

FEDERAL COMMUNICATIONS COMMISSION**47 CFR Parts 2 and 25**

[IB Docket No. 06–123; FCC 07–76]

Establishment of Policies and Service Rules for the Broadcasting-Satellite Service**AGENCY:** Federal Communications Commission.**ACTION:** Final rule.

SUMMARY: The Federal Communications Commission adopts processing and service rules for the 17/24 GHz Broadcasting-Satellite Service (BSS). Specifically, the Commission adopts a first-come, first-served licensing procedure for the 17/24 GHz BSS, as well as various safeguards, reporting requirements, and licensee obligations. The Commission also adopts geographic service rules to require 17/24 GHz BSS licensees to provide service to Alaska and Hawaii as discussed herein. In addition, the Commission establishes rules and requirements for orbital spacing, minimum antenna diameter, and antenna performance standards. Also, the Commission establishes limits for uplink and downlink power levels to minimize the possibility of harmful interference. Finally, the Commission stipulates criteria to facilitate sharing in the 24 GHz and 17 GHz bands.

DATES: Effective September 28, 2007.

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SUPPLEMENTARY INFORMATION: This is a summary of the Commission's *Report and Order* (R&O) in IB Docket No. 06–123, FCC 07–76, adopted May 2, 2007 and released on May 4, 2007. The full text of the R&O is available for public inspection and copying during regular business hours at the FCC Reference Information Center, Portals II, 445 12th Street, SW., Room CY–A257, Washington, DC 20554. The document may also be purchased from the Commission's duplicating contractor, Best Copy and Printing, Inc., Portals II, 445 12th Street, SW., Room CY–B402, Washington, DC 20554, telephone 202–488–5300, facsimile 202–488–5563, or via e-mail FCC@BCPIWEB.com.

Pursuant to the Regulatory Flexibility Act, the Commission has prepared a

Final Regulatory Flexibility Analysis (FRFA) of the possible significant economic impact on small entities by the rules adopted in the R&O. The text of the FRFA is set forth in Appendix A of the R&O.

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).

Paperwork Reduction Act Requirements*OMB Control Number:* 3060–1097.*Title:* Service Rules and Policies for the Broadcasting Satellite Service (BSS).*Form No.:* Not Applicable.*Type of Review:* On-going collection.*Respondents:* Businesses or other for-profit entities.*Number of Respondents:* 4 respondents; 24 responses.*Estimated Time per Response:* 10 hours.*Frequency of Response:* On occasion and annual reporting requirements.*Estimated Total Annual Burden:* 240 hours.*Estimated Total Annual Costs:* \$12,451,700.00.*Privacy Act Impact Assessment:* Not Applicable.

Needs and Uses: The purpose of this information collection is to address the Paperwork Reduction Act (PRA) requirements proposed in the Commission's Notice of Proposed Rulemaking (FCC 06–90) to establish policies and service rules for the new Broadcasting Satellite Service under IB Docket No. 06–123. In this NPRM, the Commission proposes three new information collection requirements applicable to Broadcasting Satellite Service licensees: (1) Annual reporting requirement on status of space station construction and anticipated launch dates, (2) milestone schedules and (3) performance bonds that are posted within 30 days of the grant of the license.

Without the information collected through the Commission's satellite licensing procedures, we would not be

able to determine whether to permit applicants for satellite licenses to provide telecommunications services in the U.S. Therefore, we would be unable to fulfill our statutory responsibilities in accordance with the Communications Act of 1934, as amended; as well as the obligations imposed on parties to the World Trade Organization (WTO) Basic Telecom Agreement.

Summary of Report and Order

1. With this Report and Order (R&O), the Federal Communications Commission (Commission) adopts processing and service rules for the 17/24 GHz Broadcasting-Satellite Service (BSS). Specifically, the Commission adopts a first-come, first-served licensing procedure for the 17/24 GHz BSS, as well as various safeguards, reporting requirements, and licensee obligations. The Commission also adopts geographic service rules to require 17/24 GHz BSS licensees to provide service to Alaska and Hawaii as discussed herein. In addition, the Commission establishes rules and requirements for orbital spacing, minimum antenna diameter, and antenna performance standards. Also, the Commission establishes limits for uplink and downlink power levels to minimize the possibility of harmful interference. Finally, the Commission stipulates criteria to facilitate sharing in the 24 GHz and 17 GHz bands.

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

3. As the Commission explained in the *NPRM*, the 1992 World Administrative Radio Conference (WARC–92) of the International Telecommunication Union (ITU) adopted an additional frequency allocation for BSS in Region 2. In 2000, the Commission implemented, in large part, the ITU Region 2 allocation for BSS domestically. 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. 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, 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; (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; 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. The Commission's objective was to accommodate new satellite services while providing adequate spectrum for existing FS operations.

