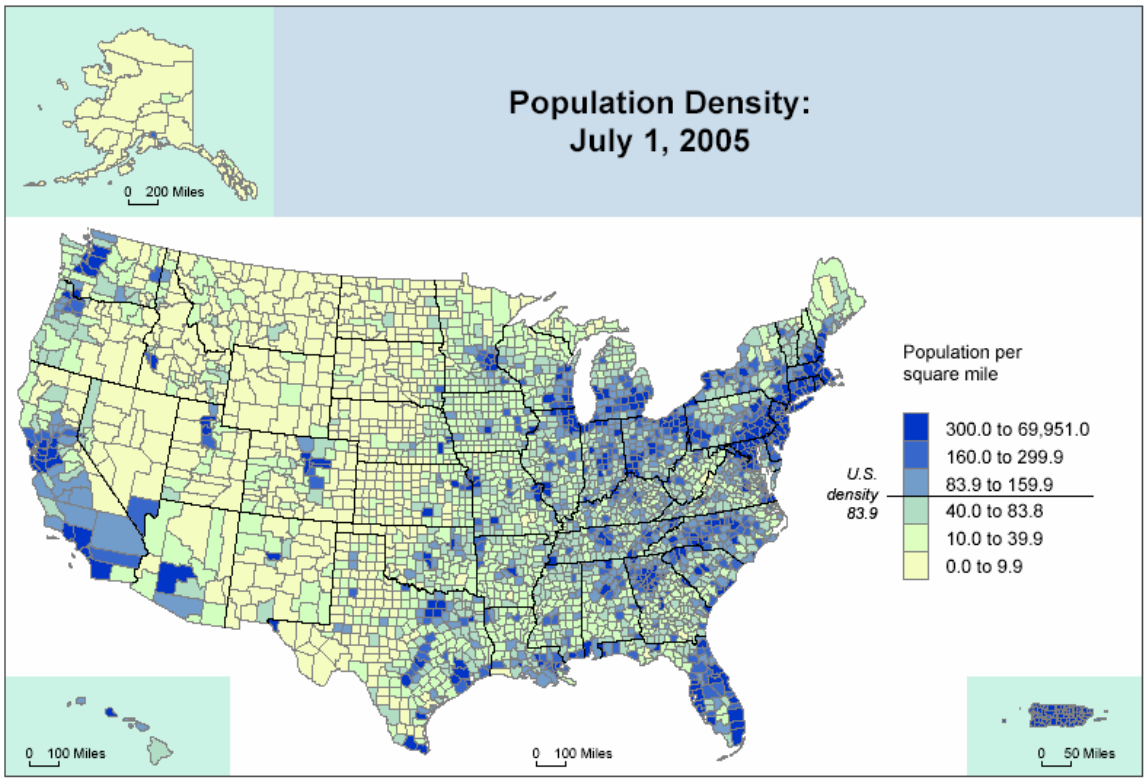

Figure 5. US Population Density

C. Use of 17.7-17.8 GHz

The four satellite commenters support use of the 17.7-17.8 GHz band internationally.[68] Each also expressed an interest in using this spectrum domestically as well.[69] Most contemplate that domestic 17/24 GHz BSS transmissions would operate on a secondary basis in this portion of the band, much as EchoStar now does in the extended Ku-band.[70]

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[68] DIRECTV Comments at 33; EchoStar Comments, Tech. Annex at 25. SES Comments at 22; Intelsat Comments at 8.

[69] *Id.*

[70] *EchoStar KuX Corp.*, 20 FCC Rcd. 942 (Int'l Bur. 2004) (121° W.L. orbital location); *EchoStar KuX Corp*, 20 FCC Rcd. 919 (Int'l Bur. 2004) (83° W.L. orbital location).

Intelsat, however, believes that 17/24 GHz BSS operations should be authorized on a co-primary basis.[71] As Intelsat sees it, BSS/FS coordination would be feasible if FS deployment is frozen as of a certain date. DIRECTV believes that Intelsat's proposal is worth considering. FiberTower, for example, indicates that there is limited FS geographic deployment in the 17.7-17.8 GHz band.[72] In light of the demonstrated interest that satellite operators have in this band, and the apparent lack of interest that FS operators have in this band, the Commission should carefully consider Intelsat's proposal.

D. Channeling and Polarization Flexibility

DIRECTV, Intelsat, and SES each seek flexibility in channelization and polarization.[73] EchoStar, on the other hand, seeks to mandate the DBS channelization plan for all systems.[74] It also seeks to codify an alternating polarization scheme between adjacent 17/24 GHz BSS orbital positions.[75] EchoStar argues that these rules would reduce interference between adjacent systems.[76] While that may be true, the reduction is small – only about 1 dB – while the price is very high. So far, 17/24 GHz BSS applicants have proposed three different channel plans, each presumably tailored to the applicant's

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71 *See* Intelsat Comments at 9 ("Intelsat is of the view that a very satisfactory arrangement can be achieved if FS deployment is frozen after a certain date.").

