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 Satellite Services Operating Bi-directionally in the 17.3-17.8 GHz Frequency Band	)	IB Docket No. 06-123

REPORT AND ORDER

AND FURTHER NOTICE OF PROPOSED RULEMAKING

Adopted: May 2, 2007 **Released:** May 4, 2007

Comment Date: (75 days after Federal Register publication)
Reply Comment Date: (105 days after Federal Register publication)

By the Commission: Commissioner McDowell issuing a statement; Commissioner Adelstein approving in part, dissenting in part, and issuing a separate statement.

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I. INTRODUCTION

1. With this Report and Order (*R&O*), we adopt processing and service rules for the 17/24 GHz Broadcasting-Satellite Service (BSS).[1] This service will introduce a new generation of broadband services to the public, providing a mix of local and domestic video, audio, data, video-on-demand, and multi-media services to U.S. consumers. In some cases, these services will complement existing Direct Broadcast Satellite (DBS) services. Specifically, we adopt a first-come, first-served licensing procedure for the 17/24 GHz BSS, as well as various safeguards, reporting requirements, and licensee obligations. We also adopt geographic service rules to require 17/24 GHz BSS licensees to provide service to Alaska and Hawaii as discussed herein. In addition, we establish rules and requirements for orbital spacing, minimum antenna diameter, and antenna performance standards. Also, we establish limits for uplink and downlink[2] power levels to minimize the possibility of harmful interference. Finally, we stipulate criteria to facilitate sharing in the 24 GHz and 17 GHz bands. We also initiate a Further Notice of Proposed Rulemaking (*FNPRM*) to address technical issues related to potential interference unique to the "reverse band" operating environment. By these actions, we facilitate the introduction of new and innovative services to consumers in the United States and promote increased competition among satellite and terrestrial services.

II. BACKGROUND

2. In June 2006, the Commission released a *Notice of Proposed Rulemaking* ("*NPRM*") in this proceeding, which proposed processing and service rules for the 17/24 GHz

[1] BSS is the international term used for a radiocommunication service in which signals transmitted or retransmitted by space stations are intended for direct reception by the general public. *See, e.g.,* 47 C.F.R. § 2.1. In this item, the term "17/24 GHz BSS" generally refers to the broadcasting-satellite service operating on space-to-Earth (downlink) frequencies in the 17.3-17.8 GHz band and the corresponding Earth-to-space (uplink) frequencies in the 24.75-25.25 GHz band.

[2] For this service, the downlink (space-to-Earth) frequencies, 17.3-17.7 GHz, are radiocommunication links that provide signals to consumers and are frequencies allocated to the Broadcasting Satellite Service (BSS). The uplink (Earth-to-space) frequencies, 24.75-25.25 GHz, are radiocommunication links that provide the source of the BSS signals retransmitted by the satellite and are frequencies allocated to the Fixed-Satellite Service (FSS).

BSS.[3] Eight parties filed comments in response to the *NPRM*, and six parties filed reply comments.[4]

3. As the Commission explained in the *NPRM*, the 1992 World Administrative Radio Conference (WARC-92) of the International Telecommunication Union (ITU)[5] adopted an additional frequency allocation for BSS in Region 2.[6] In 2000, the Commission implemented, in large part, the ITU Region 2 allocation for BSS domestically.[7] The Commission recognized that although the allocation would not become effective for several years, its action would provide interested parties with sufficient notice and time to design their systems to use this spectrum in the most efficient manner.[8] Specifically, the Commission adopted the following allocations and designations, which took effect on April 1, 2007: (1) allocated the 17.3-17.7 GHz band, on a primary basis, to the BSS for downlink transmissions,[9] recognizing that although the ITU Region 2 allocation apportioned the 17.3-17.8 GHz band for BSS use, the U.S. allocation would be limited to 17.3-17.7 GHz to retain spectrum at 17.7-17.8 GHz for the relocation of fixed service (FS) facilities which were being displaced as a result of the new BSS allocation;[10] (2) allocated 300 megahertz of spectrum at 24.75-25.05 GHz on a primary basis for the Fixed-Satellite Service (FSS) (uplink) and limited FSS uplink operations in this band to BSS feeder links;[11] and (3) allocated 200 megahertz of spectrum at 25.05-25.25 GHz for co-primary use between the 24 GHz Fixed Service, formerly known as Digital Electronic Messaging Service (DEMS), and BSS feeder links.[12] The Commission's objective was to accommodate new satellite services while providing adequate spectrum for existing FS operations.[13]

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[3] 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, *Notice of Proposed Rulemaking,* IB Docket No. 06-123, 21 FCC Rcd 7426 (2006) ("*17/24 GHz BSS NPRM*" or "*NPRM*").

[4] These parties are listed in Appendix D.

[5] The ITU, based in Geneva, Switzerland, is a United Nations specialized organization that deals with international communications issues.

[6] International Telecommunication Union, Final Acts of the World Administrative Radio Conference (Malaga-Torremolinos, 1992). The ITU Radio Regulations divide the world into three regions. Generally, Region 1 includes Africa, Europe, and northern and western portions of Asia; Region 2 includes the Americas and Greenland; Region 3 includes southern portions of Asia, Australia, and the South Pacific. *See* ITU Radio Regulations, Article 5, Section 1.

[7] Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use, *Report and Order,* 15 FCC Rcd 13430, 13482 (2000) ("*18 GHz Report and Order"*).

[8] *18 GHz Report & Order,* 15 FCC Rcd at 13478.

[9] *18 GHz Report & Order,* 15 FCC Rcd at 13476, 13478.

[10] *18 GHz Report & Order,* 15 FCC Rcd at 13477-78.

[11] *18 GHz Report & Order*, 15 FCC Rcd at 13476, 13479.

[12] *18 GHz Report & Order,* 15 FCC Rcd at 13476, 13479-80.

[13] *18 GHz Report & Order,* 15 FCC Rcd at 13476, 13479-80.

4. In the *NPRM,* the Commission proposed and sought comment on a variety of rules to facilitate the licensing of 17/24 GHz BSS space stations, and various obligations and requirements that will be applied to licensees. Also, the *NPRM* sought comment on technical rules designed to minimize interference and facilitate sharing in certain bands. The rules adopted in this Order establish licensing procedures and technical parameters that will enable prompt delivery of 17/24 GHz BSS satellite services to the public.

5. Four entities – DIRECTV Enterprises, Inc. (DIRECTV), Pegasus Development DBS Corp. (Pegasus), EchoStar Satellite LLC (EchoStar), and Intelsat North America LLC (Intelsat) – have filed applications for 17/24 GHz BSS space station licenses.[14] These applications represent a wide range of system designs and business plans, from complementing existing DBS services to providing a new suite of services which will include standard-definition and high-definition formats. We adopt in this Order a method for processing these applications and accommodating entry by other qualified applicants.

III. DISCUSSION

A. Licensing and Processing Procedures

1. Licensing Framework

6. ***First-Come, First-Served Licensing Approach Adopted:*** In the *NPRM*, the Commission sought comment on the appropriate licensing approach to adopt for the 17/24 GHz BSS.[15] The *NPRM* noted that, in the *First Space Station Licensing Reform Order*,[16] the Commission adopted new licensing procedures for all satellite services except DBS and Digital Audio Radio Service (DARS).[17] The Commission did not explain, however, whether 17/24 GHz BSS should be treated like DBS or other satellite services for purposes of processing applications.[18] Thus, the *NPRM* sought comment on whether to process applications for the 17/24 GHz BSS space stations under the first-come, first-served licensing approach adopted in the *First Space Station Licensing Reform Order* for geostationary satellite orbit (GSO)-like[19] space station applications. Under this approach, GSO-like satellite applications are processed on a first-come, first-served basis. Thus, the Commission will grant a GSO-like application provided the applicant is qualified and the proposed system is not technically incompatible with

[14] *See* Appendix E.

[15] *17/24 GHz BSS NPRM,* 21 FCC Rcd at 7431-32, paras. 7-9.

[16] Amendment of the Commission's Space Station Licensing Rules and Policies, *First Report and Order and Further Notice of Proposed Rulemaking*, IB Docket No. 02-34, 18 FCC Rcd 10760, 10764, n. 4 (2003) ("*First Space Station Licensing Reform Order"*) (*petitions for reconsideration pending*). These rules became effective on August 27, 2003.

[17] *17/24 GHz BSS NPRM,* 21 FCC Rcd at 7431, para. 7.

[18] *17/24 GHz BSS NPRM,* 21 FCC Rcd at 7431, para. 7.

[19] "GSO-like space station" is defined as a geostationary satellite orbit space station designed to communicate with earth stations with directional antennas. Examples of GSO-like space stations are those which use earth stations with antennas with directivity towards the space stations, such as FSS, and feeder link receiving space stations on GSO mobile-satellite service (MSS) satellites. *See* 47 C.F.R. § 25.158(a).

a previously-licensed satellite or with a satellite proposed in a previously-filed application.[20] Alternatively, we asked whether some other licensing approach would be more appropriate.[21] In this regard, the *NPRM* specifically sought comment as to whether, pursuant to Section 309(j)[22] of the Communications Act, a competitive bidding system, or auction, could be designed to assign mutually exclusive applications for the use of this spectrum. The *NPRM* also sought comment on whether and how such an auction could be implemented consistent with the ORBIT Act,[23] the D.C. Circuit's *Northpoint* ruling,[24] and ITU procedures.[25]

7. The majority of commenters maintain that the first-come, first-served licensing queue should be employed for processing applications for 17/24 GHz BSS space stations.[26] EchoStar, however, argues that 17/24 GHz BSS applications should not be processed under this approach, contending that this method does not result in the award of licenses to the applicant that is most able to put the spectrum to productive use.[27] EchoStar believes that we should instead award 17/24 GHz BSS licenses by auction or by a processing round approach.[28] To

[20] *See* 47 C.F.R. § 25.158. *See* EchoStar Satellite, LLC, *Order*, DA 05-1955 (rel. July 6, 2005) (denying an application that would conflict with a previously licensed satellite), *petition for reconsideration pending*.

[21] *17/24 GHz BSS NPRM,* 21 FCC Rcd at 7431, para. 8.

[22] 47 U.S.C. § 309(j).

[23] 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). The ORBIT Act amended the Communications Satellite Act of 1962, 47 U.S.C. § 701 *et seq.* (Satellite Act) and is *codified at* 47 U.S.C. § 761 *et seq.* Section 647 of the ORBIT Act, codified at 47 U.S.C. § 765f, prohibits the Commission from using competitive bidding to assign "orbital locations or spectrum used for the provision of international or global satellite communications services."

[24] *See Northpoint Technology, Ltd. And Compass Systems, Inc. v. Federal Communications Commission,* 412 F.3d 145 (D.C. Cir.2005) (*Northpoint*). In this decision, the appellate court vacated and remanded the section of the Commission's Order that concluded that DBS was not subject to the auction prohibition of the ORBIT Act. Auction of Direct Broadcast Satellite Licenses, *Order,* 19 FCC Rcd 820 (2004). The court found that the Commission's characterization of DBS as a "predominantly domestic" service was undermined by its *DISCO I Order,* which the court interpreted as actively promoting international service, and by the Commission's authorization of EchoStar's service to Mexico City, which the court viewed as implementing a policy of encouraging international service. *Northpoint,* 412 F.3d at 153-154 (*citing* EchoStar Satellite Corporation, Application for Minor Modification of Direct Broadcast Satellite Authorization, Launch and Operating Authority for EchoStar 7, *Order and Authorization,* 17 FCC Rcd 894 (2002)).

[25] *17/24 GHz BSS NPRM,* 21 FCC Rcd at 7432, para. 9.

[26] DIRECTV Comments at 16; Intelsat Comments at 2; SES Americom Comments at 23; Bermuda Comments at 2. In addition, Intelsat points out that the use of a competitive bidding system for DBS remains in question relying upon our recently released Notice of Proposed Rulemaking in Docket No. 06-160. Intelsat Comments at 2-4 (*citing* Amendment of the Commission's Policies and Rules for Processing Applications in the Direct Broadcast Satellite Service, Feasibility of Reduced Orbital Spacing for Provision of Direct Broadcast Satellite Service in the United States, *Notice of Proposed Rulemaking,* 21 FCC Rcd 9443, 9455, para. 23 (released August 18, 2006) ("*Reduced Spacing NPRM"*)).

[27] EchoStar Comments at 17-18, EchoStar Reply Comments at 19-20.

[28] EchoStar Comments at 13-19. Given the scarcity of the orbit-spectrum resource, the Commission used "processing rounds" to license most satellites from 1983-2003. Under this approach, the Commission would place a space station application on Public Notice and designate a "cut-off" date by which other applicants could file

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facilitate auctions, consistent with the ORBIT Act and the *Northpoint* ruling, EchoStar suggests that the Commission could limit 17/24 GHz BSS spectrum rights to the provision of domestic service if all competing applicants agree. Alternatively, EchoStar suggests that the Commission could require a percentage, such as 80%, of the 17/24 GHz BSS satellite's capacity be devoted to serving the United States.[29] EchoStar further suggests that, if the Commission decides against an auctions approach, it should adopt a processing round procedure combined with strict financial requirements.[30] No other commenters support the use of auctions or processing rounds.[31]

8. We find that the first-come, first-served licensing approach is well-suited for processing applications for 17/24 GHz BSS space stations.[32] As noted in the *NPRM*, the proposed 17/24 GHz BSS space stations would provide services similar to those provided by the direct-to-home fixed satellite service (DTH FSS) satellites. We also note that all 17/24 GHz BSS applicants propose to operate GSO satellites. Because GSO satellites and constellations of non-geostationary satellite orbit (NGSO) satellites cannot generally share the same spectrum, and because, as evidenced by the pending applications, GSO technology is better suited to providing DTH video services, we limit operations in the 17/24 GHz BSS to GSO satellites. The Commission licenses GSO satellites and most other satellite services on a first-come, first-served basis. As both Intelsat and DIRECTV point out, the first-come, first-served processing method has proven to be an efficient approach for licensing GSO satellites.[33] Indeed, our experience has shown that this licensing method has allowed the Commission to dramatically reduce the length of time required to process GSO applications. Moreover, with its associated package of safeguards, the first-come, first-served approach has increased the probability that those awarded licenses actually construct and launch their satellite systems. As commenters have noted, prompt deployment in this band is particularly important in light of the fact that the 17/24 GHz BSS spectrum became available for use on April 1, 2007.[34] In addition, the first-come, first-served licensing approach works well in conjunction with the ITU processes for unplanned bands, such as this one.[35]

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applications to be considered concurrently with the first-filed application. *See, e.g.,* Assignment of Orbital Locations to Space Stations in the Domestic Fixed-Satellite Service*, Memorandum Opinion and Order*, 3 FCC Rcd 6972 (1988) ("*1988 Processing Order*") and Licensing Space Stations in the Domestic Fixed-Satellite Service, *Report and Order*, CC Docket No. 85-395, 58 Rad. Reg. 2d 1267, 1278 (para. 78) (rel. Aug. 29, 1985).

[29] EchoStar Comments at 14.

[30] EchoStar Comments at 18-19.

[31] DIRECTV Reply Comments at 7-8, Intelsat Reply Comments at 2, SES Americom Reply Comments at 10.

[32] DIRECTV Comments at 17, Intelsat Comments at 4-5, SES Americom Comments at 23, Bermuda Comments at 2.

[33] Intelsat Comments at 4-5.

[34] DIRECTV Comments at 17.

[35] A "planned" band is a frequency band for which the ITU has assigned frequencies at certain orbital locations to particular countries. For example, the 12.2-12.7 GHz band, also referred to as the DBS band, is a planned band. In the 17/24 GHz BSS service and feeder link bands, the Radio Regulations require ITU member nations to bring their proposed satellite systems into use within seven years of the date the nation informs the ITU of its intent to construct and operate the satellite system. Failure to meet the bringing-into-use date causes the member nation to lose its
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9. We disagree with EchoStar that the first-come, first-served approach is legally unsound or that such an approach will be more likely to result in spectrum warehousing, speculation, and gamesmanship.[36] To the contrary, as mentioned, this approach has reduced the number of speculative applications. Further, we have previously addressed the Commission's legal authority to adopt a first-come, first-served procedure.[37] EchoStar has not provided any basis for revisiting that issue here.

10. We also are not persuaded that EchoStar's comments warrant a conclusion in this instance that a competitive bidding system would best serve the public interest. Although auctions have proven to be an efficient means of assigning licenses for scarce spectrum resources to those parties that are able to use these resources efficiently and effectively for the benefit of the public, we conclude that restricting the provision of international service solely to remove 17/24 GHz BSS from the auction prohibition of the ORBIT Act is not in the public interest. We are concerned that such a restriction would likely interfere with applicants' business plans and would thus be an impediment to the efficient deployment of service to consumers. Indeed, as Intelsat notes, three current applicants, including EchoStar, propose to provide international service.[38] Thus, the record does not support agreement by competing applicants to provide 17/24 GHz BSS domestic service only. Further, such restrictions could put U.S.-licensed operators at a competitive disadvantage to foreign-licensed 17/24 GHz BSS systems, which are not similarly restricted in their own domestic markets. For these reasons, we will not award licenses for 17/24 GHz BSS space stations by auction.

11. Further, we are not persuaded by EchoStar's proposal to adopt a processing round procedure.[39] Prior to the adoption of the *First Space Station Licensing Reform Order* in 2003, we employed a processing round procedure in licensing GSO-like applications. Under this procedure, it normally took several years to issue satellite licenses, in one case nearly four years.[40] Eliminating this regulatory delay was one of our primary motives in adopting the first-come, first served approach.[41] Since the first-come, first-served approach has been adopted, the average processing time for GSO-like applications has decreased drastically and the backlog of applications is at an all-time low.[42] The first-come, first-served processing queue provides a

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priority relative to other member nations' proposed satellite systems. *See* No. 11.44 of the ITU Radio Regulations. Thus, an efficient licensing method that does not require further proceedings will facilitate each licensee's ability to obtain date priority at the ITU.

[36] EchoStar Comments at 17.

[37] *See First Space Station Licensing Reform Order,* 18 FCC Rcd at 10800-04, paras. 99-107.

[38] Intelsat Comments at 3, n. 7.

[39] EchoStar Comments at 18.

[40] DIRECTV Reply Comments at 10 (*citing* Second Round Assignment of Geostationary Satellite Orbit Locations to Fixed Satellite Service Space Stations in the Ka-band, *Order,* 16 FCC Rcd 14389 (2001)).

[41] *Space Station Reform NPRM,* 17 FCC Rcd at 3852, para. 11.

[42] *See* Intelsat Comments at 4 (*citing* International Bureau 2004 Annual Report (January 13, 2005) available online at http://www.fcc.gov/realaudio/presentations/2005/011305/ib/ppt; International Bureau 2005 Annual Report (January 20, 2006) available online at http://www.fcc.gov/realaudio/presentations/2005/012006/ib/ppt).

workable framework for timely and prompt processing of applications in this band and thereby facilitates the provision of service to the public. Accordingly, for the reasons discussed above, we will adopt the first-come, first-served procedure for processing 17/24 GHz BSS applications.

2. Safeguards Against Speculation

12. ***Space Station Reform Safeguards Adopted, Including Bonds, Milestones, and Limits on the Number of Pending Applications:*** In the *NPRM*, the Commission noted that the *First Space Station Licensing Reform Order* adopted a package of safeguards designed to discourage speculative applications and to ensure that licensees remain committed and able to proceed with system implementation in a timely manner.[43] Applying these safeguards to the 17/24 GHz BSS would require licensees to post a $3 million bond with the Commission within 30 days of license grant[44] and construct and launch the satellite consistent with the milestone schedule specified in Section 25.164 of the Commission's rules.[45] The bond becomes payable if a licensee fails to meet a milestone, rendering the license null and void.[46] Further, GSO-like applicants are limited to a total of five pending applications and/or licensed but unlaunched satellites in a particular frequency band at any one time,[47] and must submit substantially complete applications or face dismissal,[48] and cannot sell their place in the processing queue.[49] In the *NPRM,* the Commission requested comment on whether we should apply this package of safeguards if we decide to use the first-come, first-served processing approach for 17/24 GHz BSS.[50] The Commission also sought comment on whether there are any public interest rationales for imposing a higher performance bond and/or tighter limits on the number of pending applications and licenses for unbuilt satellites that applicants for 17/24 GHz systems may have at any one time.[51]

13. Commenters generally support applying the first-come, first-served approach safeguards to the 17/24 GHz BSS.[52] Intelsat states that applying the bond requirement and milestone policies should be sufficient to deter speculative filings in the 17/24 GHz BSS.[53] Intelsat also notes that prohibiting the sale of places in the queue will further deter speculative

[43] *17/24 GHz BSS NPRM,* 21 FCC Rcd at 7433, para. 10.

[44] 47 C.F.R. § 25.165(a)(2).

[45] 47 C.F.R. § 25.164(a). Under this milestone schedule, the licensee must enter into a binding, non-contingent construction contract within one year of grant; complete critical design review within two years; begin construction within three years; and launch and operate the satellite within five years of grant.

[46] 47 C.F.R. § 25.165.

[47] 47 C.F.R. § 25.159. *See First Space Station Licensing Reform Order*, 18 FCC Rcd at 10846-51, paras. 228-39.

[48] 47 C.F.R. § 25.112.

[49] 47 C.F.R. § 25.158(c). *See First Space Station Licensing Reform Order*, 18 FCC Rcd at 10851-52, paras. 241-43.

[50] *17/24 GHz BSS NPRM,* 21 FCC Rcd at 7433, para 10.

[51] *17/24 GHz BSS NPRM,* 21 FCC Rcd at 7433, para 10.

[52] Intelsat Comments at 6, DIRECTV Comments at 17. *See also* SES Americom Comments at 24 (generally concurring on the use of the first-come, first-served approach but with no mention of safeguards).

[53] Intelsat Comments at 6.

applications.[54] DIRECTV also supports the application of the safeguards that apply to other GSO-like services, *i.e.,* milestones and performance bonds, to 17/24 GHz BSS systems.[55] The Department of Telecommunications of the Government of Bermuda (Bermuda) notes that, although it does not support excessive reliance on the attainment of milestones nor the use of performance bonds for discouraging speculation, it supports the right of each administration to establish its own mechanisms to find a reasonable balance between commercial adventure and undue speculation.[56] EchoStar raises concerns about the use of bonds and milestones to deter speculation and recommends reinstating the financial qualification rules applicable to FSS licensees prior to 2003.[57] EchoStar contends that strict financial qualifications are needed because given the relatively limited number of orbital locations for operation in the 17/24 GHz BSS, the bond and milestone requirements are not enough to protect against speculation and could still result in an orbital location remaining fallow for several years.[58]

14. We adopt our proposal in the *NPRM* to apply the safeguards in place under the first-come, first-serve licensing approach to the 17/24 GHz BSS. Contrary to EchoStar's assertions, our experience with these safeguards has shown them to be an effective measure for discouraging speculative applications. Indeed, the Commission adopted the bond requirement because the financial qualification requirements it had been using – and which EchoStar asks us to reinstate – did not accurately reflect whether a licensee would proceed with construction and launch of its space station. The Commission found requiring a surety company to assess the risk that a licensee would default on a bond would provide a more accurate market–driven determination of a licensee's ability to proceed than would a regulatory determination.[59] EchoStar has not provided any evidence to support its assertion that the previously-used financial standard was more effective. Consequently, we will not adopt EchoStar's proposal. Further, the record does not support more stringent bond requirements or different limits on the number of pending applications/unbuilt satellites for the 17/24 GHz BSS. Thus, we will apply the requirements in place for other GSO-like applicants to 17/24 GHz BSS applicants.

15. Accordingly, we will apply the same safeguards in place for other GSO-like bands to the 17/24 GHz BSS. These safeguards include requiring licensees to post a $3 million bond with the Commission within 30 days of license grant; to construct and launch satellite system(s) consistent with the milestone schedule for GSO satellites; to limit to five, the number of pending applications and/or licenses for unbuilt satellites in this band at any one time; and to file substantially complete applications. The safeguards also prohibit applicants from selling their places in the queue.

16. With respect to the "substantially complete" requirement, we require applications to be complete in substance, and to provide all the information required in the application form.[60]

[54] Intelsat Comments at 6.

[55] DIRECTV Comments at 17.

[56] Bermuda Comments at 3.

[57] EchoStar Comment at 18.

[58] EchoStar Comments at 18.

[59] *First Space Station Licensing Reform Order*, 18 FCC Rcd at 10825.

[60] *See Space Station Reform NPRM*, 17 FCC Rcd at 3875-76, para. 84.

Furthermore, applications must not be defective under the Commission's rules, meaning that the applications must be complete with respect to answers to questions and informational showings, and must be free of internal inconsistencies.[61] To be substantially complete, a 17/24 GHz BSS satellite application must include a complete Form 312[62] and Schedule S, and all the information requested in Section 25.114(d) of the Commission's rules.[63] As amended in Appendix B of this Order, Section 25.114(d) requires 17/24 GHz BSS satellite applicants to show that the proposed satellite will be able to function in a four-degree spacing environment.[64] Applicants will be required to demonstrate that they comply with the pfd limits in new Section 25.208(v), or, if they do not, to demonstrate how they will affect adjacent 17/24 GHz BSS satellite networks, and that the operators of those networks agree to the applicant's proposed operations. Applicants whose proposed orbital locations are offset from the 17/24 GHz BSS orbital locations listed in Appendix F will be required to show that they do not cause more interference than if they operated at an exact location listed in Appendix F, and that their satellite network's performance objectives will be met assuming that adjacent operators are operating at the maximum allowed power flux density levels.

3. Non-U.S.-Licensed Satellite Operators

17. ***DISCO II Market Access Standard Adopted:*** The Commission's *DISCO II Order*[65] implemented the market-opening commitments made by the United States in the World Trade Organization ("WTO") Agreement on Basic Telecommunications Service ("WTO Basic Telecom Agreement"). In particular, the *DISCO II Order* established a framework under which the Commission will consider requests for non-U.S.-licensed space stations to serve the United States.[66] This analysis considers the effect on competition in the United States,[67] eligibility and

[61] Section 25.112(a)(1) of the Commission's rules, 47 C.F.R. § 25.112(a)(1).

[62] *See* note 139 below regarding the new certification requirement on Form 312.

[63] Section 25.114(d) of the Commission's rules, 47 C.F.R. § 25.114(d).

[64] In particular, we have revised Part 25 in this Order to require all 17/24 GHz BSS applicants to submit link budget analyses to demonstrate that their proposed system will meet its performance objectives in the presence of the worst-case interference that can be expected from neighboring 17/24 GHz BSS space stations.

[65] Amendment of the Commission's Regulatory Policies to Allow Non-U.S.-Licensed Space Stations to Provide Domestic and International Satellite Service in the United States, *Report and Order*, 12 FCC Rcd 24094 (1997) ("*DISCO II Order"*).

[66] To implement this framework, the Commission, among other things, established a procedure by which a service provider in the United States could request immediate access to a foreign in-orbit space station that would serve the U.S. market. *DISCO II Order*, 12 FCC Rcd at 24174, para. 186. This procedure allows a non-U.S.-licensed earth station operator seeking to communicate with a non-U.S.-licensed space station to file an earth station application for an initial license or for a modification of its existing earth station license, listing the foreign-licensed space station as a permitted point of communication. Because the Commission does not issue duplicative U.S. licenses for space stations licensed by other countries, a U.S. earth station application often represents the Commission's first opportunity to evaluate whether the foreign-licensed space station complies with the Commission's technical, legal, and financial qualification requirements.

[67] *DISCO II Order,* 12 FCC Rcd at 24107-56, paras. 30-145.

operating requirements,[68] spectrum availability,[69] and national security, law enforcement, foreign policy, and trade concerns.[70]

18. Under *DISCO II*, the Commission evaluates the effect of foreign entry on competition in the United States in one of two ways. First, in cases where the non-U.S.-licensed space station is licensed by a country that is a member of the WTO and will provide services covered by the U.S. commitments under the WTO Basic Telecom Agreement, the Commission presumes that entry will further competition in the United States. The U.S. commitments include Mobile-Satellite Services (MSS) and many fixed-satellite services, but specifically exclude DTH, DBS, and DARS.[71] In contrast, the Commission conducts an "ECO-Sat" analysis for non-U.S.-licensed space stations licensed by countries that are not WTO members and where the foreign operator, regardless of its licensing country's WTO status, proposes to provide a non-covered service. Under this analysis, applicants seeking to access a foreign space station must provide an analysis as part of their application[72] demonstrating that U.S.-licensed space stations have effective competitive opportunities to provide analogous services in the country in which the space station is licensed ("home" market) and in all countries in which communications with the U.S. earth station will originate or terminate ("route" markets).[73] In particular, the Commission examines whether there are any *de jure* or *de facto* barriers to entry in the foreign country for the provision of analogous services and whether any such barriers cause competitive distortions in the U.S. market. In the *NPRM*, the Commission proposed to apply this framework to non-U.S.-licensed 17/24 GHz BSS satellite operators seeking to access the U.S. market.

19. With respect to eligibility requirements, the Commission also proposed, in the *NPRM*, to extend to 17/24 GHz BSS operators the *DISCO II* policy that requires foreign-licensed space stations and operators to meet the same legal, technical, and financial requirements that we require U.S. applicants to meet. These include any requirements adopted in this proceeding, such as bond requirements, milestone requirements, geographic service requirements, public interest obligations, and spacecraft end-of-life disposal requirements.

20. Further, as in other satellite services, the Commission also proposed to require entities requesting authority to serve the U.S. market from a non-U.S. satellite to provide the same information concerning the 17/24 GHz BSS satellite as U.S. applicants must provide when applying for a space station license.[74] This allows us to determine whether the foreign-licensed

[68] *Id.* at 24159-69, paras. 151-74.

[69] *Id.* at 24157-59, paras. 146-50.

[70] *Id.* at 24169-72, paras. 175-82.

[71] *DISCO II Order*, 12 FCC Rcd at 24104, para. 25. The United States' exemptions to the WTO Basic Telecom Agreement can be found at http://www.wto.org/english/tratop_e/serv_e/telecom_e/telecom_commit_exempt-list_e.htm (exempting "One-way satellite transmission of DTH and DBS transmission services and of digital audio services").

[72] 47 C.F.R. § 25.137.

[73] 47 C.F.R. § 25.137(a).

[74] *First Space Station Licensing Reform Order,* 18 FCC Rcd at 10872, para. 300. *See* 47 C.F.R. § 25.137. Thus, foreign entities must file a Schedule S and a narrative exhibit providing all the information required in Section 25.114 (d) of the Commission's rules. 47 C.F.R. § 25.114(d).

satellite complies with all Commission technical and service requirements, and whether it may cause interference to satellites providing authorized services to U.S. customers.

21. The commenters generally support this approach.[75] EchoStar and SES Americom suggest that we should strictly enforce the ECO-Sat test because it allows us to ensure that U.S.-licensed operators have the same opportunity to provide 17/24 GHz BSS services to foreign countries as the satellites licensed by foreign countries have to serve the United States.[76] In contrast, however, Bermuda notes that consumers would benefit if there was an increased presumption in all cases that entry to the market will further competition.[77]

22. We adopt the Commission's proposal in the *NPRM* to evaluate the applications of non-U.S.-licensed 17/24 GHz BSS satellite operators seeking to access the U.S. market under the *DISCO II* framework. Thus, our analysis will consider the effect on competition in the United States, eligibility and operating requirements, spectrum availability, and national security, law enforcement, foreign policy, and trade concerns. We note in particular that all applications seeking authority to provide DTH services from non-U.S.-licensed 17/24 GHz BSS operators to the U.S. market must include an ECO-Sat analysis. We will not eliminate this analysis in favor of a presumption that entry, in all cases, will further competition, as Bermuda suggests. The ECO-Sat analysis assures us that a foreign entrant will not have a competitive advantage over U.S.-licensed operators derived from their ability to serve countries and customers that U.S. operators may be precluded from serving. Bermuda has not explained why, or to what extent, the 17/24 GHz BSS is so different from other services that we need not be concerned about ensuring a level playing field among these systems. Further, any evaluation of whether to continue to apply the ECO-SAT analysis to non-covered services in general is beyond the scope of this proceeding.

23. Last, as with all other services, we require all 17/24 GHz BSS operators seeking authority to serve the U.S. market from a non-U.S. satellite to provide the same information concerning their proposed 17/24 GHz BSS space stations as U.S. applicants must provide when applying for a space station license.[78] This includes filing FCC Form 312, information required in Schedule S, and all other information required by Section 25.114 of the Commission's rules.[79] In addition, all non-U.S-licensed satellite operators must meet the requirements adopted in this proceeding, including but not limited to bond requirements, milestone requirements, geographic service requirements, public interest obligations and spacecraft end-of-life disposal requirements.

[75] EchoStar Comments at 21, SES Comments at 24, Intelsat Comments at 6, Bermuda Comments at 4, DIRECTV Comments at 18.

[76] EchoStar Comments at 21; SES Comments at 24.

[77] Bermuda Comments at 4.

[78] *First Space Station Licensing Reform Order,* 18 FCC Rcd at 10872, para. 300. *See* 47 C.F.R. § 25.137. Thus, foreign entities must file a Schedule S, providing all the information required in Section 25.114 (c) of the Commission's rules. 47 C.F.R. § 25.114(c).

[79] 47 C.F.R. § 25.114. *See also* para. 16 above for a discussion of the requirement that applications be substantially complete.

4. Licensing at Co-Located 17/24 GHz BSS and DBS Orbital Locations

24. ***No Prohibition Adopted:*** EchoStar argues that we should award licenses for 17/24 GHz BSS satellites that will be co-located with DBS satellites only to existing DBS licensees at those locations.[80] According to EchoStar, this restriction would minimize the risk of harmful interference which will occur when 17/24 GHz BSS satellites are located at or near the same orbital locations as DBS satellites.[81] SES Americom and Intelsat oppose this proposal, claiming that it is anti-competitive and would block new entrants from the 17/24 GHz BSS.[82]

25. We agree with SES Americom and Intelsat. The effect of accepting EchoStar's argument would be an expansion of the authorizations of DBS licensees to include authority to operate in the 17/24 GHz BSS on the same channel and orbital location at which they are currently operating. We find that providing such rights to existing DBS licensees would hinder competition while conferring a benefit on existing DBS licensees.[83] Further, we note that, in the *FNPRM* section of this document below, we invite comment on various methods for coordinating DBS and 17/24 GHz BSS satellites when located near each other in the geostationary orbit, perhaps as close as 0.2° or 0.3° to each other.[84] In light of this, we find that EchoStar's proposal to prohibit non-DBS operators from applying for 17/24 GHz BSS licenses at DBS orbital locations is not necessary to prevent harmful interference between DBS and 17/24 GHz BSS satellites.

5. License Terms

26. ***Fifteen-Year and Eight-Year License Terms Adopted, Respectively, for Non-Broadcast and Broadcast 17/24 GHz Licensees:*** In the *NPRM*, the Commission sought comment on the license term it should apply to 17/24 GHz licenses. The Commission noted that Section 25.121 of the Commission's rules provides that licenses for space stations will be issued for a period of 15 years, except licenses for DBS space stations.[85] DBS space stations licensed as broadcast facilities are issued licenses for eight- year terms, and those DBS space stations not licensed as broadcast facilities have 10-year terms.[86] The Communications Act provides for a maximum licensing term of eight years for broadcasting facilities and allows the Commission to

[80] EchoStar Comments at 10.

[81] EchoStar Comments at 10.

[82] SES Americom Reply Comments at 2; Intelsat Reply Comments at 14.

[83] *See, e.g.*, Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency; Amendment of the Commission's Rules to Authorize Subsidiary Terrestrial Use of the 12.2-12.7 GHz Band by Direct Broadcast Satellite Licensees and Their Affiliates, *Memorandum Opinion and Order and Second Report and Order*, ET Docket No. 98-206, RM-9147, RM-9245, 17 FCC Rcd 9614, 9711-13 (2002) (declining to provide terrestrial rights in the 12.2-12.7 GHz band to existing DBS licensees solely because DBS licensees already held authorizations in this band for their space station operations).

[84] *See* Section IV.B. below.

[85] 47 C.F.R. § 25.121(a).

[86] *Id*. Changes in the license terms for DBS space stations were initially addressed in the *DBS Auction Order*, which adopted a ten-year license term for non-broadcast DBS space stations. *See DBS Auction Order*, 11 FCC Rcd at 9762, para. 130.

determine license terms for particular classes of stations, including satellite space and earth stations.[87] In the *NPRM,* the Commission proposed to adopt a 10-year license term for all non-broadcast 17/24 GHz BSS satellites.[88] For 17/24 GHz BSS satellites that will operate as broadcast facilities, the Commission proposed an eight-year license term, as provided under Section 307(c)(1) of the Communications Act.

27. DIRECTV, Intelsat, and Bermuda support a 15-year license term for 17/24 GHz systems.[89] Bermuda states that most commercial satellites being planned or built today are intended for a service life-expectancy of longer than eight years, and notes that a 15-year term would also be consistent with international practices.[90]

28. Pursuant to our statutory authority to implement license terms for different classes of space and earth stations, with the exception of DBS stations, we adopt a 15-year license term for all non-broadcast 17/24 GHz BSS licenses and an eight-year license term for 17/24 GHz BSS licensees operating as broadcasters.[91] As noted by the parties, satellites being built today are intended for longer service life expectancy than in the past and should therefore be assigned a longer license term.[92] A 15-year license term for non-broadcast 17/24 GHz BSS satellites accurately reflects the useful life of most GSO satellites today and therefore, we will extend the license terms applicable to other non-broadcast GSO-like licensees to 17/24 GHz BSS licensees.

6. Replacement Satellites

29. ***Streamlined Procedures Adopted:*** While the Commission has consistently said that all orbital assignments confer no permanent rights of use to the licensee, it has recognized the importance of giving satellite operators some assurance that they will be able to continue to serve their customers from the same orbital location as older satellites are retired.[93] The Commission has stated that, without this assurance, operators may be discouraged from investing the hundred of millions of dollars needed to construct, launch, and operate each satellite. Further, the Commission has said that without follow-on capacity at the same orbit location,

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[87] The Telecommunications Act of 1996 granted the Commission authority to "prescribe the period or periods for which licenses shall be granted and renewed … ." Telecommunications Act of 1996, Pub. L. No. 104-104, Title II, § 203, 110 Stat. 56, 112, (1996) (amending Section 307 of the Communications Act to eliminate ten-year term and creating new Section 307(c)(1)).

[88] *17/24 GHz BSS NPRM,* 21 FCC Rcd at 7434, para. 13.

[89] DIRECTV Comments at 17, Intelsat Comments at 6, Bermuda Comments at 3. DIRECTV "sees no reason" to limit the license terms of 17/24 GHz BSS systems to 10 years.

[90] Bermuda Comments at 3.

[91] Similar to DBS, we expect 17/24 GHz BSS operators to offer subscription service on a non-broadcast, non-common carrier basis, however, there is a possibility that a licensee may choose to provide service on a broadcast or common-carrier basis. *See, e.g.*, In the Matter of Policies and Rules for the Direct Broadcast Satellite Service, *Report and Order*, 17 FCC Rcd 11331 at para. 5 (2002) (noting that subscription video service is neither broadcast nor common carrier).

[92] *See, e.g.*, Bermuda Comments at 3.

[93] *See, e.g.,* Licensing of Space Stations in the Domestic Fixed-Satellite Service, 50 Fed.Reg. 36071 (Sept. 5, 1985), at para. 27.

customers could experience service disruptions.[94] When an orbit location remains available for a U.S. satellite with the technical characteristics of the proposed replacement satellite, we will generally authorize the replacement satellite at the same location.[95]

30. To facilitate grant of replacement satellites, the Commission has historically processed applications for replacement satellites as they are filed, rather than subjecting them to the procedures that otherwise govern applications for new satellites.[96] Thus, Commission practice is to immediately consider an application for a replacement satellite -- and grant it if the applicant is qualified -- without subjecting the application to a "processing queue" or other procedure by which it considers other applications that may be mutually exclusive with the replacement satellite application.[97] To further expedite replacement satellite licensing, the Commission considers unopposed replacement satellite applications with technical characteristics consistent with those of the satellite to be retired are processed under a grant-stamp procedure.[98] In the *NPRM*, we proposed to treat replacement satellite applications in the 17/24 GHz BSS under these streamlined procedures.