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. 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.

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. The *NPRM* noted that, in the *First Space Station Licensing Reform Order*, the Commission adopted new licensing procedures for all satellite services except DBS and Digital Audio Radio Service (DARS). 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. 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 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 a previously-licensed satellite or with a satellite proposed in a previously-filed application. Alternatively, we asked whether some other licensing approach would be more appropriate. In this regard, the *NPRM* specifically sought comment as to whether, pursuant to section 309(j) 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, the D.C. Circuit's *Northpoint* ruling, and ITU procedures.

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. 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. EchoStar believes that we should instead award 17/24 GHz BSS licenses by auction or by a processing round approach. To 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. EchoStar further suggests that, if the Commission decides against an auctions approach, it should adopt a processing round procedure combined with strict financial requirements. No other commenters support the use of auctions or processing rounds.

8. We find that the first-come, first-served licensing approach is well-suited for processing applications for 17/24 GHz BSS space stations. 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. 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. In addition, the first-come, first-served licensing approach works well in conjunction with the ITU processes for unplanned bands, such as this one.

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. 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. 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. 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. 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. Eliminating this regulatory delay was one of our primary motives in adopting the first-come, first served approach. 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. The first-come, first-served processing queue provides a 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.

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. 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 and construct and launch the satellite consistent with the milestone schedule specified in § 25.164 of the Commission's rules. The bond becomes payable if a licensee fails to meet a milestone, rendering the license null and void. 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, and

must submit substantially complete applications or face dismissal, and cannot sell their place in the processing queue. 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. 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.

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

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. 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. 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. To be substantially complete, a 17/24 GHz BSS satellite application must include a complete Form 312 and Schedule S, and all the information requested in § 25.114(d) of the Commission's rules. As amended in Appendix B of this Order, § 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. Applicants will be required to demonstrate that they comply with the pfd limits in new § 25.208(w), 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.

17. DISCO II Market Access Standard Adopted: The Commission's *DISCO II Order* 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. This analysis considers the effect on competition in the United States, eligibility and operating requirements, spectrum availability, and national security, law enforcement, foreign policy, and trade concerns.

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. 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 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). 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. This allows us to determine whether the foreign-licensed 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. 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. 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.

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. This includes filing FCC Form 312, information required in Schedule S, and all other information required by § 25.114 of the Commission's rules. 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.

24. Licensing at Co-Located 17/24 GHz BSS and DBS Orbital Locations: 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. 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. SES Americom and Intelsat oppose this proposal, claiming that it is anti-competitive and would block new entrants from the 17/24 GHz BSS.

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. 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. 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.

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 § 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. 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. The Communications Act provides for a maximum licensing term of eight years for broadcasting facilities and allows the Commission to determine license terms for particular classes of stations, including satellite space and earth stations. In the *NPRM*, the Commission proposed to adopt a 10-year license term for all non-broadcast 17/24 GHz BSS satellites. 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. 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.

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. 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. 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.

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. 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, customers could experience service disruptions. 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.

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. 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. 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. 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. 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.

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. 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. 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.

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. 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. Bermuda adds that licensees should file reports regardless of whether they are U.S. operators or non-U.S. operators. Bermuda also states that requiring operators to report at intervals of less than one year would provide an increased opportunity to monitor progress. 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. 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. 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.

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.

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 § 1.1107 of the Commission's rules. 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 § 1.1107. There were no comments on our filing fee proposals and we adopt our fee proposals.

38. DBS and DTH Public Interest Obligations Adopted for 17/24 GHz BSS: § 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. The entities subject to § 25.701 include entities licensed to operate satellites in the 12.2 to 12.7 GHz DBS frequency bands; entities licensed pursuant to part 25 of the Commission's rules to provide FSS via the Ku-band, 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. 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), the licensee should be subject to the public interest obligations

contained in § 25.701. We invited comment on this proposal.

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. 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. 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 § 25.701 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. We see no reason to adopt a different approach for operations in the 17/24 GHz BSS. Accordingly, we adopt the proposal to amend § 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 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. 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.

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 § 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 other bands. Thus, we require 17/24 GHz BSS licensees to reserve four percent of their channel capacity, as defined in § 25.701, for use by qualified programmers for noncommercial programming of an educational or informational nature. See 47 CFR 25.701(c).