72 FiberTower Comments at 2.

73 DIRECTV Comments at 37; Intelsat Comments at 12; SES Comments at 22.

74 EchoStar Comments, Tech. Annex at 22-23 ("EchoStar would prefer to see a scheme adopted in this frequency band across the geostationary orbit, where the senses of polarization are alternated between adjacent orbital positions to provide for the benefit of the guard bands in the primary interfering satellites appearing with the transponder bandwidth of the interfered-with satellite, which provides typically 1 dB of interference reduction").

75 *Id.*

76 *Id.*

specific technology and business plan.[77] EchoStar's proposal would require all 17/24 GHz BSS operators (other than EchoStar itself) to re-engineer their systems and re-think their business plans. The relatively modest interference gains postulated by EchoStar cannot justify this loss of flexibility.

E. Cross Polarization

DIRECTV, EchoStar, and SES agree with the Commission that 17/24 GHz BSS space stations must provide cross-polarization isolation to a specified dB level.[78] Yet none believes that the uniform 30 dB figure required for FSS and DBS operations is required for 17/24 GHz BSS operations.[79] DIRECTV argued that 27 dB is sufficient to address intra-system interference from polarization imperfections,[80] while SES proposed an even lower figure.[81] While EchoStar also argued that a uniform 30 dB requirement is too high, it also correctly noted that "many satellite antennas fail to meet cross polarization requirements in a small part of their service area, and the shortfall is no more than around 3-4 dB."[82] EchoStar thus proposed a cross-polarization isolation rule for the

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77 *See* File Nos. SAT-LOA-19970605-00049 at D8, Table D-1 (filed June 5, 1997) (DIRECTV channelization and polarization scheme); SAT-LOA-20020328-00050 at A 4-5 (filed Mar. 28, 2003 (EchoStar channelization and polarization scheme); SAT-LOA-20050210-00029, Tech Annex at 3-6 (filed Feb. 10, 2005) (Intelsat channelization and polarization schemes in different modes of operation); SAT-LOA-20060412-00044 at 6-7 (filed Apr. 12, 2004) (Pegasus channelization and polarization scheme).

78 *BSS NPRM* ¶¶ 75, 90; DIRECTV Comments at 38; EchoStar Comments, Tech. Annex. at 29; SES Comments at 22.

79 *See* 47 C.F.R. §§ 25.210(i), 25.215.

80 DIRECTV Comments at 38.

81 SES Comments at 22 (proposing a 25 dB figure).

82 EchoStar Comments, Tech. Annex at 29.

17/24 GHz BSS band that would require 30 dB over 90 percent of the coverage area, and 26 dB over the remaining ten percent of the coverage area.[83]

After reviewing the arguments in the comments, DIRECTV believes that the rule proposed by EchoStar strikes the best balance between interference protection and operator flexibility. Accordingly, DIRECTV supports EchoStar's proposal for the cross-polarization isolation requirement.

F. TT&C

EchoStar proposes that certain guard bands be set aside for on-station TT&C – in such bands, no communications signals other than TT&C would be permitted.[84] In particular, EchoStar argues that the 10 MHz between 17.79-17.80 GHz at the upper edge would be appropriate for TT&C.[85] DIRECTV supports this proposal. However, it does not believe that TT&C operations should be *required* in any such guard band. Instead, as all commenters seem to agree, the Commission should allow flexibility in TT&C operations.

Intelsat joins EchoStar in arguing that TT&C operations should *not* be allowed in the frequencies just below 17.7 GHz, even though that is the edge of the band allocated for domestic use by 17/24 GHz BSS systems. EchoStar argues that, because this spectrum could be used domestically for communications, it should not be used for TT&C.[86] Intelsat agrees.[87] DIRECTV would add to this that, the higher the frequency

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83 *Id.*

84 *Id.* at 27.

85 *Id.*

86 *Id.* EchoStar believes this spectrum should be used domestically on a non-interference basis. *Id.* at 24-25. Intelsat, of course, argues that this spectrum could be used domestically by 17/24 GHz BSS operators on a co-primary basis. Intelsat Comments at 8-9.

used for TT&C, the further it is from radars operating below 17.3 GHz. Thus, in this particular case, higher frequency corresponds with higher reliability, which is especially important for critical TT&C functions.