31. DIRECTV and Intelsat support this proposal.[99] Bermuda also supports a replacement policy that allows operators to replace “like with like,” *i.e*., replace a satellite after a premature in-orbit failure (such as caused by solar activity or manufacturing flaw) but cautions against abuses in the satellite replacement grant-stamp process.[100]

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[94] *Id.*

[95] *Fifth Space Station Licensing Reform Order*, 19 FCC Rcd at 12657, para. 54, *citing Space Station Reform NPRM*, 17 FCC Rcd at 3887, para. 119, *citing 1988 Orbit Assignment Order*, 3 FCC Rcd at 6976 n. 31; *GE Americom Replacement Order*, 10 FCC Rcd at 13775-76, para. 6.

[96] The Commission most recently discussed its "replacement expectancy" policy in the *Space Station Licensing Reform Order*. *Fifth Space Station Reform Order*, 19 FCC Rcd at 12657, para. 54, *citing Space Station Reform NPRM*, 17 FCC Rcd at 3887, para. 119, *citing 1988 Orbit Assignment Order*, 3 FCC Rcd at 6976 n. 31; *GE Americom Replacement Order*, 10 FCC Rcd at 13775-76, para. 6. In preserving the expectancy, the Commission also adopted a rule codifying the definition of a replacement satellite. Section 25.165(e) of the Commission's rules defines a replacement satellite as one that is "authorized to be operated at the same orbit location, in the same frequency bands, and with the same coverage area as one of the licensee's existing satellites" and is "scheduled to be launched so that it will be brought into use at approximately the same time, but no later than, the existing satellite is retired." 47 C.F.R. § 25.165(e)(1) and (2). *See* Columbia Communications Corp, Application to Launch and Operate a Geostationary C-band Replacement Satellite in the Fixed-Satellite Service at 37.5º W.L., *Memorandum Opinion and Order*, 16 FCC Rcd 20,176 (Int'l Bur. 2001), at 20,180, para. 14, and 20,181, para. 19; MCI Communications Corp., Application for Extensions of Time to Construct and Launch Space Stations in the Domestic Fixed-Satellite Service, *Memorandum Opinion and Order*, 2 FCC Rcd 233, 235 n. 6 (1987) ("[s]hould replacement satellites fail to be implemented, the orbital locations occupied by the older satellites will become available for reassignment to another qualified licensee at the end of the license term of those satellites").

[97] *First Space Station Licensing Reform Order*, 18 FCC Rcd at 10854-56, paras. 250-254.

[98] *Fifth Space Station Licensing Reform Order*, 19 FCC Rcd at 12657, para. 54, *citing First Space Station Licensing Reform Order*, 18 FCC Rcd at 10856, paras. 253-54.

[99] DIRECTV Comments at 17, n. 22, Intelsat Comments at 6, Bermuda Comments at 4.

[100] Bermuda Comments at 4. In addition, Bermuda contends that, the “grant stamp” replacement procedure should be selectively applied and should recognize ITU procedures for extending the life of network notifications.

32. In order to facilitate grant of 17/24 GHz BSS replacement satellite applications, we adopt the streamlined procedures applicable to the majority of the replacement satellite applications considered by the Commission.[101] We have found that the grant-stamp procedure is an efficient method of processing replacement satellite applications and will apply this procedure to unopposed applications for replacement satellites in the 17/24 GHz BSS. Further, the procedure contains mechanisms against abuse. We will place 17/24 GHz replacement applications on Public Notice, as we do with replacement satellite applications in other services.[102] Thus, interested parties will have an opportunity to comment on all applications. We will address any concerns raised when processing the replacement application and will issue an Order, instead of a grant stamp, when appropriate.

7. Annual Reporting Requirement

33. ***Annual Reporting Requirements Adopted:*** In the *NPRM*, the Commission noted that most space station operators are subject to annual reporting requirements on June 30 of each year. These reports must include, among other things, the status of space station construction and anticipated launch dates.[103] The Commission requested comment on whether we should require 17/24 GHz BSS U.S.-licensees and 17/24 GHz BSS non-U.S. operators that are authorized to access the United States to submit similar annual reports.

34. Bermuda and Intelsat support a reporting requirement, stating that annual reports can be useful for monitoring the progress of milestone compliance and helping to deter speculative applications.[104] Bermuda adds that licensees should file reports regardless of whether they are U.S. operators or non-U.S. operators.[105] Bermuda also states that requiring operators to report at intervals of less than one year would provide an increased opportunity to monitor progress.[106] No party objects to a reporting requirement for 17/24 GHz BSS operators.

35. We adopt the Commission's proposal to require 17/24 GHz BSS U.S.-licensees and 17/24 GHz BSS non-U.S. operators that are authorized to access the United States to submit annual reports similar to the annual reports required of most FSS satellite operators to the Commission on June 30 of each year.[107] We believe such reports, filed on an annual basis, will help keep us apprised of the status of the space station, both while it is being built and once it is in-orbit. We are not convinced that more frequent reporting is needed to achieve this objective.

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[101] *See First Space Station Licensing Reform Order,* 18 FCC Rcd at 10854-56, paras. 250-54. *See also* 47 C.F.R. § 25.165(e).

[102] *See* 47 C.F.R. § 25.151.

[103] *See, e.g.*, 47 C.F.R. §§ 25.143(e) (reporting requirements for 1.6/2.4 GHz mobile-satellite service (MSS) and 2 GHz MSS); 25.144(c) (reporting requirements for satellite digital audio radio service (SDARS); 25.145(f) (reporting requirements for the NGSO fixed-satellite service in the 20/30 GHz bands); 25.210(l) (reporting requirements for FSS). Other elements of the annual reports include a listing of non-scheduled transponder outages that last more than 30 minutes and identification of transponders not available for service or not performing to specifications. *See* 47 C.F.R. § 25.210(l).

[104] Intelsat Comments at 6, Bermuda Comments at 3.

[105] Bermuda Comments at 3.

[106] Bermuda Comments at 3.

[107] *See* 47 C.F.R. § 25.210(l).

In addition to annual reports, licensees must file documentation that they have met various milestones at each milestone deadline. This provides the most timely way to monitor licensees' compliance with the milestone conditions in their licenses. We also note that the Commission may request at any time additional information if such request is warranted.[108]

36. Operators should file their annual reports with the Commission's International Bureau and the Commission's Columbia Operations Center in Columbia, Maryland. Specifically, the annual reports must include: (1) status of satellite construction and anticipated launch date, including any major problems or delays encountered; (2) a listing of any non-scheduled transponder outages for more than 30 minutes and the cause or causes of such outage; (3) a detailed description of the utilization made of each transponder on each of the in-orbit satellites, including the percentage of time that the system is actually used for U.S. domestic or transborder transmission, the amount of capacity (if any) sold but not in service within U.S. territorial geographic areas, and the amount of unused system capacity; and (4) identification of any transponder not available for service or otherwise not performing to specifications, the cause of these difficulties, and the date any space station was taken out of service or the malfunction identified.

8. Fees

37. ***NPRM Proposal Adopted:*** In the *NPRM,* the Commission proposed that applicants for 17/24 GHz BSS satellites should pay fees associated with the "Space Stations (Geostationary)" service in Section 1.1107 of the Commission's rules.[109] In addition, we proposed that applicants seeking authority to operate earth stations in the 17/24 GHz BSS should pay fees associated with the "Fixed Satellite Transmit/Receive Earth Stations" in Section 1.1107.[110] There were no comments on our filing fee proposals and we adopt our fee proposals.

B. Public Interest and Other Statutory Obligations

1. Public Interest Obligations

38. ***DBS and DTH Public Interest Obligations Adopted for 17/24 GHz BSS:*** Section 25.701 of our rules requires DBS providers to comply with certain political broadcast requirements and children's television advertising limits, and to set aside four percent of channel capacity for noncommercial, educational or informational programming.[111] The entities subject to Section 25.701 include entities licensed to operate satellites in the 12.2 to 12.7 GHz DBS frequency bands;[112] entities licensed pursuant to Part 25 of the Commission's rules to provide

[108] *See, e.g.*, 47 U.S.C. §§ 5(i) and 403.

[109] *17/24 BSS GHz NPRM,* 21 FCC Rcd at 7432, para. 8. *See* 47 C.F.R. § 1.1107, 9.

[110] *17/24 BSS GHz NPRM,* 21 FCC Rcd at 7432, para. 8. *See* 47 C.F.R. § 1.1107, 3.

[111] *See* 47 C.F.R. § 25.701. *See also* 47 U.S.C. § 335.

[112] In 2002, the Commission released a *Report and Order* eliminating Part 100 of the Commission's Rules. The Commission moved Section 100.5 to Section 25.701 and eliminated the reference to entities licensed pursuant to Part 100. Instead, the new rule in section 25.701 (a)(1) defines "DBS Providers" as entities licensed to operate satellites in the 12.2-12.7 DBS frequency bands. *See* Policies and Rules for the Direct Broadcast Satellite Service, *Report and Order,* 17 FCC Rcd 11331, 11344-45, paras. 22-24 (2002) (*"Part 100 Report & Order"*). For purposes of this section of the *Report and Order*, any reference to Part 100 licensees means entities defined in Section 25.701(a)(1).

FSS via the Ku-band,[113] that sell or lease transponder capacity to a video program distributor that offers a specified number of DTH video channels to consumers; and non-U.S. licensed satellites providing DBS or DTH-FSS services in the United States.[114] The *NPRM* proposed that, to the extent a 17/24 GHz BSS space station is used to provide video programming to consumers in the United States (DBS-like services),[115] the licensee should be subject to the public interest obligations contained in Section 25.701. We invited comment on this proposal.[116]

39. Commenters generally support applying public interest requirements to the 17/24 GHz BSS. SES Americom, however, contends that such requirements should be imposed only on 17/24 GHz BSS licensees that distribute programming to end users, and not on 17/24 GHz BSS licensees that are strictly satellite operators with no programming control, because they are not in a position to comply with the obligations.[117] In reply, EchoStar states that if public interest obligations are imposed on any 17/24 GHz BSS licensees, they should be imposed uniformly on all such licensees.[118] DIRECTV also believes that public interest obligations should be imposed equally on all 17/24 GHz BSS licensees, and states that the Commission has previously addressed and rejected SES Americom's arguments.

40. We find that the obligations imposed on DBS providers by Section 25.701[119] should apply uniformly if the 17/24 GHz BSS space station is used to provide video services to consumers in the United States. SES Americom's argument that program distributors using satellite capacity should be ultimately responsible for fulfilling these obligations was specifically addressed and rejected by the Commission when it originally adopted the public interest rules and on reconsideration of those rules.[120] We see no reason to adopt a different approach for operations in the 17/24 GHz BSS. Accordingly, we adopt the proposal to amend Section 25.701 to apply to any 17/24 GHz BSS licensee, to the extent that the space station is used to provide video programming to consumers in the United States.

41. Although Media Access Project supports the Commission's proposal to impose public interest obligations on 17/24 GHz BSS licensees that provide DBS-like services, it argues that the Commission should increase the amount of programming that service providers in this band are required to reserve for non-commercial programming of an educational or informational nature. It argues that, given the expansion of spectrum capacity being offered to service

[113] The Ku-band frequencies referenced in the statute are 11.7 GHz-12.2 GHz and 14.0 GHz-14.5 GHz.

[114] 47 C.F.R. § 25.701(a).

[115] In the *NPRM*, we used the term "DBS-like services." For purposes of this proceeding, DBS-like services are those provided by satellite for point to multipoint distribution of video programming to consumers in the United States.

[116] *17/24 BSS GHz NPRM,* 21 FCC Rcd at 7436-37, para. 20.

[117] SES Americom Comments at 24-26.

[118] EchoStar Reply Comments at 21.

[119] 47 C.F.R. § 25.701.

[120] *See* Implementation of Section 25 of the Cable Television Consumer Protection and Competition Act of 1992, Direct Broadcast Satellite Public Interest Obligations, *Report and Order,* 13 FCC Rcd 23254 (1998); Implementation of Section 25 of the Cable Television Consumer Protection and Competition Act of 1992, *Second Order on Reconsideration of First Report and Order,* 19 FCC Rcd 5647, 5653 (2004).

providers in this proceeding, the Commission should require that licensees offer an accompanying increase in their public interest programming from the statutory minimum of four percent to the statutory maximum of seven percent. According to Media Access Project, the increase would provide value to the public in return for their use of the scarce public resources of spectrum and orbital locations.[121] EchoStar argues that a public interest programming set-aside requirement of seven percent would be a disincentive to development of the 17/24 GHz BSS and would "significantly limit" the capacity available for sought-after services such as local-into-local television broadcast stations and high-definition programming.[122]

42. To the extent that Media Access Project is arguing that the channel reservation requirement should be increased for all DBS providers, including those originally covered by Section 25.701, that issue is beyond the scope of this proceeding. With respect to any argument that the reservation be increased for only licensees in the 17/24 GHz BSS, we find that this might prove detrimental to development of this band by placing greater burdens on these licensees than those operating in others bands. Thus, we require 17/24 GHz BSS licensees to reserve four percent of their channel capacity, as defined in Section 25.701, for use by qualified programmers for noncommercial programming of an educational or informational nature.[123]

43. The *NPRM* also sought comment on whether licensees in the 17/24 GHz BSS qualify to use the compulsory copyright licenses granted under Sections 119 and 122 of the Copyright Act and, if so, whether broadcast carriage requirements should apply.[124] These statutory licenses permit satellite carriers, as defined in the Copyright Act, to provide television broadcast signals to their subscribers. Section 119 of the Copyright Act defines "satellite carrier" as an entity that uses a satellite operating in the FSS or DBS service for point-to-multipoint distribution of television signals.[125] This section of the Copyright Act allows satellite carriers to offer distant broadcast signals under certain circumstances. Section 122 of the Copyright Act provides a license for local-into-local service and defines "satellite carrier" by reference to the definition in Section 119.[126]

44. Both DIRECTV and EchoStar, as well as NAB, support allowing 17/24 GHz BSS licensees to qualify to use the compulsory copyright licenses.[127] DIRECTV asserts that while the 17/24 GHZ BSS service is not totally in either the DBS or FSS frequency bands, the uplink for this service is in a frequency band allocated to FSS and, therefore, the copyright license could be construed to cover 17/24 GHz BSS. Alternatively, DIRECTV asserts that the Commission could amend its definition of "DBS" to include use of the 17/24 GHz BSS downlink band.[128] Although

[121] Media Access Project Comments at 1-3 and 7-9. *See* 47 U.S.C. § 335(b)(1).

[122] EchoStar Reply Comments at 22.

[123] *See* 47 C.F.R. § 25.701(c).

[124] *See 17/24 BSS GHz NPRM,* 21 FCC Rcd at 7437, para. 21. *See also* 17 U.S.C. §§ 119, 122.

[125] 17 U.S.C. §119(d)(6). *See also* 47 U.S.C. § 339.

[126] 17 U.S.C. §122 (j)(3). *See also* 47 U.S.C. § 338.

[127] DIRECTV Comments at 39-40, EchoStar Comments at 22, and NAB Comments at 1-3.

[128] DIRECTV Comments at 12-13. "DBS" is defined in the Commission's rules, 47 C.F.R. § 25.201, as follows: "A radiocommunication service in which signals transmitted or retransmitted by space stations, using frequencies specified in Section 25.202(a)(7) [12.2-12.7 GHz space to earth] are intended for direct reception by the general

(continued....)

we will not offer an opinion on the appropriate construction of the Copyright Act, we believe that Sections 338 and 339 of the Communications Act would apply to 17/24 GHz BSS licensees and that operators in this band, to the extent that they provide DBS-like service, qualify for use of the statutory copyright licenses. These licensees will provide point-to-multipoint service, in part using FSS frequencies, and thus they appear to come within the definition of a satellite carrier. Licensees availing themselves of the statutory copyright licenses must, of course, abide by the accompanying broadcast carriage requirements in the statute and in Commission rules,[129] and, if they offer service to more than 5 million customers, must provide television broadcast signals to subscribers in Alaska and Hawaii.[130]

2. Equal Employment Opportunities

45. ***EEO Requirements Adopted:*** The *NPRM* noted that Section 25.601 of the Commission's rules requires an entity that owns or leases an FSS or DBS service facility to provide video programming directly to the public on a subscription basis to comply with the equal employment opportunity (EEO) requirements. These requirements are set forth in Part 76 of the Commission's rules and apply if the entity exercises control over the video programming it distributes.[131] We proposed to apply Section 25.601 to 17/24 GHz BSS licensees to the extent such licensees provide DBS-like services. In addition, we proposed to require 17/24 GHz BSS licensees to comply with any other EEO requirements that may be subsequently adopted or enforced by the Commission for broadcasters and multichannel video service distributors (MVPDs). We sought comment on this proposal.

46. EchoStar states that if we impose EEO obligations on 17/24 GHz BSS licensees, we should apply them uniformly to all licensees.[132] Bermuda states generally that it supports our proposals.[133] We find that it is in the public interest to apply Section 25.601 of our rules to 17/24 GHz BSS licensees to the extent such licensees provide DBS-like services, as well as to require 17/24 GHz BSS licensees to comply with any other EEO requirements that may be subsequently adopted or enforced by the Commission for broadcasters and MVPDs. Accordingly, we will apply Section 25.601 of our rules to 17/24 GHz BSS licensees to the extent such licensees provide DBS-like services, and 17/24 GHz BSS licensees will be required to comply with any

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public." We decline to change this band-specific definition of DBS because there are certain requirements for operations in the 12.2-12.7 GHz band imposed by the ITU Region 2 BSS Plan that do not apply to the 17/24 GHz BSS or other frequency bands in which DBS-like services are provided. See ITU Radio Regulations, Appendices 30 and 30A. The provisions of Appendices 30 and 30A of the International Radio Regulations are applicable to the BSS in the frequency bands 12.2-12.7 GHz (Region 2) and to their associated feeder links in the bands 17.3-17.8 GHz (Region 2). Other BSS allocations are not subject to the provisions of these Plans.

[129] *See* 47 U.S.C. § 338(a), 47 C.F.R. § 76.66.

[130] 47 U.S.C. § 338(a)(4). *See also* Implementation of Section 210 of the Satellite Home Viewer Extension and Reauthorization Act of 2004 to Amend Section 338 of the Communications Act*, Report and Order,* 20 FCC Rcd 14242 (2005).

[131] *See* 47 C.F.R. § 25.601.

[132] EchoStar Comments at 21.

[133] Bermuda Comments at 4.

other EEO requirements that may be subsequently adopted or enforced by the Commission for broadcasters and MVPDs.

3. Geographic Service Rules

47. ***Service Requirements for Alaska and Hawaii Adopted:*** The Commission is committed to establishing policies and rules that will promote service to all regions in the United States, particularly to traditionally underserved areas, such as Alaska and Hawaii, and other remote areas. To achieve these goals, the *NPRM* proposed to apply geographic service rules for the states of Alaska and Hawaii in the 17/24 GHz BSS. Specifically, to the extent that 17/24 GHz BSS space stations are used to provide video programming to consumers in the United States, we proposed to adopt rules analogous to those in effect for DBS satellites in Section 25.148(c) of the Commission's rules.[134] These rules require DBS licensees to provide service to Alaska and Hawaii where such service is technically feasible from the authorized orbital location. DBS applicants who do not propose to serve Alaska and Hawaii at the licensing stage must provide technical analyses to the Commission demonstrating that such service is not feasible as a technical matter or that, while technically feasible, such service would require so many compromises in satellite design and operation as to make it economically unreasonable. The Commission sought comment on this proposal. In addition, the *NPRM* noted that it is likely that many of the satellite operators in the 17/24 GHz BSS will operate multiple satellites. We asked whether, in such instances, we should apply geographic service rules at each orbital location or on a system-wide basis.[135]

48. Commenters generally support adopting rules analogous to the DBS rules.[136] DIRECTV and EchoStar also support applying the rules on a system-wide basis rather than on an orbital location basis.[137] DIRECTV states that applying the rules on a system-wide basis will provide flexibility without compromising the goal of comparable service to all regions of the

[134] *17/24 BSS GHz NPRM,* 21 FCC Rcd at 7437, para. 23. 47 C.F.R. § 25.148(c).

[135] *17/24 BSS GHz NPRM,* 21 FCC Rcd at 7438, para. 24. *See* EchoStar Satellite LLC, *Memorandum Opinion and Order*, 19 FCC Rcd 6075 (2004) (In this Order, the International Bureau granted EchoStar's request for a waiver of the geographic service rule for its EchoStar 4 satellite at the 157° W.L. orbital location because service to Alaska and Hawaii was not technically feasible from that satellite at that particular orbital location, and EchoStar was providing service to Alaska and Hawaii from its satellites at the 119° orbital location.); In re EchoStar Satellite Corporation, DIRECTSAT Corporation, EchoStar DBS Corporation, *Memorandum Opinion and Order,* 13 FCC Rcd 8595 (1998) (In this Order, the International Bureau granted EchoStar's request for a waiver of the geographic service rule for its EchoStar 1 satellite at the 148° W.L. orbital location because service to Hawaii was not technically feasible from that satellite at that particular orbital location, and EchoStar pledged to provide service to Hawaii from its satellite at the 119.2° W.L. orbital location.).

[136] *See* DIRECTV Comments at 18, EchoStar Comments at 21-22, Bermuda Comments at 5.

[137] DIRECTV Comments at 18-19, EchoStar Reply Comments at 6, 23. In this context, "system-wide" means the combination of all of the space stations in a particular provider's fleet that are licensed to operate in the 17/24 GHz BSS. Thus, when applying the rule on a system-wide basis as proposed by DIRECTV and EchoStar, a provider could meet the geographic service requirement by providing service to Alaska and Hawaii using a subset of the 17/24 GHz BSS space stations in its fleet. The provider would not have to provide service to Alaska and Hawaii from every 17/24 GHz BSS space station in its fleet from which such service is technically feasible and not economically unreasonable.

United States.[138] EchoStar notes that the technical feasibility of service from a particular orbital location may not be the same for the 12 GHz and 17 GHz bands.

49. Accordingly, 17/24 GHz BSS licensees, to the extent that such licensees provide DBS-like services, are required to certify that they will provide service to Alaska and Hawaii comparable to that provided to locations in the 48 contiguous United States (CONUS), unless such service is not technically feasible or not economically reasonable from the authorized orbit location.[139] In addition, we require applicants to design and configure 17/24 GHz BSS satellites to be capable of providing service to Alaska and Hawaii that is comparable to the service that such satellites will provide to CONUS subscribers.[140] Furthermore, we require applicants to design and configure these satellites to be able to provide service to Alaska and Hawaii from any orbital location capable of providing service to either Alaska or Hawaii to which they may be relocated in the future. Thus, regardless of the location to which the satellite is initially authorized to operate from, if moved to a location capable of providing coverage to Alaska and Hawaii, the satellite will be configured to provide service to Alaska and Hawaii at the new orbital location. Applying geographic service requirements to 17/24 GHz BSS operators in this manner will best ensure that 17/24 GHz BSS service provided to Alaska and Hawaii is comparable to that provided to CONUS locations. Although we are applying these requirements to each satellite where technically feasible instead of on a system-wide basis as proposed by DIRECTV and EchoStar, we believe that operators will have sufficient flexibility to design their systems in a manner that will be both technically and economically efficient. We also require licensees to certify that replacement and relocated satellites at locations from which service to Alaska and Hawaii had been provided by another 17/24 GHz BSS satellite will have the capability to provide at least the same level of service to Alaska and Hawaii as the previous 17/24 GHz BSS satellite at that location. 17/24 GHz BSS applicants who do not intend to provide service to Alaska and Hawaii must provide, in their initial application, technical analyses to the Commission demonstrating that such service is not feasible as a technical matter or that, while technically feasible, such service would require so many compromises in satellite design and operation as to make it economically unreasonable.

4. Emergency Alert System

50. ***EAS Requirements Adopted:*** In the *NPRM*, the Commission noted that, in the *EAS First Report and Order and Further Notice,* the Commission amended Part 11 of its rules to require participation in the Emergency Alert System (EAS) by digital broadcast stations, digital cable systems, DBS services, and DARS.[141] The *NPRM* also noted that in the *EAS First Report*

[138] DIRECTV Comments at 18-19.

[139] The Commission has recently revised Form 312, the satellite license application form, to require all applicants subject to geographic service rule requirements to certify that they will comply with those requirements. *See* 71 Fed. Reg. 62463 (Oct. 25, 2006); 72 Fed. Reg. 5715 (Feb. 7, 2007). As a result, 17/24 GHz BSS licensees will also be subject to a geographic service rule certification. *See* International Bureau Announces Revision to FCC Form 312, Main Form, *Public Notice,* DA 07-1762 (rel. April 17, 2007).

[140] *See Part 100 Report and Order,* 17 FCC Rcd at 11367, para. 72.

[141] *See* Review of the Emergency Alert System, *First Report and Order and Further Notice of Proposed Rulemaking*, 20 FCC Rcd 18625 (rel. Nov. 10, 2005) (*EAS First Report and Order and Further Notice*). In the Further Notice of Proposed Rulemaking that accompanied the *EAS First Report and Order and Further Notice*, the (continued....)

and Order and Further Notice, the Commission defined DBS broadly to include the "vast majority of DTH services, particularly those which viewers may have expectations as to available warnings based on experience with broadcast television services."[142] Because the same concerns the Commission addressed in the *EAS First Report and Order and Further Notice* are presented with the introduction of services by 17/24 GHz BSS providers, the *NPRM* proposed to apply the EAS requirements to providers of those services to the extent that 17/24 GHz BSS licensees provide DBS-like services.[143]

51. Commenters disagree as to whether the Commission should apply EAS requirements to all 17/24 GHz BSS licensees. SES Americom and Intelsat maintain that EAS requirements should apply only to 17/24 GHz BSS licensees that distribute programming to end users and not to FSS licensees that provide satellite capacity, such as SES Americom and Intelsat.[144] According to SES Americom, FSS operators have conclusively demonstrated that placing EAS obligations on the licensee instead of the programming distributor impairs the effectiveness of the EAS program and prevents the Commission from penalizing a programming distributor that fails to deliver a required alert.[145] SES concludes that if the Commission decides to apply EAS requirements to the 17/24 GHz BSS, it should ensure that they are placed only on programming distributors and not on the underlying satellite operators.[146]

52. EchoStar and DIRECTV disagree with SES Americom and Intelsat. On reply, EchoStar and DIRECTV argue that all 17/24 GHz BSS licensees, whether they provide programming or underlying capacity, should be subject to EAS requirements.[147] DIRECTV also notes that the Commission has previously determined that satellite licensees, such as Intelsat, should be subject to EAS requirements for other satellite services.[148] Consequently, DIRECTV argues, unless the Commission changes its policy regarding the application of EAS requirements

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Commission sought comment on how DBS providers might deliver regionally targeted alerts in a next generation alert and warning system. *Id*. at para. 68.

[142] *Id*. at para 49. In the *EAS First Report and Order and Further Notice*, the Commission defined DBS providers for EAS purposes to include: (1) entities licensed to operate satellites in the 12.2 to 12.7 GHz DBS frequency bands; (2) entities licensed to operate satellites in the Ku-band fixed satellite service (FSS) and that sell or lease capacity to a video programming distributor that offers service directly to consumers providing a sufficient number of channels so that four percent of the total applicable programming channels yields a set aside of at least one channel of non-commercial programming pursuant to section 25.701(e) of the Commission's rules, or (3) non-U.S.-licensed satellite operators in the Ku-band that offer video programming directly to consumers in the United States pursuant to an earth station license issued under Part 25 of this title and that offer a sufficient number of channels to consumers so that four percent of the total applicable programming channels yields a set aside of one channel of non-commercial programming pursuant to Section 25.701(e) of the Commission's rules. *Id.*

[143] *17/24 GHz BSS NPRM,* 21 FCC Rcd 7439-40, para. 27.

[144] Intelsat Comments at 11, SES Americom Comments at 26.

[145] SES Americom Comments at 26.

[146] SES Americom Comments at 26.

[147] DIRECTV Reply Comments at 33, EchoStar Reply Comments at 5.

[148] DIRECTV Reply Comment at 33.

to other services it should not adopt Intelsat and SES Americom's proposal for the 17/24 GHz service alone.[149]

53. Bermuda also submitted comments in support of applying EAS requirements to all 17/24 GHz BSS licensees that provide DBS-like services. Bermuda argues that imposing this requirement not only insures that all satellite operators providing DTH-like or DBS-like services will be subject to the same requirements, but also means that consumers will receive equal services in the event of an emergency. Bermuda further states that in the broader context of EAS, it has concerns regarding extreme weather conditions and recognizes that resilient communications are necessary for the dissemination of vital information to the public in times of emergency.[150]

54. We believe that customers of the new 17/24 GHz BSS services would likely have similar expectations regarding these services as they do towards those other satellite services where video programming is provided directly to consumers. The particular band in which DTH services are offered has no relevance to customers' expectations regarding their ability to receive warnings. In other words, the EAS obligations for these services should be uniform no matter what portion of spectrum a particular provider chooses for its services. In this regard, we note that, pursuant to the rules adopted in the *EAS First Report and Order*, entities providing DBS services as defined by Section 25.701(a) of the Commission's rules,[151] will be subject to the Part 11 EAS rules effective May 31, 2007. In light of this precedent and the reasons stated above, we conclude that, where 17/24 GHz BSS space stations are used to provide video services directly to consumers, the EAS requirements will apply. This will ensure consistent application of the EAS requirements irrespective of the different spectrum being used. We note, however, that PanAmSat Corporation, SES Americom, Inc. and Intelsat, Ltd. (collectively the "FSS Group") filed a petition for partial reconsideration of the *EAS First Report and Order*,[152] making arguments essentially identical to those raised in their comments in this proceeding.[153] We will address these issues in an Order dealing with the reconsideration petitions in the EAS proceeding.

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[149] DIRECTV Reply Comments at 33.

[150] Bermuda Comments at 6.

[151] 47 C.F.R. § 25.701(a).

[152] Petition for Partial Reconsideration of PanAmSat Corporation, SES Americom, Inc., and Intelsat, Ltd., in Docket No. 04-296, filed December 27, 2005 (FSS Group Petition).

[153] In its petition, the FSS Group requests the Commission to revise its conclusions by requiring EAS to apply to the DTH video programming distributor, not the FSS satellite operator. Should the Commission decide that its EAS rules would continue to apply to FSS satellite operators providing capacity to DTH video programming distributors, the FSS Group requests that the Commision rule that contracts between FSS operators and DTH video programming distributors for the sale or lease of satellite capacity that are already in place when the EAS rules become effective for DBS providers should be grandfathered. Finally, the FSS Group requests that the Commission provide an exemption for DTH-FSS services that are directed primarily to consumers outside the United States. On March 2, 2006, EchoStar Satellite L.L.C. (EchoStar) and DIRECTV Latin America, LLC (DTVLA) filed oppositions to the FSS Group's petition for partial reconsideration. *See* Opposition of EchoStar Satellite L.L.C. to the Petition for Partial Reconsideration of PanAmSat Corporation, SES Americom, Inc., and Intelsat, Ltd., filed March 2, 2006 (EchoStar Opposition); *see also* Opposition of Petition for Partial Reconsideration, DIRECTV Latin America, LLC, filed March 2, 2006 (DTVLA Opposition).

C. Use of BSS Spectrum at 17.7-17.8 GHz

55. ***17.7-17.8 GHz BSS Spectrum Limited to International Service and TT&C Operations Not Prohibited Just Below 17.7 GHz:*** Although the international allocation for Region 2 BSS in the space-to-Earth direction extends from 17.3-17.8 GHz, in the *18 GHz Report and Order*, the Commission extended the domestic allocation to the BSS only to 17.7 GHz.[154] As discussed in the *Notice*, the Commission based its decision in part upon the ubiquitous nature of broadcasting-satellite services which we believed would preclude successful coordination with a terrestrial service that was similarly widely deployed, and taking into account the amount of terrestrial fixed spectrum being lost as a result of that proceeding.[155] In the *NPRM*, the Commission recognized that U.S. satellite operators might wish to use the 17.7 – 17.8 GHz band to provide service to receiving earth stations located within ITU Region 2, but outside of the United States.[156] Accordingly, the Commission proposed to permit U.S. operators to use the international allocation to the BSS, but to limit use of the downlink to international service only, *i.e.*, to receiving earth stations located outside of the U.S. and its possessions.[157] The *NPRM* sought comment on this proposal and any rule changes that might be necessary to effect its implementation.[158] Recognizing that the footprint of satellite beams serving nearby Region 2 countries could illuminate portions of the United States, the *NPRM* also proposed to adopt Power Flux Density (pfd) limits in order to protect terrestrial service antennas from co-frequency interference from space station transmissions. Specifically, it proposed to adopt the same pfd limits that were imposed on FSS transmissions in the 17.7 – 17.8 GHz band by Section 25.208(c) of the Commission's rules[159] prior to the adoption of the *18 GHz Report and Order*[160] in 2002, and are also the same limits that Article 21 of the ITU Radio Regulations currently imposes on FSS operators in this band.[161] The *NPRM* sought comment on extension of these proposed pfd limits to the 17/24 GHz BSS.[162]

56. Commenters responding to this issue consistently favor the Commission's proposal to permit use of the 17.7 – 17.8 GHz band outside of the United States and its

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[154] *See 18 GHz Report & Order,* 15 FCC Rcd at 13475, paras. 95-99.

[155] *Id.*

[156] *17/24 GHz BSS NPRM,* 21 FCC Rcd at 7441, paras. 31-32.

[157] *Id.*

[158] *Id*.

[159] These limits were as follows:

-115 dBW/m^2/MHz	for $0^\circ \leq \delta \leq 5^\circ$
-115 + 0.5(δ-5) dBW/m^2/MHz	for $5^\circ \leq \delta \leq 25^\circ$
-105 dBW/m^2/MHz	for $25^\circ \leq \delta \leq 90^\circ$

where δ is the angle of arrival above the horizontal plane.

[160] *See 18 GHz Report and Order*, 15 FCC Rcd 13430.

[161] *See* Table 21-4 of the ITU Radio Regulations.

[162] *17/24 GHz BSS NPRM,* 21 FCC Rcd at 7441, paras. 31-32.

possessions.[163] However, many argue that the Commission's proposal did not go far enough with regard to domestic service. DIRECTV and EchoStar both request that the Commission also allow satellite operators to provide service to U.S.-based receiving earth stations on a non-protected, non-interference basis, arguing that there is very little chance that downlink transmissions from a BSS satellite would interfere with the much stronger terrestrial service transmissions in this portion of the band and stating that spectrum should not be required to remain fallow in areas where there is little terrestrial use.[164] Intelsat further argues that coordination with Fixed Service (FS) operators in the 17.7 – 17.8 GHz band is feasible particularly if FS deployment is frozen after a certain date to permit BSS operators to deploy their earth stations with full knowledge of the locations of FS earth stations.[165] Alternatively, Intelsat suggests that the Commission could grant BSS and FS co-primary status and protect receive earth station sites on a case-by-case basis while permitting FS deployment in the band to continue.[166] Finally, SES Americom states that the Commission should entertain requests for a waiver of the Commission's rules to permit use of the 17.7 – 17.8 GHz band on a case-by-case basis.[167]

57. The Fixed Wireless Communications Coalition (FWCC) opposes satellite operators' requests for authority to provide domestic service in the 17.7 – 17.8 GHz band.[168] The FWCC claims that the FS used the band heavily even prior to the 1998 *18 GHz Report and Order*[169] and that the number of FS links continues to increase. It argues that such an action on the Commission's part would be both bad policy and contrary to law as the *NPRM* expressly took such a possibility off the table.[170] The FWCC further argues that satellite operators seek to reopen the issue of terrestrial service and satellite service sharing that has already been thoroughly aired and considered, and urges the Commission to state that the matter is closed.[171] FiberTower also opposes 17/24 GHz BSS domestic use of the 17.7 – 17.8 GHz band, stating that it would not be possible to effect coordination with ongoing FS operations in the band and that such a reallocation would once again disrupt FS operations in order to rechannelize the 18 GHz band.[172]

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[163] *See* DIRECTV Comments at 33-35, EchoStar Comments at 23, Intelsat Comments at 8-10, and SES Americom Comments at 22.

[164] *See* DIRECTV Comments at 34, EchoStar Comments at A.6.3.

[165] *See* Intelsat Comments at 8-9, Intelsat Reply Comments at 18.

[166] *Id.* In its Reply Comments, DIRECTV maintains that there is limited FS geographic deployment in the band and that due to satellite operator's demonstrated interest, Intelsat's proposal should be carefully considered. *See* DIRECTV Reply Comments at 29.

[167] *See* SES Americom Reply Comments at 18.

[168] *See* FWCC Reply Comments at 4.

[169] *See 18 GHz Report and Order*.

[170] *Id*.

[171] *Id*.

[172] *See* FiberTower Comments at n. 17.

58. In the *NPRM*, the Commission made clear that it did not intend to reexamine the question of BSS and FS sharing in the 17.7 –17.8 GHz band in this rulemaking.[173] We believe that undertaking examination of such a technically complex issue would only result in a protracted and contentious rulemaking. As stated in the *NPRM*, this could only disserve our goal of establishing technical and service rules for the 17/24 GHz BSS in a timely manner, particularly recognizing the April 1, 2007 date at which the allocation became effective. Moreover, the Commission also stated that no applicant had provided either convincing evidence that terrestrial FS spectrum relocation requirements are less demanding than predicted, or a compelling argument that coordination of widely deployed terrestrial services with ubiquitously located 17/24 GHz BSS receivers would be readily feasible.[174] That remains true to date. For these reasons, we agree with the FWCC's assertion that reopening the issue in this rulemaking is not appropriate, and we decline to consider requests to make the 17.7 – 17.8 GHz band available for domestic BSS operations as a part of this proceeding.

59. EchoStar, DIRECTV and SES Americom all suggest that reception of some non-protected BSS transmissions at U.S. earth stations might be accommodated successfully in the 17.7 – 17.8 GHz band. EchoStar notes that a similar approach has been undertaken successfully with FSS DTH antennas in the extended Ku-bands.[175] In certain instances, FSS applicants seeking to use extended Ku-band spectrum for domestic service, have obtained waivers of the Commission's rules and agreed to accept all interference from FS stations as a condition of authorization.[176] However, in the extended Ku-bands, there is an existing primary allocation to the FSS in the 10.95 – 11.2 GHz and 11.45 – 11.7 GHz bands, although footnote NG 104 to the United States Table of Frequency Allocations (Table of Allocations) limits FSS use to international systems only.[177] In the case of the 17.7 – 17.8 GHz band, neither a primary nor a secondary domestic allocation to the BSS exists in the space-to-Earth direction. The Commission will not modify the Table of Allocations to provide a secondary allocation to the BSS in this band for the reasons stated above – we do not intend to reexamine BSS/FS sharing issues in this rulemaking.

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[173] *See17/24 GHz BSS NPRM* at 7440, para. 30. In the *NPRM,* the Commission stated that "we do not propose to authorize or to protect the reception off BS (space-to-Earth) transmissions in the United States and its possessions in the 17.7 – 17.8 GHz band." *17/24 GHz BSS NPRM,* 21 FCC Rcd at 7440, para. 30.

[174] *Id.*

[175] *See* EchoStar Reply Comments at 14.

[176] Specifically, on a number of occasions, the Commission has authorized downlink of domestic service to customer receive-only earth stations in the 10.95-11.2 GHz and 11.45-11.7 GHz bands. *See* PanAmSat Licensee Corp. Application for Authority to Use the Extended Ku-Band Frequencies for Domestic Service, *Order and Authorization*, DA 05-2444, Sat. Div., Int'l Bur., (released Sept. 13, 2005); EchoStar KuX Corporation Application for Authority to Construct, Launch and Operate a Geostationary Satellite Using the Extended Ku-Band Frequencies in the Fixed-Satellite service at the 83° W.L. Orbital Location, *Order And Authorization*, 20 FCC Rcd 919, 921-922 (para. 9) (Sat. Div., Int'l Bur. 2004); EchoStar Satellite LLC Application for Authority to Construct, Launch and Operate a Geostationary Satellite Using the Extended Ku-Band Frequencies in the Fixed-Satellite Service at the 109° W.L. Orbital Location, *Order and Authorization*, 20 FCC Rcd 930 (Sat. Div., Int'l Bur., 2004); EchoStar KuX Corporation Application for Authority to Construct, Launch and Operate a Geostationary Satellite Using the Extended Ku-Band Frequencies in the Fixed-Satellite Service at the 121° W.L. Orbital Location, *Order And Authorization*, 20 FCC Rcd 942 (Sat. Div., Int'l Bur. 2004).