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. See 17 U.S.C. 119, 122. 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. See 17 U.S.C. 119(d)(6). See also 47 U.S.C. 339. 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. See 17 U.S.C. 122(j)(3). See also 47 U.S.C. 338.

44. Both DIRECTV and EchoStar, as well as NAB, support allowing 17/24 GHz BSS licensees to qualify to use the compulsory copyright licenses. 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. Although 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, and, if they offer service to more than 5 million customers, must provide television broadcast signals to subscribers in Alaska and Hawaii.

45. EEO Requirements Adopted: The *NPRM* noted that § 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. We proposed to apply § 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. Bermuda states generally that it supports our proposals. We find that it is in the public interest to apply § 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 § 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 other EEO

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

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 § 25.148(c) of the Commission's rules. 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.

48. Commenters generally support adopting rules analogous to the DBS rules. *DIRECTV* and *EchoStar* also support applying the rules on a system-wide basis rather than on an orbital location basis. *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 United States. *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 orbital location. 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. 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.

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. The *NPRM* also noted that in the *EAS First Report 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.” 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.

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. 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. 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.

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. 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. Consequently, DIRECTV argues, unless the Commission changes its policy regarding the application of EAS requirements to other services it should not adopt Intelsat and SES Americom’s proposal for the 17/24 GHz service alone.

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.

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 § 25.701(a) of the Commission’s rules, 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*, making arguments essentially identical to those raised in their comments in this proceeding. We will address these issues in an Order dealing with the reconsideration petitions in the EAS proceeding.

55. Use of BSS Spectrum at 17.7–17.8 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. As discussed in the *NPRM*, 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. 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. 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. The *NPRM* sought comment on this proposal and any rule changes that might be necessary to effect its implementation. 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 § 25.208(c) of the Commission’s rules prior to the adoption of the *18 GHz Report and Order* in 2002, and are also the same limits that Article 21 of the ITU Radio Regulations currently imposes on FSS operators in this band. See Table 21–4 of the ITU Radio Regulations. The *NPRM* sought comment on extension of these proposed pfd limits to the 17/24 GHz BSS.

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 possessions. 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. 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. 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. 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.

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. The FWCC claims that the FS used the band heavily even prior to the 1998 *18 GHz Report and Order* 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. 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. 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.

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. 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. 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. 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. 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. See 47 CFR 2.106 and NG 104. 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.

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. 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. 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. 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, See, e.g., 47 CFR 25.208(a)–(c), the maximum values will apply to elevation angles (δ) between 25° and 90° above the horizontal plane. We will restrict pfd values by a factor of $(\delta - 5)/2$ for elevation angles between 5° and 25° above the horizontal plane, and to values of 10 dB lower for elevation angles between 0° and 5° 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. 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). See 47 CFR 25.202(g). 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. 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.

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. Rather, EchoStar asserts that the upper guardband is better defined at 17.790–17.800 GHz. At present, § 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. 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. 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.

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 § 25.202(g).

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. 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 secondary in-band government radar systems at frequencies just above 17.3 GHz. DIRECTV cautions that higher frequencies correspond with higher reliability for TT&C operations due to their separation from government radar systems. 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.

66. *Orbital Spacing*: 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. 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. 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. 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. DIRECTV maintains that four degrees of orbital separation will support deployment of the 60 cm diameter antennas it plans to implement. SES Americom and Intelsat maintain that a four-degree separation

scheme will permit their planned use of 45 cm antennas. 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. 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.

68. In contrast, EchoStar, in its comments, advocates a 4.5-degree orbital separation scheme centered upon current DBS locations. 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. 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. 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.

69. To this end, EchoStar and SES Americom propose a mutually-agreed orbital assignment framework for the portion of the geostationary arc between 56.9° W.L. and 147.6° W.L. This proposal seeks to reconcile the differing business models, system designs and 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. 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 83° W.L. and 123° 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. DIRECTV also submits that its proposed framework would preserve the flexibility to locate 17/24 GHz BSS satellites near certain U.S. DBS locations while avoiding orbital locations that are too close to Appendices 30 and 30A 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.

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. 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 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. 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. 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. 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. No one has suggested in the record another four-degree spacing configuration that accommodates other commenters' proposals better than DIRECTV's proposal.

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.

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. 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 83° W.L. or above 123° W.L.). 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.

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.

Accordingly, we find that DIRECTV has not adequately supported its proposal.

77. Minimum Antenna Diameter and Performance Standards—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. 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. 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. In particular, the *NPRM* requested comment on what types of antenna performance regulation, if any, might be appropriate.