V. EAS and other Public Interest Obligations

SES and Intelsat each argue that EAS and other public interest obligations should not be imposed on satellite operators that do not themselves distribute programming to end users.[88] The Commission, of course, has already addressed these very arguments on several occasions.[89] It has repeatedly determined that such obligations should apply to satellite licensees – and cannot apply to MVPDs outside of the Commission's jurisdiction that may happen to purchase capacity from satellite licensees. Unless and until such time as the Commission changes its approach for other satellite services, it cannot adopt SES's and Intelsat's proposed rule for this service alone.[90]

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87 Intelsat Comments at 12.

88 SES Comments at 24; Intelsat Comments at 11.

89 *See, e.g., Review of the Emergency Alert System*, 20 FCC Rcd. 18625 (2005) (imposing EAS requirements on DTH operators); *Implementation of Section 25 of the Cable Television Consumer Protection and Competition Act of 1992; Direct Broadcast Satellite Public Interest Obligations*, 13 FCC Rcd. 23254 (1998); *Implementation of Section 25 of the Cable Television Consumer Protection and Competition Act of 1992; Direct Broadcast Satellite Public Interest Obligations; Sua Sponte Reconsideration*, 19 FCC Rcd. 5647, 5653 (2004) (rejecting arguments identical to those raised by SES and Intelsat in this proceeding).

90 In this regard, DIRECTV endorses the Opposition to Petition for Partial Reconsideration filed by its affiliate, DIRECTV Latin America, in EB Docket No. 04-296 on March 2, 2006.

CONCLUSION

The 17/24 GHz BSS band presents a tremendous opportunity for the Commission to support competition in the video marketplace. DIRECTV believes that the proposals it has presented in its initial comments and these reply comments provide the Commission with the means to do so. DIRECTV thus respectfully urges that Commission implement service rules consistent with these proposals.

Respectfully submitted,

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November 15, 2006

APPENDIX A

Table A-1 below presents the analysis for the Paraguayan assignment PRG00002 at 99.2 W.L. and the Colombian assignment CLM00001 at 103.2 W.L. versus 17/24 GHz BSS satellites operating at 99.0 W.L. and 103.0 W.L. and producing -115 dBW/m^2/MHz PFD on the Earth's surface.

		PRG00002	CLM00001
R2 assignment system temp.	dBK	31.8	31.8
Boltzmann's constant	dBW/K/Hz	-228.6	-228.6
Noise power density (No)	dBW/Hz	-196.8	-196.8
Frequency	GHz	17.5	17.5
Isotropic area	dB-m^2	-46.3	-46.3
17 GHz xpndr BW	MHz	24	24
Sat. RX ant. peak gain	dBi	**42.7**	**35.5**
Interfering satellite peak EIRP	dBW/24MHz	61.2	61.2
Off-axis discrimination of Interfering satellite TX antenna toward victim (~90 deg.)	dB	40.0	40.0
Off-axis discrimination of victim satellite RX antenna toward interferer (~90 deg. from gain toward geo arc diagram of assignment)	dB	57.9	49.1
Orbital separation between satellites	**deg.**	**0.05**	**0.05**
Orbital separation in km	Km	23.8	23.8
Spreading loss	dB	-98.5	-98.5
Interfering receive power	dBW	-138.8	-137.2
Io/No	dB	-15.8	-14.2
Delta T/T	**%**	**2.6**	**3.8**

Table A-1. Delta T/T Analysis for Region 2 Assignments

The analysis shows that a separation of 0.05 degrees is sufficient to achieve a Delta T/T less than 6%, with some margin. Allowing ± 0.1 degree station-keeping for the Region 2 assignment and ± 0.05 degree for the 17/24 GHz BSS satellite, the 17/24 GHz BSS satellite can be located nominally 0.2 degrees away from a Region 2 assignment. If station-keeping of ± 0.1 degree is desired for the 17/24 GHz BSS satellite, then 0.25 degree separation would be required. It is wise to leave some margin in the nominal

location of the 17/24 GHz BSS satellite relative to the Region 2 assignment as different assignments have different receive gains towards the geostationary arc, and the Delta T/Ts could be slightly higher than the two examples in the table.

ENGINEERING CERTIFICATION

The undersigned hereby certifies to the Federal Communications Commission as follows:

(i) I am the technically qualified person responsible for the engineering information contained in the foregoing Reply Comments,

(ii) I am familiar with Part 25 of the Commission's Rules, and

(iii) I have either prepared or reviewed the engineering information contained in the foregoing Reply Comments, and it is complete and accurate to the best of my knowledge and belief.

Signed:

/s/
David Pattillo

November 15, 2006
Date