[177] *See* 47 C.F.R. § 2.106 and NG 104.

60. Commenters also support the adoption of pfd limits in the 17.7 – 17.8 GHz band to protect terrestrial networks. SES Americom and Intelsat agree with the Commission's proposal to apply the pfd limits of Article 21 of the ITU Radio Regulations for FSS systems operating in the 17.7 – 19.7 GHz band to BSS downlink transmissions in the 17.7 – 17.8 GHz band.[178] DIRECTV, although proposing a different (graduated) set of pfd values for 17/24 GHz BSS downlink transmissions in general, states that the ITU Article 21 pfd limits are sufficient to protect terrestrial services from interference.[179] EchoStar also proposes a graduated set of pfd values for the entire 17.3 – 17.8 GHz band and compares its proposed values to the limits proposed in the *NPRM,* noting that at low elevation angles its values are actually 8 dB more stringent than those of Article 21, hence sufficient to protect terrestrial services from interference.[180] Accordingly, as proposed in the *NPRM*, we extend the FSS pfd limits of Article 21 of the ITU Radio Regulations to 17/24 GHz BSS in the 17.7 – 17.8 GHz band. Consistent with other pfd requirements in our rules,[181] the maximum values will apply to elevation angles (δ) between 25º and 90º above the horizontal plane. We will restrict pfd values by a factor of (δ-5)/2 for elevation angles between 5º and 25º above the horizontal plane, and to values of 10 dB lower for elevation angles between 0º and 5º above the horizontal plane.

61. The *NPRM* also sought comment on Tracking, Telemetry and Command (TT&C) operations in the 17.7 – 17.8 GHz band.[182] Section 25.202(g) of the Commission's rules requires that TT&C functions for all U.S. domestic satellites be conducted at either or both edges of the allocated band(s).[183] In the case of the 17.3 – 17.7 GHz allocation, this rule would permit TT&C operations at frequencies just above 17.3 GHz or just below 17.7 GHz. The Commission's rules would not permit TT&C operations into U.S.-based earth stations at frequencies just below 17.8 GHz. Recognizing that reliance upon foreign-based TT&C facilities for on-station operations could adversely affect the U.S. operator's ability to maintain control of its spacecraft, the *NPRM* sought comment on how best to accommodate TT&C operations for those applicants seeking to use the 17.7 – 17.8 GHz band for international service.[184] The *NPRM* asked further whether there was sufficient spectrum available above 17.3 GHz to accommodate these operations, particularly in light of the reverse-band sharing situation, and potential for out-of-band interference from radar systems operating just below 17.3 GHz.[185]

62. EchoStar proposes that the Commission set aside 10 MHz guardbands at the edges of the 17/24 GHz bands for on-station TT&C operations. In the 17 GHz band, EchoStar asks us to define a guardband at the lower band edge near 17.3 GHz, but not at frequencies near 17.7 GHz because of the planned use by many operators of the entire 17.3-17.8 GHz bandwidth.

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[178] *See* SES Americom Comments at 22, Intelsat Comments at 9.

[179] *See* DIRECTV Comments at 34.

[180] *See* EchoStar Comments at A.6.3.

[181] *See, e.g.*, 47 C.F.R. § 25.208(a)-(c).

[182] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7442, para. 33.

[183] *See* 47 C.F.R. § 25.202(g).

[184] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7442, paras. 33.

[185] *Id*.

Rather, EchoStar asserts that the upper guardband is better defined at 17.790-17.800 GHz.[186] At present, Section 25.202(g) of our rules does not set aside any specific bandwidth for TT&C transmissions. Instead, it requires only that these functions be conducted at the edges of the allocated band. In the case of DBS satellites, the ITU Radio Regulations' Region 2 BSS and feederlink Plans of Appendices 30 and 30A do designate 12 MHz guardbands at either edge of the allocated band, and our rules require DBS operations to be in accordance with the technical characteristics contained in these appendices.[187] However, the planned-band guardbands are set out in the larger context of a channelization scheme over the entire allocated bandwidth. Similarly, EchoStar makes its request for designated TT&C guardbands in the context of its more general request that the 24 MHz channelization scheme used for DBS satellites be applied to 17/24 GHz BSS satellites.[188] The possibility of channelization schemes are addressed in more detail in this Order below, where the Commission declines to enforce a particular channelization scheme for the 17/24 GHz BSS.[189]

63. Moreover, we do not believe that it is practicable to plan for TT&C operations in the 17.7-17.8 GHz band. Our rules require that TT&C operations take place at the edges of the *allocated band*. Although we may authorize operators to provide international service in the 17.7-17.8 GHz band, there is no domestic allocation to the BSS in the 17.7-17.8 GHz band, and we have declined to modify the Table of Allocations to provide for one. Accordingly, we do not propose to designate guardbands limited to on-station TT&C operations for 17/24 GHz BSS systems. For these reasons we will make no changes to Section 25.202(g).[190]

64. Both EchoStar and Intelsat urge the Commission not to permit TT&C operations at the band edge just below 17.7 GHz, arguing that such transmissions would fall within band for those operators seeking to use the entire 17.3-17.8 GHz band, and as a result, TT&C transmissions of one operator could be incompatible with the communications transmissions of another operator.[191] However, this request is made in conjunction with their assertions that the Commission should permit domestic BSS operations in the 17.7-17.8 GHz band. Commenters do not offer alternatives in the event that the Commission declines this request. In addition, although commenters believe TT&C operations should occur at edge of the 17.7-17.8 GHz band segment, they do not address where to accommodate the TT&C transmissions of future applicants who choose not to provide international service in the 17.7-17.8 GHz band. In addition, the *NPRM* recognized significant interference potential from both adjacent band and

[186] *See* EchoStar Comments at A.6.5.

[187] *See* 47 C.F.R. § 25.148(f), § 3.9.2 of Annex 5 to Appendix 30 and § 4.1 of Annex 3 to Appendix 30A of the International Radio Regulations.

[188] *See* EchoStar Comments at A.6.1.

[189] *See* Section III.F.2. below.

[190] However, in the *International Bureau 2006 Biennial Review Staff Report*, the International Bureau recommended re-examining all the provisions in Part 25 to, among other things, determine whether any rules need to be updated to reflect the transition in satellite services from analog to digital traffic. *See International Bureau 2006 Biennial Review Staff Report*, IB Docket No. 06-154, DA 07-675 (released Feb. 14, 2007) at 27-28. In that context, the Commission may revisit the issue of whether to specify a particular amount of spectrum to be set aside at the edges of service bands for TT&C operations.

[191] *See* Intelsat Comments at 12, EchoStar Comments at Technical Annex at 28.

secondary in-band government radar systems at frequencies just above 17.3 GHz.[192] DIRECTV cautions that higher frequencies correspond with higher reliability for TT&C operations due to their separation from government radar systems.[193] For these reasons, we believe that operators should be afforded sufficient bandwidth, particularly at higher frequencies, to provide for flexibility and reliability in planning their TT&C operations.

65. Moreover, we are not convinced that TT&C transmissions will present a significant interference problem to the communications transmissions of adjacent satellite operators using the 17.7-17.8 GHz band. The worst interference case likely will occur into small-diameter earth station antennas that receive off-axis telemetry signal transmissions from nearby 17/24 GHz BSS satellites. However, TT&C transmissions are relatively narrow-band – typically a few megahertz – and the resulting interference would be averaged across the much wider bandwidth of the typical BSS signal. In addition, at four degrees or greater of orbital separation the interfering telemetry signal power should be significantly reduced. A somewhat analogous situation occurs in the extended Ku-bands between 11.45-11.7 GHz and the standard Ku-band between 11.7-12.2 GHz. Although the adjacent, extended Ku-band (11.45-11.7 GHz) may be used to provide international service, and many operators choose to make use of the entire 11.45-12.2 GHz bandwidth, the Commission does not preclude TT&C operations at frequencies just above 11.7 GHz. Accordingly, we will not prohibit TT&C operations at frequencies just below 17.7 GHz.

D. Orbital Spacing and Minimum Antenna Diameter and Performance Standards

1. Orbital Spacing

a. Background

66. ***Four Degree Spacing Framework Adopted:*** The *NPRM* sought comment on whether the Commission should adopt an orbital spacing policy in the 17/24 GHz BSS, and if so, what separation would be appropriate.[194] We asked specifically how best to balance our conflicting goals of making available the maximum GSO orbital capacity while simultaneously minimizing interference into small-diameter receiving antennas.[195] Most commenters recognize the importance of adopting a well-considered orbital spacing policy, noting the critical role that spacing plays in determining required receive antenna diameters, quality of service, efficiency of design and types of services possible to deliver that result as a consequence of orbital separation. Only Bermuda differs in its view, advocating that the Commission should remove the minimum orbital separation requirement from all services, including DBS services, and instead should allow operators to coordinate their services using the procedures in the ITU Radio Regulations.[196]

[192] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7568-7472, paras. 94-100.

[193] *See* DIRECTV Reply Comments at 32-33.

[194] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7446, para. 42.

[195] *Id.*

[196] *See* Bermuda Comments at 8. Further, Bermuda's suggestion that we eliminate orbital separation requirements in all satellite services, including the two-degree spacing framework in place for GSO FSS satellites since 1983, is beyond the scope of this proceeding.

Bermuda does not address how operators within the same administration should reconcile instances of interference arising among each other, which is a primary objective we seek to address by developing appropriate requirements within this proceeding.

67. In their comments, DIRECTV, SES Americom, and Intelsat all propose orbital-separation schemes of four degrees, expressing a preference for alignment with existing Ku- and Ka-band FSS locations, some of which are currently used to provide DTH-FSS services.[197] DIRECTV maintains that four degrees of orbital separation will support deployment of the 60 cm diameter antennas it plans to implement.[198] SES Americom and Intelsat maintain that a four-degree separation scheme will permit their planned use of 45 cm antennas.[199] DIRECTV also argues that a separation scheme of four degrees will facilitate use of hybrid BSS-FSS satellites enabling operators to capture the inherent efficiencies associated with these platforms thereby significantly reducing the cost of providing services.[200] Intelsat supports a four-degree orbital separation scheme, stating that it offers a good balance between the use of small diameter antennas and the need to achieve good coverage of the United States from a reasonable number of orbital positions.[201]

68. In contrast, EchoStar, in its comments, advocates a 4.5-degree orbital separation scheme centered upon current DBS locations.[202] EchoStar plans to employ low-cost single-feed, dual-frequency (12/17 GHz) 45 cm diameter subscriber antennas, utilizing a system design predicated upon near co-location with its DBS satellites.[203] EchoStar argues that a spacing scheme based on four degrees is not workable due to heavy use of many of the integer orbital locations for FSS satellites, and that non-integer (constant offset) spacing would be incompatible with Region 2 BSS Plan assignments used by DBS satellites at many orbital locations.[204] However, in its Reply Comments, EchoStar relaxes its position, stating that what is of primary importance is *near* co-location with conventional DBS positions, and that the differences between four-degree and 4.5-degree spacing can easily be reconciled.[205]

69. To this end, EchoStar and SES Americom propose a mutually-agreed orbital assignment framework for the portion of the geostationary arc between 56.9º W.L. and 147.6º W.L.[206] This proposal seeks to reconcile the differing business models, system designs and

[197] *See* DIRECTV Comments at 3-8, Intelsat Comments at 7-8, and SES Americom Comments at 10-12.

[198] *See* DIRECTV Comments at 4-8.

[199] *See* SES Americom Comments at 11, Intelsat Comments at 10. DIRECTV differs from SES Americom and Intelsat in their determination of minimum antenna diameter largely as a result of each operator's choice of acceptable C/I ratios in its system design.

[200] *See* DIRECTV Comments at 5-6.

[201] *See* Intelsat Comments at 7.

[202] *See* EchoStar Comments at 9. EchoStar also proposes an allowance of up to 0.4 degrees between co-located satellites.

[203] *See* EchoStar Comments at A.3.

[204] *See* EchoStar Comments at 11.

[205] *See* EchoStar Reply Comments at 2.

[206] *See* EchoStar Reply Comments at 6-9, SES Americom Reply Comments at 4-9.

accompanying concerns raised by the various commenters. The proposed orbital locations place new 17/24 GHz BSS satellites close enough to selected U.S. DBS locations to permit single-feed earth stations to simultaneously access downlink transmissions from both. Additionally, the proposal seeks to provide sufficient flexibility to allow alignment with FSS orbital positions as well as to permit any adjustments necessary to avoid other presumed unsuitable satellite positions, including those designated for non-U.S. DBS satellites.[207] The orbital positions proposed by EchoStar and SES Americom range from 4° to 5.9° in separation. In contrast, DIRECTV submits a proposal for the portion of the geostationary arc between 83º W.L. and 123º W.L. that assigns in-orbit satellites at four-degree spacing intervals. DIRECTV argues that this framework accommodates most commenters' proposals to co-locate 17/24 GHz BSS satellites with FSS satellites.[208] DIRECTV also submits that its proposed framework would preserve the flexibility to locate 17/24 GHz BSS satellites near certain U.S. DBS locations[209] while avoiding orbital locations that are too close to Appendices 30 and 30A[210] Plan assignments of other Region 2 administrations. Intelsat similarly supports assigning satellites at four-degree spacing. Later, in an *ex parte* statement, DIRECTV, EchoStar, and Intelsat proposed another spacing scheme, in which the proposed orbital positions ranged from 4° to 6.5° in separation between 81° and 124° W.L.[211]

b. Discussion

70. All operators agree that orbital separations as small as four degrees are feasible and will permit deployment of consumer antennas of a size consistent with their system designs and marketing strategies. Even EchoStar, who initially argued for a 4.5-degree separation requirement, agrees that four degrees of separation can be implemented if we allow some flexibility and in this context supports use of 45 cm antennas.[212] After studying the technical discussions presented, we concur that a minimum orbital separation of four degrees between 17/24 GHz BSS satellites is feasible, and that it best affords all applicants the flexibility to design and deploy systems consistent with their stated plans. Moreover, we believe that such a minimum spacing requirement realizes our mutual goals of maximizing orbital capacity while

[207] The jointly-proposed plan does not rely on constant offset between adjacent orbital locations. However, the minimum separation between any two adjacent locations is four degrees.

[208] *See* DIRECTV Reply Comments at 3-6. This plan presumes a constant four degrees of separation between adjacent orbital positions.

[209] DIRECTV's scheme would allow location at or near the 110º W.L. and 119º W.L. locations. *See* Reply Comments of DIRECTV at 4.

[210] *See* Appendices 30 and 30A of the ITU Radio Regulations,

[211] In this orbital spacing scheme, each of the parties joining in the *ex parte* statement recommend assigning two orbital locations to themselves. Intelsat would be assigned 89° W.L. and 95° W.L. DIRECTV would be assigned 99° W.L. and 103° W.L. EchoStar would be assigned 109.5° W.L. and 119° W.L. *See* Letter from William M. Wiltshire, Counsel to DIRECTV, to Marlene H. Dortch, Secretary, FCC, dated March 15, 2007 (*March 15 Joint Ex Parte Statement*). In response to the *March 15 Joint Ex Parte Statement,* Pegasus noted that the proposal does not take into account its three pending applications, and stated that, because it has not yet discussed the proposal with Intelsat, DIRECTV, and EchoStar, it is not in a position to concur with the proposal. *See* Letter from Bruce D. Jacobs and Tony Lin, Counsel to Pegasus, to Marlene H. Dortch, Secretary, FCC, dated March 26, 2007.

[212] *See* EchoStar Reply Comments at Technical Annex at 3.

accommodating small-diameter receiving antennas. Accordingly, we will require that BSS satellite networks operating in the 17/24 GHz BSS be capable of operating at four-degree orbital spacing.

71. In discussing orbital spacing policy, all commenters stress the need for some flexibility relative to mandating adherence to a rigid in-orbit spacing grid.[213] While we agree that some flexibility is beneficial, uniform orbital spacings maximize use of scarce orbital resources and opportunities for competitive entry. Indeed, uniform two-degree spacing has been the cornerstone of the Commission's licensing framework for GSO FSS satellites since 1983, and has served to create a competitive and interference-free operating environment.[214] Therefore, we will require 17/24 GHz BSS licensees to place their satellites in orbit so that all 17/24 GHz BSS satellites are placed at multiples of four degrees away from each other, as set forth in Appendix F of this Order. Allowing complete flexibility in orbital spacing would result in inefficient use of scarce geostationary satellite orbit resources and limit opportunities for competitive entry.

72. Parties opposing uniform four-degree orbital spacing do not provide adequate justification for their positions. First, we find concerns regarding co-location with DBS to be unpersuasive. In the *FNPRM* below, we note that commenters argue that DBS and 17/24 GHz BSS satellites should be able to operate as close as 0.2° to 0.4° away from each other. Furthermore, we find concerns that the orbital assignment plan may need revision in the future to be speculative at best. In any case, the potential need for revision at some time in the future does not warrant allowing inefficient use of the geostationary orbit and limiting opportunities for competitive entry in the interim. Finally, we conclude that parties' concerns regarding potential physical interference between satellites operating with overlapping station-keeping volumes are misplaced. 17/24 GHz BSS satellite licensees will be able to offset their satellites in order to address any undesirable operational constraints arising from satellite co-location.

73. Consequently, we will adopt the orbital spacing framework set forth in Appendix F of this Order. This orbital spacing scheme is consistent with the locations of FSS satellites in the Ku-band and Ka-band, as recommended by DIRECTV and Intelsat.[215] Moreover, we agree with DIRECTV that this framework will accommodate most commenters' proposals for the portion of the geostationary arc between 83° W.L. and 123° W.L.[216] No one has suggested in the record another four-degree spacing configuration that accommodates other commenters' proposals better than DIRECTV's proposal.

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[213] *See* EchoStar Comments at 9, Intelsat Comments at 7, SES Americom Reply Comments at 4-6, and DIRECTV Reply Comments at 4.

[214] *See* Licensing of Space Stations in the Domestic Fixed-Satellite Service and Related Revisions of Part 25 of the Rules and Regulations, *Report and Order*, CC Docket No. 81-704, FCC 83-184, 54 Rad. Reg. 2d 577 (released Aug. 16, 1983); *summary printed in* Licensing Space Stations in the Domestic Fixed-Satellite Service, 48 F.R. 40233 (Sept. 6, 1983) (*Two Degree Spacing Order*). *See also* Licensing of Space Stations in the Domestic Fixed-Satellite Service and Related Revisions of Part 25 of the Rules and Regulations, *Report and Order*, CC Docket No. 81-704, 99 FCC 2d 737 (1985) (*Two Degree Spacing Reconsideration Order*).

[215] DIRECTV Reply Comments at 3-8, Intelsat Comments at 7-8.

[216] DIRECTV Reply Comments at 3-6.

74. However, we also agree to some extent with the commenters who argue for some flexibility in orbital assignments. In particular, we recognize that it may not be possible to locate a 17/24 GHz BSS satellite precisely at some of the orbital locations specified in Appendix F, *e.g.*, because there are undesirable operational constraints required to coordinate physical operations with co-located satellites, or because there is a DBS or other ITU Region 2 BSS satellite receiving feeder-link signals in the 17.3-17.8 GHz band at or very near that location. Thus, we will not require that 17/24 GHz BSS satellites be located precisely at the orbital locations specified in Appendix F. However, an applicant seeking an authorization to operate a 17/24 GHz BSS satellite at a location offset from an orbital location specified in Appendix F will be required to make a technical showing that the proposed satellite will not cause any more interference to any 17/24 GHz BSS satellite operating at a location specified in Appendix F, and in compliance with the rules for this service, than if the proposed satellite were positioned precisely at the Appendix F orbital location. In addition, such applicants must also agree to accept any increased interference that may result from adjacent 17/24 GHz BSS space stations that are operating in compliance with the rules for this service. As with all applicants, such applicants must also make a technical showing demonstrating that their system design accommodates any additional interference from adjacent 17/24 GHz BSS space stations operating at the maximum allowed pfd levels, and otherwise in compliance with the rules for this service, that may result from the location offset of their proposed satellite. Applicants that have reached a coordination agreement with an operator at an Appendix F 17/24 GHz BSS orbital location up to 10° away from the location listed in Appendix F from which their proposed satellite is offset to allow that operator to exceed the pfd levels specified in the rules for this service must use those higher pfd levels for the purposes of this showing.[217]

2. Reference Interference Baseline

75. ***DIRECTV's Reference Interference Baseline Not Adopted:*** In its reply comments, DIRECTV advocates a broad approach proposing that the Commission define a "reference interference baseline" for the 17/24 GHz BSS.[218] Under this proposal, we would establish routine processing standards for satellite applications. A 17/24 GHz BSS satellite applicant would be allowed to receive routine processing even if it deviates from standard parameters set forward in the rules, provided it makes offsetting changes to create no additional interference beyond the reference situation. DIRECTV also advocates that applicants be able to receive routine processing by obtaining consent through coordination to operate outside of the reference situation parameters, and that more flexible requirements would apply outside of the domestic arc (*i.e.*, at least four degrees below 83º W.L. or above 123º W.L.).[219] DIRECTV argues that this approach would create opportunities for individual flexibility, eliminate the burden and delay of unnecessary coordination while maintaining the stability of the overall environment.[220]

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[217] *See* para. 104 below.

[218] *See* DIRECTV Reply Comments at 6.

[219] *Id.* at 7.

[220] *Id.*

76. We decline to adopt DIRECTV's approach of defining a reference interference baseline to be used for routine processing of satellite applications in this proceeding. There is little information or comment on the record to develop or to support what would amount to a rather extensive set of interdependent values. Nor is DIRECTV specific in its proposal other than to say that the baseline should assume four-degree spacing and receiving antennas compliant with ITU Recommendation BO.1213.[221] Accordingly, we find that DIRECTV has not adequately supported its proposal.

3. Minimum Antenna Diameter and Performance Standards

77. ***45 cm/ITU-R Recommendation BO.1213-1 Minimum Antenna Standards Adopted:*** The *NPRM* sought comment on what minimum diameter earth stations the Commission should seek to accommodate in formulating service rules for the 17/24 GHz BSS.[222] In addition, the *NPRM* also asked whether we should afford interference protection to 17/24 GHz BSS systems only to the extent that they meet certain receive-antenna performance characteristics.[223] The Commission also noted that it has typically chosen not to explicitly regulate receive-only antenna characteristics, but rather has opted to regulate other characteristics shaping the interference environment, thereby leaving the choice of antenna characteristics to the operator. However, the *NPRM* recognized that receiving earth station antenna off-axis discrimination performance will affect the interference experienced by BSS subscribers arising from other systems and we asked whether in this instance we should depart from our established policy.[224] In particular, the *NPRM* requested comment on what types of antenna performance regulation, if any, might be appropriate.[225]

78. Most commenters support accommodating a minimum antenna diameter of 45 cm[226] and Intelsat proposes that the Commission adopt a specific 45 cm minimum antenna size requirement.[227] EchoStar and SES Americom advocate less stringent approaches, urging the Commission to adopt rules and policies that would facilitate the deployment of receiving antennas as small as 45 cm[228] or afford interference protection only to receiving antennas no smaller than 45 cm.[229] DIRECTV expressed the view that 60 cm is the minimum antenna diameter that the Commission should accommodate when considering an orbital spacing policy.[230] DIRECTV notes that 60 cm dishes have become more prevalent in recent years and have long been the consumer standard in Europe and elsewhere.[231] DIRECTV states further that

[221] *Id.*

[222] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7448-49, paras. 46-47.

[223] *Id.*

[224] *Id.*

[225] *Id.*

[226] *See* EchoStar Comments at Technical Annex at 3, SES Americom Comments at 10.

[227] *See* Intelsat Comments at 10.

[228] *See* SES Americom Comments at 10.

[229] *See* EchoStar Reply Comments at 10.

[230] *See* DIRECTV Comments at 8.

[231] *Id*.

BSS operators needing to combine capacity from multiple orbital locations will likely require multi-feed receive antennas with an effective diameter greater than 60 cm.[232] Alternatively, SES Americom argues that limiting interference protection to 17/24 GHz BSS receiving antennas that are greater than 45 cm would preclude new BSS entrants from successfully competing with established DBS operators for a customer base.[233] SES Americom asserts that affording interference protection to receiving antennas as small as those commonly used for DBS today (45 cm) is critical to ensuring the usefulness of the band for new competition.[234]

79. As a general matter, commenters also favor adoption of reference antenna performance characteristics that will ensure sufficient interference protection for subscriber antennas and to establish a baseline for protection in licensing of 17/24 GHz BSS systems.[235] Although advocating different minimum antenna diameters, SES Americom, DIRECTV, and Intelsat all propose that the reference antenna pattern given in ITU-R Recommendation BO.1213-1 be used as an appropriate standard for the protection of receiving antennas in the 17/24 GHz BSS.[236] DIRECTV cautions that while protection should be granted only to the extent that receiving antennas conform to the ITU-R standard, the Commission should continue its policy of letting operators retain the discretion to determine the characteristics of their equipment. As such, DIRECTV believes operators should remain free to deploy non-conforming antennas, but with the understanding that they must accept any resulting increase in interference levels.[237] Bermuda, in contrast, argues that the Commission should not regulate 17/24 GHz BSS receiving antenna performance characteristics, but rather that they should be determined by the requirements of the system in which they are deployed.[238]

80. Although the Commission has historically chosen not to regulate the antenna performance characteristics of non-transmitting earth stations, we recognize that the 17/24 GHz BSS confronts an operating environment different from the one in which most other GSO satellite services, must operate. In particular, the reverse-band sharing situation that exists between BSS receiving antennas and transmitting DBS feeder link earth stations in the 17 GHz band creates significant potential for interference from sources other than neighboring co-frequency space stations. Such an interference environment may not be as satisfactorily managed by the Commission's more traditional approach to regulating the downlink interference environment by establishing an orbital separation scheme and accompanying pfd limits, particularly given the widespread deployment of such small-diameter receiving antennas in a four-degree spacing environment. We agree with DIRECTV that establishing performance standards for receiving antennas could help to create a more stable and predictable interference

[232] *Id.*

[233] *Id.*

[234] *See* SES Americom Comments at 6.

[235] *See* DIRECTV Comments at 8 -9, SES Americom Reply Comments at 14, Intelsat Reply Comments at 8.

[236] *See* DIRECTV Comments at 9, SES Americom Comments at 13, SES Americom Reply Comments at 14, and Intelsat Reply Comments at 8. *See* also ITU-R Recommendation BO.1213-1 which provides formulae defining reference co-polar and cross-polar antenna patterns.

[237] *See* DIRECTV Comments at 9.

[238] *See* Bermuda Comments at 8.

environment. Moreover, we note that the majority of commenters concur as evidenced by their support for inclusion of the ITU antenna performance standards of Rec. BO.1213-1 in the Commission's rules. Accordingly, we adopt a rule that 17/24 GHz BSS receiving earth stations 45 cm or greater in diameter may claim protection from interference, but only to the extent that they meet the antenna performance characteristics given in ITU-R Recommendation BO.1213-1.[239] This rule does not apply to 17/24 GHz BSS telemetry earth stations that are subject to the antenna performance requirements of Section 25.209.

81. In adopting this rule, we recognize that we have already bounded the downlink interference environment by establishing a minimum orbital separation requirement in combination with the downlink pfd limits addressed in Section III. E. Thus, by specifying a minimum antenna diameter and reference antenna pattern for interference protection, we are departing from past practice in our treatment of receive-only earth stations and adding an additional interference mitigation requirement. However, as discussed above, we concur with commenters' concerns regarding the need to establish a predictable environment, particularly in light of the unique reverse-band frequency operations in the 17 GHz band. In addition we support DIRECTV's request to preserve operator discretion with regard to choice of antenna characteristics. We note that this new antenna performance standard does not preclude operators from deploying receiving earth stations smaller than 45 cm, or antennas that do not conform to the reference patterns in the ITU-R Recommendation. However, the operator must accept the additional levels of interference that results from its use of the non-conforming antenna.

E. Technical Requirements for Intra-Service Operations

1. Uplink Power Levels

82. ***Standards For Routine/Non-Routine Licensing of Feeder Link Antennas Adopted:*** In the *NPRM*, the Commission stated that successful implementation of any orbital spacing scheme in the 17/24 GHz BSS will likely require adoption of uplink power density and antenna off-axis performance standards similar to those established for the FSS.[240] However, we also recognized that space stations in the 17/24 GHz BSS are likely to operate at orbital separations greater than those existing in the FSS, and that feeder uplink earth stations typically operate with larger diameter antennas that exhibit good off-axis rejection properties.[241] Both of these factors will tend to mitigate the problem of off-axis interference into neighboring space stations. Consequently, we sought comment on the need to establish uplink off-axis power limits for this service.[242] Additionally, the Commission's rules currently provide for routine licensing of FSS earth stations when specific antenna performance standards and uplink power levels are

[239] The amount of interference from adjacent satellites that a receiving antenna can reject is a function not only of the antenna size and performance standards, but also of the pointing accuracy of the antenna. Operators of 17/24 GHz BSS networks should take this parameter into account when designing and deploying their networks. Operators of 17/24 GHz BSS networks should assume the minimum allowed orbital separation between adjacent 17/24 GHz BSS satellites on both sides, and the maximum allowed pfd level. The Commission will not favorably consider complaints from 17/24 GHz BSS network operators that are based on the mispointing of their own BSS receiving antennas.

[240] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7449, para.48.

[241] *Id.*

[242] *Id.*

met.[243] The *NPRM* sought comment on whether analogous criteria might be developed to expedite licensing of 17/24 GHz BSS feeder link stations, and if so, what criteria might be appropriate.[244]

83. Because, by definition, feeder links operate in the FSS, the *NPRM* stated that the antenna performance standards of Section 25.209[245] could be applied to 17/24 GHz BSS feeder link earth stations. The Commission proposed to apply these off-axis performance standards in combination with the highest uplink Equivalent Isotropically Radiated Power (EIRP) density proposed by an applicant, *i.e.*, 5.6 dBW/Hz.[246] We sought comment on this proposal, recognizing that absent a clearly defined orbital separation scheme at that time, the resulting contribution to adjacent satellite interference would be difficult to determine.[247] We also asked what form any uplink off-axis power density requirement should take, and whether it would be most appropriate to specify separate off-axis antenna performance standards and uplink power density requirements, or a single composite off-axis EIRP density curve.[248]

84. Commenters in general acknowledge the need to apply uplink off-axis uplink EIRP limits to 17/24 GHz BSS feeder link stations, recognizing that such limits would help to address off-axis interference concerns as well as facilitate coordination with other services.[249] Intelsat initially stated that such requirements were unnecessary,[250] but, in its reply comments, provides off-axis EIRP density limits that it believes would be adequate.[251]

85. Commenters addressing this issue support applying the Ka-band FSS uplink off-axis power density requirements contained in Section 25.138(a)(1) – (4)[252] of our rules to feeder link earth stations in the 17/24 GHz BSS.[253] Commenters assert that this rule has been effective in the Ka-band,[254] sets limits that are consistent with levels proposed in applications already before the Commission,[255] and will successfully address adjacent satellite interference

[243] *See* 47 C.F.R. §§ 25.211(d), 25.212 (c)-(d).

[244] *Id.*

[245] *See* 47 C.F.R. § 25.209.

[246] *See 17/24 GHz BSS NPRM* at 7450, para. 49.

[247] *See 17/24 GHz BSS NPRM* at 7451, para. 50.

[248] *Id.*

[249] *See* DIRECTV Comments at 14-15, EchoStar Comments at A.4.2, SES Americom Comments at 16.

[250] *See* Intelsat Comments at 11.

[251] *See* Intelsat Reply Comments at 12-13.

[252] *See* 47 C.F.R. § 25.138(a)(1)-(4).

[253] *See* DIRECTV Comments at 14-15, EchoStar Reply Comments at 15 and Exhibit 1, 8-11, SES Americom Reply Comments at 20, Intelsat Reply Comments at 12-13.

[254] *See* SES Americom Reply Comments at 20.

[255] *See* Intelsat Reply Comments at 13.

concerns.[256] Commenters also agree that in the case of the 17/24 GHz BSS, these values should be scaled to a 1 MHz reference bandwidth rather than the 40 kHz resolution specified in our current rule.[257] In addition, commenters suggest expressing the requirement as a limit on the off-axis EIRP density (rather than as separate off-axis antenna requirements and uplink power density limits) such that the operators must meet this EIRP density value regardless of on-axis absolute EIRP or actual antenna performance.[258]

86. Although the off-axis EIRP density limits favored by commenters are approximately 3 dB greater than those tentatively proposed by the Commission,[259] we agree with the commenters that the higher level has proven effective in the Ka-band FSS two-degree spacing environment and will effectively mitigate adjacent satellite interference in the 17/24 GHz BSS four-degree spacing environment. Accordingly, for routine processing of feeder link antennas transmitting to GSO satellites in the 24.75- 25.25 GHz band, we adopt the off-axis antenna performance requirements of Section 25.138(a) scaled to a 1 MHz reference bandwidth as follows:

(1) 17/24 GHz BSS earth station antenna off-axis EIRP spectral density for co-polarized signals shall not exceed the following values, within ±3º of the GSO arc, under clear sky conditions:

$32.5 - 25\log(\theta)$	dBW/MHz	for $2^\circ \le \theta \le 7^\circ$
11.4	dBW/MHz	for $7^\circ \le \theta \le 9.2^\circ$
$35.5 - 25\log(\theta)$	dBW/MHz	for $9.2^\circ \le \theta \le 48^\circ$
3.5	dBW/MHz	for $48^\circ \le \theta \le 180^\circ$

Where θ is the angle in degrees from the axis of the main lobe.

(2) 17/24 GHz BSS earth station antenna off-axis EIRP spectral density for co-polarized signals shall not exceed the following values, for all directions other than within ±3º of the GSO arc, under clear sky conditions:

$35.5 - 25\log(\theta)$	dBW/MHz	for $2^\circ \le \theta \le 7^\circ$
14.4	dBW/MHz	for $7^\circ \le \theta \le 9.2^\circ$
$38.5 - 25\log(\theta)$	dBW/MHz	for $9.2^\circ \le \theta \le 48^\circ$
6.5	dBW/MHz	for $48^\circ \le \theta \le 180^\circ$

Where θ is the angle in degrees from the axis of the main lobe.

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[256] *See* EchoStar Reply Comments at Table A.4.2-1 of the Technical Annex that calculates the resulting typical ΔT/T from 1 12m feeder link antenna into adjacent satellites at 4º separation to be only 2.2% for spot beams and 0.2% for CONUS beams.

[257] *Id.*

[258] *See* DIRECTV Comments at 15, EchoStar Comments at Technical Annex at 19.

[259] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7450, para. 49. The Commission tentatively proposed to accommodate 5.6 dBW/Hz of EIRP Assuming a 65.1 dBi gain antenna this translates to an off-axis EIRP density at angle θ of no greater than $-30 - 25*\log_{10}(\theta)$ dBW/Hz. Scaled to a 1 MHz reference bandwidth this becomes $29.5 - 25*\log_{10}(\theta)$ dBW/MHz.

(3) The values given in paragraphs (a) (1) and (2) of this section may be exceeded by 3 dB, for values of $\theta > 10^{\circ}$, provided that the total angular range over which this occurs does not exceed 20° when measured along both sides of the GSO arc.

(4) 17/24 GHz BSS earth station antenna off-axis EIRP spectral density for cross-polarized signals shall not exceed the following values, in all directions other relative to the GSO arc, under clear sky conditions:

$22.5 - 25\log(\theta)$	dBW/MHz	for $2^{\circ} \leq \theta \leq 7^{\circ}$
1.4	dBW/MHz	for $7^{\circ} \leq \theta \leq 9.2^{\circ}$

Where θ is the angle in degrees from the axis of the main lobe.

87. The off-axis EIRP density curves given in Section 25.138(a)(1) – (4)[260] of our rules include the term N, which is defined as the likely maximum number of simultaneously transmitting co-frequency earth stations in the receive beam of the satellite. Commenters do not include this term in their proposed formulae and we have chosen not to include it in our rules. Section 25.138 addresses *blanket licensing* of FSS earth stations where a number of co-frequency earth stations may be transmitting simultaneously in cases where contention protocols or CDMA may be used. We do not anticipate multiple simultaneous co-frequency transmissions from 17/24 GHz BSS feeder link earth stations, and as a consequence, these access schemes likely will not be relevant. Commenters do not explicitly address EIRP density envelopes for directions other than within 3 degrees of the GSO arc. Neither do they specifically address envelopes for cross-polarized signals or allowable exceedences, as contained in other parts of Section 25.138. Rather, they make more general references to a rule modeled on the framework of Section 25.138. We include these requirements here on the strength of those comments, and also because they are consistent with the Commission's approach to off-axis EIRP density limits in general.[261]

88. The *NPRM* also recognized that in some instances applicants might seek to operate at higher EIRP density levels than those permitted under the above requirement.[262] Our current rules provide a mechanism for licensing such non-conforming systems operating in the FSS by placing the burden on the applicant to provide a technical showing to the Commission, and to coordinate its non-conforming operations with adjacent operators.[263] We proposed a similar approach to licensing non-conforming systems in the 17/24 GHz BSS and sought comment on whether our proposal was appropriate to adopt.[264] We also asked over what angular

[260] *See* 47 C.F.R. § 25.238(a)(1)-(4).

[261] *See* §§ 25.138(a)(3)-(4), 25.209(a), (b).

[262] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7451, para. 51.

[263] *See* 47 C.F.R. §§ 25.220, 25.138(b), (c).

[264] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7451, para. 51.

distance coordination should be required, recognizing that the orbital spacing in the 17/24 GHz service could very likely be greater than the two-degree separation typical of the FSS.[265]

89. Commenters consistently favor allowing a mechanism by which operators could be licensed for non-conforming systems seeking to operate at higher off-axis power levels than those permitted for routine licensing. All commenters favor the general approach employed for FSS systems whereby applicants for non-conforming earth stations must submit the necessary technical showing to the Commission and coordinate their non-conforming operations with adjacent space station operators.[266] At present, our rules require non-compliant FSS operators to coordinate with potentially affected neighboring operations over an angular arc of six degrees, corresponding to up to three adjacent positions on each side.[267] At an orbital separation of six degrees, off-axis power levels are decreased by nearly 12 dB relative to those at the nearest neighbor at two degrees, and at a separation of eight degrees, power levels relative to the two-degree neighbor are decreased by more than 13 dB. [268] These values are true for an antenna that complies with FSS antenna gain envelope rules of 29-25*log10 (θ).[269] Accordingly, we believe that an angular arc of ±8 degrees, which in a four-degree spacing environment corresponds to the two nearest possible neighboring co-frequency space stations, is sufficient.

90. Commenters differ somewhat on the precise angular separation over which operators should be required to coordinate their non-conforming operations. DIRECTV and SES Americom, both of whom favor a four-degree orbital spacing scheme, propose coordination arcs of ±8 degrees and ±9 degrees, respectively.[270] EchoStar proposes a slightly more complex coordination arc requirement whereby operators would be required to obtain the agreement only of the immediate neighboring satellites (spaced at approximately four degrees away) for exceedences up to 3 dB, with the additional agreement of the second adjacent operator for exceedences up to 6 dB; no exceedence greater than 6 dB would be permitted.[271] We find that EchoStar's proposal affords significant interference protection to adjacent co-frequency satellites, while reducing the coordination burden on both the conforming and non-conforming parties. However, we also recognize that space stations may not always be located along a perfectly spaced four-degree grid, but sometimes may be offset from the orbital locations specified in Appendix F. To accommodate such instances, we will extend the angular coordination distance proposed by EchoStar by two degrees.

91. Accordingly, we will adopt a requirement that each applicant for an earth station license that proposes off-axis EIRP density levels in excess of those defined above shall certify that all potentially affected parties acknowledge and do not object to the use of the applicant's

[265] *Id.*

[266] *See* EchoStar Comments at Technical Annex at 20, DIRECTV Comments at 16, SES Americom Comments at 17, and EchoStar Reply Comments at Technical Annex at 11.

[267] *See* § 25.220(d)(1)(ii), (e)(1)(ii) and § 25.138(b).

[268] These values are true for an antenna that complies with the 29-25*log10 (θ) antenna gain envelope.

[269] *See* 47 C.F.R. § 25.209.

[270] *See* DIRECTV Comments at 16, SES Americom Comments at 17.