78. Most commenters support accommodating a minimum antenna diameter of 45 cm and Intelsat proposes that the Commission adopt a specific 45 cm minimum antenna size requirement. 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 or afford interference protection only to receiving antennas no smaller than 45 cm. DIRECTV expressed the view that 60 cm is the minimum antenna diameter that the Commission should accommodate when considering an orbital spacing policy. DIRECTV notes that 60 cm dishes have become more prevalent in recent years and have long been the consumer standard in Europe and elsewhere. DIRECTV states further that 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. 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. 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.

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. 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. 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. 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.

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 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. This rule does not apply to 17/24 GHz BSS telemetry earth stations that are subject to the antenna performance requirements of § 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.

82. Technical Requirements for Intra-Service Operations—Uplink Power Levels. 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. 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. 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. Additionally, the Commission's rules currently provide for routine licensing of FSS earth stations when specific antenna performance standards and uplink power levels are met. 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.

83. Because, by definition, feeder links operate in the FSS, the *NPRM* stated that the antenna performance standards of § 25.209, *See 47 CFR 25.209*, 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. 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. 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.

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. Intelsat initially stated that such requirements were unnecessary, but, in its reply comments, provides off-axis EIRP density limits that it believes would be adequate.

85. Commenters addressing this issue support applying the Ka-band FSS uplink off-axis power density requirements contained in § 25.138(a)(1)–(4), *See 47 CFR 25.138(a)(1)–(4)*, of our rules to feeder link earth stations in the 17/24 GHz BSS. Commenters assert that this rule has been effective in the Ka-band, sets limits that are consistent with levels proposed in applications already before the Commission, and will successfully address adjacent satellite interference concerns. 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. 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.

86. Although the off-axis EIRP density limits favored by commenters are approximately 3 dB greater than those tentatively proposed by the Commission, 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 § 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 ±3° of the GSO arc, under clear sky conditions:

32.5–25log(θ)	dBW/MHz	for 2° ≤ θ ≤ 7°
11.4	dBW/MHz	for 7° ≤ θ ≤ 9.2°
35.5–25log(θ)	dBW/MHz	for 9.2° ≤ θ ≤ 48°
3.5	dBW/MHz	for 48° ≤ θ ≤ 180°

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 ±3° of the GSO arc, under clear sky conditions:

35.5–25log(θ)	dBW/MHz	for 2° ≤ θ ≤ 7°
14.4	dBW/MHz	for 7° ≤ θ ≤ 9.2°
38.5–25log(θ)	dBW/MHz	for 9.2° ≤ θ ≤ 48°
6.5	dBW/MHz	for 48° ≤ θ ≤ 180°

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

(3) The values given in paragraphs (a)(1) and (2) of this section may be exceeded by 3 dB, for values of θ > 10°, 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:

22.5–25log(θ)	dBW/MHz	for 2° ≤ θ ≤ 7°
1.4	dBW/MHz	for 7° ≤ θ ≤ 9.2°

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

87. The off-axis EIRP density curves given in § 25.138(a)(1)–(4) of our rules, *See 47 CFR 25.138(a)(1)–(4)*, 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 § 25.138. Rather, they make more general references to a rule modeled on the framework of § 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.

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. 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. 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. We also asked over what angular 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.

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. 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. 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. These values are true for an antenna that complies with FSS antenna gain envelope rules of $29-25 \cdot \log_{10}(\theta)$. 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. 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. 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 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 exceedences, we believe that the sharing situation with 24 GHz fixed service systems requires a somewhat more conservative approach. 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, noting that § 25.204(g) of our rules, *See* 47 CFR 25.204(g), requires all Ka-band FSS earth stations to employ adaptive power control or other methods of rain fade compensation. Commenters recognize the need for uplink power control in the event of rain fade and cite the specification already contained in our rules, *See, e.g.*, 47 CFR 25.138(a)(5), as appropriate for the 17/24 GHz BSS. 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 § 25.138(a)(5), 47 CFR 25.138(a)(5). This rule 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 actual amount, whichever is greater; and (3) that this should occur with a confidence level of 90% except for transient periods of no more than 0.5% during which the excess shall be no more than 4.0 dB.

93. Some commenters also object to requiring applicants to provide measured radiation patterns as specified in § 25.138(d), 47 CFR 25.138(d), of our rules as a means of demonstrating compliance with off-axis EIRP limits. Intelsat argues that the requirement to provide measured radiation patterns for antennas not yet built is often not practical and unduly burdens the applicant. 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 § 25.221, 47 CFR 25.221. 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. 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. 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. DIRECTV's proposed approach is based on a proposal submitted by the Satellite Industry Association in the *Biennial Review* docket, and are founded in part upon existing rules for large C- and Ku-band earth stations.