[271] *See* EchoStar Comments at Technical Annex at 20.

higher power densities. For proposed power levels less than 3 dB in excess of the limits defined above, the affected parties shall be those co-frequency operators authorized to provide service to the U.S. at up to ±6 degrees away; for excesses of greater than 3 dB and up to 6 dB, affected parties shall be all those co-frequency U.S. licensed operators at up to ±10 degrees away. We will not permit exceedences greater than 6 dB above the limits defined above. Although we take a slightly more flexible approach with regard to coordination of downlink pfd excedeences,[272] we believe that the sharing situation with 24 GHz fixed service systems requires a somewhat more conservative approach.[273] In addition, we require non-compliant operators to coordinate with any future applicants or licenses over these same orbital separation distances. We also require a non-compliant licensee to reduce its power levels should a coordination agreement not be reached. In addition, non-conforming applicants will be required to submit link budget analyses of the operations proposed along with a detailed written explanation of how they have derived each uplink and each transmitted satellite carrier density figure. Applicants will also be required to submit a narrative summary that must indicate whether there are margin shortfalls in any other licensee's current baseline services as a result of the addition the applicant's higher power service, and if so, how the applicant intends to resolve those margin shortfalls.

92. The *NPRM* also sought comment on the need for uplink adaptive power control, particularly in presence of rain fade,[274] noting that Section 25.204(g)[275] of our rules requires all Ka-band FSS earth stations to employ adaptive power control or other methods of rain fade compensation.[276] Commenters recognize the need for uplink power control in the event of rain fade and cite the specification already contained in our rules[277] as appropriate for the 17/24 GHz BSS.[278] We realize that systems operating in the 24 GHz band can suffer significant signal attenuation in the event of precipitation and concur that some provision for adaptive uplink power control is necessary. Accordingly, we amend our rules to require 17/24 GHz BSS earth stations to employ adaptive uplink power control or other methods of fade compensation. We also adopt a requirement for the 17/24 GHz BSS analogous to the Ka-band FSS requirement of Section 25.138(a)(5).[279] This rules provides that (1) the required clear-sky uplink off-axis power limits may be exceeded by up to 20 dB in the presence of uplink fading due to precipitation; (2) that the amount of this increase relative to the excess attenuation over the clear sky propagation conditions shall not exceed 1.5 dB or 15% of the of the actual amount, which ever is greater; and (3) that this should occur with a confidence level of 90% except for transient periods of no more that 0.5% during which the excess shall be no more than 4.0 dB.

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[272] *See* paras. 97-104 below. In the case of downlink pfd limits, we do not limit power exceedances to 6 dB.

[273] The band 25.05 – 25.25 GHz is allocated to the Fixed Service (FS) on a co-primary basis in the United States. *See* Section III.G.1. of this Order for requirements for coordination with FS systems.

[274] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7451, para. 52.

[275] *See* 47 C.F.R. § 25.204(g).

[276] *See* 47 C.F.R. § 25.204(g).

[277] *See e.g.*, 47 C.F.R. § 25.138(a)(5).

[278] *See* EchoStar Comments at Technical Annex at 20, SES Americom Comments at 16, DIRECTV Comments at 15, and Intelsat Comments at 11.

[279] *See* 47 C.F.R. § 25.138(a)(5).

93. Some commenters also object to requiring applicants to provide measured radiation patterns as specified in Section 25.138(d)[280] of our rules as a means of demonstrating compliance with off-axis EIRP limits.[281] Intelsat argues that the requirement to provide measured radiation patterns for antennas not yet built is often not practical and unduly burdens the applicant.[282] Intelsat asserts that, instead, the Commission's evaluation process for earth stations in the 17/24 GHz service should follow the approach for earth stations on vessels (ESVs) contained in Section 25.221.[283] That approach requires the applicant to submit a series of charts or tables calculated for a production earth station antenna, based on measurements taken on a calibrated antenna range.[284] DIRECTV agrees that it is impractical to submit measured data, and argues further that because these very large feeder link antennas are typically assembled on site, it is simply not necessary to test these antennas on a range.[285] Instead, DIRECTV proposes that 17/24 GHz BSS feeder link antennas 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.[286] DIRECTV's proposed approach is based on a proposal submitted by the Satellite Industry Association in the *Biennial Review* docket,[287] and are founded in part upon existing rules for large C- and Ku-band earth stations.[288]

94. At present, our rules extend different earth station licensing requirements to different satellite services. Typically, C- and Ku-band GSO FSS applicants are required to meet the antenna performance requirements of Section 25.209[289] and may not exceed specified uplink power density levels and minimum antenna diameters.[290] Those C- and Ku-band applicants who do not meet these requirements may still be licensed via the rules outlined in Section 25.220.[291] In contrast, Ka-band earth station applicants must meet the off-axis EIRP density requirements of Sections 25.138(a)(1)-(4)[292] and demonstrate such by providing the antenna radiation pattern measurements specified in Section 25.138(d).[293] The earth station licensing requirement to

[280] *See* 47 C.F.R. §§ 25.138(d), 25.115(e).

[281] *See* Intelsat Comments at 11, DIRECTV Reply Comments at 22.

[282] *See* Intelsat Comments at 11.

[283] *Id.*

[284] *See* 47 C.F.R. § 25.221(b).

[285] *See* DIRECTV Reply Comments at 22.

[286] *See* DIRECTV Reply Comments at 22.

[287] *See* Satellite Industry Association Comments at 12-13, IB Docket No. 06-154.

[288] *See* 47 C.F.R. § 25.132(c)-(d).

[289] *See* 47 C.F.R. § 25.209.

[290] *See* 47 C.F.R. §§ 25.134, 25.211, 25.212.

[291] *See* 47 C.F.R. § 25.220. We note however that the Commission is currently considering off-axis EIRP envelopes for fixed earth stations in the C-band and Ku-band. *See Part 25 Earth Station Third Report and Order*, 20 FCC Rcd 5593.

[292] *See* 47 C.F.R. §§ 25.138(a)(1)-(4).

[293] *See* 47 C.F.R. § 25.138(d).

submit with its application a series of measured test values over a range of frequencies is applied to any FSS earth station other than ESVs not meeting the antenna performance requirements of Section 25.209, as well as to all earth stations operating in the 20/30 GHz service. We find that it will be generally unnecessary to constrain feeder link earth stations applicants in the 24 GHz band in this manner, particularly since such large-diameter earth stations generally comply easily with existing antenna performance requirements. Moreover, we agree with commenters that such a requirement could be both impractical and burdensome for very large diameter antennas typically used for feeder link operations. Accordingly, we do not restrict 17/24 GHz BSS earth station applicants to the approach of Section 25.138(d). However, we will retain the option to allow non-compliant applicants to submit measured data.

95. We will require applicants for feeder link earth station licenses operating in the 24.75 – 25.25 GHz band to provide the particulars of operation identified on Form 312 and associated Schedule B, which may include an affirmative response that the earth station antenna conforms to the gain pattern criteria of Section 25.209(a) and (b) and that combined with the input power density entered in schedule B, demonstrates that the off-axis EIRP spectral density envelope set forth above will be met.[294] Alternately, an applicant that does not meet the antenna performance requirements of Section 25.209(a) and (b) may demonstrate that it meets the required off-axis EIRP spectral density requirements by providing: (i) a copy of the manufacturer's range test plots of the antenna gain patterns as specified in Section 25.132(b)(3) as revised in this Order; and (ii) a series of EIRP density charts or tables similar to the current requirements for ESVs as set forth in Section 25.222(b)(1).[295] Finally, an applicant that meets the antenna performance requirements of Section 25.209(a) and (b), but does not provide an input power density value in schedule B that will satisfy the off-axis EIRP spectral density envelope set forth above, may also demonstrate its compliance by providing a series of EIRP density charts or tables. Applicants seeking to operate with off-axis power density values in excess of the specified envelope are subject to the coordination process discussed above.

96. In addition, Section 25.132 of our rules sets forth the process for verification of earth station performance requirements. This rule is applicable to earth stations operating in the 24 GHz uplink band.[296] Paragraph (a)(1) of this rule requires applicants to submit manufacturer certification of measurements demonstrating that the antenna is compliant with the requirements of Section 25.209, and stipulates that the applicant be prepared to demonstrate these measurements to the Commission upon request. For non-compliant antennas, as discussed above, the requirements of Section 25.132(b)(3), as revised in Appendix B of this Order, will apply.[297] Finally, Paragraphs (c) and (d) of this section recognize that while testing is typically performed at the manufacturer's facility, very large earth stations that are assembled on-site may

[294] These requirements assume antenna performance characteristics consistent with § 25.209 and a maximum input power density of 3.5 dBW/MHz (-56.5 dBW/Hz). By allowing applicants to submit separate power level and antenna performance data in their applications, we give them the option of complying with requirements substantially similar to those currently in effect for C-band and Ku-band FSS earth stations.

[295] *See* 47 C.F.R. § 25.222(b)(1).

[296] *See* 47 C.F.R. § 25.132.

[297] We will amend Section 25.132(b)(3) by adding a reference to the new off-axis antenna requirements adopted for 17/24 GHz BSS systems in Section 25.223.

require on-site measurements.[298] Paragraph (d) specifies the on-site verification measurements that must be performed for each new or modified transmitting antenna over three meters in diameter. Thus, for large-diameter 17/24 GHz BSS feeder link antennas, applicants must submit on-site verification measurements to the Commission as part of the notification of completion of the construction process as required in Section 25.133.[299]

2. Downlink Power Limits

97. ***Geographical Downlink PFD Limits Adopted:*** The downlink power levels transmitted by adjacent co-frequency satellites, when combined with the off-axis performance characteristics of the receiving antenna will determine the carrier-to-interference (C/I) value resulting from adjacent satellite interference.[300] The *NPRM* sought comment on whether we should adopt pfd or other downlink power limits in the 17.3 – 17.7 GHz band to ensure that receiving antennas are not subject to unforeseen levels of adjacent satellite interference, particularly as newer-generation, higher-powered satellites are brought into use.[301] The *NPRM* asked, in particular, whether the ITU Radio Regulations' pfd limit applicable to FSS systems in the 17.7 – 19.7 GHz band would be appropriate for BSS transmissions in the 17.3 – 17.7 GHz band.[302]

98. Commenters favor adopting pfd limits in the 17.3 – 17.7 GHz band to protect against unforeseen levels of adjacent satellite interference and to obviate the need for time-consuming coordination among co-frequency networks.[303] Intelsat favors adopting the ITU FSS pfd limits and maintains that these limits would satisfy the operational requirements in the band, provided that they are no more restrictive than the FSS pfd limits of Article 21 of the ITU Radio Regulations.[304] All other commenters advocate adopting a system of graduated pfd limits.[305] Under this approach, pfd limits would vary over different geographic regions of the United States, primarily to allow for the resulting signal attenuation arising from the variation in rainfall in different regions of the country.[306] In formulating this approach, commenters considered the planned deployment of both wide-area beams, and more localized, high-power spot beams by 17/24 GHz BSS operators. Due to the expected higher antenna gain for spot beams, in a given geographic area, EIRP imbalances of 10 dB or more may be anticipated between adjacent satellite transmissions. Potentially, the resulting interference could significantly affect quality of

[298] *See* 47 C.F.R. § 25.132(c)-(d).

[299] *See* 47 C.F.R. § 25.133.

[300] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7452, para. 53.

[301] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7453, para. 55.

[302] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7453, para. 55. These pfd limits are contained in Article 21-4 of the ITU Radio Regulations.

[303] *See* Intelsat Comments at 10, EchoStar Comments at Technical Annex, 15-17, SES Americom Comments at 18, and DIRECTV Comments at 10.

[304] *See* Intelsat Comments at 10, and Intelsat Reply Comments at 10.

[305] *See* DIRECTV Comments at 10-14, EchoStar Reply Comments, Technical Annex at 6-7, and SES Americom Reply Comments at 19.

[306] *Id.*

service to those consumers receiving lower-power, wide-area beam signals. The various proposals' utilization of graduated pfd levels in differing regions seeks to balance the competing goals of permitting sufficient flexibility to spot beam operations while simultaneously protecting wide-area beams from unacceptable interference levels. This approach also considers the need to allow higher-power downlink transmissions in regions of the country where they are most needed in order to overcome rain fade effects. As a result, all proposals to adopt graduated power levels for downlink transmissions in the 17/24 GHz BSS recognize the need for the highest power limits in the Southeastern region of the United States, with lower levels in the Northeast and the lowest levels in the West.[307]

99. Although the various proposals to adopt graduated pfd limits are similar in their general approach, they differ in certain respects. EchoStar's proposal advocates four geographic regions with the highest pfd level in the Southeast of -113 dBW/m^2/MHz; -114.5 dBW/m^2/MHz in the Northeast; -116 dBW/m^2/MHz in the Upper Midwest; and -118 dBW/m^2/MHz in the West. The westernmost region is defined by the 103º West Longitude line; the northern regions are above the 40º North Latitude line; and the 85º West Longitude line divides the Northeast Region from the Upper Midwest Region.[308] For areas outside of the Contiguous United States (CONUS) including Alaska, Hawaii and Puerto Rico, the pfd limit would be -113 dBW/m^2/MHz.[309] EchoStar notes that its proposal does not differ significantly from that of DIRECTV, discussed further below, and maintains that the somewhat lower power limits proposed by DIRECTV result from its plan to offer service using 60 cm diameter antennas contrasted with the 45 cm antennas planned by EchoStar, SES Americom and Intelsat.[310] Accordingly, EchoStar urges the Commission to accommodate the requirements of all operators and to permit pfd levels on the higher side.[311] SES Americom supports EchoStar's proposal.[312]

100. DIRECTV proposes adopting three geographic regions, with the highest power level in the Southeast of -115 dBW/m^2/MHz; -118 dBW/m^2/MHz in the Northeast; and -121 dBW/m^2/MHz in the West. In DIRECTV's proposal the far western region is defined by the 100º West Longitude line and the Northeast and Southeast Regions are divided by the 38º North Latitude line.[313] DIRECTV argues that its somewhat lower pfd levels are more appropriate because CONUS beams cannot match the higher power levels of -113 dBW/m^2/MHz proposed by EchoStar and SES Americom, and should the Commission adopt pfd values this high, the result would only be to codify the power disparity between wide-area and spot beams.[314] Later, in an *ex parte* statement, DIRECTV, EchoStar, and Intelsat proposed a jointly-agreed scheme, which proposed geographic regions and pfd levels in a four-degree spacing environment

[307] *See* DIRECTV Reply Comments at 13, EchoStar Reply Comments at Technical Annex at 7, SES Americom Reply Comments at 19.

[308] *See* EchoStar Reply Comments at Technical Annex at 6-7.

[309] *Id.*

[310] *See* EchoStar Reply Comments at Technical Annex at 7.

[311] *Id.*

[312] *See* SES Americom Reply Comments at 19.

[313] *See* DIRECTV Reply Comments at 13.

[314] *See* DIRECTV Reply Comments at 15

consistent with the values proposed in DIRECTV's original proposal as discussed above. This new scheme also proposes a formula by which pfd levels could be allowed to vary as a function of orbital separation.[315]

101. We agree that there is merit in considering graduated pfd limits in differing regions of the country. We recognize the need to employ both wide-area and spot beams in the 17/24 GHz BSS and appreciate the inherent difficulties encountered in attempting to balance the requirements of both applications. While we wish to protect the more vulnerable wide-area beam receivers from adjacent satellite downlink interference, we also want to permit licensees the flexibility to achieve the power and spectral efficiencies attainable with spot beam transmissions, particularly when broadcasting local programming to restricted geographic areas. We concur with DIRECTV, EchoStar and SES Americom that the use of regional pfd values best balances these competing goals. Although it presents a somewhat more complex regulatory mechanism than does a uniform pfd limit, this approach has been applied to other services, notably MVDDS.[316] Thus, after carefully considering the various regional pfd schemes, and recognizing the agreement among many of the commenting parties with regard to the regional boundaries and pfd levels, we believe that the proposal originally put forward by DIRECTV most successfully balances our goals of accommodating both beam technologies while best meeting the needs of all operators. Accordingly, we adopt the three-region graduated pfd plan presented by DIRECTV. We note that a key difference between DIRECTV's proposal and the approach contained in the *Joint Ex Parte Statement*, is the proposed use of formulae to determine the variation in pfd levels that would be permitted as a function of orbital separation.[317] We decline to adopt this approach. Rather, we will adopt pfd levels consistent with a four-degree spacing environment, but will permit licensees to operate at higher levels subject to coordination, as discussed below.

102. In most cases, commenters propose pfd limits for the entire 17.3 – 17.8 GHz band and do not separate the question of pfd limits in the 17.7 – 17.8 GHz band from the issue of pfd limits for BSS downlink transmissions in the 17.3 – 17.7 GHz band. In adopting the graduated pfd scheme discussed above, the Commission seeks to facilitate intra-service operations by establishing a relatively homogeneous transmitting environment that will accommodate both wide-area and spot beam operations. Because U.S. domestic service is not allocated in the 17.7 – 17.8 GHz band, we do not believe these intra-service sharing challenges will be present to the same extent. In contrast, pfd limits in the 17.7-17.8 GHz band are intended to facilitate inter-service sharing by protecting terrestrial service receivers from satellite transmissions serving other Region 2 countries, but that may illuminate portions of the United States. We believe that the pfd limits that are adopted in Section III.C. of this Order, that vary as a function of elevation angle, will best accomplish that goal.[318] Accordingly, we clarify here that the graduated pfd

[315] *See March 15 Joint Ex Parte Statement.*

[316] *See* 47 C.F.R. § 101.105.

[317] *See March 15 Joint Ex Parte Statement* at 6-7.

[318] These limits do not vary as a function of geographic area. The are as follows:

-115 dBW/m^2/MHz	for $0^\circ \leq \delta \leq 5^\circ$
-115 + 0.5(δ-5) dBW/m^2/MHz	for $5^\circ \leq \delta \leq 25^\circ$

(continued....)

limits adopted above will apply only to the 17.3 – 17.7 GHz band, and that the elevation-angle-based pfd limits adopted in Section III.C. will apply in the 17.7-17.8 GHz BSS GHz band.

103. Commenters also advocate applying the pfd levels in the 17.3 – 17.7 GHz band in a manner similar to the Ka-band FSS requirement in Section 25.138(a)(6).[319] Under this approach an applicant seeking to operate outside the required pfd levels must submit a technical showing to the Commission that includes detailed link budgets and a narrative summary indicating whether there are margin shortfalls resulting from the applicant's higher powers, and if so, an explanation of how these shortfalls will be addressed. In addition, a non-conforming applicant must certify that its operations have been coordinated with all affected parties. EchoStar proposes that for non-conforming 17/24 GHz BSS operations, the angular separation over which coordination is required should be linked to the magnitude of the power excess.[320] Specifically, EchoStar proposes that given the wider orbital spacing in the 17/24 GHz BSS as compared to the Ka-band FSS, the agreement of the immediately adjacent operators should be sufficient for excesses of no greater than 3 dB, and that coordination with the second adjacent neighboring satellite should also be required for excesses between 3 dB and 6 dB. EchoStar also proposes prohibiting power levels greater than 6 dB.[321] DIRECTV and SES Americom support EchoStar's proposal, although DIRECTV argues that power exceedences of greater than 6 dB should be permitted if a coordination agreement can be reached, however unlikely that may be.[322]

104. The Commission has always sought to afford satellite operators the maximum flexibility to design and operate their systems while simultaneously protecting other licensees from unacceptable levels of interference. Thus, we concur with commenter's proposals to provide a mechanism for licensing and coordinating systems operating with non-compliant pfd levels. We also agree that there are advantages in linking the angular separation over which coordination is required to the degree of the power excess, as this approach may avoid placing an unnecessary coordination requirement on the parties. Accordingly, we adopt a requirement for non-compliant systems in the 17/24 GHz BSS similar to the Ka-band requirement of Section 25.138(b). However, to account for the different orbital spacing rules that we adopt for the 17/24 GHz BSS environment, as well as the possibility of offset from the locations specified in Appendix F, we will require applicants to coordinate with adjacent satellites within an angular separation of ±6 degrees for exceedences of up to 3 dB, and to coordinate with adjacent operators within an angular separation of ±10 degrees for exceedences of more than 3 dB. In addition, consistent with the Ka-band FSS requirement of Section 25.138(c), we require non-compliant operators to coordinate with any future applicants or licensees over these same orbital

(...continued from previous page)

$-105\ \text{dBW/m}^2\text{/MHz}$ for $25^\circ \leq \delta \leq 90^\circ$

where δ is the angle of arrival above the horizontal plane.

[319] *See* EchoStar Comments at Technical Annex at 17, DIRECTV Reply Comments at 19-20, and SES Americom Reply Comments at 14-15.

[320] *See* EchoStar Comments at Technical Annex at 16-17.

[321] *Id.*

[322] *See* DIRECTV Reply Comments at 20, SES Americom Reply Comments at 14.

separation distances. We also require a non-compliant licensee to reduce its power levels should a coordination agreement not be reached.

F. Other Technical Requirements

105. The *NPRM* sought comment on several additional technical matters, including issues relating to Tracking Telemetry and Control (TT&C) frequencies, full frequency re-use, polarization requirements, cross-polarization isolation requirements, and channelization requirements.

1. Tracking, Telemetry and Command (TT&C) Frequencies

106. ***No Additional TT&C Rules Adopted:*** With regard to TT&C frequencies, the *NPRM* recognized the present lack of 17/24 GHz ground facilities to support launch, transfer and testing operations, and sought comment on how best to address the issue.[323] Commenters suggest that the Commission should take a flexible approach toward TT&C requirements, particularly recognizing the absence of the ground network necessary for support during critical launch and early operation phases.[324] DIRECTV also points out that because the 17/24 GHz bands are not allocated for use by BSS satellites outside of Region 2, it is unlikely that such facilities will be deployed in other parts of the world.[325] Commenters generally encourage the Commission to consider requests to use alternate TT&C frequencies on the merits of each individual application, but maintain that applicants should demonstrate their need for such non-standard uses and must coordinate their operations.[326] Accordingly, we make no changes to our existing rules, but will consider the merits and needs for 17/24 GHz BSS systems to use alternate TT&C frequencies on a case-by-case waiver basis. Applicants seeking alternative TT&C frequencies should include a request for waiver in their applications.

107. The *NPRM* also sought comment on the problem of reverse-band interference between receiving 17 GHz telemetry stations and DBS feeder uplink transmissions, and in particular on the ramifications to TT&C operations when such operations are co-located or located in close proximity to one another.[327] DIRECTV states that with careful planning it is possible to coordinate the operations of the two services, even to the point that the earth stations may be co-located.[328] Thus, DIRECTV requests that the Commission not limit operator flexibility by precluding such co-location, or by requiring a minimum separation distance.[329] Rather, DIRECTV supports the Commission's proposal to require that applicants submit a technical showing demonstrating its ability to maintain sufficient telemetry link margin in the

[323] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7464, para. 82.

[324] *See* EchoStar Comments at Technical Annex at 28, DIRECTV Comments at 36, SES Americom Comments at 20-21, and SES Americom Reply Comments at 15.

[325] *See* DIRECTV Comments at 36.

[326] *See* EchoStar Comments at Technical Annex at 28, DIRECTV Comments at 36, SES Americom Comments at 20-21, and SES Americom Reply Comments at 15.

[327] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7464, para. 83.

[328] *See* DIRECTV Comments at 22.

[329] *Id.*

presence of the interfering DBS signal.[330] Bermuda also supports this proposal, stating that the applicant could demonstrate compliance through a technical showing and urges the Commission not to preclude the possibility of co-locating DBS feeder link earth stations with 17/24 GHz BSS telemetry stations.[331] EchoStar also argues that interference can be avoided by careful frequency planning.[332]

108. At this time, we will not modify our rules to preclude co-location of DBS and 17/24 GHz BSS TT&C facilities, nor will we require a minimum separation distance between TT&C facilities for the two services. Although there was support for our proposal to require a technical showing on the part of applicants seeking to operate co-located earth stations, we are not prepared to adopt such a requirement at this time. Rather, we recognize that the question of interference into 17/24 GHz BSS telemetry receivers from DBS feeder link transmissions is not separate from the larger issue of reverse-band, ground path interference into 17/24 GHz BSS receiving antennas in general. For this reason, we will not adopt specific rules concerning the question of DBS ground path interference into 17/24 GHz BSS telemetry stations in this Order, but will address this issue in the further notice, within the larger context of ground path interference in the presence of reverse-band operations.[333] We believe that this approach will better permit us to develop the record more fully, treat the issue within its larger context, and ultimately adopt the most appropriate requirements.

2. Polarization and Full Frequency Re-Use Requirements

109. ***Full Frequency Re-Use Required:*** The *NPRM* sought comment on requirements relating to antenna polarization and full frequency re-use.[334] Most commenters agreed that the Commission should mandate full-frequency re-use for 17/24 GHz BSS systems, but that it should maintain flexibility with regard to channelization and polarization, and therefore should not adopt any specific channelization or polarization requirements.[335] DIRECTV argues, however, that all transmissions from a given orbital location should be of the same type,[336] and SES Americom urges the Commission not to divide the spectrum at a given orbital location among multiple entrants as was done for the DBS service.[337] Only EchoStar proposes a standardized polarization and channelization scheme in which the co-frequency polarization senses are alternated among adjacent satellites across the geostationary arc.[338] EchoStar asserts that such a scheme would yield about 1 dB of reduction in adjacent-satellite interference through

[330] *Id.*

[331] *See* Bermuda Comments at 9.

[332] *See* EchoStar Comments at Technical Annex at 23.

[333] *See* Section IV.A. below.

[334] *See 17/24 GHz BSS NPRM*, 21 FCC Rcd at 7465-66, paras. 87-90. 47 C.F.R. § 25.210.

[335] *See* DIRECTV Comments at 37-38, Intelsat Comments at 12, SES Americom Comments at 21-22, DIRECTV Reply Comments at 30, SES Americom Reply Comments at 16. *See also* EchoStar Comments at 23 regarding full frequency re-use.

[336] DIRECTV Comments at 37.

[337] SES Americom Comments at 21.

[338] EchoStar Comments at Technical Annex at 22-23.

judicious placement of the guardbands of an interfering satellite within the transponder bandwidth of the victim satellite.[339] DIRECTV notes that applicants have all proposed to implement different channelization schemes, and argues that the cost to re-engineer their business plans cannot justify the modest 1 dB of interference reduction.[340] We concur with DIRECTV that the potential for 1 dB of interference reduction does not compensate for the accompanying loss of flexibility in system design that the Commission has historically sought to afford satellite operators. Accordingly, we will not mandate a polarization or channelization scheme for 17/24 GHz BSS systems. We will, however, mandate full frequency re-use, through either the use of orthogonal polarizations within the same beam and/or through the use of spatially independent beams.

3. Cross-Polarization Isolation Requirements

110. ***25 dB Space Station Cross-Polarization Isolation Requirements Adopted:*** Commenters generally support some relaxation of the current FSS requirement for 30 dB cross-polarization isolation contained in Section 25.210(i) of the Commission's rules.[341] All commenters believe that this rule is too restrictive and should be relaxed for 17/24 GHz BSS systems, although they differ in the degree of relaxation that should be provided. SES Americom proposes a reduction of the cross-polarization isolation requirement from 30 dB to 25 dB, stating that this value will adequately protect adjacent operators and that licensees will be able to manage any accompanying intra-system interference (*i.e.,* "self-interference").[342] DIRECTV also proposes a less strict value of 27 dB, arguing that this value is more than sufficient to avoid excess levels of intra-system interference, particularly in light of recent advances in digital transmission technology that reduce system sensitivity to cross-polarization interference.[343] EchoStar argues that the Commission's existing FSS requirement is too stringent and notes that most antennas fail to meet this level in only a small part of their service area, usually by no more than a few dB.[344] Accordingly, EchoStar initially proposes a multipart scheme wherein operators would be required to meet the 30 dB level over 90% of the land within its service area, and a value of at least 26 dB within the remaining 10%.[345] In its Reply Comments, EchoStar proposed a compromise to take into account the comments from other parties and amended its proposal to require 27 dB cross-polarization isolation over 90% of the land within its service area and at least 25 dB within the remaining 10%.[346] In its Reply Comments, DIRECTV offered support for EchoStar's original proposal.[347]

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[339] *Id.*

[340] DIRECTV Reply Comments at 30-31.

[341] *See* 47 C.F.R. § 25.210(i).

[342] SES Americom Comments at 22, SES Americom Reply Comments at 17.

[343] DIRECTV Comments at 38.

[344] EchoStar Comments at Technical Annex at 28-29.

[345] *Id.*

[346] EchoStar Reply Comments at 17.

[347] DIRECTV Reply Comments at 31.

111. The Commission adopted its 30 dB FSS cross-polarization isolation requirement in an environment where satellites were predominantly using analog transmissions. Along with the C-band analog video frequency plan of Section 25.211(a)[348] and the polarization switchability requirement of Section 25.210(c),[349] the cross-polarization requirement serves to minimize the interference between adjacent satellites when both are carrying analog video signals that have highly varying (peaked) power density levels. In addition, the cross polarization requirement serves to limit the level of self-interference, thus assuring that operators do not allocate an inordinate proportion of the interference budget to themselves. In this context, it is worth noting that the cross polarization performance of the satellite receive antenna has negligible effect on the interference into other systems.

112. Moreover, in a four-degree spacing environment, the cross-polarization performance of the downlink satellite antenna has only a second-order effect on the interference into the neighboring system. The impact of the satellite downlink antenna's cross polarization transmission is to raise slightly the interference level into the downlink of the victim satellite's wanted polarization. Thus, the earth station receiving the signal from the neighboring victim satellite receives a co-polar interfering signal at a level defined by its own antenna co-polar sidelobe performance. In addition, in the same polarization, it also receives a much lower interfering signal whose level is defined by the interfering satellite's downlink cross-polarization performance. If the satellite antenna meets the 30 dB FSS requirement of Section 25.210(i) and if it transmits at the same level in both polarizations, this cross-polarization contribution will increase the co-polar interference level into the adjacent satellite's downlink signal by one part per thousand. This increase corresponds to a decrease in carrier-to-interference ratio (C/I) of 0.004 dB. For 17/24 GHz BSS satellites meeting a cross-polarization isolation requirement of 25 dB, the co-polar interference will increase by about 3 parts per thousand with a corresponding C/I decrease of 0.014 dB.[350] This level of increased interference resulting from the satellite downlink antenna's more relaxed performance remains negligible relative to the main interfering signal.

113. We anticipate that 17/24 GHz BSS system will operate almost exclusively with digital transmissions. We also accept that operators will be able to manage intra-system interference if a more relaxed requirement is adopted. In addition, we agree with the commenters that a more relaxed off-axis cross-polarization isolation requirement should yield only a negligible increase in interference to adjacent satellite systems. Thus, we agree that the 30 dB antenna cross-polarization isolation requirement originally designed for the analog transmission environment is unnecessarily stringent for 17/24 GHz BSS systems. Moreover, we recognize that the Commission has frequently waived the cross-polarization requirement of Section 25.210(i) for FSS applicants, allowing these systems to operate with isolation levels less

[348] 47 C.F.R. § 25.211(a).

[349] 47 C.F.R. § 25.210(c).

[350] If the downlink antenna cross-polarization isolation requirement is relaxed to 27 dB as proposed by DIRECTV, the cross-polar interference contribution will increase to about two parts per thousand, which represents a C/I decrease of 0.009 dB.

that 30 dB.[351] Consequently, we adopt the 25 dB antenna cross-polarization isolation requirement proposed by SES Americom.

4. Spectrum Allocation Issue

114. ***Footnote NG176 Unchanged:*** The *NPRM* also proposed to modify footnote NG167 of the Domestic Table of Frequency Allocations[352] in order to permit use of the 24.75 – 25.25 GHz FSS allocation (Earth-to-space) by feeder links operating with the BSS in frequency bands other than 17 GHz, *e.g.*, the 12 GHz DBS band.[353] Only Intelsat supports this proposal asserting that this increase in flexibility of spectrum use would help alleviate groundpath interference problems associated with reverse-band operations.[354] EchoStar disagrees strongly with the proposal, arguing that it would preclude co-location of 17/24 GHz BSS and DBS satellites, and would also be inconsistent with its planned uses of both multiple spot-beam technology, and the 17.7 – 17.8 GHz band.[355] Finally, DIRECTV responds that, although the flexibility to use this alternative uplink spectrum could be useful in avoiding ground-path interference problems associated with reverse-band operations in the DBS uplink band (17.3-17.8 GHz), users of this band already face the challenges of sharing spectrum with co-primary commercial and government systems.[356] DIRECTV also states that 17/24 GHz BSS operators will likely require more uplink locations than do traditional DBS systems due to the increased atmospheric attenuation at these higher frequencies, which will result in increased site-diversity requirements, further increasing the potential burdens on systems sharing the band.[357] Accordingly, DIRECTV cautions the Commission to weigh carefully the offsetting disadvantages of increased interference in the band.[358] Intelsat disagrees with DIRECTV's comments, which it believes overstate the difficulties associated with additional use of the 24 GHz band. Intelsat argues that, given the limited number of 17/24 GHz BSS feeder link sites anticipated overall, any increase in use of spectrum could still be easily accommodated.[359]

115. In light of the limited support in the record for this proposal, we decline to adopt the *NPRM* proposal to permit the additional use of the 24.75-25.25 GHz band by DBS feeder

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[351] *See, e.g.,* EchoStar Satellite Operating Corporation, Order and Authorization, File Nos. SAT-MOD-20060830-00092 and SAT-STA-20050608-00116, paras. 6-8, (adopted Dec. 22, 2006); Hughes Communications Inc., Grant Stamp, File No., SAT-MOD-20050523-00106, at condition 9, (granted June 30, 2006); DIRECTV Enterprises, LLC, Grant Stamp, File No. SAT-LOA-20041122-00210, at condition 3, (granted March 18, 2005); New Skies Satellites N.V., 17 FCC Rcd. 10369 (Int'l bur. 2002) at para. 19.

[352] *See* 47 C.F.R. § 2.106. Footnote NG 167 to the Domestic Table of Frequency Allocations limits use of the FSS allocation (Earth-to-space) in the 24.75 – 25.25 GHz band to use by feeder links for the BSS operating in the band 17.3 – 17.7 GHz, *i.e.*, the 17/24 GHz BSS service.

[353] *See 17/24 GHz BSS NPRM*, 21 FCC Rcd at 7459, para. 69.

[354] Intelsat Comments at 10 and Intelsat Reply Comments at 16-17.

[355] EchoStar Comments at Technical Annex at 26-27, EchoStar Reply Comments at Technical Annex at 22-23.

[356] DIRECTV Comments at 35.

[357] *Id*.

[358] *Id*.

[359] Intelsat Reply Comments at 16-17.

uplink earth stations. Specifically, only Intelsat offers any support for this proposal, and bases that support on a speculative assumption regarding growth of 17/24 GHz BSS feeder link sites. As a result, in this case, we find DIRECTV's and EchoStar's concerns regarding the potential complexities created by changing the spectrum allocation to be more persuasive.

G. Technical Requirements for Inter-Service Operations

1. Sharing in the 24 GHz Band

a. Coordination Procedure

116. ***-114 dBW/m^2/MHz PFD Coordination Threshold Adopted at Edge of FS License Area:*** Feeder uplinks for satellites operating in the 17/24 GHz BSS are allocated use of the 24.75-25.25 GHz band on a primary basis in both the U.S. Table of Allocations and the International Tables of Allocations.[360] Domestically, the upper portion of this band from 25.05 – 25.25 GHz is also allocated on a primary basis to the Fixed Service (FS).[361] Fixed service operations in the band include Digital Electronic Message Service (DEMS)[362] systems as well as a variety of other fixed services licensed throughout the United States by Economic Areas (EAs).[363] In the *18 GHz Report and Order,* the Commission amended the Table of Allocations to allocate spectrum in the 24.75 – 25.25 GHz band for use by BSS feeder links consistent with the international allocation made at the 1992 World Administrative Radiocommunication Conference.[364] The Commission adopted this shared allocation[365] in part based on the belief that co-frequency operation would be feasible given the limited number of anticipated feeder link earth stations. It noted, however, that the successful implementation of this allocation would require the development of sharing criteria in a future rulemaking.[366]

117. Recognizing the potential for 17/24 GHz BSS feeder link earth stations operating in this portion of the band to interfere with existing and future 24 GHz FS operations, the *NPRM* sought comment on rules we might adopt to facilitate co-frequency operations of these two services. Specifically we asked whether the antenna off-axis performance requirements of

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[360] *See* 47 C.F.R. § 2.106 and note NG 167. *See also* ITU Radio Regulations, Article 5 and No. 5.535.

[361] *See* 47 C.F.R. § 2.106. Domestically, the radionavigation service is also allocated use of the 24.75 – 25.05 GHz band on a primary basis. However as the *NPRM* stated, at this time we are aware of no operational systems in this band.

[362] DEMS systems were relocated from the 18 GHz band to the 24 GHz band in 1997. *See* Amendment of the Commission's Rules to Reallocate the Digital Electronic Message Service from the 18 GHz Band to the 24 GHz Band and to Allocate the 24 GHz Band for Fixed Service, *Order*, ET Docket No. 97-99, 12 FCC Rcd 3471 (1997).

[363] *See* Amendments to Parts 1, 2, 87 and 101 of the Commission's Rules to License Fixed Services at 24 GHz, *Order*, 15 FCC Rcd 16934 (2000) ("*24 GHz Report and Order*").

[364] *See 18 GHz Report & Order*, 15 FCC Rcd at 13479-80, paras. 102-06. *See also* 47 C.F.R. §2.106 and the International Radio Regulations, Article 5.

[365] The allocation is shared on a co-primary basis with the fixed service only in the 25.05 – 25.25 GHz frequency band. The fixed service is not allocated use of the 24.75 – 25.05 GHz band.

[366] *See 18 GHz Report & Order*, 15 FCC Rcd at 13477, para. 98. *See also 24 GHz Report and Order*, 15 FCC Rcd at 16940-41, para. 10, where the Commission again opted to defer rules for terrestrial and satellite sharing to a future rulemaking.

Section 25.209[367] in combination with earth station power limits in Section 25.204[368] would afford sufficient protection to 24 GHz FS systems, or whether changes to our rules are required.[369] The *NPRM* also recognized certain conditions unique to the 24 GHz band that may either facilitate or complicate inter-service sharing, including the relatively small number of anticipated BSS feeder uplink stations, their large diameters and accompanying good off-axis discrimination characteristics,[370] as well as the geographic area licensing of 24 GHz FS systems wherein licensees are not required to file site-specific data.[371]

118. Commenters' responses were similar among the terrestrial and satellite communities. Satellite commenters generally believe that co-frequency operation of 24 GHz FS systems and 17/24 GHz BSS feeder link earth stations should be feasible, given the Commission's well-established procedures for coordination between terrestrial operations and satellite earth stations, in combination with the large-diameter and relatively small number of feeder link antennas, and the large regions of the country where no FS systems are licensed to operate.[372] Terrestrial service commenters assert that the tests and analyses necessary to understand the inter-service sharing situation will be time-consuming and costly, and that the cost of complying with coordination procedures that are eventually developed will be substantial.[373]

119. FiberTower asserts that the technical data and assumptions before the Commission are outdated, and that Section 25.204(b) is overly permissive as it does not take into account present-day equipment evolution.[374] FiberTower maintains that reliable answers concerning band sharing criteria will only become available following the substantial expenditure of time and resources devoted to that end.[375] FiberTower details many questions that it believes need to be answered, and additional information it believes must be made available in the record, in order to begin the necessary sharing studies.[376] Consequently, FiberTower asserts that the best course of action is to require 17/24 GHz BSS feeder link earth stations to locate well beyond the boundaries of the FS licensed areas until such studies can be completed and non-

[367] 47 C.F.R. § 25.209.

[368] 47 C.F.R. § 25.204. Paragraph (b) of this section establishes power limits for earth stations operating in frequency bands above 15 GHz shared co-equally with terrestrial radiocommunication services. These power limits extend to elevation angles up to 5 degrees above the horizon. In this Order the Commission also adopts off-axis EIRP density limits for 17/24 GHz BSS feeder link earth stations that are significantly more restrictive than those contained in § 25.204. *See* Section III.B.1. of this Order.

[369] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7467, para. 92.

[370] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7467, para. 92.

[371] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7467, para. 91.