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 § 25.209, 47 CFR 25.109, and may not exceed specified uplink power density levels and minimum antenna diameters. Those C- and Ku-band applicants who do not meet these requirements may still be licensed via the rules outlined in § 25.220, 47 CFR 25.220. In contrast, Ka-band earth station applicants must meet the off-axis EIRP density requirements of § 25.138(a)(1)–(4), 47 CFR 25.138(a)(4) and demonstrate such by providing the antenna radiation pattern measurements specified in § 25.138(d), 47 CFR 25.138(d). The earth station licensing requirement to 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 § 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 § 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 § 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. Alternately, an applicant that does not meet the antenna performance requirements of § 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 § 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 § 25.222(b)(1), 47 CFR 25.222(b)(1). Finally, an applicant that meets the antenna performance requirements of § 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, § 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. Paragraph (a)(1) of this rule requires applicants to submit manufacturer certification of measurements demonstrating that the antenna is compliant with the requirements of § 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 § 25.132(b)(3), as revised in Appendix B of this Order, will apply. 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 require on-site measurements.

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 § 25.133, 47 CFR 25.133.

97. Downlink Power Limits. 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. 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. 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.

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. 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. All other commenters advocate adopting a system of graduated pfd limits. 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. 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 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.

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/m²/MHz; -114.5 dBW/m²/MHz in the Northeast; -116 dBW/m²/MHz in the Upper Midwest; and -118 dBW/m²/MHz in the West. The westernmost region is defined by the 103° West Longitude line; the northern regions are above the 40° North Latitude line; and the 85° West Longitude line divides the Northeast Region from the Upper Midwest Region. For areas outside of the Contiguous United States (CONUS) including Alaska, Hawaii and Puerto Rico, the pfd limit would be -113 dBW/m²/MHz. 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. Accordingly, EchoStar urges the Commission to accommodate the requirements of all operators and to permit pfd levels on the higher side. SES Americom supports EchoStar's proposal.

100. DIRECTV proposes adopting three geographic regions, with the highest power level in the Southeast of -115 dBW/m²/MHz; -118 dBW/m²/MHz in the Northeast; and -121 dBW/m²/MHz in the West. In DIRECTV's proposal the far western region is defined by the 100° West Longitude line and the Northeast and Southeast Regions are divided by the 38° North Latitude line. DIRECTV argues that its somewhat lower pfd levels are more appropriate because CONUS beams

cannot match the higher power levels of -113 dBW/m²/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. 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 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.

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. 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. 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. Accordingly, we clarify here that the graduated pfd 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 § 25.138(a)(6), *See* 47 CFR 25.138(a)(6). 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. 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. 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.

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 § 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 § 25.138(c), we require non-compliant operators to coordinate with any future applicants or licensees 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.

105. Other Technical Requirements: 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.

106. Tracking, Telemetry and Command (TT&C) Frequencies. No Additional 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. 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. 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. 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. 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. 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. Thus, DIRECTV requests that the Commission not limit operator flexibility by precluding such co-location, or by requiring a minimum separation distance. 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 presence of the interfering DBS signal. 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. EchoStar also argues that interference can be avoided by careful frequency planning.

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. 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.

109. Polarization and Full Frequency Re-Use Requirements. Full Frequency Re-Use Required: The *NPRM* sought comment on requirements relating to antenna polarization and full frequency re-use. 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. DIRECTV argues, however, that all transmissions from a given orbital location should be of the same type, 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. 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. EchoStar asserts that such a scheme would yield about 1 dB of reduction in adjacent-satellite interference through judicious placement of the guardbands of an interfering satellite within the transponder bandwidth of the victim satellite. 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. 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.

110. Cross-Polarization Isolation Requirements. 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 § 25.210(i) of the Commission's rules, 47 CFR 25.210(i). 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"). 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. 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. 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%. 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%. In its Reply Comments, DIRECTV offered support for EchoStar's original proposal.

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 § 25.211(a), 47 CFR 25.211(a), and the polarization switchability requirement of § 25.210(c), 47 CFR 25.210(c), 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 § 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. 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 § 25.210(i) for FSS applicants, allowing these systems to operate with isolation levels less than 30 dB. Consequently, we adopt the 25 dB antenna cross-polarization isolation requirement proposed by SES Americom.

114. Spectrum Allocation Issue. Footnote NG176 Unchanged: The *NPRM* also proposed to modify footnote NG167 of the Domestic Table of Frequency Allocations, *See* 47 CFR 2.106, 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. 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. 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. 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. 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. Accordingly, DIRECTV cautions the Commission to weigh carefully the offsetting disadvantages of increased interference in the band. 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.

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 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.

116. Technical Requirements for Inter-Service Operations: Sharing in the 24 GHz Band. – 114 dBW/m²/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. See 47 CFR 2.106 and note NG 167. 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). Fixed service operations in the band include Digital Electronic Message Service (DEMS) systems as well as a variety of other fixed services licensed throughout the United States by Economic Areas (EAs). 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. The Commission adopted this shared allocation 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.

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 § 25.209, 47 CFR 25.109, in combination with earth station power limits in § 25.204, 47 CFR 25.205, would afford sufficient protection to 24 GHz FS systems, or whether changes to our rules are required. 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, as well as the geographic area licensing of 24 GHz FS systems

wherein licensees are not required to file site-specific data.

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. 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.

119. FiberTower asserts that the technical data and assumptions before the Commission are outdated, and that § 25.204(b) is overly permissive as it does not take into account present-day equipment evolution. 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. 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. 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-interference to FS operations can be assured. 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. 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. 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.

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 than 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. 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.

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. As all commenters agree, FS facilities are not operating in large parts of the country. 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.

122. Coordination Threshold: 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. 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. They note that the Commission's rules already establish interference protection criteria between adjacent terrestrial license areas in the 24 GHz band. Specifically, § 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/m²/MHz, and that licensees should be able to deploy with a pfd of up to -94 dBW/m²/MHz at the boundary of the relevant adjacent area without negatively affecting the operations of the adjacent area licensee. See 47 CFR 101.509(e). 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. 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.

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. FiberTower states that the results of its preliminary study indicate that pfd level specified in § 101.509(e) of our rules is insufficient and should be reduced from -114 dBW/m²/MHz to at least -142 dBW/m²/MHz to protect FS operations. Consequently, FiberTower asserts that substantial changes are needed in the Commission's rule. 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 § 101.509(e) should be changed to -142 dBW/m²/MHz, and outlines an accompanying approach for determining compliance with this pfd limit.

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 § 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. FiberTower, however, argues that this pfd level should be reduced by 28 dB to afford sufficient protection to 24 GHz FS operations. The pfd coordination threshold of § 101.509(e) was adopted in the *24 GHz Report and Order* to facilitate coordination between U.S. licensed 24 GHz FS operations. The Commission adopted a -114 dBW/m²/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. 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 § 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 § 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, we extend the pfd coordination threshold value of

-114 dBW/m²/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/m²/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. 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. If transmit power control is used, the EIRP value used in the calculation should be the maximum value. We agree with FiberTower that in cases where adaptive uplink power control is used the EIRP value used for calculation should be the maximum. 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, 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 develop appropriate sharing criteria. 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. 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 §§ 25.203 and 25.251 of our rules, whether or not coordination is required on the basis of the pfd levels adopted above.

129. Sharing in the 17 GHz Band. 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, *See* 47 CFR 2.106. 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. 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. 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.

130. The *NPRM* also made available information that NTIA had provided concerning technical and operating characteristics of certain adjacent-band radiolocation systems that it considers likely to impact 17/24 GHz BSS receiving earth stations. We sought comment on the general applicability of the NTIA's findings to planned 17/24 GHz BSS systems. 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. 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.

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. NTIA indicates that radiolocation systems may seek to continue operating in this spectrum regardless of their allocation status with respect to the BSS, albeit in limited geographic areas and in limited portions of the band. The *NPRM* sought comment on approaches by which BSS operations could co-exist with secondary radiolocation operations.

132. Commenters agree that radar interference into 17/24 GHz BSS receivers is a serious issue that must be addressed as early as possible. 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. Accordingly, commenters encourage the Commission to facilitate this process.

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. EchoStar maintains that out-of-band interference will most severely affect those frequencies closest to 17.3 GHz, but that frequencies up to 100 MHz from the band edge are likely to be seriously impaired; the in-band interference will prevent receiver function on all channels while the signal is present.

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. 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 3×10^{-8} and the interference event only occurs for approximately 2 seconds. For the mainbeam-to-sidelobe and sidelobe-to-mainbeam antenna coupling again interference is shown, but the estimated probability of this scenario occurring is 2×10^{-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. 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 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.

136. Another sharing scenario was raised by NTIA in a letter dated March 21, 2007. 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 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.”

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. 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.

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 Administrative Procedure Act (APA) pursuant to 47 CFR 1.412(b)(1) and 1.412(c). 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. 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.