[372] *See* DIRECTV Comments at 28-31, SES Americom Comments at 22-23, SES Americom Reply Comments at 18-19, EchoStar Reply Comments at 28-31, and DIRECTV Reply Comments at 22-25.

[373] FiberTower Comments at 8.

[374] FiberTower Comments at 6 – 11.

[375] FiberTower Comments at 2.

[376] *Id.* at 4-7.

interference to FS operations can be assured.[377] Specifically, FiberTower urges the Commission to require 17/24 GHz BSS earth stations to locate at least 100 miles from the edge of any FS licensed area.[378] In addition, FiberTower maintains that the Commission may also need to limit the number of BSS feeder links allowed to no more than five nationally until mutually acceptable analyses and supporting data are available to demonstrate that additional BSS feeder links are actually necessary, and that they can be operated without causing interference to 24 GHz FS systems in existing license areas.[379] The FWCC supports FiberTower's proposals, arguing that the characteristics of the BSS feeder links are not well known, and adding that FS operations are subject to recent developments in available equipment and architectures.[380]

120. DIRECTV and EchoStar take issue with FiberTower's argument that coordination between 24 GHz FS systems and 17/24 GHz BSS feeder link earth stations is unduly complicated. These commenters object to FiberTower's proposals to restrict feeder link earth stations to distances greater than 100 miles from a 24 GHz license area and to limit the number to no more that five. EchoStar and DIRECTV argue that such severe constraints are inequitable given the co-primary status of both services in the band and state further that these restrictions would place undue burden on 17/24 GHz operators. [381] DIRECTV argues further that such draconian rules are unnecessary and that it is possible to establish interference protection criteria between 24 GHz FS and 17/24 GHz BSS systems.[382]

121. We agree that FiberTower's proposed restrictions on BSS earth stations are too severe. This approach would obviate the coordination process traditionally employed in other frequency sharing situations, by placing the entire burden of interference mitigation onto the BSS earth station operator. Such a requirement is not consistent with the Commission's approach to frequency sharing among co-primary services wherein we have typically sought to distribute any coordination burden in an equitable manner among all affected parties. Nor is it consistent with our approach to efficient use of spectrum resources. Rather, the Commission has historically relied upon coordination among affected parties to resolve interference issues, only resorting to less spectrum-efficient methods such as geographic separation in cases where coordination was not considered feasible (*e.g.*, ubiquitously-deployed, small-diameter earth stations.) In addition, we note that many of the technical parameters that FiberTower claims are required to fully understand the frequency sharing situation are best made available as part of the coordination process itself. Accordingly, we continue to believe that coordination is a viable approach to resolving inter-service interference issues in this band, and note that this is also the approach 24 GHz FS licensees use to resolve interference issues among themselves.[383] As all commenters

[377] FiberTower Reply Comments at 2.

[378] FiberTower Comments at 8.

[379] FiberTower Comments at 9-10.

[380] FWCC Reply Comments at 4-5.

[381] EchoStar Reply Comments at 11, DIRECTV Reply Comments at 24.

[382] DIRECTV Reply Comments at 24.

[383] *See* 47 C.F.R. § 101.509.

agree, FS facilities are not operating in large parts of the country.[384] These regions will be the likely locations for the majority of BSS feeder link earth stations so that the issue of coordination should be raised relatively infrequently. Moreover, given the relatively small number of anticipated feeder link earth stations in combination with their large-diameter antennas, we do not believe that the coordination burden on either party will be overly severe.

b. Coordination Threshold

122. SES Americom states that Commission rules are sufficient to effect coordination and to protect 24 GHz FS operations, and consequently urges the Commission to adopt no new requirements.[385] However, EchoStar and DIRECTV both propose an additional requirement to facilitate sharing in the case of 24 GHz FS and 17/24 GHz BSS earth station operations.[386] They note that the Commission's rules already establish interference protection criteria between adjacent terrestrial license areas in the 24 GHz band.[387] Specifically, Section 101.509(e) includes a recommendation that coordination is not necessary if the pfd at the boundary of the adjacent terrestrial licensing area is less than -114 dBW/m^2/MHz, and that licensees should be able to deploy with a pfd of up to -94 dBW/m^2/MHz at the boundary of the relevant adjacent area without negatively affecting the operations of the adjacent area licensee.[388] EchoStar and DIRECTV urge the Commission to adopt this same approach for 24 GHz FS and 17/24 GHz BSS systems. They assert that it has worked well among 24 GHz terrestrial service licensees for many years and argue that it will work equally well in the present case.[389] In conjunction with this proposal, commenters submit analyses to demonstrate that with worst-case assumptions, separation distances required to meet this coordination threshold are typically on the order of 50 miles.[390]

123. In its reply comments FiberTower submits a technical analysis to demonstrate the need for a minimum separation of 100 miles from the edge of a 24 GHz FS licensing area.[391] FiberTower states that the results of its preliminary study indicate that pfd level specified in Section 101.509(e) of our rules is insufficient and should be reduced from -114 dBW/m^2/MHz to at least -142 dBW/m^2/MHz to protect FS operations.[392] Consequently, FiberTower asserts that

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[384] *See* FiberTower Comments at 9, EchoStar Reply Comments at Technical Annex at 15, SES Americom Reply Comments at 19, and DIRECTV Reply Comments at 23.

[385] SES Americom Reply Comments at 18.

[386] DIRECTV Comments at 30, DIRECTV Reply Comments at 24, and EchoStar Reply Comments at 16.

[387] *Id.*

[388] *See* 47 C.F.R. § 101.509(e).

[389] *See* DIRECTV Comments at 30, DIRECTV Reply Comments at 24, and EchoStar Reply Comments at 16.

[390] *See* EchoStar Reply Comments at 14, DIRECTV Reply Comments at 25. As commenters correctly note, the calculated coordination distance is a function of the earth station antenna elevation angle, which in turn varies depending upon its geographic location as well as the orbital position of the satellite. It also will depend upon the uplink power levels of the earth station as well as its off-axis performance characteristics.

[391] *See* FiberTower Reply Comments at Attachment 1.

[392] *See* FiberTower Reply Comments at 6 and Attachment 1. FiberTower's analysis assumes an FS receiving antenna with 45 dBi gain, and a 4 dB noise figure. The criteria used for acceptable interference power levels at the FS receiver input is the value that will raise the receiver noise threshold by 1 dB.

substantial changes are needed in the Commission's rule.[393] Although FiberTower continues to urge the Commission to adopt a 100-mile exclusion zone at the edges of the FS license areas, it proposes as an alternative that the pfd criterion specified in Section 101.509(e) should be changed to -142 dBW/m^2/MHz, and outlines an accompanying approach for determining compliance with this pfd limit.[394]

124. We adopt a pfd level as a coordination threshold at the edge of the FS license area. Under such a scheme, the operator of a 17/24 GHz BSS feeder link earth station that produces a pfd level greater than the specified threshold value at the boundary of a 24 GHz FS license area would be required to coordinate its operations with the affected FS operations. Such an approach is relatively straightforward, and distributes the burden of coordination equitably among all parties. In addition, it is consistent with the approach currently contained in our rules to permit licensing of co-frequency 24 GHz FS operations in adjacent Economic Areas (EA's). In contrast to requiring an absolute separation distance, this approach will allow operators to take into account the various interference-mitigating factors that will vary at different locations around the country including foliage or terrain-shielding, as well as regional differences in precipitation. Moreover, such an approach will permit operators the flexibility to implement various mitigation techniques and to mutually resolve their coordination problems with as little input from the Commission as possible.

125. DIRECTV and EchoStar assert that the current pfd level in Section 101.509(e) can be successfully extended to the case of BSS feeder link earth station transmissions to serve as a threshold for FS/BSS coordination.[395] FiberTower, however, argues that this pfd level should be reduced by 28 dB to afford sufficient protection to 24 GHz FS operations.[396] The pfd coordination threshold of Section 101.509(e) was adopted in the *24 GHz Report and Order* to facilitate coordination between U.S. licensed 24 GHz FS operations.[397] The Commission adopted a -114 dBW/m^2/MHz value to be consistent with the coordination threshold value in the U.S. and Canada agreement for coordination between administrations in the border areas.[398] Consequently, FiberTower's proposal would create more extensive difficulties in the general ability of 24 GHz FS licensees to coordinate with each other, and possibly with co-frequency operations across the border with Canada as well. Thus, changing the pfd threshold of Section 101.509(e) has ramifications far beyond the question of FS/BSS coordination and raises issues well outside the scope of this rulemaking. Accordingly, we decline to reduce the pfd coordination threshold of Section 101.509(e) in this rulemaking. Nor do we believe that there is justification for adopting a pfd coordination threshold for 17/24 GHz BSS operations different from the one applied to the transmissions of other co-frequency operations. For these reasons,

[393] *Id.*

[394] *Id*. at 10.

[395] *See* EchoStar Reply Comments at Technical Annex at 12, DIRECTV Reply Comments at 14.

[396] *See* FiberTower Reply Comments at 9.

[397] *See 24 GHz Report & Order,* 15 FCC Rcd at 16963, paras. 65-68.

[398] *Id*. *See* Interim Arrangement Concerning the Sharing between Canada and the United States of America on Broadband Wireless Systems in the Frequency Bands 24.25-24.45 GHz, 25.05-25.25 GHz, and 38.6-40.0 GHz, signed by the FCC on Dec. 8, 1999 and Canada on Dec. 21, 1999.

we extend the pfd coordination threshold value of -114 dBW/m^2/MHz value now specified in our rules for coordination of fixed service operations, to BSS feeder link earth stations seeking to operate in the 24 GHz band. Further, to fully protect 24 GHz FS operations from multiple feeder link earth stations, any pfd level used as a coordination threshold at the FS license boundary must be cumulative. Accordingly, when determining whether the pfd threshold limit is exceeded at the 24 GHz FS licensing boundary, a feeder link earth station applicant must take into account not only the transmissions from its own antenna(s), but also those from any previously authorized feeder link earth stations. Thus, if the cumulative pfd level at the FS license boundary is in excess of -114 dBW/m^2/MHz, the earth station applicant must either modify its proposed operations such that this value is not exceeded, or enter into coordination with the affected FS licensee.

126. Commenters raise the question of methodology used to compute the pfd level at the boundary of the FS license area. EchoStar states that the pfd calculation should be based on the actual characteristics of the proposed earth station, use a realistic propagation model such as ITU-R Recommendation P.452, with a reasonable probability of occurrence (*e.g.*, 1%), and take into account the topography around the earth station.[399] FiberTower asserts that the pfd should be determined at the boundary of the 24 GHz FS license area by establishing the EIRP of the earth station toward the horizon on the azimuth toward the FS boundary, and then applying the spreading loss for the distance between the feeder link station and the FS boundary.[400] If transmit power control is used, the EIRP value used in the calculation should be the maximum value.[401] We agree with FiberTower that in cases where adaptive uplink power control is used the EIRP value used for calculation should be the maximum.[402] We also agree with EchoStar that calculations should be based on the actual characteristics of the proposed earth station. Consistent with our other pfd requirements,[403] we also take into account only free-space propagation loss when computing the pfd level at the FS license area. Although we recognize that many factors including terrain, atmospheric attenuation and climactic variations will likely further decrease pfd levels, we believe that a coordination threshold should be as simple and straightforward a calculation as possible. Other interference-mitigating factors may be taken into account should the coordination process be invoked.

127. We are establishing a procedure whereby 17/24 GHz BSS feeder link earth stations may be licensed, subject to coordination with 24 GHz FS licensees when warranted. This procedure presumes that the earth station's location is outside of the 24 GHz FS license area. We need not address the case where 17/24 GHz BSS earth stations and 24 GHz FS systems might operate in the same EA since we do not intend to license 17/24 GHz BSS feeder links to operate in an existing 24 GHz FS license area. Such a sharing situation is considerably more complicated, and in this instance, we agree that more information and study is necessary to

[399] *See* EchoStar Reply Comments at Technical Annex at 17.

[400] *See* FiberTower Reply Comments at 10.

[401] *Id.*

[402] In Section III.E.1 of this Order we modify Section 25.204(g) to provide for the use of uplink adaptive power control. We also limit the use of power control to an excess of no more than 20 dB.

[403] *See, e.g.*, § 25.208.

develop appropriate sharing criteria.[404] Moreover, we recognize that at some point in the future, additional 24 GHz FS licenses may be awarded, and that these operators may wish to consider locating their operations within an EA where a feeder link earth station has previously been licensed. Commenters have raised the possibility that BSS and FS working groups should complete the necessary technical studies and develop sharing criteria.[405] The Commission supports all such efforts by the industry. It is possible that after further study and the development of more detailed sharing criteria, we may reconsider these requirements.

128. As noted above, we anticipate that additional 24 GHz FS systems may be authorized subsequent to future Commission action. Such systems locating near an authorized 17/24 GHz BSS feeder link earth station may not claim protection from interference from the feeder link earth station's transmissions, provided that these transmissions are compliant with our rules. Rather, future 24 GHz FS applicants will be required to take into account the transmissions from the previously authorized earth station when considering system designs, including the choice of location for its license area. To make these decisions, future FS applicants must have access to relevant feeder link earth station characteristics. Accordingly, we make clear that all applicants for 17/24 GHz BSS feeder link earth stations are subject to the information filing requirements of Sections 25.203 and 25.251 of our rules, whether or not coordination is required on the basis of the pfd levels adopted above.

2. Sharing in the 17 GHz Band

129. ***Coordination with NTIA Encouraged:*** The Radiolocation Service is allocated use of the 15.7-17.3 GHz band on a primary basis, and the 17.3-17.7 GHz band on a secondary basis for U.S. Government systems.[406] As stated in the *NPRM*, military services are the largest users of the 15.7-17.3 GHz band and their radiolocation operations include a large number of radar systems, particularly high-powered synthetic aperture radars operating near the 17.3 GHz band edge.[407] The Commission, noting similar concerns of the National Telecommunications and Information Administration (NTIA), anticipated that unwanted emissions from high-power, adjacent-band radiolocation systems, could pose a significant harmful interference threat to 17/24 GHz BSS subscriber earth stations.[408] The Commission also recognized that discussions between the radiolocation and BSS communities could help to resolve potential adjacent band interference issues between the two services. In the *NPRM,* the Commission noted its encouragement of operator-to-operator discussions as a means of resolving interference issues, and sought comment on this approach. Specifically, the Commission asked how best to address the issue of potential adjacent-band interference into 17/24 GHz BSS receivers.[409]

130. The *NPRM* also made available information that NTIA had provided concerning technical and operating characteristics of certain adjacent-band radiolocation systems that it

[404] *See* FiberTower Reply Comments at 5, FWCC Reply Comments at 5.

[405] *See* FiberTower Comments at 13, FWCC Reply Comments at 6.

[406] *See* 47 C.F.R. § 2.106.

[407] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7468, para. 94.

[408] *Id.*

[409] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7469, para. 95.

considers likely to impact 17/24 GHz BSS receiving earth stations.[410] We sought comment on the general applicability of the NTIA's findings to planned 17/24 GHz BSS systems.[411] The *NPRM* also sought comment on anticipated BSS receiver sensitivity to unwanted adjacent-band emissions, on the level of protection required, and on any measures 17/24 GHz BSS operators might adopt in order to mitigate such interference.[412] Specifically, it asked whether the Commission should adopt requirements to limit 17/24 GHz BSS receiver susceptibility to unwanted emissions, and specifically what requirements might be appropriate.[413]

131. Finally, the *NPRM* recognized that Federal Government systems use the Radiolocation Service secondary allocation in the 17.3-17.7 GHz band by operating numerous types of radiolocation stations.[414] NTIA indicates that radiolocation systems may seek to continue operating in this spectrum regardless of their allocation status with respect to the BSS, albeit at limited geographic areas and in limited portions of the band.[415] The *NPRM* sought comment on approaches by which BSS operations could co-exist with secondary radiolocation operations.[416]

132. Commenters agree that radar interference into 17/24 GHz BSS receivers is a serious issue that must be addressed as early as possible.[417] Commenters recognized the need for further exchange of information between industry and federal government concerns to better analyze the extent of the interference problem, and to develop appropriate mitigation strategies.[418] Accordingly, commenters encourage the Commission to facilitate this process.[419]

133. EchoStar states that both in-band and adjacent-band interference mechanisms will prevent 17/24 GHz BSS receivers from operating when the radiolocation signal is present.[420] EchoStar maintains that out-of-band interference will most severely affect those frequencies

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[410] *See* Appendix C for the technical characteristics of the radiolocation systems operating in the 15.7-17.3 GHz band. The NTIA also identified two likely interference scenarios, and made available measured data from a 4 GHz system.

[411] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7469, para. 96.

[412] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7469, paras. 95-97.

[413] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7470, para. 97.

[414] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7471, para. 99.

[415] *See* Letter to Dale M. Hatfield, Chief, Office of Engineering and Technology, Federal Communications Commission, from William T. Hatch, Associate Administrator, Office of Spectrum Management, National Telecommunications and Information Administration, (March 29, 2000). *See also* Letter to Edmond J. Thomas, Chief, Office of Engineering and Technology, Federal Communications Commission, from Fredrick R. Wentland, Associate Administrator, Office of Spectrum Management, National Telecommunications and Information Administration (April 8, 2005).

[416] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7471, para. 100.

[417] *See* EchoStar Comments at Technical Annex, A.6.2, DIRECTV Comments at 31-33, EchoStar Reply Comments at 18, and SES Americom Reply Comments at 19.

[418] *Id.*

[419] *Id.*

[420] EchoStar Comments at Technical Annex at 24.

closest to 17.3 GHz, but that frequencies up to 100 MHz from the band edge are likely to be seriously impaired;[421] the in-band interference will prevent receiver function on all channels while the signal is present.[422]

134. DIRECTV presents a generalized, worst-case analysis as well as a detailed examination of four interference scenarios for adjacent-band interference from airborne radar systems.[423] The interference scenarios consider different antenna couplings between the radar and the BSS earth station: mainbeam-to-mainbeam antenna coupling, mainbeam-to-sidelobe antenna coupling, sidelobe-to-mainbeam antenna coupling, and sidelobe-to-sidelobe antenna coupling. The analysis results for mainbeam-to-mainbeam antenna coupling show significant interference from the adjacent band radars, but the estimated probability of this interference scenario occurring is $3x10^{-8}$ and the interference event only occurs for approximately 2 seconds.[424] For the mainbeam-to-sidelobe and sidelobe-to-mainbeam antenna coupling again interference is shown, but the estimated probability of this scenario occurring is $2x10^{-4}$ and again the duration of the interference is around 2 seconds. From the DIRECTV analysis the most likely interference scenario is sidelobe-to-sidelobe antenna coupling. In this scenario the analysis shows that interference-to-carrier ratios as high as 9.1 dB may result, but that interference is limited primarily to the first transponder. In general, the analysis results indicate that for a single radar and BSS receiver interaction that the probability of interference is low and the duration of interference is relatively short. However, if the radars are operated over long durations and large geographic areas the probability and duration of interference can increase. DIRECTV believes that in order to fully evaluate the potential impact on BSS receivers additional information is needed on the current and future radar systems in the 15.7-17.3 GHz band. We agree with DIRECTV that further exchanges of information are necessary in order to fully assess the potential impact on BSS receiver operations. We encourage the industry representatives to work directly with NTIA to obtain this information.

135. DIRECTV also states that, in the measurement results presented by NTIA, a key finding was that the maximum interference tolerance is directly related to the ratio of the interference pulse length to the information signal length. DIRECTV questions whether error correction coding or data interleaving could significantly mitigate the effects of radar interference as the symbol rates of planned 17/24 GHz BSS systems will result in signal lengths on the order of 1000 times less than those planned for the radar systems.[425] The DIRECTV assessment of the NTIA measurements is based on the in-band pulse characteristics (pulse width and pulse repetition frequency) of the radar systems provided by NTIA. However, the out-of-band radar signal that appears after the front-end filtering of a BSS earth station receiver may not have the same characteristics as the in-band radar signal (*e.g.*, the pulse width may be shorter). Measurements of the effects of out-of-band pulsed interference on the BSS receiver could serve to quantify this effect. For example, as part of the above-mentioned discussion and information

[421] *Id.*

[422] *Id.*

[423] DIRECTV Comments, Appendix at A-1 to A-16.

[424] Estimates of interference duration assume an aircraft speed of 500 feet per second.

[425] DIRECTV Comments, Appendix at A-14.

exchange between industry and NTIA, equipment representative of the 17/24 GHz BSS earth station receivers could be provided to NTIA for testing and evaluation.[426]

136. Another sharing scenario was raised by NTIA in a letter dated March 21, 2007.[427] In that letter, NTIA, on behalf of the Department of Defense (DoD), requested that we adopt the following footnote to the U.S. Table of Frequency Allocations:

> "US402 - In the band 17.3-17.7 GHz, existing Federal satellites and associated earth stations in the fixed-satellite service (Earth-to-space) are authorized to operate on a primary basis in the frequency bands and areas listed below. Receiving earth stations in the broadcasting-satellite service within the bands and areas listed below shall not claim protection from Federal earth stations in the fixed-satellite service.
>
> (a) 17.600-17.700 GHz for stations within a 120 km radius of 38º49´N latitude and 76º52´W longitude.
>
> (b) 17.375-17.475 GHz for stations within a 160 km radius of 39º42´N latitude and 104º45´W longitude."[428]

Additionally, NTIA states that Government Footnote G117 should be modified to limit Federal fixed-satellite use of these bands to military systems.

137. NTIA states that the U.S. Government's implementation of this allocation supports military functions as well as specific national security interests of the United States and further asserts that this allocation is essential for these federal space systems to perform satisfactorily.[429] In addition, NTIA states that non-federal operations in this band are currently limited to existing transmitting feeder links for the BSS and future receiving BSS earth stations. According to NTIA, the federal operations are limited to two sites and only utilize a portion of the 17.3-17.7 GHz band and have operated compatibly with the BSS feeder links for many years. We agree with NTIA that protecting these Federal operations at this time will ensure that BSS operators have sufficient time to design their future space-to-Earth systems accordingly.[430]

138. Based on the foregoing, we find that this change to the U.S. Table of Frequency Allocations is related to the exercise of military functions of the United States in support of urgent national security interests. Consequently, we also find that notice and public comment procedures are, for good cause shown, impracticable, unnecessary, and contrary to the public interest. Accordingly, the Commission is authorized to waive the public notice provisions of the

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[426] We recognize that 17 GHz BSS receivers may not be available at this time. However, earth station receivers operating in nearby frequency bands (*e.g.,* 18.3-18.86 GHz) may have sufficiently similar characteristics to the 17 GHz receivers.

[427] *See* Letter from John M. R. Kneuer, Assistant Secretary for Communications and Information, United States Department of Commerce to Kevin J. Martin, Chairman, Federal Communications Commission, dated March 21, 2007.

[428] *Id.*

[429] *Id*.

[430] *Id*.

Administrative Procedure Act (APA) pursuant to 47 C.F.R. Sections 1.412(b)(1) and 1.412(c).[431] Based on the representations of NTIA that adoption of a national footnote and an amendment of a government footnote specifically supports essential military functions of the national defense, we find that the public interest will best be served by accommodating NTIA's request to expeditiously add United States Footnote US402 to the U.S. Table of Frequency Allocations and amend Government Footnote G117 of the U.S. Table of Frequency Allocations.

139. Finally, with regard to the secondary in-band interference issue, DIRECTV notes the lack of sufficient technical information necessary to perform an analysis of the problem, but suggests that given more information exchange between industry and the Federal Government it may be possible to adopt case-by-case solutions to accommodate such operations.[432] We agree with DIRECTV that further exchanges of information are necessary in order to develop solutions to this issue. We encourage the parties to talk with NTIA directly to develop solutions to this issue.

H. Pending Applications

140. ***Pending Applications Treated as Filed Simultaneously; Amendments Required to Conform to Rules Adopted Herein; Freeze Imposed on New Applications:*** As noted, we adopted a first-come, first-served licensing procedure for GSO-like applications and a modified processing round approach for NGSO-like applications in the *First Space Station Licensing Reform Order*. In doing so, we recognized that retroactively applying these procedures to all applications pending at that time may not best serve the public interest. Thus, we stated that we would apply the procedures "in cases where doing so will help further the goals of this proceeding to expedite service to the public and discourage speculation."[433] We decided to treat most pending GSO-applications under the first-come, first-served procedure. In other words, in most cases, we would grant a pending application if the applicant was qualified and if the proposed system would not cause harmful interference to any previously licensed satellite or to any satellite proposed in a previously filed application. The Commission adopted a somewhat different procedure for V-band applications, which had been filed pursuant to a processing round cut-off.[434] There, the Commission treated all pending GSO V-band applications as though they were filed at the same time and entitled to concurrent consideration. This meant that if two or more V-band applications were mutually exclusive, the Commission would divide the available spectrum equally among the qualified licensees. The Commission employed a third processing approach for pending Ka-band NGSO applications. There, the Commission had already issued a *Notice of Proposed Rulemaking* in which it proposed a technical solution that would resolve mutual exclusivity and allow NGSO systems to share the same spectrum.[435] Consequently, we

[431] *See also* 47 U.S.C. § 154(j); 5 U.S.C. § 552(b)(1); 47 C.F.R. § 0.603(a); 47 C.F.R. § 1.3; *Bendix Aviation Corp. v. FCC*, 272 F. 2d 533, 536-537 (D.C. Cir. 1959), *cert. denied sub nom. Aeronautical Radio, Inc. v. United States*, 361 U.S. 965 (1960).

[432] *Id.* at A-15.

[433] *First Space Station Licensing Reform Order*, 18 FCC Rcd at 10863, para. 276.

[434] *First Space Station Licensing Reform Order*, 18 FCC Rcd at 10863-6, paras. 275-284.

[435] *See* Establishment of Policies and Service Rules for the Non-Geostationary Satellite Orbit, Fixed-Satellite Service in the Ka-band, *Notice of Proposed Rulemaking*, 17 FCC Rcd 2807 (2002) ("*Ka-band NGSO NPRM"*).

determined that we did not need to use the band-splitting approach we adopted for mutually-exclusive NGSO applications in the *First Space Station Reform Order*.[436] Instead, we granted each qualified NGSO Ka-band applicant authority to operate throughout the available spectrum.[437]

141. DIRECTV, EchoStar, and Intelsat make various suggestions as to how to process the pending 17/24 GHz space station applications.[438] DIRECTV generally proposes that we should process the applications under the first-come, first-served approach.[439] Nevertheless, they request that we exempt them from the rule[440] that requires us to treat their amended applications as newly filed. Newly filed applications move to the bottom of the processing queue. In contrast, Intelsat recommends that we allow each applicant to amend a single application at a time, in order of the entity's date of filing its first application, "round-robin" style. This means that the entity with the oldest filing would be given the opportunity to file an amended application, with its choice of orbital location, first. The next entity to pick would be the remaining entity with the oldest application, and so on. Once all applicants had amended one application, each would be given an opportunity, in turn, to amend a second, third, fourth, and fifth application as warranted.[441] Intelsat suggests that a "round-robin" procedure will ensure that orbital locations are assigned in a manner that promotes competition.[442] For the reasons discussed below, we adopt another approach that treats all pending applications as filed simultaneously

142. There are 22 pending applications for 17/24 GHz BSS space station authorizations.[443] Most of these filings are not at a four-degree-compliant location or request an orbit location less than 4 degrees away from a location sought by another entity. As a result, under any processing method used for the pending applications, we will not be able to grant all the applications as originally filed. We further recognize that applicants will be required to

[436] *First Space Station Licensing Reform Order*, 18 FCC Rcd at 10865, para 280. Establishment of Policies and Service Rules for the Non-Geostationary Satellite Orbit, Fixed Satellite Service in the Ka-band, *Report and Order*, 18 FCC Rcd 14708 (2003) ("*Ka-band NGSO Report and Order"*).

[437] *Id.*

[438] The other comments did not address the treatment of pending applications.

[439] DIRECTV Comments at 17, DIRECTV Reply Comments at 7, n. 14. Although EchoStar favors an auctions or processing round approach for processing applications, EchoStar alternatively suggests that if the Commission adopts a first-come, first-served approach, the pending application should be processed using date priority. EchoStar Reply Comments at 20. Under a date-priority approach, assuming no locations are changed, DIRECTV and EchoStar would each receive five authorizations assuming they do not request a change of orbital location, Intelsat would receive two authorizations, and the Pegasus applications would be denied. EchoStar Reply Comments at 20.

[440] 47 C.F.R. § 25.116 (b), (d). Specifically, Section 25.116 explains that major amendments that change orbital locations, frequencies bands, increase the potential for interference, or are otherwise deemed substantial pursuant to Section 309 of the Communications Act will cause the application to lose its status relative to later-filed applications in the "queue" as described in 25.158.

[441] Intelsat Comments at 6, Intelsat Reply Comments at 7.

[442] Intelsat Comments at 6.

[443] *See* Appendix E listing the 22 pending applications.

amend their pending applications to conform to the new service and technical rules, including the rule limiting applicants to five pending 17/24 GHz BSS applications.[444] At the same time, we will require applicants to select a location conforming to the four-degree spacing framework adopted today.[445] Moreover, some applicants may choose not to continue prosecuting their pending applications due to changed business plans. Consequently, we expect the amended applications to look materially different than the pending applications.

143. In light of these anticipated material changes and the new rules for the 17/24 GHz BSS, we will treat the applications before us, as amended, as though they were filed at the same time.[446] Accordingly, as in the V-band proceeding, where two or more applications are mutually exclusive, we will divide the available spectrum equally among the applicants pursuant to Section 25.158(d). To the extent necessary, we will waive Sections 25.116 and 25.155(c) of our Rules to process the applications in this manner.[447] We find that this approach best serves the public interest by most equitably balancing our goals of maximizing use of scarce spectrum and orbital resources while at the same time retaining opportunities for competitive entry and speeding service to the public.

144. We recognize that where the spectrum will be divided, the authorizations issued under this procedure may not be exactly what the applicants expected. This, by itself, would not bar the adoption of this procedure.[448] As we explained in the *First Space Station Reform Order*, the Commission has the authority to apply new procedures to pending applications if doing so does not impair the rights an applicant possessed when it filed its application, increase an applicant's liability for past conduct, or impose new duties on applicants with respect to "transactions already completed."[449] Applicants do not gain any vested right merely by filing an

[444] *See* para. 15 above.

[445] *See* paras. 66-74 above.

[446] If, however, an applicant makes a major amendment to its application after the amendment deadline, we will treat the amended application as newly filed pursuant to Section 25.116(d). Thus, the opportunity to amend an application and have it treated as simultaneously filed with the other pending applications does not extend past the date specified by the Bureau.

[447] The Commission may waive a rule for good cause shown. Waiver is appropriate if special circumstances warrant a deviation from the general rule and such deviation would better serve the public interest than would strict adherence to the general rule. *Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1166 (D.C. Cir. 1990). Generally, the Commission may grant a waiver of its rules in a particular case if the relief requested would not undermine the policy objective of the rule in question and would otherwise serve the pubic interest. *WAIT Radio v. FCC*, 418 F.2d 1153, (D.C. Cir. 1969); Dominion Video Satellite, Inc., *Order and Authorization,* 14 FCC Rcd 8182 (Int'l Bur. 1999).

[448] *See First Space Station Licensing Reform Order*, 18 FCC Rcd at 10865, para. 278 and n.673 (*citing Landgraf*, 511 U.S. at 269-70; *DIRECTV*, 110 F.3d at 826, *citing* Bell Atlantic Telephone Cos. v. FCC, 79 F.3d 1195, 1207 (D.C. Cir., 1996); Black Citizens for a Fair Media v. FCC, 719 F.2d 407, 411 (D.C. Cir., 1983).

[449] DIRECTV, Inc. v. FCC, 110 F.3d 816, 825-26 (D.C. Cir.., 1997) (*DIRECTV)*; Landgraf v. USI Film Products, 511 U.S. 244, 280 (1994) (*Landgraf*). In *DIRECTV,* the appeals court found that the Commission's decision to adopt an auction rule was not retroactive and hence unlawful. In doing so, the appeals court relied on the Supreme Court's finding in *Landgraf* that "there are three ways in which a rule can be retroactive: if it "impair[s] rights a party possessed when he acted, increase[s] a party's liability for past conduct, or impose[s] new duties with respect to transactions already completed."

application.[450] Merely filing an application cannot be considered a "transaction already completed" for purposes of this analysis. It would be within our authority to dismiss all the pending applications entirely and start the licensing process anew.[451] Such an action, however, would not serve the policy goals articulated above. Thus, we conclude that there is no legal barrier to our processing the pending applications as filed simultaneously.

145. To implement our decision here, we direct the Bureau to release a Public Notice shortly after these rules become effective, inviting applicants to amend the applications pending as of the date of this order consistent with the rules we adopt today. Applicants can amend their choice of orbital locations consistent with our spacing rules adopted today to reduce the likelihood of mutual exclusivity. In addition, applicants are limited to five pending 17/24 GHz BSS applications.[452] Any application that is not amended by the date specified by the Bureau will be dismissed as defective.[453] The Bureau will review the amended applications to determine whether they are substantially complete and acceptable for filing. The Bureau will place acceptable applications on public notice. The Bureau will return to the applicant as defective any amended applications that are not substantially complete.[454] In the event that two or more amended applications are mutually exclusive, we direct the Bureau to consider the applications together and, if the applicants are qualified, to license them to operate in an equal portion of the spectrum.[455]

146. To facilitate the amendment process, we require each applicant to notify the Commission by letter, within 45 days of release of this Order, whether it intends to go forward with each of its

[450] Chadmoore Communications, Inc. v. FCC, 113 F.3d 235, 240-41 (D.C. Cir. 1997)(*Chadmoore*). ("In this case the Commission's action did not increase [the applicant's] liability for past conduct or impose new duties with respect to completed transactions. Nor could it have impaired a right possessed by [the applicant] because none vested on the filing of its application."); Hispanic Info. & Telecomms. Network v. FCC, 865 F.2d 1289, 1294-95 (D.C.Cir.1989) ("The filing of an application creates no vested right to a hearing; if the substantive standards change so that the applicant is no longer qualified, the application may be dismissed."); Schraier v. Hickel, 419 F.2d 663, 667 (D.C.Cir.1969) (filing of application that has not been accepted does not create a legal interest that restricts discretion vested in agency). *See also* United States v. Storer Broadcasting Co., 351 U.S. 192 (1952) (pending application for new station dismissed due to rule change limiting the number of licenses that could be held by one owner); Bachow Communications, Inc. v. FCC, 237 F.3d 683, 686-88 (D.C. Cir. 2001) (*Bachow*) (upholding freeze on new applications and dismissal of pending applications in light of adoption of new licensing scheme); PLMRS Narrowband Corp. v. FCC, 182 F. 3d 995, 1000-01 (D.C. Cir. 1999) (applicant did not, by virtue of filing application, obtain the right to have it considered under the rules then applicable).

[451] Bachow Communications, Inc. v. FCC, 237 F.3d 683, 686-88 (D.C. Cir. 2001)

[452] *See* 47 C.F.R. § 25.159.

[453] 47 C.F.R. § 25.112(a)(2).

[454] *See First Space Station Licensing Reform Order,* 18 FCC Rcd at 10852, para. 244. Applications of PanAmSat Licensee Corp. For Authority to Construct, Launch, and Operate a Hybrid Satellite System in its Separate International Communications Satellite System, *Order on Reconsideration*, 18 FCC Rcd 23916 (2003). We note that the Commission reserves the right to return an application which has been placed on Public Notice as acceptable for filing if, upon further examination, it is determined that the application is not in conformance with the Commission's rules. *See, e.g.,* Policy Branch Information, Satellite Space Applications Accepted for Filing, *Public Notice,* Report No. SAT-00418 (Feb. 2, 2007).

[455] In these cases, licensees will be allowed to select the particular band segment they wish to use no earlier than 60 days before they plan to launch the satellite. 47 C.F.R. § 25.158(d)(5).

pending applications. If an applicant fails to file a notification of its intent to proceed with a particular application, we will dismiss that application. By identifying applications that will not be pursued in advance of the amendment deadline, the remaining applicants may be in a better position to reach a compromise regarding their orbital assignment requests and minimize, or avoid, mutually exclusive situations.

147. Finally, from the release date of this Order until a date and time designated by the Bureau after the pending applications are amended, we establish a freeze on new applications. The freeze on 17/24 GHz BSS applications applies to any application for authority to provide service to the United States using the 17.3-17.7 GHz (space-to-Earth) and 24.75-25.25 GHz (Earth-to-space) frequency bands or to provide international satellite service using the 17.7-17.8 GHz (space-to-Earth) frequency band. This freeze is limited to applications for licenses for new space stations or for new requests for market access by foreign-licensed space stations. Further, the freeze does not apply to amendments to the 22 pending applications.

IV. FURTHER NOTICE OF PROPOSED RULEMAKING

148. In the *NPRM*, the Commission sought comment on what measures were needed to address issues concerning reverse band operations. These included measures to mitigate against space-path interference between DBS and 17/24 GHz BSS satellites (space-path interference) and to protect 17/24 GHz BSS subscribers from DBS feeder links (ground-path interference). The record on these issues is insufficient to develop requirements. While most commenters advocate certain general approaches, we need more information to build on the generalities and derive specific requirements. Thus, we seek further comment on the issues concerning reverse band operations.

A. Ground-Path Interference in Reverse Band Operations

1. Background

149. As discussed in the *NPRM*,[456] ground path interference will occur when the signals from transmitting DBS[457] feeder link earth stations operating in the 17.3-17.7 GHz band are detected at the receiving earth stations of 17/24 GHz BSS subscribers. This interference situation will be the most severe in areas surrounding the DBS feeder uplink stations. In addition, 17/24 GHz BSS operators who choose to co-locate their TT&C earth stations with DBS TT&C earth stations systems may experience difficulty in receiving the downlinked telemetry signal from the 17/24 GHz BSS spacecraft. Although at present there are a relatively small number of DBS feeder link and TT&C earth stations, the *NPRM* recognized that DBS feeder link earth stations that transmit in the Earth-to-space direction may increasingly locate in populated areas, thereby escalating the potential for interference into 17/24 GHz BSS subscriber antennas.[458] The *NPRM* also anticipated that future entrants, such as short-spaced DBS systems,

[456] *See 17/24 GHz BSS NPRM*, 21 FCC Rcd at 7453-54, para. 57.

[457] In this section, the terms "DBS" or "DBS earth station" refer to earth stations that are DBS feeder links.

[458] *See 17/24 GHz BSS NPRM*, 21 FCC Rcd at 7454, para. 58. This was attributed in part to the increase in local programming uplinked from metropolitan areas. *See also*, *e.g.*, DIRECTV Enterprises, LLC for Authority to Launch and Operate DIRECTV 7S (USABSS-18), *Order and Authorization,* 19 FCC Rcd 7754 (2004). DIRECTV sought authority to operate uplink earth stations at sites in Los Angeles, CA, Castle Rock, CO, Winchester, VA and St. Paul, MN.

or non-U.S. DBS satellites serving the U.S. market, could result in the deployment of an even greater number of feeder link earth stations at multiple sites within the United States.[459] The *NPRM* also raised concerns that the interference problem could be further exacerbated by the proliferation of small-diameter 17/24 GHz BSS subscriber receiving antennas with relatively poor off-axis discrimination properties.[460]

2. Grandfathering Existing DBS Uplink Facilities

150. ***Tentatively Conclude that Existing DBS Feeder Link Earth Stations Should Not be Subject to New Interference-Mitigation Requirements:*** DIRECTV notes that, although DBS operators have recently sought authority for additional feeder link earth stations to uplink local broadcast signals from regional collection sites, the number of such sites is still very small.[461] DIRECTV states, by way of illustration, that it operates DBS feeder links from only four sites across the country, and has no plans for additional regional sites. DIRECTV proposes that we "grandfather" licensed and operating DBS uplink facilities so that they may continue to operate in the manner in which they were designed in reliance on the rules then in effect.[462] Accordingly, DIRECTV does not support off-axis EIRP density or other transmitting power limits for existing DBS feeder link antennas, or a requirement that such be shielded.[463] EchoStar also advocates "grandfathering" of existing DBS feeder link earth stations, arguing that there are relatively few in number, and that the majority are located in less populated areas do that they pose little problem.[464]

151. The Commission did not discuss this issue in the *NPRM*. Nevertheless, based on the record, we tentatively conclude that existing DBS feeder link earth stations should not be subject to new interference-mitigation requirements imposed as a result of this rulemaking. Accordingly, we intend to define an area around existing DBS feeder link earth stations that transmit in the 17.3 - 17.7 GHz band,[465] within which 17/24 GHz BSS receiving earth stations cannot claim protection from the DBS feeder uplink transmissions. We discuss this issue in more detail below.