140. Pending 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.” 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. 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. Consequently, we 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*. Instead, we granted each qualified NGSO Ka-band applicant authority to operate throughout the available spectrum.

141. DIRECTV, EchoStar, and Intelsat make various suggestions as to how to process the pending 17/24 GHz space station applications. DIRECTV generally proposes that we should process the applications under the first-come, first-served approach. Nevertheless, they request that we exempt them from the rule that requires us to treat their amended applications as newly filed. See 47 CFR 25.116(b), (d). 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. Intelsat suggests that a "round-robin" procedure will ensure that orbital locations are assigned in a manner that promotes competition. 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. 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 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. At the same time, we will require applicants to select a location conforming to the four-degree spacing framework adopted today. 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. 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 § 25.158(d). To the extent necessary, we will waive §§ 25.116 and 25.155(c) of our Rules to process the applications in this manner. 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. 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." Applicants do not gain any vested right merely by filing an application. 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. 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. Any application that is not amended by the date specified by the Bureau will be dismissed as defective. 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. 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.

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 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.

148. Conclusion: 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 a limit on the number of pending applications), geographic service requirements to provide service to Alaska and Hawaii, and various public service obligations.

Ex Parte Presentations

149. This proceeding shall be treated as a "permit-but-disclose" proceeding in accordance with the Commission's ex parte rules. 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. Other rules pertaining to oral and written presentations are set forth in § 1.1206(b) of the Commission's rules as well.

Paperwork Reduction Act

150. 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).

Final Regulatory Flexibility Analysis

151. As required by the Regulatory Flexibility Act of 1980, as amended (RFA), 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. 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.

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

152. 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

153. There were no comments filed that specifically addressed the IRFA.

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

154. 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. The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction." In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act. 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). Below, we further describe and estimate the number of small entity licensees that may be affected by the adopted rules.

155. *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. 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." For this category, Census Bureau data for 2002 show that there were a total of 371 firms that operated for the entire year. Of this total, 307 firms had annual receipts of under \$10 million, and 26 firms had receipts of \$10 million to \$24,999,999. Consequently, we estimate that the majority of Satellite Telecommunications firms are small entities that might be affected by our action.

156. 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." For this category, Census Bureau data for 2002 show that there were a total of 332 firms that operated for the entire year. 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. Consequently, we estimate that the majority of Other Telecommunications firms are small entities that might be affected by our action.

157. *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.

158. *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.

159. *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. According to Census Bureau data for 2002, in this category there were 1,397 firms that operated for the entire year. Of this total, 1,378 firms had employment of 999 or fewer employees, and 19 firms had employment of 1,000 employees or more. 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

160. 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. Similarly, to obtain an earth station authorization, applicants must file the appropriate forms as required by the Commission's rules. 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.

161. 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 § 25.208(w) of the Commission's rules. In cases where an applicant will not comply with the power flux density limits set forth in § 25.208(w), 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.

162. 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.

163. 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 § 25.208(c) of the Commission's rules.

164. An applicant proposing a 17/24 GHz BSS space station that proposes to provide "DBS-like service" within the meaning of § 25.225 of the Commission's rules, must either certify that it will meet the requirements of § 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.

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

166. 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 § 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 §§ 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 §§ 25.223(b)(1) through (4) of the Commission's rules will be met.

167. Earth station applicants seeking authority to use an antenna that does not meet the standards set forth in §§ 25.209(a) and (b) of the Commission's rules, pursuant to the procedure set forth in § 25.220 or § 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.

168. An applicant for an earth station license that proposes levels in excess of those defined in the new § 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.

169. 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

170. 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.

171. 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

172. None.

173. *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**.

174. 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*.

175. *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**.

176. *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.

177. *It is further ordered* that the International Bureau is delegated authority to issue Public Notices consistent with this *Report and Order*.

178. *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 § 603(a) of the Regulatory Flexibility Act, 5 U.S.C. 601, *et seq.* (1981).

179. *It is further ordered* that the Commission *shall send* a copy of this *Report and Order* 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).

List of Subjects

47 CFR Part 2

Telecommunications,

47 CFR Part 25

Satellites.

Federal Communications Commission.

Marlene H. Dortch,
Secretary.

Rule Changes

■ For the reasons discussed above, the Federal Communications Commission amends 47 CFR parts 2 and 25 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 additions and revisions read as follows:

§ 2.106 Table of Frequency Allocations.