3. Protection Zones for Existing DBS Uplink Facilities

152. ***Comment Invited on Two Protection Zone Options:*** We propose to limit any protection zone to some area surrounding the specific geographic location and frequencies within the 17.3 – 17.7 GHz BSS band in which the DBS feeder link earth station licensee is already authorized to transmit. In addition, we agree that the feeder link operator should have some ability to upgrade facilities at existing sites, as long as the modification does not cause any

[459] *17/24 GHz BSS NPRM*, 21 FCC Rcd at 7454, para. 58.

[460] *Id.*

[461] DIRECTV Comments at 21.

[462] *Id.*

[463] *Id.*

[464] EchoStar Comments at Technical Annex at 21.

[465] For a listing of currently authorized earth stations operating in the 17.3-17.7 GHz band, see Appendix G.

increase in interference to 17/24 GHz BSS receiving antennas outside of the defined protection zone.

153. We seek comment on these tentative conclusions and on how a protection zone should be defined. One option is to define the boundary of the protection zone as a fixed distance away from the coordinates of the DBS Feeder Link Earth Station. DIRECTV presents an analysis demonstrating that, in the absence of shielding, the separation distance between a DBS feeder link earth station and a receiving 17/24 GHz subscriber antenna can become significant, *i.e.*, on the order of 22 miles.[466] EchoStar suggests that likely separation distances necessary to mitigate groundpath interference are on the order of 10 to 60 miles.[467] SES Americom states that levels of interference could be harmful if the subscriber earth station is located within 20-30 km (12.5-18.6 miles) of the DBS feeder link station.[468]

154. We note too that the DBS feeder link earth station's transmissions will not be equal in all directions, but will vary in part as a function of azimuth and elevation angle, and this picture may be complicated by the presence of multiple transmitting antennas at a particular site. In addition, we recognize that different areas of the country will have differing climate, rainfall and terrain conditions that will also mitigate groundpath interference. Accordingly, a second option is to employ a more detailed methodology that takes into account these site-specific characteristics, rather than imposes a uniform radius around the earth station coordinates. Parties supporting this approach should explain in detail how exactly they would adjust for climate, rainfall, or terrain conditions, or any other variables that they believe should be reflected in the protection zone.

155. Thus, we invite comment on each of the two protection zone options set forth above: (1) to set the boundary at some fixed distance from the DBS feeder link earth station; or (2) to adjust that boundary to account for climate, terrain, or other considerations. We also seek comment on any other approaches we might adopt. Commenting parties should provide specific details on any such proposal.

4. Upgrades To Grandfathered Facilities

156. ***Comments Sought on Extension of Grandfathered Facilities:*** EchoStar urges the Commission to make clear that any protection is afforded to existing DBS uplink *sites*, and not just to currently licensed earth stations to protect the operator's ability to expand their existing uplink sites.[469] EchoStar argues that this approach would promote efficiency by reducing the number of new geographically diverse sites.[470] Specifically, EchoStar proposes that "grandfathering" would apply both to existing earth stations and to new earth stations located "within a mile of the easternmost, westernmost, northernmost and southernmost coordinates of

[466] DIRECTV Comments at 20. For the shielded case this distance is reduced to approximately 4 miles. DIRECTV's analysis necessarily assumes characteristics for both the transmitting and receiving antenna, but these may not reflect all interference situations.

[467] EchoStar Reply Comments, Technical Annex at 18.

[468] SES Americom Comments at 19.

[469] EchoStar Comments at Technical Annex at 21 (emphasis in original).

[470] EchoStar Comments at Technical Annex at 21, EchoStar Reply Comments at Technical Annex at 18.

existing earth stations in each site."[471] We seek comment on EchoStar's proposal to extend "grandfathered" status to any new earth stations located within a mile of an existing earth station site.[472] Parties commenting on this proposal should explain in detail the reasons for their positions. Among other things, we invite comment on whether, and to what extent, adding new DBS feeder link earth stations within a mile of an existing DBS feeder link earth station is likely to increase the probability of harmful interference to 17/24 GHz BSS receivers.

157. As an alternative approach, we could define a pfd level at the boundary of the protection zone that would take into account the cumulative effect of any modified operations of the existing earth station site. If these modified operations do not exceed this pfd level, the modification would not be subject to the new coordination requirements. We seek comment on this approach. We also seek comment on what pfd level at the boundary might be suitable.

5. Coordination Between DBS and 17/24 GHz BSS Operators

a. Background

158. Commenters addressing the issue of new DBS feeder link earth stations recognize that to protect the interests of 17/24 GHz BSS consumers, these earth stations will need to be subject to some restrictions.[473] As detailed below, we seek comment on developing a coordination zone and a coordination methodology.

b. Coordination Zone

159. ***Comment Sought on Coordination Zones:*** In the *NPRM*, the Commission observed that its rules do not contain a procedure to coordinate co-frequency, DBS feeder link earth stations with BSS subscriber terminals.[474] Consequently, the Commission proposed to establish "coordination zones" or, in other words, areas around DBS feeder link earth stations in which coordination would be required. The Commission proposed to define these areas based on the methodology outlined in Annex 3 of Appendix 7 of the ITU Radio Regulations.[475]

160. The Commission further observed that it had used Appendix 7 as the basis of other coordination rules it had adopted.[476] The Commission also noted, however, that Table 9b of Appendix 7, which includes data needed for determining the coordination zone for services in several frequency bands, does not include some data needed for determining the coordination zone for services in the 17.3-17.8 GHz band.[477] Accordingly, the Commission invited parties to recommend data for a table based on Table 9b that would allow operators to calculate

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[471] EchoStar Comments at Technical Annex at 21.

[472] EchoStar Comments at Technical Annex at 21.

[473] DIRECTV Comments at 21; EchoStar Comments at Technical Annex at 21; SES Americom Comments at 19, DIRECTV Reply Comments at 27; EchoStar Reply Comments at 13, SES Americom Reply Comments at 15.

[474] *17/24 GHz BSS NPRM*, 21 FCC Rcd at 7454, para. 59.

[475] *17/24 GHz BSS NPRM*, 21 FCC Rcd at 7454, para. 59.

[476] *17/24 GHz BSS NPRM*, 21 FCC Rcd at 7454, paras. 59-60, *citing* Section 25.203(c) of the Commission's rules, 47 C.F.R. § 25.203(c).

[477] *17/24 GHz BSS NPRM*, 21 FCC Rcd at 7454, para. 60.

coordination areas for the 17.3-17.8 GHz band in a way comparable to the method operators in other frequency bands use Table 9b to determine their coordination distances.

161. Consistent with our proposal in the *NPRM,* we tentatively conclude that use of the procedure in Table 9b to establish the coordination zone for DBS feeder link earth stations and BSS subscriber terminals is appropriate. In this *FNPRM*, we seek comment on the specific values for Table 9b as set forth below. We seek comment on the appropriateness of this approach. Parties proposing an alternative set of values should provide a detailed justification for those values.

Table 9b

Parameters required for the determination of coordination distance for a transmitting earth station in bands shared bidirectionally with receiving earth stations

Parameter(s)		Value	Description
Orbit		GSO	Orbit in which the space service in which receiving earth station operates (GSO or NGSO)
Modulation at receiving earth station		N	Analog or digital
Receiving earth station interference parameters and criteria	p_0 (%)	0.003	Percentage of the time during which interference from all sources may exceed the threshold value
	N	2	Number of equivalent, equal level, equal probability entries of interference, assumed to be uncorrelated for small percentages of the time
	p(%)	0.0015	Percentage of the time during which the interference from one source may exceed the permissible interference power value; since the entries of interference are not likely to occur simultaneously, $p=p_0/n$
	N_L (dB)	1	Link noise contribution
	M_s (dB)	5	Link performance margin
	W (dB)	0	A thermal noise equivalence factor for interfering emissions in the reference bandwidth; it is positive when the interfering emissions would cause more degradation than thermal noise
Receiving earth station parameters	G_m (dBi)	36	On-axis gain of the receive earth station antenna
	G_r	10	Horizon antenna gain for the receive earth station
	ε_{min}	5°	Minimum elevation angle of operation in degrees
	T_e (K)	300K	The thermal noise temperature of the receiving system at the terminal of the receiving antenna. *See* § 2.1 of Annex 7 to Appendix 7 of the ITU Radio Regulations which provides a default value for two earth stations operating in opposite directions of transmission at frequencies greater than 17/24 GHz.
Reference Bandwidth	B (Hz)	1.0×10^6	Reference bandwidth (Hz), *i.e.,* the bandwidth in the receiving station that is subject to the interference and over which the power of the interfering emission can be averaged
Permissible interference power	$P_r(p)$ (dBW) in B	-139.5	Permissible interference power of the interfering emission (dBW) in the reference bandwidth to be exceeded no more than p% of the time at the receiving antenna terminal of a station subject to

			interference, from a single source of interference, using the general formula: $P_r(p) = 10 \log (k T_e B) + N_L + 10 \log (10^{Ms/10} - 1) - W$

162. DIRECTV proposes that the Commission establish a coordination zone around any new DBS feeder uplink earth stations and that within this zone, a new the DBS operator would be required to coordinate its operations with 17/24 GHz BSS subscriber earth stations.[478] DIRECTV asserts further that this process would be greatly facilitated if new DBS uplink facilities were required to operate with strict pfd limits on transmissions toward the horizon and/or to employ shielding.[479] Although DIRECTV suggests that this coordination zone could be relatively large (*e.g.*, 10 km)[480] it proposes no specific methodology for how such a zone might be defined, nor does it propose pfd limits in the direction of the horizon.

163. However, EchoStar proposes that, rather than defining a coordination zone, the Commission should define an area around any new DBS feeder link earth station within which 17/24 GHz BSS earth stations would become, in effect, secondary to the DBS operation and thus would required to accept all interference.[481] For this reason, EchoStar contends that the methodology of Appendix 7 is not likely to determine particularly realistic separation distances, as it is intended to calculate threshold separations to initiate coordination.[482] EchoStar also contends that there are several other methodologies that the Commission might consider for determining the spacing between DBS feeder link stations and 17/24 GHz BSS earth stations. Specifically, EchoStar suggests that ITU-R Recommendation P.452 defines a general propagation model that could be applied, and ITU-R Recommendation S.1712, although intended for the 14 GHz band, might provide additional useful methodologies that could be extrapolated to the 17 GHz band.[483] In addition, EchoStar proposes that the choice of methodology for computing the separation distance should be left to the operators concerned.[484]

164. Accordingly, we seek comment on the above proposals, and which, if any we should adopt to facilitate reverse-band operations in the 17 GHz band. As an initial matter, we request interested parties to discuss whether the Commission should adopt a coordination zone of any type, or whether the defined zone should be an area in which the 17/24 GHz BSS is

[478] DIRECTV Comments at 21.

[479] DIRECTV Comments at 21.

[480] DIRECTV Comments at 22.

[481] EchoStar Comments at Technical Annex at 21-22.

[482] EchoStar Reply Comments at Technical Annex at 17-18. Since Appendix 7 was intended for calculating thresholds to initiate coordination, it may not be particularly realistic as a basis for separation distances used in the BSS.

[483] *Id*.

[484] EchoStar Comments at Technical Annex at 21-22; EchoStar Reply Comments at Technical Annex at 18. EchoStar makes this proposal in conjunction with a proposal to limit new DBS feeder link earth stations to low-population areas. We address this proposal in more detail below.

secondary to DBS as EchoStar recommends. We invite interested parties to discuss whether they prefer to define such a zone using a methodology based on Appendix 7, Annex 3 as proposed in the *NPRM*, or based on one of the ITU recommendations suggested by EchoStar (*i.e.*, ITU-R Recommendation P.452 or S.1712). We request comment on all these proposals, and invite commenters to propose different coordination or separation distances, provided that they can provide adequate justification on the record for their proposals.

165. In addition, we seek comment on whether we should permit operators to determine jointly among themselves the choice of methodology to calculate the corresponding separation distance as EchoStar suggests. We also seek comment on how, under this approach, established 17/24 GHz BSS subscriber antennas might be protected from interference from newer DBS feeder link operations seeking to locate nearby. Such parties should explain in detail why they support their preferred methodology, and why they believe their methodology is superior to other options. Finally, we invite parties to recommend the appropriate parameter values necessary to employ the method they support.

c. Coordination Methodology

166. ***Comment Sought on Coordination Methodology:*** We invite comment here on the methodology to be used within that zone to coordinate DBS feeder links and 17/24 GHz BSS earth stations, should the Commission adopt a coordination zone as discussed above. The *NPRM* envisioned that both DBS operators and 17/24 GHz BSS operators will be deploying new earth stations over time, so that new stations of one service will continually be established among existing stations from the other.[485] The Commission made a similar observation in the *MVDDS Second R&O*,[486] in which it addressed a frequency sharing situation that presented ground path interference issues and gradual build-out of interspersed earth stations similar to those we envision in the 17.3-17.7 GHz band.[487]

167. In the *MVDDS Second R&O*, the Commission concluded that careful MVDDS system design and the use of various mitigation techniques could achieve successful sharing of the 12 GHz frequency band by both services.[488] To accomplish this goal, the Commission adopted, among other things, a coordination procedure that requires that a MVDDS operator entering a market where DBS receivers are already established must satisfy certain requirements in order to protect these customers.[489] In addition, a mechanism is established for information

[485] *See 17/24 GHz BSS NPRM*, 21 FCC Rcd at 7457, para. 63.

[486] Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range; Amendment of the Commission's Rules to Authorize Subsidiary Terrestrial Use of the 12.2-12.7 GHz Band by Direct Broadcast Satellite Licensees and Their Affiliates; and Applications of Broadwave USA, PDC Broadband Corporation, and Satellite Receivers, Ltd. to Provide a Fixed Service in the 12.2-12.7 GHz Band. *Memorandum Opinion and Order and Second Report and Order*, 17 FCC Rcd 9614 (2002) ("*MVDDS Second R&O"*), *cited in NPRM*, 21 FCC Rcd at 7457 (para. 63).

[487] *See 17/24 GHz BSS NPRM*, 21 FCC Rcd at 7457, para. 63. In the 12 GHz band, two co-primary, co-frequency services sought to operate in a sharing scenario where ubiquitous and ongoing deployment of earth stations from both services was anticipated; the incumbent DBS receive-only antennas were subject to interference from the introduction of transmitting MVDDS stations.

[488] *MVDDS Second R&O*, 17 FCC Rcd at 9653, para. 88.

[489] *See* 47 C.F.R. §101.144(d).

exchange between the operators of both services, in particular to take into account recently acquired DBS customers.[490] The *NPRM* sought comment on whether we should adopt a similar approach to sharing between DBS feeder link earth stations and 17/24 GHz BSS receiving earth stations.[491] We seek further comment here. Specifically we ask whether we should adopt service rules similar to those in Section 25.203(c), requiring all applications for new (non-grandfathered) DBS feeder link earth stations or new 17 GHz transmitting TT&C stations to complete prior frequency coordination with existing and planned 17/24 GHz BSS receiving stations.

168. The Commission recognizes that requiring 17/24 GHz BSS operators to make available a list of their subscriber earth stations raises issues of sensitive customer information, particularly if the DBS feeder link applicant is also a competitor. Accordingly, we tentatively conclude that use of a neutral, third-party frequency coordinator is appropriate to assuage such concerns. Thus, we propose that, prior to filing an application with the Commission, a DBS operator planning a new feeder link earth station or 17 GHz transmitting TT&C station must provide certain specified technical information to a qualified frequency coordinator. The frequency coordinator would make this technical information available to all licensed 17/24 GHz operators. Interested parties could obtain both a list of potentially-affected and active 17/24 GHz BSS customer locations that are within a defined coordination area, as well as a list of potentially-affected 17/24 GHz TT&C earth stations for which applications are on file with the Commission within the defined coordination area. The 17/24 GHz BSS operators would be required to provide these lists within 30 days upon receipt of the new DBS feeder link earth station technical information and the notice. A DBS operator would be allowed to file an application with the Commission for a new DBS feeder link or TT&C transmitting earth station within 6 months of successfully completing coordination with all stations on these lists. If the Commission grants a license for the newly proposed 17 GHz transmitting station, any 17/24 GHz receiving earth station not on these lists would be unable to claim protection from this new DBS feeder link earth station. We seek comment on this proposal, and on the method that should be employed to calculate such a coordination area.

169. We also seek comment on the types of technical information DBS feeder link earth station operators should make available for the purposes of earth station coordination with 17/24 GHz BSS operators. In the case of satellite and terrestrial earth station coordination, Commission rules now require that all transmitting satellite earth station applicants submit an interference analysis as required by Section 25.203 of the Commission's rules.[492] Section

[490] *See MVDDS Second R&O*, 17 FCC Rcd at 9653, para. 88. MVDDS operators are required to provide DBS operators with specific technical information concerning its planned operation. After receipt of the MVDDS system information the DBS licensees must provide the MVDDS licensee with a list of any new DBS customer locations that have been installed following the MVDDS notification. At this time, DBS licensees may also provide the MVDDS operator with additional information regarding affected customer locations, or comment on its analysis, including its agreement. Before beginning operations, the MVDDS operator must take into account existing as well as the new DBS customers of record, and ensure that its operations do not cause interference. Once the time period prescribed for this information exchange has passed, any new DBS receive antennas must be installed in a manner to avoid interference from the MVDDS signal. These later installed DBS earth stations have no right of complaint against the notified MVDDS transmitting antenna.

[491] *17/24 GHz BSS NPRM*, 21 FCC Rcd at 7457-58, para. 64.

[492] *See* 47 C.F.R. § 25.203(b)(2) (requiring earth station applicants to provide each terrestrial station licensee with certain specific technical details).

25.203(c)(2) requires that the earth station applicant provide each terrestrial station licensee with specific technical details. Similarly, we propose that DBS feeder link earth station applicants provide the following information to the qualified frequency coordinator:[493]

(i) The geographical coordinates of the proposed earth station antenna(s);

(ii) Proposed operating frequency band(s) and emission(s);

(iii) Antenna diameter (meters)

(iv) Antenna center height above ground and ground elevation above mean sea level;

(v) Antenna gain pattern(s) in the plane of the main beam;

(vi) Longitude range of geostationary satellite orbit (GSO) satellites at which an antenna may be pointed, for proposed earth station antenna(s) accessing GSO satellites;

(vii) Horizon elevation plot;

(viii) Antenna horizon gain plot(s) determined in accordance with the procedure in Section 2.1 of Annex 5 to Appendix 7 of the ITU Radio Regulations;

(ix) Minimum elevation angle;

(x) Maximum equivalent isotropically radiated power (EIRP) density in the main beam in any 1 MHz[494] band;

(xi) Maximum available RF transmit power density in any 1 MHz[495] band at the input terminals of the antenna(s);

(xii) A plot of the coordination distance contour(s) and rain scatter coordination distance contour(s) as determined by Table 2 of Section 3 to Appendix 7.

We ask what reference bandwidths would be appropriate in items (x) and (xi). In addition, we seek comment on whether the parameters listed here or other technical information would be appropriate to provide in order to facilitate coordination between new DBS feeder link earth stations and receiving 17/24 GHz BSS antennas.

6. Other Measures to Protect 17/24 GHz BBS Operations

a. Background

170. ***Comment Sought on Other Measures, Including Power Level Limits, Geographic Restriction of Earth Stations, Showing Requirements for Co-Location and Earth Station Shielding:*** In addition to the protection zone and coordination requirements proposed

[493] This list of parameters differs slightly from the one currently specified in § 25.203(c)(2). We have deleted the parameter "Maximum permissible RF interference power level as determined in accordance with Annex 7 to Appendix 7 for all applicable percentages of time." This parameter applies in mutual interference protection situations, and is not applicable to the case of the DBS feeder link earth station that will not seek protection from receive-only 17/24 GHz BSS earth stations.

[494] We note that Section 25.203 stipulates a reference bandwidth of 4 kHz for frequency bands below 15 GHz and 1 MHz for frequency bands above 15 GHz.

[495] Section 25.203 stipulates reference bandwidths of both 1 MHz and 4 kHz.

above, some commenters assert that further measures are necessary to protect 17/24 GHz BSS earth stations from harmful interference from DBS feeder link earth stations. Those measures include: (1) limits on DBS feeder link earth station EIRP toward the horizon; (2) placement of new DBS feeder link facilities in low-population density areas; (3) technical showing requirements for co-located DBS and 17/24 GHz BSS earth stations; and (4) antenna shielding requirements.[496] These proposed approaches are not necessarily mutually exclusive, and it is entirely possible that we might employ several methods in combination with each other, as well as adopting the protection zone and coordination requirements discussed above. Moreover, as DIRECTV correctly notes, a decision to employ one approach may influence the extent to which we simultaneously apply another.[497] However, no commenter has been specific in its proposals, nor provided a comprehensive approach necessary to definitively address the issue. Consequently, we do not believe that the record is sufficiently developed so that we may determine whether to adopt requirements at this time.

171. Accordingly, we invite further comment on each of the additional measures suggested by commenters. In particular, commenters supporting any of these proposals should explain in detail why that additional measure would be necessary to protect 17/24 GHz BSS earth stations from harmful interference, in the event that we adopt coordination procedures of the kind discussed above. Moreover, such commenters should discuss whether they support adoption of all the additional measures discussed here, or whether some of the additional measures would provide adequate protection from harmful interference.

b. Power Level Limits

172. In the *NPRM*, the Commission noted that Section 25.204(b) of the Commission's rules places limits on earth station EIRP in bands above 15 GHz shared coequally with terrestrial radiocommunication services, in order to facilitate sharing with these services.[498] The Commission sought comment on whether the Commission should extend this requirement to new DBS feeder link earth stations operating in the entire 17.3-17.7 GHz band.[499] The Commission

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[496] SES Americom Comments at 19, EchoStar Comments, Technical Annex at 22, DIRECTV Comments at 21-22, SES Americom Reply Comments at 15, EchoStar Reply Comments at 13, DIRECTV Reply Comments at 27-28.

[497] DIRECTV Reply Comments at 28. Specifically DIRECTV notes that, if we rely on EIRP limits to determine a separation distance, as EchoStar suggests, that the EIRP limit must be relatively strict in order to ensure that the zone of affected subscribers is reasonably small. By contrast, EIRP limits used to determine a coordination zone could be more relaxed.

[498] *See 17/24 GHz BSS NPRM*, 21 FCC Rcd at 7458-59, para. 66. *See also* 47 C.F.R. § 25.204(b), which states that "in bands shared coequally with terrestrial radio-communication services, the equivalent isotropically radiated power transmitted in any direction towards the horizon by an earth station operating in frequency bands above 15 GHz shall not exceed the following limits except as provided for in paragraph (c) of this section:

$+64$ dBW in any 1 MHz band for $\theta < 0^\circ$

$+64 + 3\theta$ dBW in any 1 MHz band for $0^\circ < \theta < 5^\circ$

where θ is as defined in paragraph (a) of this section."

[499] *17/24 GHz BSS NPRM*, 21 FCC Rcd at 7458-59, para. 66. The *NPRM* also recognized that this rule was not intended to facilitate sharing among DBS and BSS earth stations, and it is applicable to DBS feeder link earth stations only in the band segment 17.7-17.8 GHz that is shared with terrestrial services.

also asked whether the EIRP density limits in Sections 25.204(b) through (e) would be sufficient to protect 17/24 GHz BSS earth stations, or if DBS feeder link earth stations should meet some more stringent requirements.[500] We seek further comment on these questions.

173. Under EchoStar's power limit proposal, new DBS earth stations would be constrained only in terms of EIRP density toward the horizon.[501] We invite comment on whether any such limit would be necessary if we adopt a coordination procedure as discussed above. Alternatively, we ask whether the adoption of EIRP density limits toward the horizon would obviate the need for coordination procedures. Advocates of EIRP density limits should include a specific limit in their discussions, and advocates of both approaches should provide adequate justification for their recommendations.

c. Restrictions on Placement of New DBS Earth Stations

174. DIRECTV and EchoStar advocate requiring DBS feeder link earth station operators to locate their earth stations only in areas of low population density.[502] Although neither define precisely how such sparely populated locations would be determined, DIRECTV notes that counties with populations less that ten people per square mile comprise a significant portion of the contiguous United States.[503] We seek comment on this approach, either alone, or in conjunction with other proposals, and ask how the Commission should determine what constitutes a low-population density site. We also request parties to explain how DBS feeder link operators would be able to protect 17/24 GHz BSS consumer earth stations that are already deployed in these areas.

175. EchoStar makes its proposal to restrict new DBS feeder link earth stations to low population-density areas in conjunction with its proposal to require those earth stations to meet strict off-axis EIRP density limits towards the horizon.[504] Presumably however, even areas of low population density may contain 17/24 GHz BSS subscribers. Thus, although this approach might be applied to new DBS feeder uplink stations locating in areas yet unoccupied by 17/24 GHz BSS subscriber earth stations, EchoStar does not make clear how subscriber terminals would be protected if the DBS applicant sought to locate in an area where 17/24 GHz BSS consumer earth stations were already deployed. We request commenters to address this issue.

d. Technical Showing Requirement for Co-Located Earth Stations

176. The *NPRM* also addressed groundpath interference that may occur between transmitting DBS feeder uplinks and the receiving telemetry stations of 17/24 GHz BSS systems

[500] *17/24 GHz BSS NPRM*, 21 FCC Rcd at 7458-59, para. 66.

[501] EchoStar Comments at Technical Annex at 22; EchoStar Reply at Technical Annex at 17. EchoStar makes this proposal in conjunction with a proposal to restrict new DBS feeder link earth stations to low-population areas. We discuss that proposal in more detail below.

[502] EchoStar Comments at Technical Annex at 22, EchoStar Reply at Technical Annex at 17.

[503] DIRECTV Reply Comments at 28.

[504] EchoStar Comments at Technical Annex at 21-22.

that choose to locate their TT&C facilities at or near to existing DBS feeder uplink sites.[505] The Commission recognized that choice of facility site is a system design parameter that is under the control of the operator, and does not necessarily require a Commission action to remedy. Moreover, given the large financial investment required to launch and operate a satellite, we believe that 17/24 GHz BSS operators have strong incentive to make correct technical decisions with regard to their choice of TT&C facility sites and equipment design. However, the *NPRM* also recognized that interference into TT&C systems can present a serious problem due to the potential for loss of satellite control, and sought comment on whether the Commission should adopt requirements to guard against such scenarios.[506]

177. Specifically, the Commission proposed to require earth station applicants planning to co-locate their 17/24 GHz BSS TT&C stations with DBS feeder link earth stations to make a technical showing to the Commission demonstrating their ability to maintain sufficient margin in their telemetry links in the presence of the interfering DBS signal.[507] Similarly, the Commission proposed to require DBS feeder link earth station applicants planning to co-locate with their 17/24 GHz BSS telemetry earth stations to make an analogous technical showing to the Commission.[508] The Commission sought comment on these proposals and asked what parameters would be appropriate in such a showing.[509] It also asked whether it should preclude co-location of 17 GHz BSS TT&C and DBS feeder link facilities altogether, or whether it should require some minimum separation between such facilities.[510]

178. DIRECTV responds that, with careful planning, it should be possible to coordinate the operations of these two services, even to the point where the facilities can be co-located.[511] Accordingly, DIRECTV does not believe that the Commission should limit operator flexibility by precluding such co-location or by requiring some minimum separation distance. Rather, DIRECTV supports the Commission's proposal that operators seeking to co-locate such facilities should be required to make a technical showing demonstrating their ability to maintain sufficient margin in the 17/24 GHz BSS telemetry links in the presence of the interfering DBS signal. DIRECTV asserts that this will enable those operators who want to capture the efficiencies of co-location to do so, provided they can prove to the Commission that receipt of critical 17/24 GHz BSS telemetry data will not be subject to disruption.[512] EchoStar also believes that such interference can be avoided by careful frequency planning of the 17 GHz uplink and downlink signals, and believes that this frequency planning can be conducted by the operator alone, within its own earth station complex.[513] Accordingly, we will restate the proposal

[505] *17/24 GHz BSS NPRM*, 21 FCC Rcd at 7459, para. 67.

[506] *Id.*

[507] *Id.*

[508] *Id.*

[509] *Id.*

[510] *Id.*

[511] *See* DIRECTV Comments at 22.

[512] *See* DIRECTV Comments at 22.

[513] *See* EchoStar Comments at Technical Annex at 23.

to require a technical showing to the Commission in the event of co-location of DBS feeder link and 17/24 GHz BSS telemetry earth stations, and seek any further comment on the issue.

e. Shielding

179. We also seek comment on whether we should impose any additional requirements on either DBS feeder link earth station operators or on 17/24 GHz BSS operators in order to mitigate interference into 17/24 GHz BSS subscriber receiving antennas. We ask whether, as most commenters suggest,[514] a requirement to employ shielding should be adopted in conjunction with any of the approaches discussed above, and if so what form such a requirement might take.

B. Space Path Interference in Reverse Band Operations

180. ***Comment Sought on Protection Method for DBS Satellite and Associated BSS Information Required to Effect Protection:*** The *NPRM* sought comment on how best to manage the problem of space path interference arising when the transmitted signals from 17/24 GHz BSS satellites are received by the feeder link receivers on satellites operating in the DBS service.[515] In addition, the *NPRM* sought comment on the particular instance where applicants sought to locate within the same cluster as co-frequency receiving DBS satellites and asked whether this was feasible at all, and if so what measures might be required to facilitate such co-clustering.[516] The Commission also sought comment on the more general question of locating 17/24 GHz BSS satellites at close distances to co-frequency DBS satellites and asked what measures, including a minimum orbital separation requirement, off-axis EIRP limits, antenna discrimination requirements, or other requirements might be adopted to protect DBS receiving antennas from unacceptable interference.[517] Finally the *NPRM* sought comment on the particular problem of interference to DBS TT&C transmissions in the 17 GHz band that could result in loss of satellite control.[518] The Commission proposed to require 17/24 GHz BSS space station applicants seeking to co-locate with DBS satellites to make a technical showing demonstrating their ability to sufficiently minimize interference such that adequate margin is maintained in the DBS telecommand links.[519] An analogous requirement was proposed for any future DBS applicant seeking to co-locate with 17/24 BSS satellites to make a similar technical showing demonstrating its ability to maintain sufficient TT&C link margin.[520]

181. Commenters addressing these issues all realize the potential for space path interference between 17/24 GHz BSS and DBS satellites, but generally maintain that co-location is feasible at relatively small orbital separations, typically on the order of a few tenths of a

[514] *See* DIRECTV Comments at 20; EchoStar Comments, Technical Annex at 21; SES Americom Comments at 19; DIRECTV Reply at 27; EchoStar Reply at 13; SES Americom Reply at 15.

[515] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7460-63, paras. 71-79.

[516] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7462, para. 76.

[517] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7462, para. 77.

[518] *See 17/24 GHz BSS NPRM,* 21 FCC Rcd at 7462, para. 78.

[519] *Id.*

[520] *Id.*

degree.[521] EchoStar asserts that a separation of 0.4 degrees is sufficient, however only if the DBS and 17/24 BSS satellites are operated by the same licensee.[522] EchoStar argues that the risk of interference in such situations is most severe, and is best avoided by assigning space-to-Earth frequencies at that location only to the 17/24 GHz BSS operator that uses these same frequencies in the Earth-to-space direction for its DBS feeder link operations.[523] DIRECTV also believes that co-frequency operation may be possible at small orbital separations, but that this will depend upon a number of factors including the gain toward the GSO of both transmitting and receiving satellites as well as the desired protection level of the DBS system.[524] DIRECTV also believes that given the many uncertainties involved, it is best to permit only operators who control transmissions in both directions at a given location to locate in close proximity as they can best "self coordinate" their operations.[525] DIRECTV also suggest that the Commission may want to consider a strict off-axis gain specification for 17/24 GHz BSS satellites wishing to locate within a certain distance of a DBS satellite.[526]

182. SES Americom and Intelsat oppose the idea that 17/24 GHz BSS satellites seeking to operate at the same frequency and location as DBS satellites should only be licensed to the corresponding DBS licensee, arguing that this restriction is unnecessary and unfairly favors incumbent DBS operators.[527] SES Americom believes that spacepath interference issues can be resolved through the use of offset orbital locations and coordination between operators.[528] Similarly, Intelsat believes that a four-degree orbital spacing plan with small offsets in combination with coordination between operators will be sufficient to mitigate spacepath interference issues between closely spaced 17/24 GHz BSS and DBS satellites.[529] In Section III. D. of this Order, we require 17/24 GHz BSS satellite licensees to design their satellites to be capable of operating in a four-degree spacing environment. We will license satellites in this band only if they comply with the orbital spacing rules we adopt in this Order.

183. EchoStar also proposes that the spacepath interference into DBS receivers can be managed by establishing a pfd value at the victim (*i.e.*, DBS) receiver above which coordination is required. Specifically, EchoStar proposes a pfd threshold level at the victim satellite receiver of -93 dBW/m^2/24 MHz and derives this value from the ITU 6% $\Delta T/T$ requirement used to determine the need for coordination between Administrations, contained in Appendix 30A of the

[521] DIRECTV Comments at 25, SES Americom Comments at 20, EchoStar Comments at 4, DIRECTV Reply Comments at Appendix A, and Intelsat Reply Comments at 14. *See also* Erratum to DIRECTV Reply Comments at A-1, in which a supplementary analysis is presented demonstrating that under certain conditions, separations as small as 0.05 degrees may be feasible.

[522] EchoStar Comments at 10-12.

[523] *Id.*

[524] DIRECTV Comments at 26.

[525] *Id.*

[526] *Id.*

[527] Intelsat Reply Comments at 14, SES Americom Reply Comments at 12.

[528] SES Americom believes that minimum separations of 0.2-0.3 degrees are required. *See* Comments of SES Americom at 20.

[529] Intelsat Reply Comments at 14-15.

Radio Regulations.[530] EchoStar also proposes that the Commission should require a minimum separation between DBS and 17/24 GHz BSS satellites of at least 0.2-0.3 degrees, although these parameters might be relaxed in the event of agreement among all affected parties.[531]

184. We concur with EchoStar's proposed approach to managing spacepath interference between 17/24 GHz BSS and DBS satellites by requiring coordination when pfd values are exceeded at the DBS satellite receiver. This approach is consistent with the method used by the ITU[532] and has proved workable for international coordination of satellite systems. However, as EchoStar notes, its proposed pfd value depends in part on certain assumptions about the DBS off-axis receiving antenna gain[533] and may not afford sufficient to protection to all systems, particularly as DBS off-axis antenna gain patterns are not necessarily well known.[534] Accordingly, in order to protect receiving DBS satellites from unacceptable levels of interference, we propose to adopt an off-axis pfd coordination trigger of -93 dBW/m^2/24 MHz at the DBS receiving antenna. Coordination with affected co-frequency licensees, both existing and planned, would be required in the event that the 17/24 GHz BSS satellite exceeds this level at the DBS receiving antenna; coordination would not be required in cases where no frequency overlap occurs. We seek comment on this proposal and ask whether it is sufficient to protect existing DBS operations from interference, or whether some other approach or additional requirement might better protect DBS receiving antennas from unwanted spacepath interference. We also ask how such a requirement might apply to future DBS operations that might be affected, including in particular any replacement satellites.

185. We also seek comment on the particular information that 17/24 GHz BSS applicants should be required to submit to the Commission. Clearly, reliable information concerning the off-axis transmitting antenna gain of the 17/24 GHz BSS satellite will need to be made available. Presumably this information will need to include *all* frequencies in the 17.3 – 17.7(8) GHz range so that any future DBS applicant will also have sufficient information to protect its operations from unwanted interference. We seek comment on what form this information should take (*i.e.,* measured data, charts, graphs). We ask whether off-axis gain in the plane of the GSO is sufficient and over what angular range it should be provided (*e.g.*, ±30°, ±45° with respect to the plane passing through the x- and y-axes of the satellite.)

186. In its reply comments EchoStar also proposes the Commission adopt a minimum orbital separation between 17/24 GHz BSS and DBS satellites of 0.2-0.3 degrees.[535] SES Americom also believes that an orbital offset of at least 0.2-0.3 degrees is necessary for co-

[530] EchoStar Comments at 17 and Appendix A. *See also*, the ITU Radio Regulations, Annex 4 of Appendix 30A, § 7.1 of Article 7 of Appendix 30A.

[531] EchoStar Reply Comments at 9. In its comments, EchoStar cautions that such limits may be insufficient in instances of co-location, and may also result in less efficient use of spectrum. EchoStar Comments at 11.

[532] *See* Annex 4 of Appendix 30A of the ITU Radio Regulations.

[533] *See* Appendix A, Table A of EchoStar Comments. Specifically, this value was derived assuming a victim off-axis antenna gain toward the interfering satellite of 0 dBi, and is based on the technical parameters for DBS receiving antennas given in Section 3.7.3 of Annex 3 of Appendix 30A of the ITU Radio Regulations.

[534] EchoStar Comments at 32, DIRECTV Comments at 23.

[535] EchoStar Reply Comments at 9.

frequency operation of DBS and 17/24 GHz BSS satellites.[536] DIRECTV however indicates that a minimum orbital separation value as small as 0.05 degrees would be sufficient to permit co-frequency operation, provided modest care in satellite antenna design is employed.[537] We seek comment on EchoStar's proposal to require a minimum orbital separation between co-frequency operation of DBS and 17/24 GHz BSS satellites, and we ask what separation value is appropriate should we adopt such a requirement. We also seek comment on whether such a requirement is necessary should we adopt the pfd threshold and coordination requirements discussed above, particularly if, as EchoStar suggests, this separation value might be relaxed by agreement among the affected operators.

187. Finally, the *NPRM* sought comment on our proposal to protect DBS TT&C operations, particularly in recognition of the potential for loss of satellite control. DIRECTV comments on this proposal, asserting that the Commission should allow co-location of 17/24 GHz BSS and DBS space stations only if the affected DBS operator gives its consent, and only if the 17/24 GHz BSS applicant demonstrates its ability to maintain sufficient margin in the DBS telecommand links in the presence of the interfering 17/24 GHz BSS signal.[538] We believe this proposal has merit, for both 17/24 GHz BSS operators seeking to locate in close proximity to DBS satellites, and also in the case where DBS operators may seek to locate in close proximity to established 17/24 BSS GHz satellites. Accordingly, we propose to adopt a requirement that a 17/24 GHz BSS applicant proposing to locate its satellite in the vicinity of a DBS space station make a technical showing to the Commission demonstrating its ability to sufficiently minimize interference into the DBS systems, such that adequate margin is maintained in the DBS telecommand links in the presence of the interfering BSS signal. Similarly we will require that a DBS applicant proposing to locate its satellite in the vicinity of existing 17/24 GHz BSS space station make a technical showing to the Commission demonstrating its ability to maintain sufficient margin in its telecommand links in the presence of the interfering BSS signal. We seek comment on these proposals. We ask under what circumstances such a technical showing should be required, *e.g.*, co-location at less than some minimum distance, or on the basis of a threshold pfd value. We seek comment on whether the threshold pfd level of -93 dBW/m^2/MHz proposed above is also a suitable coordination trigger for DBS telecommand links, or whether some other value might be more appropriate. We also seek comment the maximum orbital separation distance at which would be appropriate to require such a technical showing.

188. SES Americom also commented on 17/24 GHz BSS interference into DBS telecommand links, stating that issues relating to space path interference can be resolved through offset of orbital locations and coordination between the involved operators with respect to TT&C frequencies.[539] SES Americom also stated that it believes that a frequency separation of as little as 500 kHz is adequate to prevent interference from the beacon of a 17/24 GHz BSS satellite into the command carrier of a DBS space station.[540] We seek comment on whether some minimum

[536] SES Americom Comments at 13.

[537] Erratum to DIRECTV Reply Comments at Appendix A.

[538] DIRECTV Comments at 23.

[539] SES Americom Comments at 20.

[540] SES Americom Comments at 20.

frequency separation is required between the signals transmitted by a 17/24 GHz BSS space station and the telecommand frequencies of DBS space station located in close proximity to the 17/24 GHz BSS space station, or a combination of frequency separation and pfd limits, and what the appropriate parameters would be.

V. CONCLUSION

189. With this Report and Order, we adopt licensing and service rules for the 17/24 GHz BSS that will facilitate the deployment of new broadband services. These rules include a first-come, first-served processing approach for licensing 17/24 GHz BSS applications, several safeguards (*e.g.*, bond requirements, milestones, and limit on number of applications), geographic service requirements to provide service to Alaska and Hawaii, and various public service obligations. We also adopt a Further Notice of Proposed Rulemaking to seek comment on technical issues related to reverse band operations to address potential interference concerns.

VI. PROCEDURAL MATTERS

A. Ex Parte

190. This proceeding shall be treated as a "permit-but-disclose" proceeding in accordance with the Commission's ex parte rules.[541] Persons making oral ex parte presentations are reminded that memoranda summarizing the presentations must contain summaries of the substance of the presentations and not merely a listing of the subjects discussed. More than a one- or two-sentence description of the views and arguments presented is generally required.[542] Other rules pertaining to oral and written presentations are set forth in Section 1.1206(b) of the Commission's rules as well.

B. Final Regulatory Flexibility Analysis

191. Pursuant to the Regulatory Flexibility Act (RFA),[543] an Initial Regulatory Flexibility Analysis (IRFA) was incorporated into the *NPRM*. The Commission sought written public comments on the possible significant economic impact of the proposed policies and rules on small entities in the *NPRM,* including comments on the IRFA. No one commented specifically on the IRFA. Pursuant to the RFA, a Final Regulatory Flexibility Analysis is contained in Appendix A.

C. Initial Regulatory Flexibility Analysis

192. Pursuant to the Regulatory Flexibility Act (RFA),[544] the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic

[541] 47 C.F.R. §§ 1.1200, 1.1206; Amendment of 47 C.F.R. § 1.1200 *et seq*. Concerning Ex Parte Presentations in Commission Proceedings, GC Docket No. 95-21, *Report and Order*, 12 FCC Rcd 7348 (1997).

[542] 47 C.F.R. § 1.1206(b)(2).

[543] *See* 5 U.S.C. § 603. The RFA has been amended by the Contract with America Advancement Act of 1996, Pub. L. No. 104-121, 110 Stat. 847 (1996) (CWAAA). Title II of the CWAAA is the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA).

[544] *See* 5 U.S.C. § 603. The RFA has been amended by the Contract with America Advancement Act of 1996, Pub. L. No. 104-121, 110 Stat. 847 (1996) (CWAAA). Title II of the CWAAA is the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA).

impact on small entities by the proposals considered in this *Further Notice of Proposed Rulemaking* ("*FNPRM*"). The text of the IRFA is set forth in Appendix H. Written public comments are requested on this IRFA. Comments must be filed in accordance with the same filing deadlines for comments on the *FNPRM*, and they should have a separate and distinct heading designating them as responses to the IRFA. The Commission will send a copy of the *Further Notice of Proposed Rulemaking*, including the IRFA, to the Chief Counsel for Advocacy of the Small Business Administration.[545]

D. Final Paperwork Reduction Act of 1995 Analysis

193. *Paperwork Reduction Act.* The actions contained herein have been analyzed with respect to the Paperwork Reduction Act of 1995 at the initiation of the Notice of Proposed Rulemaking in this proceeding, and we have previously received approval of the associated information collection requirements from the Office of Management and Budget (OMB) under OMB Control No. 3060-1097. The Report and Order and Further Notice of Proposed Rulemaking does not contain any new or modified "information collection burden for small business concerns with fewer than 25 employees," pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, *see* 44 U.S.C. 3506(c)(4).

E. Comment Filing Procedures

194. Pursuant to Sections 1.415 and 1.419 of the Commission's rules, *47 C.F.R. §§ 1.415, 1.419,* interested parties may file comments in response to this *FNPRM* no later than on or before 75 days after Federal Register publication. Reply comments to these comments may be filed no later than on or before 105 days after Federal Register publication. All pleadings are to reference IB Docket No. 06-123. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS) or by filing paper copies. Parties are strongly encouraged to file electronically. *See Electronic Filing of Documents in Rulemaking Proceedings, 63 Fed. Reg. 24,121 (1998).*

195. Comments filed through the ECFS can be sent as an electronic file via the Internet to http://www.fcc/gov/e-file/ecfs.html. Parties should transmit one copy of their comments to the docket in the caption of this rulemaking. In completing the transmittal screen, commenters should include their full name, U.S. Postal Service mailing address, and the applicable docket or rulemaking number. Parties may also submit an electronic comment by Internet e-mail. To get filing instructions for e-mail comments, commenters should send and e-mail to ecfs@fcc.gov and should include the following words in the body of the message, "get form <your e-mail address>." A sample form and directions will be sent in reply.

196. Parties choosing to file by paper must file an original and four copies of each filing in IB Docket No. 06-123. Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail (although we continue to experience delays in receiving U.S. Postal Service mail). If more than one docket or rulemaking number appears in the caption of this proceeding, commenters must submit two additional copies for each additional docket or rulemaking number. The Commission's mail contractor, Natek, Inc., will receive hand-delivered or messenger-delivered paper filings for the

[545] 5 U.S.C. § 603(a).

Commission's Secretary at 236 Massachusetts Avenue, N.E., Suite 110, Washington, D.C. 20002. The filing hours at this location are 8:00 a.m. to 7:00p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes must be disposed of before entering the building. Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743. U.S. Postal Service first-class mail, Express Mail, and Priority Mail should be addressed to 445 12th Street, S.W., Washington, D.C. 20554. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

197. Comments submitted on diskette should be on a 3.5 inch diskette formatted in an IBM-compatible format using Word for Windows or compatible software. The diskette should be clearly labeled with the commenter's name, proceeding (including the docket number, in this case, IB Docket No. 06-123), type of pleading (comment or reply comment), date of submission, and the name of the electronic file on the diskette. The label should also include the following phrase "Disk Copy - Not an Original." Each diskette should contain only one party's pleadings, preferably in a single electronic file.

198. All parties must file one copy of each pleading electronically or by paper to each of the following: (1) The Commission's duplicating contractor, Best Copy and Printing, Inc., 445 12th Street, S.W., Room CY-B402, Washington, D.C. 20554, telephone (202) 488-5300, facsimile (202) 488-5563, or via e-mail at FCC@BCPIWEB.COM.

199. Comments and reply comments and any other filed documents in this matter may be obtained from Best Copy and Printing, Inc., in person at 445 12th Street, S.W., Room CY-B402, Washington, D.C. 20554, via telephone at (202) 488-5300, via facsimile (202) 488-5563, or via e-mail at FCC@BCPIWEB.COM. The pleadings will be also available for public inspection and copying during regular business hours in the FCC Reference Information Center, Room CY-A257, 445 Twelfth Street, S.W., Washington, D.C. 20554 and through the Commission's Electronic Filing System (ECFS) accessible on the Commission's World Wide Website, www.fcc.gov.

200. Comments and reply comments must include a short and concise summary of the substantive arguments raised in the pleading. Comments and reply comments must also comply with Section 1.49 and all other applicable sections of the Commission's rules.[546] All parties are encouraged to utilize a table of contents, and to include the name of the filing party and the date of the filing on each page of their submission. We also strongly encourage that parties track the organization set forth in this *NPRM* in order to facilitate our internal review process.

201. Commenters who file information that they believe is proprietary may request confidential treatment pursuant to Section 0.459 of the Commission's rules. Commenters should file both their original comments for which they request confidentiality and redacted comments, along with their request for confidential treatment. Commenters should not file proprietary information electronically. *See* Examination of Current Policy Concerning the Treatment of Confidential Information Submitted to the Commission, *Report and Order*, 13 FCC Rcd 24816 (1998), *Order on Reconsideration*, 14 FCC Rcd 20128 (1999). Even if the Commission grants confidential treatment, information that does not fall within a specific exemption pursuant to the

[546] 47 C.F.R. § 1.49.

Freedom of Information Act (FOIA) must be publicly disclosed pursuant to an appropriate request. *See* 47 C.F.R. § 0.461; 5 U.S.C. § 552. We note that the Commission may grant requests for confidential treatment either conditionally or unconditionally. As such, we note that the Commission has the discretion to release information on public interest grounds that does fall within the scope of a FOIA exemption.

VII. ORDERING CLAUSES

202. Accordingly, IT IS ORDERED that, pursuant to the authority contained in Sections 1, 4(i), 4(j), 7(a), 301, 303(c), 303(f), 303(g), 303(r), 303(y), and 308 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 154(i), 154(j), 157(a), 301, 303(c), 303(f), 303(g), 303(r), 303(y), 308, this *Report and Order* IS ADOPTED.

203. IT IS FURTHER ORDERED that Part 25 of the Commission's rules IS AMENDED as set forth in Appendix B. An announcement of the effective date of these rule revisions will be published in the Federal Register.

204. IT IS FURTHER ORDERED that from the release date of this Order until a date and time designated by the International Bureau, no applications for authority to provide service to the United States using the 17.3-17.7 GHz (space-to-Earth) and 24.75-25.25 GHz (Earth-to-space) frequency bands or to provide international satellite service using the 17.7-17.8 GHz (space-to-Earth) frequency band will be accepted for filing. The freeze does not apply to amendments to the pending applications listed in Appendix E to conform the applications to the rules adopted in this Order.

205. IT IS FURTHER ORDERED that the International Bureau is delegated authority to issue Public Notices consistent with this *Report and Order*.

206. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center shall send a copy of this *Report And Order*, including the final regulatory flexibility analysis, to the Chief Counsel for Advocacy of the Small Business Administration, in accordance with Section 603(a) of the Regulatory Flexibility Act, 5 U.S.C. § 601, *et seq.* (1981).

207. IT IS FURTHER ORDERED that, pursuant to the authority contained in sections 4(i), 303(r), and 309(j) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 303(r), and 309(j), this *Further Notice of Proposed Rulemaking* IS ADOPTED.

208. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center shall send a copy of this *Further Notice Of Proposed Rulemaking*, including the initial regulatory flexibility analysis, to the Chief Counsel for Advocacy of the Small Business Administration, in accordance with Section 603(a) of the Regulatory Flexibility Act, 5 U.S.C. § 601, *et seq*. (1981).

209. IT IS FURTHER ORDERED that the Commission SHALL SEND a copy of this *Report and Order and Further Notice of Proposed Rulemaking* in a report to be sent to Congress and the General Accountability Office pursuant to the Congressional Review Act, see 5 U.S.C. § 801(a)(1)(A).

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A

FINAL REGULATORY FLEXIBILITY ANALYSIS

As required by the Regulatory Flexibility Act of 1980, as amended (RFA),[547] an Initial Regulatory Flexibility Analysis (IRFA) was incorporated in 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, Notice of Proposed Rulemaking (*NPRM*), adopted on June 21, 2006.[548] The Commission sought written public comment on the proposals in the *NPRM,* including comment on the IRFA. This present Final Regulatory Flexibility Analysis (FRFA) conforms to the RFA.[549]

A. Need for, and Objectives of, the Report and Order

The objective of the Report and Order is to adopt processing and service rules for the 17/24 GHz Broadcasting-Satellite Service (BSS). This service will introduce a new generation of broadband services to the public, providing a mix of local and domestic video, audio, data, video-on-demand, and multimedia services to consumers in the United States. In some cases, these services will complement existing Direct Broadcast Satellite (DBS) services. Specifically, we adopt a first-come, first-served licensing procedure for the 17/24 GHz BSS, as well as various safeguards, reporting requirements, and licensee obligations. We also adopt geographic service rules to require 17/24 GHz BSS licensees to provide service to Alaska and Hawaii. In addition, we establish rules and requirements for orbital spacing, minimum antenna diameter, and antenna performance standards. Also, we establish limits for uplink and downlink power levels to minimize the possibility of harmful interference. Finally, we stipulate criteria to facilitate sharing in the 24 GHz and 17 GHz bands. By these actions, we facilitate the introduction of new and innovative services to consumers in the United States and promote increased competition among satellite and terrestrial services.

B. Summary of Significant Issues Raised by Public Comments in Response to the IRFA

There were no comments filed that specifically addressed the IRFA.

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[547] *See* 5 U.S.C. § 603. The RFA (*see* 5 U.S.C. § 601 – 612), has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[548] *See* 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, *Notice of Proposed Rulemaking*, 21 FCC Rcd 7426, 7476 (2006).

[549] *See* 5 U.S.C. § 604.

C. Description and Estimate of the Number of Small Entities to Which Rules Will Apply

The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that may be affected by the rules adopted herein.[550] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[551] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[552] A small business concern is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA).[553] Below, we further describe and estimate the number of small entity licensees that may be affected by the adopted rules.

Satellite Telecommunications. The SBA has developed a small business size standard for the two broad census categories of "Satellite Telecommunications" and "Other Telecommunications." Under both categories, a business is considered small if it has $13.5 million or less in annual receipts.[554] The category of Satellite Telecommunications "comprises establishments primarily engaged in providing point-to-point telecommunications services to other establishments in the telecommunications and broadcasting industries by forwarding and receiving communications signals via a system of satellites or reselling satellite telecommunications."[555] For this category, Census Bureau data for 2002 show that there were a total of 371 firms that operated for the entire year.[556] Of this total, 307 firms had annual receipts of under $10 million, and 26 firms had receipts of $10 million to $24,999,999.[557] Consequently, we estimate that the majority of Satellite Telecommunications firms are small entities that might be affected by our action.

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[550] 5 U.S.C. § 604(a)(3).

[551] 5 U.S.C. § 601(6).

[552] 5 U.S.C. § 601(3) (incorporating by reference the definition of "small business concern" in 15 U.S.C. § 632). Pursuant to the RFA, the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after the opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register." 5 U.S.C. § 601(3).

[553] Small Business Act, 15 U.S.C. § 632 (1996).

[554] 13 C.F.R. § 121.201, NAICS code 517410.

[555] U.S. Census Bureau, 2002 NAICS Definitions, "517410 Satellite Telecommunications"; http://www.census.gov/epcd/naics02/def/NDEF517.HTM.

[556] U.S. Census Bureau, 2002 Economic Census, Subject Series: Information, "Establishment and Firm Size (Including Legal Form of Organization)," Table 4, NAICS code 517410 (issued Nov. 2005).

[557] *Id*. An additional 38 firms had annual receipts of $25 million or more.

The category of Other Telecommunications "comprises establishments primarily engaged in (1) providing specialized telecommunications applications, such as satellite tracking, communications telemetry, and radar station operations; or (2) providing satellite terminal stations and associated facilities operationally connected with one or more terrestrial communications systems and capable of transmitting telecommunications to or receiving telecommunications from satellite systems."[558] For this category, Census Bureau data for 2002 show that there were a total of 332 firms that operated for the entire year.[559] Of this total, 259 firms had annual receipts of under $10 million and 15 firms had annual receipts of $10 million to $24,999,999.[560] Consequently, we estimate that the majority of Other Telecommunications firms are small entities that might be affected by our action.

Space Stations (Geostationary). Commission records reveal that there are 44 space station licensees. We do not request nor collect annual revenue information concerning such licensees, and thus are unable to estimate the number of geostationary space station licensees that would constitute a small business under the SBA definition cited above, or apply any rules providing special consideration for geostationary space station licensees that are small businesses.

17 GHz Transmitting Earth Stations. Currently there are approximately 47 operational earth stations in the 17.3-17.7 GHz bands. The Commission does not request or collect annual revenue information, and thus is unable to estimate the number of earth stations that would constitute a small business under the SBA definition.[561]

Cellular and Other Wireless Telecommunications. The SBA has developed a small business size standard for Cellular and Other Wireless Telecommunications, which consists of all such firms having 1,500 or fewer employees.[562] According to Census Bureau data for 2002, in this category there were 1,397 firms that operated for the entire year.[563] Of this total, 1,378 firms had employment of 999 or fewer employees, and 19 firms had employment of 1,000 employees or more.[564] Thus, under this category and size standard, the majority of firms can be considered small.

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[558] U.S. Census Bureau, 2002 NAICS Definitions, "517910 Other Telecommunications"; http://www.census.gov/epcd/naics02/def/NDEF517.HTM.

[559] U.S. Census Bureau, 2002 Economic Census, Subject Series: Information, "Establishment and Firm Size (Including Legal Form of Organization)," Table 4, NAICS code 517910 (issued Nov. 2005).

[560] *Id*. An additional 14 firms had annual receipts of $25 million or more.

[561] The SBA has developed a small business size standard for Satellite Telecommunications, which consists of all such companies having $13.5 million or less in annual receipts. 13 C.F.R. § 121.201, NAICS code 517410.

[562] 13 C.F.R. § 121.201, NAICS code 517212.

[563] U.S. Census Bureau, 2002 Economic Census, Subject Series: Information, "Establishment and Firm Size (Including Legal Form of Organization," Table 5, NAICS code 517212 (issued Nov. 2005).

[564] *Id.* The census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with "1000 employees or more."

D. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements

Under the Commission's existing rules, all requests for space station authorizations are required to be in the form of a comprehensive proposal submitted on the relevant FCC forms.[565] Similarly, to obtain an earth station authorization, applicants must file the appropriate forms as required by the Commission's rules.[566] In addition to our existing requirements, in this Report and Order, we adopt certain specific requirements for 17/24 GHz BSS earth and space station applications.

Space Station Applications. The rules adopted will require an applicant proposing a satellite to be located at one of the orbit locations specified in Appendix F of the Report and Order and proposing to operate in the 17.3-17.7 GHz frequency band to provide a demonstration that the proposed space station shall comply with the power flux density limits set forth in Section 25.208(v) of the Commission's rules. In cases where an applicant will not comply with the power flux density limits set forth in Section 25.208(v), the applicant will be required to provide a certification that all potentially affected parties acknowledge and do not object to the use of the applicant's higher power flux densities.

In cases where the proposed 17/24 GHz BSS space station will be operated in the 17.3-17.7 GHz band, or operated to provide international service in the 17.7-17.8 GHz band, and cannot be located precisely at one of the nominal 17/24 GHz BSS orbital locations specified in Appendix F of the Report and Order, the applicant must provide a demonstration that the proposed space station will not cause more interference to other 17/24 GHz BSS satellite networks operating in compliance with the rules for this service than if it were located at the precise 17/24 GHz BSS orbital location from which its proposed location is offset.

An applicant proposing a 17/24 GHz BSS space station to be located at one of the orbit locations specified in Appendix F of the Report and Order and proposing to provide international service in the 17.7-17.8 GHz band, must demonstrate that it will meet the power flux density limits set forth in Section 25.208(c) of the Commission's rules.

An applicant proposing a 17/24 GHz BSS space station that proposes to provide "DBS-like service" within the meaning of Section 25.225 of the Commission's rules, must either certify that it will meet the requirements of Section 25.225, or include as an attachment to its application a technical analysis demonstrating that comparable DBS-like service is not feasible as a technical matter or that, while technically feasible, such service would require so many compromises in satellite design and operation as to make it economically unreasonable.

An applicant proposing a 17/24 GHz BSS space station must provide an interference analysis to demonstrate the compatibility of its proposed system 4° from any current or future

[565] *See* 47 C.F.R. § 25.114.

[566] *See* 47 C.F.R. § 25.115.

authorized space station in the 17/24 GHz BSS that complies with the Commission's technical rules.

Earth Station Applications. Applications for feeder link earth stations operating in the 24.75 – 25.25 GHz band (Earth-to-space) and providing service to geostationary satellites in the 17/24 GHz BSS must include, for each earth station antenna type, in addition to the particulars of operation identified on FCC Form 312 and associated Schedule B, a series of EIRP density charts or tables, calculated for a production earth station antenna, based on measurements taken on a calibrated antenna range at 25 GHz, with the off-axis EIRP envelope set forth in paragraphs (g)(1)(i) through (g)(1)(iv) of Section 25.115 of the Commission's rules. These charts or tables should show (i) off-axis co-polarized EIRP spectral density in the azimuth plane, for off-axis angles from minus 10° to plus 10° and from minus 180° to plus 180°; (ii) off-axis co-polarized EIRP spectral density in the elevation plane, at off-axis angles from 0° to plus 30°; (iii) off-axis cross-polarized EIRP spectral density in the azimuth plane, at off-axis angles from minus 10° to plus 10°; and (iv) off-axis cross-polarized EIRP spectral density in the elevation plane, at off-axis angles from minus 10° to plus 10°. In lieu of providing such charts or tables, applicants may provide a certification on Schedule B that the antenna conforms to the gain pattern criteria of Sections 25.209(a) and (b) of the Commission's rules, that when combined with input power density (computed from the maximum on-axis EIRP density per carrier less the antenna gain entered in Schedule B), demonstrates that the off-axis EIRP spectral density envelope set forth in Sections 25.223(b)(1) through (4) of the Commission's rules will be met.

Earth station applicants seeking authority to use an antenna that does not meet the standards set forth in Sections 25.209(a) and (b) of the Commission's rules, pursuant to the procedure set forth in Section 25.220 or Section 25.223(c), are required to submit a copy of the manufacturer's range test plots of the antenna gain patterns specified in paragraph (b)(1) of this section.

An applicant for an earth station license that proposes levels in excess of those defined in the new Section 25.223(b) of the Commission's rules, shall (1) submit link budget analyses of the operations proposed along with a detailed written explanation of how each uplink and each transmitted satellite carrier density figure is derived; and (2) submit a narrative summary which must indicate whether there are margin shortfalls in any of the current baseline services as a result of the addition of the applicant's higher power service, and if so, how the applicant intends to resolve those margin short falls;

The Commission does not expect significant costs to be associated with these rules. Therefore, we do not anticipate that the burden of compliance would be greater for smaller entities.

E. Steps Taken to Minimize Significant Economic Impact on Small Entities, and Significant Alternatives Considered

The RFA requires that, to the extent consistent with the objectives of applicable statutes, the analysis shall discuss significant alternatives such as: (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for small entities; (3) the use of performance, rather than

design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.[567]

The rules adopted herein are necessary for the efficient operation of the 17/24 GHz BSS, which is expected to introduce a new generation of broadband services to the public. The technical rules adopted here are designed to be the least intrusive in terms of compliance requirements and the most effective in terms of facilitating the licensing of operations in the 17/24 GHz BSS without causing harmful interference to other authorized radiocommunication services. We have considered alternatives and believe these are the most equitable solutions to the potential interference problems posed by the operations in 17/24 GHz BSS. By requiring that technical showings be made prior to operation, we anticipate that there will be far fewer instances of harmful interference. This will have a positive economic impact on all satellite space station and earth station licensees, including small entities.

F. Federal Rules that May Duplicate, Overlap, or Conflict With the Proposed Rules

None.

Report to Congress: The Commission will send a copy of the Report and Order, including this FRFA, in a report to be sent to Congress pursuant to the Congressional Review Act. In addition, the Commission will send a copy of the Report and Order, including this FRFA, to the Chief Counsel for Advocacy of the SBA. A copy of the Report and Order and FRFA (or summaries thereof) will also be published in the Federal Register.[568]

[567] 5 U.S.C. § 603(c)(1), (c)(4).

[568] *See* 5 U.S.C. § 604(b).

APPENDIX B

FINAL RULES

For the reasons set forth in the preamble, parts 2 and 25 of title 47 of the Code of Federal Regulations is amended as follows:

PART 2 – FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

1. The authority citation for part 2 continues to read as follows:

   Authority: 47 U.S.C. 154, 302a, 303, and 336, unless otherwise noted.

2. Section 2.106 is amended as follows:
   a. Revise page 48.
   b. In the list of United States (US) Footnotes, add footnote US402.
   c. In the list of Non-Federal Government (NG) Footnotes, revise footnotes NG163 and NG167.
   d. In the list of Federal Government (G) Footnotes, revise footnote G117.

   The revisions and additions read as follows:

§ 2.106 Table of Frequency Allocations.

* * * * *

15.35-15.4 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) 5.340 5.511			15.35-15.4 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) US246		
15.4-15.43 AERONAUTICAL RADIONAVIGATION 5.511D			15.4-15.43 AERONAUTICAL RADIONAVIGATION US260 US211		Aviation (87)
15.43-15.63 FIXED SATELLITE (Earth-to-space) 5.511A AERONAUTICAL RADIONAVIGATION 5.511C			15.43-15.63 AERONAUTICAL RADIONAVIGATION US260 5.511C US211 US359	15.43-15.63 FIXED SATELLITE (Earth-to-space) AERONAUTICAL RADIONAVIGATION US260 5.511C US211 US359	Satellite Communications (25) Aviation (87)
15.63-15.7 AERONAUTICAL RADIONAVIGATION 5.511D			15.63-15.7 AERONAUTICAL RADIONAVIGATION US260 US211		Aviation (87)
15.7-16.6 RADIOLOCATION 5.512 5.513			15.7-16.6 RADIOLOCATION G59	15.7-17.2 Radiolocation	Private Land Mobile (90)
16.6-17.1 RADIOLOCATION Space research (deep space) (Earth-to-space) 5.512 5.513			16.6-17.1 RADIOLOCATION G59 Space research (deep space) (Earth-to-space)		
17.1-17.2 RADIOLOCATION 5.512 5.513			17.1-17.2 RADIOLOCATION G59		
17.2-17.3 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) 5.512 5.513 5.513A			17.2-17.3 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH (active)	17.2-17.3 Radiolocation Earth exploration-satellite (active) Space research (active)	
17.3-17.7 FIXED-SATELLITE (Earth-to-space) 5.516 (space-to-Earth) 5.516A 5.516B Radiolocation 5.514	17.3-17.7 FIXED-SATELLITE (Earth-to-space) 5.516 BROADCASTING-SATELLITE Radiolocation 5.514 5.515 5.517	17.3-17.7 FIXED-SATELLITE (Earth-to-space) 5.516 Radiolocation 5.514	17.3-17.7 Radiolocation US259 G59 US402 G117	17.3-17.7 FIXED-SATELLITE (Earth-to-space) US271 BROADCASTING-SATELLITE US402 NG163 US259	Satellite Communications (25)

UNITED STATES (US) FOOTNOTES

* * * * *

US402 In the band 17.3-17.7 GHz, existing Federal satellites and associated earth stations in the fixed-satellite service (Earth-to-space) are authorized to operate on a primary basis in the frequency bands and areas listed below. Receiving earth stations in the broadcasting-satellite service within the bands and areas listed below shall not claim protection from Federal earth stations in the fixed-satellite service.

(a) 17.600-17.700 GHz for stations within a 120 km radius of 38° 49' N latitude and 76° 52' W longitude.

(b) 17.375-17.475 GHz for stations within a 160 km radius of 39° 42' N latitude and 104° 45' W longitude.

NON-FEDERAL GOVERNMENT (NG) FOOTNOTES

* * * * *

NG163 The allocation to the broadcasting-satellite service in the band 17.3-17.7 GHz shall come into effect on 1 April 2007. Use of the 17.3-17.7 GHz band by the broadcasting-satellite service is limited to geostationary satellite orbit systems.

* * * * *

NG167 The use of the fixed-satellite service (Earth-to-space) in the band 24.75-25.25 GHz is limited to feeder links for the broadcasting-satellite service. The allocation to the fixed-satellite service (Earth-to-space) in the band 24.75-25.25 GHz shall come into effect on 1 April 2007.

* * * * *

FEDERAL GOVERNMENT (G) FOOTNOTES

* * * * *

G117 In the bands 7.25-7.75 GHz, 7.9-8.4 GHz, 17.3-17.7 GHz, 17.8-21.2 GHz, 30-31 GHz, 33-36 GHz, 39.5-41 GHz, 43.5-45.5 GHz and 50.4-51.4 GHz, the Federal fixed-satellite and mobile-satellite services are limited to military systems.

* * * * *

PART 25 – SATELLITE COMMUNICATIONS

3. The authority citation for Part 25 continues to read as follows:

AUTHORITY: 47 U.S.C. 701-744. Interprets or applies Sections 4, 301, 302, 303, 307, 309 and 332 of the Communications Act, as amended, 47 U.S.C. Sections 154, 301, 302, 303, 307, 309 and 332, unless otherwise noted.

4. Amend Section 25.114 by revising paragraph (d)(7) and adding paragraphs (d)(15) and (d)(16) to read as follows**:**

§ 25.114 Applications for space station authorizations.

* * * * *

(d) * * *

(7) Applicants for authorizations for space stations in the fixed-satellite service must also include the information specified in §§ 25.140(b)(1) and (2) of this Part. Applicants for authorizations for space stations in the 17/24 GHz broadcasting-satellite service must also include the information specified in §§ 25.140(b)(1) and (3) of this Part.

* * *

(15) Each applicant for a space station license in the 17/24 GHz BSS shall include the following information as an attachment to its application:

(i) Except as set forth in paragraph (d)(15)(ii) of this Section, an applicant proposing to operate in the 17.3-17.7 GHz frequency band, must provide a demonstration that the proposed space station will comply with the power flux density limits set forth in § 25.208(v) of this Part.

(ii) In cases where the proposed space station will not comply with the power flux density limits set forth in § 25.208(v) of this Part, the applicant will be required to provide a certification that all potentially affected parties acknowledge and do not object to the use of the applicant's higher power flux densities. The affected parties with whom the applicant must coordinate are those GSO 17/24 GHz BSS satellite networks located up to ±6º away for excesses of up to 3 dB above the power flux-density levels specified in § 25.208(v) of this Part, and up to ±10º away greater for excesses greater than 3 dB above those levels.

(iii) In cases where the proposed 17/24 GHz BSS space station will be operated in the 17.3-17.7 GHz band, or operated to provide international service in the 17.7-17.8 GHz band, and cannot be located precisely at one of the nominal 17/24 GHz BSS orbital locations specified in Appendix F of the Report and Order, adopted March XX, 2007, IB Docket No. 06-123, FCC 07-xxx, the applicant must provide a demonstration that the proposed space station will not cause more interference to other 17/24 GHz BSS satellite networks operating in compliance with the rules for this service than if it were located at the precise 17/24 GHz BSS orbital location from which its proposed location is offset.

(iv) An applicant proposing to provide international service in the 17.7-17.8 GHz band must demonstrate that it will meet the power flux density limits set forth in § 25.208(c) of this Part.

(16) In addition to the requirements of paragraph (d)(15) of this Section, each applicant for a license to operate a 17/24 GHz BSS space station that will be used to provide video programming directly to consumers in the United States, that will not meet the requirements of § 25.225 of this Part, must include as an attachment to its application a technical analysis demonstrating that providing video programming service to consumers in Alaska and Hawaii

that is comparable to the video programming service provided to consumers in the 48 contiguous United States (CONUS) is not feasible as a technical matter or that, while technically feasible, such service would require so many compromises in satellite design and operation as to make it economically unreasonable.

5. Amend Section 25.115 by adding paragraph (g) to read as follows:

§ 25.115 Applications for earth station authorizations.

* * * * *

(g) Applications for feeder link earth stations operating in the 24.75 – 25.25 GHz band (Earth-to-space) and providing service to geostationary satellites in the 17/24 GHz BSS must include, in addition to the particulars of operation identified on Form 312 and associated Schedule B, the information specified in either paragraph (g)(1) or (g)(2) below for each earth station antenna type:

(1) A series of EIRP density charts or tables, calculated for a production earth station antenna, based on measurements taken on a calibrated antenna range at 25 GHz, with the off-axis EIRP envelope set forth in paragraphs (g)(1)(i) through (g)(1)(iv) of this section superimposed, as follows:

(i) Showing off-axis co-polarized EIRP spectral density in the azimuth plane, for off-axis angles from minus 10° to plus 10° and from minus 180° to plus 180°;

(ii) Showing off-axis co-polarized EIRP spectral density in the elevation plane, at off-axis angles from 0° to plus 30°;

(iii) Showing off-axis cross-polarized EIRP spectral density in the azimuth plane, at off-axis angles from minus 10° to plus 10°; and

(iv) Showing off-axis cross-polarized EIRP spectral density in the elevation plane, at off-axis angles from minus 10° to plus 10°.

(2) A certification on Schedule B that the antenna conforms to the gain pattern criteria of §§ 25.209(a) and (b), that when combined with input power density (computed from the maximum on-axis EIRP density per carrier less the antenna gain entered in Schedule B), demonstrates that the off-axis EIRP spectral density envelope set forth in §§ 25.223(b)(1) through (4) of this Part will be met.

6. Amend Section 25.121 by revising paragraph (a) to read as follows:

§ 25.121 License term and renewals.

(a) License Term.

(1) Except for licenses for DBS space stations and 17/24 GHz BSS space stations licensed as broadcast facilities, licenses for facilities governed by this part will be issued for a period of 15 years.
(2) Licenses for DBS space stations and 17/24 GHz BSS space stations licensed as broadcast facilities will be issued for a period of 8 years. Licenses for DBS space stations not licensed as broadcast facilities will be issued for a period of 10 years.

* * * * *

7. Amend Section 25.132 by revising paragraph (b)(3) to read as follows:

§ 25.132 Verification of earth station antenna performance standards.

* * * * *

(b) * * *

(3) Applicants seeking authority to use an antenna that does not meet the standards set forth in §§ 25.209(a) and (b) of this Part, pursuant to the procedure set forth in § 25.220 or § 25.223(c) of this Part, are required to submit a copy of the manufacturer's range test plots of the antenna gain patterns specified in paragraph (b)(1) of this section.

* * * * *

8. Amend Section 25.140 by revising paragraph (b)(2) and adding paragraphs (b)(3) and (c) to read as follows:

§ 25.140 Qualifications of fixed-satellite space station licensees.

* * * * *

(b) * * *

(2) Except as set forth in paragraph (b)(3) of this section, all applicants must provide an interference analysis to demonstrate the compatibility of their proposed system 2° from any authorized space station. An applicant should provide details of its proposed r.f. carriers which it believes should be taken into account in this analysis. At a minimum, the applicant must include, for each type of r.f. carrier, the link noise budget, modulation parameters, and overall link performance analysis. (*See, e.g.*, appendices B and C to Licensing of Space Stations in the Domestic Fixed-Satellite Service (available at address in Sec. 0.445)).

(3) Applicants for licenses for satellites in the 17/24 GHz BSS must provide an interference analysis of the kind described in paragraph (b)(2) of this Section, except that the applicant must demonstrate the compatibility of its proposed system 4° from any current or future authorized space station in the 17/24 GHz BSS that complies with the technical rules in this Part. The link budget must take into account longitudinal stationkeeping tolerances and any existing orbital location offsets from the nominal 17/24 GHz BSS orbital locations of the adjacent prior-authorized 17/24 GHz BSS space stations. In addition, any 17/24 GHz BSS satellite applicant that has reached a coordination agreement with an operator of another 17/24 GHz BSS satellite located up to ±10° away to allow that operator to exceed the pfd levels specified in the rules for this service, must use those higher pfd levels for the purposes of this showing.

(c) Any space station applicant for a space station authorization in the 17/24 GHz BSS must design its satellite network to be capable of operating with another 17/24 GHz BSS satellite as close as four degrees away from its 17/24 GHz BSS satellite.

9. Revise Section 25.201 to add a definition for 17/24 GHz Broadcasting Satellite Service, to read as follows:

§ 25.201 Definitions.

17/24 GHz Broadcasting-Satellite Service. A radiocommunications service using geostationary satellites between one or more feeder link earth stations and other earth stations, in the 17.3 - 17.7 GHz (space-to-Earth) (domestic allocation), 17.3 – 17.8 GHz (international allocation) and 24.75 - 25.25 GHz frequency bands. This service is also known as "17/24 GHz BSS." For purposes of the application processing provisions of this Part, 17/24 GHz BSS is a GSO-like service. For purposes of the technical requirements of this Part, we will treat 17/24 GHz BSS as if it were FSS. Unless specifically stated otherwise, the 17/24 GHz BSS systems are subject to the rules in this Part applicable to FSS.

10. Amend Section 25.202 by revising paragraph (a)(1) and adding paragraph (a)(9), to read as follows:

§ 25.202 Frequencies, frequency tolerance and emission limitations.

Section (a)(1), modify the table as follows:

(1) Add the following two entries to the right-hand column as follows:

24.75-25.05 GHz	\18\
25.05-25.25 GHz	\1\18\

(2) Append the following footnote to the end of the footnote section:

[18] Use of the band 24.75-25.25 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links for space stations in the broadcasting-satellite service, and the sub-band 25.05-25.25 GHz is shared co-equally with terrestrial fixed services. The allocation to the fixed-satellite service (Earth-to-space) in the band 24.75-25.25 GHz shall come into effect on 1 April 2007.

*****

(9) The following frequencies are available for use by the Broadcasting-Satellite Service after 1 April 2007:

17.3-17.7 GHz	(space-to-Earth) \1\
17.7-17.8 GHz	(space-to-Earth) \2\

\1\ Use of the 17.3-17.7 GHz band by the broadcasting-satellite service is limited to geostationary satellite orbit systems.

\2\ Use of the 17.7 - 17.8 GHz band (space-to-Earth) by the broadcasting-satellite service is limited to transmissions from geostationary satellite orbit systems to receiving earth stations located outside of the United States and its Possessions. In the United States and its Possessions, the 17.7 - 17.8 GHz band is allocated on a primary basis to the Fixed Service.

11. Amend Section 25.203 by adding paragraph (l) to read as follows:

§ 25.203 Choice of sites and frequencies.

*****

(l) Applicants for feeder link earth station facilities operating in the 25.05 – 25.25 GHz band may be licensed only in Economic Areas where no existing FS licensee has been authorized, and shall coordinate their operations with 24 GHz fixed service operations if the power flux density of their transmitted signal at the boundary of the fixed service license area is equal to or greater than -114 dBW/m^2 in any 1 MHz.

(1) When uplink adaptive power control is used, the EIRP used for calculation of the power flux density level should be the maximum possible, taking into account the adaptive power increase.

(2) The power flux density levels should be calculated based on the actual off-axis gain characteristics of the earth station antenna, and should assume free space propagation conditions.

(3) When determining whether the power flux density threshold limit is exceeded at the 24 GHz FS licensing boundary, a feeder link earth station applicant must take into account not only the transmissions from its own antenna(s), but also those from any previously authorized feeder link earth stations. Thus, if the cumulative power flux density level at the FS license boundary is in excess of -114 dBW/m^2/MHz, the earth station applicant must either modify its proposed operations such that this value is not exceeded, or enter into coordination with the affected FS licensee.

12. Amend Section 25.204 by revising paragraph (g) to read as follows:

§ 25.204 Power limits.

*****

(g) All earth stations in the Fixed Satellite Service in the 20/30 GHz band, and feeder link earth stations operating in the 24.75 - 25.25 GHz band (Earth-to-space) and providing service to geostationary satellites in the 17/24 GHz BSS, shall employ uplink adaptive power control or other methods of fade compensation such that the earth station transmissions shall be conducted at the power level required to meet the desired link performance while reducing the level of mutual interference between networks.

13. Amend Section 25.208 by revising paragraph (c) and adding paragraph (v) to read as follows:

§ 25.208 Power flux density limits.

*****

(c) In the 17.7-17.8 GHz, 18.3-18.8 GHz, 19.3-19.7 GHz, 22.55-23.00 GHz, 23.00-23.55 GHz, and 24.45-24.75 GHz frequency bands, the power flux density at the Earth's surface produced by emissions from a space station for all conditions for all methods of modulation shall not exceed the following values:

(1) -115 dB (W/m^2) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane.

(2) -115 + 0.5 (δ-5) dB (W/m^2) in any 1 MHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane.

(3) -105 dB (W/m^2) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

*****

(v) The power flux density at the Earth's surface produced by emissions from a 17/24 GHz BSS space station operating in the 17.3 - 17.7 GHz band for all conditions, including clear sky, and for all methods of modulation shall not exceed the regional power flux density levels defined below.

(1) In the region of the contiguous United States, located south of 38º North Latitude and east of 100º West Longitude: -115 dBW/m^2/MHz.

(2) In the region of the contiguous United States, located north of 38º North Latitude and east of 100º West Longitude: -118 dBW/m^2/MHz.

(3) In the region of the contiguous United States, located west of 100º West Longitude: -121 dBW/m^2/MHz.

(4) For all regions outside of the contiguous United States including Alaska and Hawaii: -115 dBW/m^2/MHz.

14. Amend Section 25.209 by redesignating paragraph (c) as (c)(1), and adding new paragraph (c)(2) to read as follows:

§ 25.209 Antenna performance standards.

* * * * *

(c) * * *

(2) 17/24 GHz BSS telemetry earth stations are protected from harmful interference caused by other space stations to the extent set forth in paragraph (c)(1) of this Section. Receive-only earth stations in the 17/24 GHz BSS are protected from harmful interference caused by other space stations to the extent set forth in Section 25.224 of this Part.

15. Amend Section 25.210 by revising paragraphs (f) and (i) to read as follows:

§ 25.210 Technical requirements for space stations in the Fixed-Satellite Service.

*****

(f) All space stations in the Fixed Satellite Service in the 3600-3700 MHz, 3700-4200 MHz, 5091-5250 MHz, 5825-5925 MHz, 5925-6425 MHz, 6425-6525 MHz, 6525-6700 MHz, 6700-7025 MHz, 10.7-10.95 GHz, 10.95-11.2 GHz, 11.2-11.45 GHz, 11.45-11.7 GHz, 11.7-12.2 GHz, 12.2-12.7 GHz, 12.75-13.15 GHz, 13.15-13.2125 GHz, 13.2125-13.25 GHz, 13.75-14.0 GHz, 14.0-14.5 GHz,15.43-15.63

GHz, and 24.75-25.25 GHz bands, or in the Broadcasting-Satellite Service in the 17.3-17.8 GHz band (space-to-Earth), shall employ state-of-the-art full frequency reuse either through the use of orthogonal polarizations within the same beam and/or the use of spatially independent beams.

*****

(i)(1) Space station antennas in the Fixed-Satellite Service, other than antennas in the 17/24 GHz BSS, must be designed to provide a cross-polarization isolation such that the ratio of the on axis co-polar gain to the cross-polar gain of the antenna in the assigned frequency band shall be at least 30 dB within its primary coverage area.

(2) Space station antennas in the 17/24 GHz Broadcasting Satellite Service must be designed to provide a cross-polarization isolation such that the ratio of the on axis co-polar gain to the cross-polar gain of the antenna in the assigned frequency band shall be at least 25 dB within its primary coverage area.

16. Amend Section 25.212 by adding paragraph (f) to read as follows:

§ 25.212 Narrowband analog transmissions, digital transmissions, and video transmissions in the GSO Fixed-Satellite Service.

* * * * *

(f) In the 24.75-25.25 GHz band, an earth station that meets the antenna gain pattern requirements set forth in §§ 25.209(a) and (b) of this Part may be routinely licensed if the maximum power density into the antenna does not exceed 3.5 dBW/MHz.

17. Amend Section 25.220 by revising paragraph (a)(1) to read as follows:

§25.220 Non-conforming transmit/receive earth station operations.

(a)(1) This section applies to earth station applications other than ESV and 17/24 GHz BSS feeder link applications in which:

18. Amend Part 25 by adding Section 25.223 to read as follows:

§ 25.223 Off-axis EIRP spectral density limits for feeder link earth stations in the 17/24 GHz BSS.

(a) This section applies to all applications for earth station licenses in the 17/24 GHz BSS frequency bands, except for applications in which the proposed antenna does not conform to the

standards of §§25.209(a) and (b), and/or the proposed power density levels are in excess of those specified in §25.212(f) of this Part.

(b) All applications for earth station licenses in the 24.75-25.25 GHz portion of 17/24 GHz BSS shall be routinely processed if they meet the following requirements:

(1) 17/24 GHz BSS earth station antenna off-axis EIRP spectral density for co-polarized signals shall not exceed the following values, within ±3º of the GSO arc, under clear sky conditions:

32.5 – 25log(θ)	dBW/MHz	for $2^\circ \le \theta \le 7^\circ$
11.4	dBW/MHz	for $7^\circ \le \theta \le 9.2^\circ$
35.5 – 25log(θ)	dBW/MHz	for $9.2^\circ \le \theta \le 48^\circ$
3.5	dBW/MHz	for $48^\circ \le \theta \le 180^\circ$

Where θ is the angle in degrees from the axis of the main lobe.

(2) 17/24 GHz BSS earth station antenna off-axis EIRP spectral density for co-polarized signals shall not exceed the following values, for all directions other than within ±3º of the GSO arc, under clear sky conditions:

35.5 – 25log(θ)	dBW/MHz	for $2^\circ \le \theta \le 7^\circ$
14.4	dBW/MHz	for $7^\circ \le \theta \le 9.2^\circ$
38.5 – 25log(θ)	dBW/MHz	for $9.2^\circ \le \theta \le 48^\circ$
6.5	dBW/MHz	for $48^\circ \le \theta \le 180^\circ$

Where θ is the angle in degrees from the axis of the main lobe.

(3) The values given in paragraphs (b) (1) and (2) of this section may be exceeded by 3 dB, for values of $\theta > 10^\circ$, provided that the total angular range over which this occurs does not exceed 20º when measured along both sides of the GSO arc.

(4) 17/24 GHz BSS earth station antenna off-axis EIRP spectral density for cross-polarized signals shall not exceed the following values, in all directions greater than ±3° relative to the GSO arc, under clear sky conditions:

22.5 – 25log(θ)	dBW/MHz	for $2^\circ \le \theta \le 7^\circ$
1.4	dBW/MHz	for $7^\circ \le \theta \le 9.2^\circ$

Where θ is the angle in degrees from the axis of the main lobe.

(c) Notwithstanding § 25.220 of this Part, each applicant for earth station license(s) that proposes levels in excess of those defined in paragraph (b) of this section shall:

(1) submit link budget analyses of the operations proposed along with a detailed written explanation of how each uplink and each transmitted satellite carrier density figure is derived;

(2) submit a narrative summary which must indicate whether there are margin shortfalls in any of the current baseline services as a result of the addition of the applicant's higher power service, and if so, how the applicant intends to resolve those margin short falls;

(3) certify that all potentially affected parties acknowledge and do not object to the use of the applicant's higher power densities. For proposed power levels less than or equal to 3 dB in excess of the limits defined above, the affected parties shall be those co-frequency U.S. licensed 17/24 GHz BSS satellite networks that are located at angular separations of up to ±6º away; for power levels greater than 3 dB and less than or equal to 6 dB in excess of the limits defined above, affected parties shall be all those co-frequency U.S. licensed operators at up to ±10º away. No power levels greater than 6 dB in excess of the limits defined above shall be permitted.

(d) Licensees authorized pursuant to paragraph (c) of this section shall bear the burden of coordinating with any future applicants or licensees whose proposed compliant operations at 10 degrees or smaller orbital spacing, as defined by paragraph (b) of this section, is potentially or actually adversely affected by the operation of the non-compliant licensee. If no good faith agreement can be reached, however, the non-compliant licensee shall reduce its earth station EIRP spectral density levels to be compliant with those specified in paragraph (b) of this section.

(e) For earth stations employing uplink power control, the values in paragraphs (b) (1), (2), and (4) of this section may be exceeded by up to 20 dB under conditions of uplink fading due to precipitation. The amount of such increase in excess of the actual amount of monitored excess attenuation over clear sky propagation conditions shall not exceed 1.5 dB or 15 % of the actual amount of monitored excess attenuation in dB, whichever is larger, with a confidence level of 90 percent except over transient periods accounting for no more than 0.5% of the time during which the excess is no more than 4.0 dB.

19. Amend Part 25 by adding Section 25.224 to read as follows:

§ 25.224 Protection of receive-only earth stations in the 17/24 GHz BSS.

(a) Notwithstanding Section 25.209(c) of this Part, receive-only earth stations operating in the 17/24 GHz broadcasting-satellite service can claim no greater protection from interference than they would receive if the equivalent antenna diameter were equal to or greater than 45 cm and the antenna meets the co-polar and cross-polar performance patterns represented by the following set of formulas (adopted in Recommendation ITU-R BO.1213-1, dated November 2005) that are valid for $D/\lambda \geq 11$:

(1) Co-polar pattern:

$$G_{co}(\varphi) = G_{max} - 2.5 \times 10^{-3}\left(\frac{D}{\lambda}\varphi\right)^2 \text{ for } \qquad 0 \leq \varphi < \varphi_m$$

where:

$$\varphi_m = \frac{\lambda}{D}\sqrt{\frac{G_{max} - G_1}{0.0025}}$$

$$G_{max} = 10 \log\left(\eta\left(\frac{\pi D}{\lambda}\right)^2\right)$$

$$G_1 = 29 - 25 \log \varphi_r, \text{ and } \varphi_r = 95\frac{\lambda}{D}$$

$G_{co}(\varphi) = G_1$ for $\varphi_m \le \varphi < \varphi_r$

$G_{co}(\varphi) = 29 - 25 \log \varphi$ for $\varphi_r \le \varphi < \varphi_b$ where $\varphi_b = 10^{(34/25)}$

$G_{co}(\varphi) = -5$ dBi for $\varphi_b \le \varphi < 70°$

$G_{co}(\varphi) = 0$ dBi for $70° \le \varphi < 180°$

(2) Cross-polar pattern:

$G_{cross}(\varphi) = G_{max} - 25$ for $0 \le \varphi < 0.25\ \varphi_0$

where:

$$\varphi_0 = 2\frac{\lambda}{D}\sqrt{\frac{3}{0.0025}} = 3 \text{ dB beamwidth}$$

$$G_{cross}(\varphi) = G_{max} - 25 + 8\left(\frac{\varphi - 0.25\ \varphi_0}{0.19\ \varphi_0}\right) \text{ for } 0.25\ \varphi_0 \le \varphi < 0.44\ \varphi_0$$

$G_{cross}(\varphi) = G_{max} - 17$ for $0.44\ \varphi_0 \le \varphi < \varphi_0$

$$G_{cross}(\varphi) = G_{max} - 17 + C\left|\frac{\varphi - \varphi_0}{\varphi_1 - \varphi_0}\right| \text{ for } \varphi_0 \le \varphi < \varphi_1 \text{ where } \varphi_1 = \frac{\varphi_0}{2}\sqrt{10.1875}$$

and $C = 21 - 25 \log(\varphi_1) - (G_{max} - 17)$

$G_{cross}(\varphi) = 21 - 25 \log \varphi$ for $\varphi_1 \le \varphi < \varphi_2$ where $\varphi_2 = 10^{(26/25)}$

$G_{cross}(\varphi) = -5$ dBi for $\varphi_2 \le \varphi < 70°$

$G_{cross}(\varphi) = 0$ dBi for $70° \le \varphi < 180°$

where:

D: equivalent antenna diameter

λ: wavelength expressed in the same unit as the diameter

φ: off-axis angle of the antenna relative to boresight (degrees)

η: antenna efficiency.

(b) Paragraph (a) of this section does not apply to 17/24 GHz BSS telemetry earth stations. Those earth stations are subject to the antenna performance standards of §§ 25.209(a) and (b) of this Part.

20. Amend Part 25 by adding Section 25.225 to read as follows:

§ 25.225 Geographic Service Requirements for 17/24 GHz Broadcasting Satellite Service

(a) Each operator of a 17/24 GHz BSS space station that is used to provide video programming directly to consumers in the 48 contiguous United States (CONUS) must provide comparable service to Alaska and Hawaii , unless such service is not technically feasible or not economically reasonable from the authorized orbital location.

(b) Each operator of a 17/24 GHz BSS space station subject to paragraph (a) of this section must design and configure its space station to be capable of providing service to Alaska and Hawaii, that is comparable to the service that such satellites will provide to CONUS subscribers, from any orbital location capable of providing service to either Alaska or Hawaii to which it may be located or relocated in the future.

(c) If an operator of a 17/24 GHz BSS space station that is used to provide video programming directly to consumers in the Unites States relocates or replaces a 17/24 GHz BSS space station at a location from which service to Alaska and Hawaii had been provided by another 17/24 GHz BSS space station, the operator must use a space station capable of providing at least the same level of service to Alaska and Hawaii as previously provided from that location.

21. Amend Part 25 by adding Section 25.262 to read as follows:

§ 25.262 Space station coordination requirements in the 17/24 GHz BSS.

(a) Any space station licensee operating a space station in the 17/24 GHz BSS, and required to provide information in its application pursuant to § 25.114(d)(15)(ii) of this Part, shall bear the burden of coordinating with any future co-frequency applicants or licensees under the following circumstances:

(1) If the licensee's operations exceed the power flux-density limits set forth in § 25.208(v) of this Part by 3 dB or less, the licensee shall bear the burden of coordinating with any future applicants or licensees proposing a satellite in compliance with power flux-density limits set forth in § 25.208(v) of this Part and located within $\pm$ 6 degrees of the licensee's satellite.

(2) If the licensee's operations exceed the power flux-density limits set forth in § 25.208(v) of this Part by more than 3 dB, the licensee shall bear the burden of coordinating with any future applicants or licensees proposing a satellite in compliance with power flux-density limits set forth in § 25.208(v) of this Part and located within $\pm$ 10 degrees of the licensee's satellite.

(3) If no good faith agreement can be reached, the operator of the 17/24 GHz satellite that does not comply with § 25.208(v) of this Part shall reduce its space station power flux-density levels to be compliant with those specified in § 25.208(v) of this Part.

(b) Any space station licensee operating a space station in the 17/24 GHz BSS, and required to provide information in its application pursuant to § 25.114(d)(15)(iii) of this Part, must accept any increased interference that may result from adjacent 17/24 GHz BSS space stations that are operating in compliance with the rules for this service.

22. Amend Section 25.601 by revising it to read as follows:

§ 25.601 Equal employment opportunities

Notwithstanding other EEO provisions within these rules, an entity that uses an owned or leased fixed-satellite service or direct broadcast satellite service or 17/24 GHz broadcasting-satellite service facility (operating under this part) to provide video programming directly to the public on a subscription basis must comply with the equal employment opportunity requirements set forth in part 76, subpart E, of this chapter, if such entity exercises control (as defined in part 76, subpart E, of this chapter) over the video programming it distributes. Notwithstanding other EEO provisions within these rules, a licensee or permittee of a direct broadcast satellite station operating as a broadcaster must comply with the equal employment opportunity requirements set forth in part 73.

23. Amend Section 25.701 by revising paragraph (a)(3) and adding paragraphs (a)(4) and (a)(5) to read as follows:

§ 25.701 Public interest obligations

(a) * * *

(3) Non U.S. licensed satellite operators in the Ku band that offer video programming directly to consumers in the United States pursuant to an earth station license issued under part 25 of this title and that offer a sufficient number of channels to consumers so that four percent of the total applicable programming channels yields a set aside of one channel of non commercial programming pursuant to paragraph (e) of this section, or

(4) Entities licensed to operate satellites in the 17/24 GHz BSS that offer video programming directly to consumers or that sell or lease capacity to a video programming distributor that offers service directly to consumers providing a sufficient number of channels so that four percent of the total applicable programming channels yields a set aside of at least one channel of non commercial programming pursuant to paragraph (e) of this section, or

(5) Non U.S. licensed satellite operators in the 17/24 GHz BSS that offer video programming directly to consumers in the United States or that sell or lease capacity to a video programming distributor that offers service directly to consumers in the United States pursuant to an earth station license issued under part 25

of this title and that offer a sufficient number of channels to consumers so that four percent of the total applicable programming channels yields a set aside of one channel of non commercial programming pursuant to paragraph (e) of this section.

* * * * *

APPENDIX C

TECHNICAL CHARACTERISTICS OF RADIOLOCATION SYSTEMS IN THE 15.7-17.3 GHZ BAND

Table C-1 shows technical characteristics of radar systems that will likely impact the 17/24 GHz BSS earth station receivers, namely, the airborne ground-mapping radars. The lower power radars of "System 1" are included because of wider antenna beamwidths (e.g., mainbeam and sidelobe), which could increase the potential for interference. These systems currently tend to operate in the sub-band 16.2-17.3 GHz by provision of National Telecommunications and Information Administration Manual of Regulations and Procedures for Federal Radio Frequency Management Section 8.2.46, but this could change at any time to also allow ground-based radars. The airborne radar systems tend to have antenna pointing capabilities such that mainbeam-to-mainbeam coupling can occur with BSS subscriber earth station antennas. The information provided in Table C-1 should be sufficient for general calculation to assess the compatibility between these radars and BSS systems.

Table C-1. Characteristics of Radar Systems Operating in the 16.2-17.3 GHz Frequency Range

Characteristics	System 1	System 2
Function	Search, track and ground-mapping radar (multi-function)	Search, track and ground-mapping radar (multi-function)
Platform type	Airborne, low power	Airborne, high power
Tuning range (GHz)	16.2-17.3	16.29-17.21
Modulation	Linear FM pulse	Linear and non-Linear FM pulse
Transmit peak power (W)	< 80	< 3260
Pulse width (μs)	18.2; 49	120-443
Pulse rise/fall time (ns)	20	4
Pulse repetition rate (pps)	2041; 5495	900-1600
Duty Cycle	4-25%	< 50%
Output device	Travelling wave tube	Travelling wave tube
Antenna pattern type	Fan/pencil	Fan
Antenna type	Slotted waveguide	Phased array

Characteristics	System 1	System 2
Antenna polarization	Linear vertical	Linear vertical
Mainbeam Antenna gain (dBi)	25.6	38.0
Antenna elevation beamwidth (deg)	9.7	2.5
Antenna azimuthal beamwidth (deg)	6.2	2.2
Antenna horizontal scan rate	0-30 deg/s	0-5 deg/s
Antenna horizontal scan type (continuous, random, sector, etc.)	±45 deg to ±135 deg (mechanical)	±30 deg (electronic, conical)
Antenna vertical scan rate	0-30 deg/s	0-5 deg/s
Antenna vertical scan type.(*)	–10 to –50 deg (mechanical)	0 to –90 deg (electronic, conical)
Antenna 1st side-lobe gain level	10 dBi @ 31 deg	18 dBi @ 1.7 deg
Antenna height	Aircraft altitude	Aircraft altitude
Chirp bandwidth (MHz)	< 640	< 1200
Transmitter RF emission bandwidth (MHz).(**) –3 dB –20 dB -40 dB -60 dB	< 622 < 725 < 868 < 1040	< 1200 < 1220 < 1300 < 1400

(*) 0 degrees represents a horizontal orientation. Angles below horizontal are negative.

(**) The radar center frequency is lowered if necessary to ensure that the -20 dB bandwidth is contained below 17.3 GHz. This may cause radar emissions to fall below 16.2 GHz, but they will still be within the allocated band.

APPENDIX D
LIST OF PARTIES

Parties Filing Comments

Government of Bermuda, Department of Telecommunications
DIRECTV, INC.
EchoStar Satellite L.L.C.
FiberTower Corporation
Intelsat North America LLC
National Association of Broadcasters
Media Access Project, on behalf of The National Hispanic Media Coalition, The New America Foundation, Hawaii Consumers, Prometheus Radio Project, Media Alliance, the Benton Foundation and U.S. PRIG (collectively, NHMC, *et al*.)
SES Americom, Inc.

Parties Filing Reply Comments

DIRECTV, Inc.
EchoStar Satellite L.L.C.
FiberTower Corporation
Fixed Wireless Communications Coalition
Intelsat North America LLC
SES Americom, Inc.

Parties Making Ex Parte Filings
DIRECTV, Inc., EchoStar Satellite L.L.C.,
and Intelsat North America LLC – Joint Proposal (March 14, 2007)
Pegasus Development DBS Corporation (March 26, 2007)
FiberTower Corporation (April 3, 2007)
DIRECTV, Inc. (April 26, 2007)
EchoStar Satellite L.L.C. (April 26, 2007)

APPENDIX E

17/24 GHz BSS Applications and Amendments Pending before the Commission.

Filings (Earliest to Most Recent)	Call Sign	Applicant	Orbital Location (all W.L.)
SAT-LOA-19970605-00049	S2242	DIRECTV Enterprises, LLC	96.5°
SAT-AMD-20051118-00226			
SAT-LOA-19970605-00050	S2243	DIRECTV Enterprises, LLC	101°
SAT-AMD-20051118-00225			
SAT-LOA-19970605-00051	S2244	DIRECTV Enterprises, LLC	105.5°
SAT-AMD-20051118-00224			
SAT-LOA-20020328-00050	S2440	EchoStar Satellite Operating Corporation	119°
SAT-AMD-20051118-00247			
SAT-LOA-20020328-00051	S2441	EchoStar Satellite Operating Corporation	114.5°
SAT-AMD-20051118-00246			
SAT-LOA-20020328-00052	S2442	EchoStar Satellite Operating Corporation	110°
SAT-AMD-20051118-00245			
SAT-LOA-20050210-00028	S2659	Intelsat North America LLC	67.5°
SAT-AMD-20051118-00241			
SAT-LOA-20050210-00029	S2660	Intelsat North America LLC	121°
SAT-AMD-20051118-00240			
SAT-LOA-20050210-00030	S2661	Intelsat North America LLC	97°
SAT-AMD-20051118-00239			
SAT-LOA-20050210-00031	S2662	Intelsat North America LLC	89°
SAT-AMD-20051118-00238			
SAT-LOA-20060412-00042	S2698	Pegasus Development DBS Corporation	91°
SAT-LOA-20060412-00043	S2699	Pegasus Development DBS Corporation	101°
SAT-LOA-20060412-00044	S2700	Pegasus Development DBS Corporation	110°
SAT-LOA-20060908-00099	S2711	DIRECTV Enterprises, LLC	99°
SAT-LOA-20060908-00100	S2712	DIRECTV Enterprises, LLC	103°
SAT-LOA-20070105-00001	S2723	EchoStar Satellite Operating Corporation	61.9°
SAT-LOA-20070105-00002	S2724	EchoStar Satellite Operating Corporation	67°
SAT-LOA-20070105-00003	S2725	EchoStar Satellite Operating Corporation	77.2°
SAT-LOA-20070105-00004	S2726	EchoStar Satellite Operating Corporation	86.3°
SAT-LOA-20070105-00005	S2727	EchoStar Satellite Operating Corporation	124°
SAT-LOA-20070105-00006	S2728	EchoStar Satellite Operating Corporation	128.6°
SAT-LOA-20070105-00007	S2729	EchoStar Satellite Operating Corporation	147.6°

APPENDIX F

ORBITAL ASSIGNMENTS – All W.L.

43.00º	63.00º	83.00º	103.00º	123.00º	143.00º	163.00º
47.00º	67.00º	87.00º	107.00º	127.00º	147.00º	167.00º
51.00º	71.00º	91.00º	111.00º	131.00º	151.00º	171.00º
55.00º	75.00º	95.00º	115.00º	135.00º	155.00º	175.00º
59.00º	79.00º	99.00º	119.00º	139.00º	159.00º	179.00º

APPENDIX G

Currently Authorized Earth Stations Operating in the 17.3-17.7 GHz band.

Call Sign	Licensee	Coordinates	NAD	Location
E060003	EchoStar Satellite Operating Corp	33°21'53.6"N 111°48'53.6"W	83	Gilbert, AZ
E980174	EchoStar Satellite Operating Corp	33°21'55.3"N 111°48'48.2"W		Gilbert, AZ
E970394	EchoStar Satellite Operating Corp	33°21'55.3"N 111°48'49.7"W	27	Gilbert, AZ
E020307	EchoStar Satellite Operating Corp	33°21'55.3"N 111°48'51.4"W	83	Gilbert, AZ
E050017	EchoStar Satellite Operating Corp	33°21'55.9"N 111°48'50"W	83	Gilbert, AZ
E010241	EchoStar Satellite Operating Corp	33°21'56.1"N 111°48'50.7"W	83	Gilbert, AZ
E980180	EchoStar Satellite Operating Corp	33°21'56.5"N 111°48'48.2"W		Gilbert, AZ
E980178	EchoStar Satellite Operating Corp	33°21'56.5"N 111°48'49.7"W	27	Gilbert, AZ
E020306	EchoStar Satellite Operating Corp	33°21'59.8"N 111°48'52.3"W	83	Gilbert, AZ
E010242	EchoStar Satellite Operating Corp	33°21'59.9"N 111°48'51.6"W	83	Gilbert, AZ
E070014	EchoStar Satellite Operating Corp	33°22'0.8"N 111°48'54.7"W	83	Gilbert, AZ
E050340	DIRECTV Enterprises, LLC	39°33'36"N 104°51'50"W	83	Englewood, CA
E980285	DIRECTV Enterprises, LLC	33°58'56.5"N 118°25'31.2"W	83	Los Angeles, CA
E990159	DIRECTV Enterprises, LLC	33°58'56"N 118°25'28.5"W	27	Los Angeles, CA
E980338	DIRECTV Enterprises, LLC	33°59'0"N 118°25'27"W	27	Los Angeles, CA
E980340	DIRECTV Enterprises, LLC	33°59'0"N 118°25'29"W	83	Los Angeles, CA
E010129	DIRECTV Enterprises, LLC	33°59'1"N 118°25'27"W	83	Los Angeles, CA
E970336	SES Americom, Inc.	34°19'31"N 118°59'41"W	27	Moorpark, CA
E990323	PanAmSat Licensee Corp	39°16'35"N 104°48'23.9"W	83	Castle Rock, CO
E010130	DIRECTV Enterprises, LLC	39°16'37"N 104°48'24"W	83	Castle Rock, CO
E930304	DIRECTV Enterprises, LLC	39°16'37"N 104°48'29"W	83	Castle Rock, CO
E930191	DIRECTV Enterprises, LLC	39°16'38"N 104°48'18.5"W	83	Castle Rock, CO
E020172	DIRECTV Enterprises, Inc	39°16'38"N 104°48'20.5"W	83	Castle Rock, CO

E030105	DIRECTV Enterprises, LLC	39°16’38”N 104°48’26.5”W	83	Castle Rock, CO
E930229	DIRECTV Enterprises, LLC	33°39’50”N 84°16’24”W	83	Ellenwood, GA
E010112	PanAmSat Licensee Corp.	33°39’53”N 84°16’19”W	83	Ellenwood, GA
E930485	DIRECTV Enterprises, LLC	44°59’36”N 92°58’43”W	83	Oakdale, MN
E030102	Rainbow DBS Company LLC	40°44’39”N 73°29’39.3”W	83	Bethpage, NY
E010320	Pegasus Development Corporation	42°47’52”N 73°43’40”W	83	Cohoes, NY
E980195[1]	Loral Skynet Corporation	41°27’50”N 75°7’44”W		Hawley, PA
E980196[2]	Loral Skynet Corporation	41°27’51”N 75°7’45”W		Hawley, PA
E020248[3]	EchoStar Satellite LLC	44°11’14.2”N 103°20’7.5”W	83	Rapid City, SD
E060004	EchoStar Satellite Operating Corp	29°45’35.9”N 98°3’48.1”W	83	
E050373	EchoStar Satellite Operating Corp	38°43’22.4”N 78°39’58.5”W	83	Quicksburg, VA
E030117	DIRECTV Enterprises, LLC	39°7’55.4”N 78°12’5.5”W	83	Winchester, VA
E050374	EchoStar Satellite Operating Corp	47°35’31.8”N 117°33’2.5”W	83	Spokane, WA
E990138	EchoStar Satellite Operating Corp	41°38’52”N 72°54’8”W	27	Cheyenne, WY
E990139	EchoStar Satellite Operating Corp	41°38’52”N 72°54’8”W	27	Cheyenne, WY
E980005	EchoStar Satellite Operating Corp	41°7’56.4”N 104°44’10.4”W	27	Cheyenne, WY
E980142	EchoStar Satellite Operating Corp	41°7’56.6”N 104°44’15.6”W	83	Cheyenne, WY
E990309	EchoStar Satellite Operating Corp	41°7’56.8”N 104°44’11.2”W	27	Cheyenne, WY
E950287	EchoStar Satellite Operating Corp	41°7’56”N 104°44’7”W	27	Cheyenne, WY
E950288	EchoStar Satellite Operating Corp	41°7’56”N 104°44’9”W	27	Cheyenne, WY
E990310	EchoStar North America Corp	41°7’56.8”N 104°44’11.2”W	27	Cheyenne, WY
E980143	EchoStar Satellite Operating Corp	41°7’57.5”N 104°44’14.3”W	27	Cheyenne, WY
E980081[4]	EchoStar Satellite Operating	41°7’58.3”N 104°44’9.1”W		Cheyenne, WY

[1] Uses the 17301.02-17301.98 MHz band only.

[2] Uses the 17307.52-17308.48 MHz band only.

[3] Uses the 17303.25-17303.25 MHz band only.

[4] Uses the 17301.00-17302.00 MHz band only.

	Corp			
E980082[5]	EchoStar Satellite Operating Corp	41°7’58.3”N 104°44’9.1”W		Cheyenne, WY

[5] Uses the 17301.00-17302.00 MHz band only.

APPENDIX H

INITIAL REGULATORY FLEXIBILITY ANALYSIS

As required by the Regulatory Flexibility Act of 1980, as amended (RFA),[1] the Commission has prepared this present Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on a substantial number of small entities by the policies and rules proposed in this item, 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 17.3-17.8 GHz Frequency Band, Report and Order and Further Notice of Proposed Rulemaking (*R&O and FNPRM*).[2] Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments on the *FNPRM* provided in paragraph 194 of this *NPRM*. The Commission will send a copy of the *FNPRM*, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA).[3] In addition, the *FNPRM* and IRFA (or summaries thereof) will be published in the Federal Register.[4]

A. Need for, and Objectives of, the Proposed Rules

The objective of the proposed rules is to address potential interference scenarios which arise in the reverse band operating environment. In the *NPRM,* we sought comment on what measures were needed to address issues concerning reverse band operations. These included measures to mitigate against space-path interference between DBS and 17/24 GHz BSS satellites (space-path interference) and to protect 17/24 GHz BSS subscribers from DBS feeder links (ground-path interference). The record on these issues is insufficient to develop requirements. While most commenters advocate certain general approaches, we need more information to build on the generalities and derive specific requirements. Thus, we seek further comment on the issues concerning reverse band operations.

The two types of interference which might occur in the reverse band operating environment are ground path interference space path interference. Ground path interference will occur when the signals from transmitting DBS feeder link earth stations operating the 17.3-17.7 GHz band are detected at the receiving earth stations of 17/24 GHz BSS subscribers. This

[1] *See* 5 U.S.C. § 603. The RFA (*see* 5 U.S.C. § 601 – 612), has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[2] *See* 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, *Report and Order and Further Notice of Proposed Rulemaking,* IB Docket No. 06-123 (2007).

[3] *See* 5 U.S.C. § 603(a).

[4] *See* 5 U.S.C. § 603(a).

interference will be the most severe in areas surrounding the DBS feeder uplink stations. Space path interference will occur when the transmitted signals from 17/24 GHz BSS satellites are received by the feeder link receivers on satellites operating in the DBS service.

In order to mitigate against ground path and space path interference, we are proposing a variety of measures, such as the establishment of protection zones, coordination zones, power level limits, geographic restrictions of earth stations, informational requirements for coordination, and required technical showings.

B. Legal Basis

This *NPRM* is adopted pursuant to Sections 1, 4(i), 7(a), 301, 303(c), 303(f), 303(g), 303(r), 303(y), and 308 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 151, 154(i), 154(j), 157(a), 301, 303(c), 303(f), 303(g), 303(r), 303(y), 308.

C. Description and Estimate of the Number of Small Entities to Which the Proposals Will Apply

The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that may be affected by the rules adopted herein.[5] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[6] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[7] A small business concern is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA).[8] Below, we further describe and estimate the number of small entity licensees that may be affected by the adopted rules.

Satellite Telecommunications. The SBA has developed a small business size standard for the two broad census categories of "Satellite Telecommunications" and "Other Telecommunications." Under both categories, a business is considered small if it has $13.5 million or less in annual receipts.[9] The category of Satellite Telecommunications "comprises establishments primarily engaged in providing point-to-point telecommunications services to other establishments in the telecommunications and broadcasting industries by forwarding and receiving communications signals via a system of satellites or reselling satellite

[5] 5 U.S.C. § 604(a)(3).

[6] 5 U.S.C. § 601(6).

[7] 5 U.S.C. § 601(3) (incorporating by reference the definition of "small business concern" in 15 U.S.C. § 632). Pursuant to the RFA, the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after the opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register." 5 U.S.C. § 601(3).

[8] Small Business Act, 15 U.S.C. § 632 (1996).

[9] 13 C.F.R. § 121.201, NAICS code 517410.

telecommunications."[10] For this category, Census Bureau data for 2002 show that there were a total of 371 firms that operated for the entire year.[11] Of this total, 307 firms had annual receipts of under $10 million, and 26 firms had receipts of $10 million to $24,999,999.[12] Consequently, we estimate that the majority of Satellite Telecommunications firms are small entities that might be affected by our action.

The category of Other Telecommunications "comprises establishments primarily engaged in (1) providing specialized telecommunications applications, such as satellite tracking, communications telemetry, and radar station operations; or (2) providing satellite terminal stations and associated facilities operationally connected with one or more terrestrial communications systems and capable of transmitting telecommunications to or receiving telecommunications from satellite systems."[13] For this category, Census Bureau data for 2002 show that there were a total of 332 firms that operated for the entire year.[14] Of this total, 259 firms had annual receipts of under $10 million and 15 firms had annual receipts of $10 million to $24,999,999.[15] Consequently, we estimate that the majority of Other Telecommunications firms are small entities that might be affected by our action.

Space Stations (Geostationary). Commission records reveal that there are 44 space station licensees. We do not request nor collect annual revenue information concerning such licensees, and thus are unable to estimate the number of geostationary space station licensees that would constitute a small business under the SBA definition cited above, or apply any rules providing special consideration for geostationary space station licensees that are small businesses.

17 GHz Transmitting Earth Stations. Currently there are approximately 47 operational earth stations in the 17.3-17.7 GHz bands. The Commission does not request or collect annual revenue information, and thus is unable to estimate the number of earth stations that would constitute a small business under the SBA definition.[16]

Cellular and Other Wireless Telecommunications. The SBA has developed a small business size standard for Cellular and Other Wireless Telecommunications, which consists of

[10] U.S. Census Bureau, 2002 NAICS Definitions, "517410 Satellite Telecommunications"; http://www.census.gov/epcd/naics02/def/NDEF517.HTM.

[11] U.S. Census Bureau, 2002 Economic Census, Subject Series: Information, "Establishment and Firm Size (Including Legal Form of Organization)," Table 4, NAICS code 517410 (issued Nov. 2005).

[12] *Id*. An additional 38 firms had annual receipts of $25 million or more.

[13] U.S. Census Bureau, 2002 NAICS Definitions, "517910 Other Telecommunications"; http://www.census.gov/epcd/naics02/def/NDEF517.HTM.

[14] U.S. Census Bureau, 2002 Economic Census, Subject Series: Information, "Establishment and Firm Size (Including Legal Form of Organization)," Table 4, NAICS code 517910 (issued Nov. 2005).

[15] *Id*. An additional 14 firms had annual receipts of $25 million or more.

[16] The SBA has developed a small business size standard for Satellite Telecommunications, which consists of all such companies having $13.5 million or less in annual receipts. 13 C.F.R. § 121.201, NAICS code 517410.

all such firms having 1,500 or fewer employees.[17] According to Census Bureau data for 2002, in this category there were 1,397 firms that operated for the entire year.[18] Of this total, 1,378 firms had employment of 999 or fewer employees, and 19 firms had employment of 1,000 employees or more.[19] Thus, under this category and size standard, the majority of firms can be considered small.

D. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements

In this Further Notice of Proposed Rulemaking, the Commission invites comment on various issues related to the mitigation of harmful interference in the reverse band operating environment, which is unique to operation in the 17/24 GHz BSS. None of the proposed methods are intended to increase the projected reporting, recordkeeping, and other compliance requirements.

E. Steps Taken to Minimize Significant Economic Impact on Small Entities, and Significant Alternatives Considered

The RFA requires that, to the extent consistent with the objectives of applicable statutes, the analysis shall discuss significant alternatives such as: (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.[20]

The measures proposed are necessary to mitigate against space-path interference between DBS and 17/24 GHz BSS satellites (space-path interference) and to protect 17/24 GHz BSS subscribers from DBS feeder links (ground-path interference). The measures include the establishment of protection zones, coordination zones, power level limits, geographic restrictions of earth stations, and technical showings. We believe that these proposals are the most equitable solutions to the potential interference problems posed by operation in the 17/24 GHz BSS. We seek comment on viable alternatives to these rules or their reporting requirements that would lessen the economic impact on small entities. We also seek comment on the establishment of differing compliance or reporting requirements that take into account the resources available to small entities.

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[17] 13 C.F.R. § 121.201, NAICS code 517212.

[18] U.S. Census Bureau, 2002 Economic Census, Subject Series: Information, "Establishment and Firm Size (Including Legal Form of Organization," Table 5, NAICS code 517212 (issued Nov. 2005).

[19] *Id.* The census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with "1000 employees or more."

[20] 5 U.S.C. § 603(c)(1), (c)(4).

F. Federal Rules that May Duplicate, Overlap, or Conflict With the Proposed Rules

None.

STATEMENT OF
COMMISSIONER ROBERT M. McDOWELL

RE: 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, *Report and Order and Further Notice of Proposed Rulemaking*, FCC 07-76

Today, the Commission takes a constructive step forward to open a new window of opportunity for more competition in the satellite industry. The services offered in the 17/24 GHz band will include standard-definition and high-definition formats, and will provide a mix of advanced, multi-media services to residential and business subscribers located not only in the continental United States, but in Alaska and Hawaii as well. I am particularly pleased that our new rules require operators to construct each satellite to accommodate the provision of service to Alaska and Hawaii in the event the satellite reaches, or is moved to, an orbital location that would provide this coverage.

In addition, our order adopts a four-degree orbital spacing plan and associated technical rules to implement the plan, while also permitting flexibility to the extent that proposed offset locations do not increase the potential for interference to other systems. We also adopt technical rules to protect receive-only consumer antennas, which would shield incumbents and their customers from harmful interference, while creating a means for roll-out of new, innovative products and facilities. Finally, we are proceeding mindful of the need to protect the operations of terrestrial systems that have co-primary rights in certain of the bands at issue here.

Because we implement a light regulatory touch, our action will ease the ability of diverse entrants to introduce exciting new services to American consumers living in urban, rural and insular areas. This is precisely the type of action the Commission must continuously take to provide the certainty necessary for America's entrepreneurs to forge ahead with advanced broadband offerings. Our work will result in more choices for consumers and more competition among different broadband platforms. This should, in turn, result in lower prices for consumers and a corresponding increase in delivery to consumers living and working in *all* areas of our country.

Finally, I thank the International Bureau for its comprehensive, thoughtful work.

STATEMENT OF
COMMISSIONER JONATHAN S. ADELSTEIN
APPROVING IN PART, DISSENTING IN PART

Re: *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; Report and Order and Further Notice of Proposed Rulemaking,* FCC-07-76

I support the vast bulk of this decision. In particular, I am very pleased that we have concluded a large portion of this proceeding in a relatively short time frame given that the 17/24 GHz BSS allocation became effective on April 1, 2007. I want to ensure that our satellite

services have prompt access to this new allocation, and I appreciate very much the work of the International Bureau in bringing this item forward on a timely basis.

The 17/24 GHz BSS band holds great promise for operators to introduce a new generation of innovative satellite services to American consumers – providing a mix of video, audio, data, and multimedia services to residential and business subscribers. Indeed, the spectrum already is in high demand with over 20 applications on file for a variety of orbital locations. Because we adopt an orbital spacing requirement of four degrees, the item allows these applicants an opportunity to amend their applications to conform to the new orbital spacing framework and new technical rules. Our decision puts in place a freeze on the filing of new 17/24 GHz BSS applications until some time after the pending applications are amended.

It is the keen interest in the 17/24 GHz BSS allocation and our somewhat unique application situation that gives me some pause in this proceeding. I believe that our experience with the existing bond requirements and the Commission's already dubious track record of bond enforcement warrant for a far more aggressive approach with respect to the 17/24 GHz BSS band to ensure that the spectrum is promptly put to use.[21] This is a new allocation of a large swath of free spectrum that counsels for a higher bond obligation and a commitment from this Commission that it will hold 17/24 GHz BSS applicants accountable for their bond requirements. This spectrum is far too valuable to have it fall in the hands of speculators or those with anti-competitive interests. Like others, I am unsure that our existing safeguards against speculation are sufficient.

Finally, I am concerned that we have not considered more seriously the argument to increase the amount of programming that service providers in the 17/24 GHz BSS band are required to reserve for non-commercial programming of an educational or informational nature. Given the additional spectrum capacity being offered service providers by this new allocation, I believe we should have taken a harder look at the merits of increasing public interest programming to the maximum of seven percent.

For all of these reasons, I must approve in part, dissent in part.

[21] *See* Comments of Echostar at 18. "Such additional protection is needed because even the FSS bond and milestone requirements would not be enough to protect against speculation in the RBW [reverse band working] band with its relatively limited number of slots."