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BILLING CODE 6712-01-P

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

BILLING CODE 6712-01-C

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 in the band 17.3–17.8 GHz. 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 § 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(w) 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(w) 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 6 away for excesses of up to 3 dB above the power flux-density levels specified in § 25.208(w) of this part, and up to 10 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 May 2, 2007, IB Docket No. 06–123, FCC 07–76, 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 § 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 § 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 § 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 § 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. Amend § 25.201 to add a definition in alphabetical order 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 § 25.202 by revising the table in paragraph (a)(1) and adding footnote 18 to paragraph (a)(1) and by adding paragraph (a)(9), to read as follows:

§ 25.202 Frequencies, frequency tolerance and emission limitations.

(a)(1) * * *

Space-to-Earth (GHz)	Earth-to-space (GHz)
3.65–3.7 ¹⁷	
3.7–4.2 ¹	
10.7–10.95 ^{1 12}	5.925–6.425 ¹
10.95–11.2 ^{1 2 12}	12.75–13.25 ^{1 12 14}
11.2–11.45 ^{1 12}	13.75–14.4 ¹²
11.45–11.7 ^{1 2 12}	14–14.2 ⁵
11.7–12.2 ³	14.2–14.5
12.2–12.7 ¹³	17.3–17.8 ⁹
18.3–18.58 ^{1 10}	24.75–25.05 ¹⁸
18.58–18.8 ^{6 10 11}	25.05–25.25 ^{1 18}
18.8–19.3 ^{7 10}	27.5–29.5 ¹
19.3–19.7 ^{8 10}	29.5–30
	47.2–50.2 ¹

Space-to-Earth (GHz)	Earth-to-space (GHz)
19.7–20.2 ¹⁰	
37.5–40 ^{15 16}	
37.6–38.6	
40–42 ¹⁶	

¹ This band is shared coequally with terrestrial radio communication service.

² Use of this band by geostationary satellite orbit satellite systems in the fixed-satellite service is limited to international systems; i.e., other than domestic systems.

³ Fixed-satellite transponders may be used additionally for transmissions in the broadcasting-satellite service.

⁴ This band is shared on an equal basis with the Government radiolocation service and grandfathered space stations in the Tracking and Data Relay Satellite System.

⁵ In this band, stations in the radionavigation service shall operate on a secondary basis to the fixed-satellite service.

⁶ The band 18.58–18.8 GHz is shared coequally with existing terrestrial radio-communication systems until June 8, 2010.

⁷ The band 18.8–19.3 GHz is shared coequally with terrestrial radiocommunication services, until June 8, 2010. After this date, the sub-band 19.26–19.3 GHz is shared coequally with existing terrestrial radio-communication systems.

⁸ The use of the band 19.3–19.7 GHz by the fixed-satellite service (space-to-Earth) is limited to feeder links for the mobile-satellite service.

⁹ The use of the band 17.3–17.8 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links for broadcasting-satellite service, and the sub-band 17.7–17.8 GHz is shared co-equally with terrestrial fixed services.

¹⁰ This band is shared co-equally with the Federal Government fixed-satellite service.

¹¹ The band 18.6–18.8 GHz is shared coequally with the non-Federal Government and Federal Government Earth exploration-satellite (passive) and space research (passive) services.

¹² Use of this band by non-geostationary satellite orbit systems in the fixed-satellite service is limited to gateway earth station operations.

¹³ Use of this band by the fixed-satellite service is limited to non-geostationary satellite orbit systems.

¹⁴ Use of this band by NGSO FSS gateway earth station uplink operations is subject to the provisions of § 2.106 NG53.

¹⁵ Use of this band by the fixed-satellite service is limited to "gateway" earth station operations, provided the licensee under this Part obtains a license under Part 101 of this Chapter or an agreement from a Part 101 licensee for the area in which an earth station is to be located. Satellite earth station facilities in this band may not be ubiquitously deployed and may not be used to serve individual consumers.

¹⁶ The band 37.5–40.0 GHz is designated as being available for use by the fixed and mobile services and the band 40.0–42.0 GHz is designated as being available for use by the fixed-satellite service.

¹⁷ FSS earth stations in this band must operate on a secondary basis to terrestrial radiocommunication services, except that the band is shared co-equally between certain grandfathered earth stations and the terrestrial radiocommunication services.

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)
17.7–17.8 GHz (space-to-Earth)

Note 1 to Paragraph (a)(9): Use of the 17.3–17.7 GHz band by the broadcasting-satellite service is limited to geostationary satellite orbit systems.

Note 2 to Paragraph (a)(9): 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 § 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/m² 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/m²/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 § 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 § 25.208 by revising paragraph (c) and adding paragraph (w) 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/m²) 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/m²) 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/m²) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

* * * * *

(w) 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 38° North Latitude and east of 100 West Longitude: –115 dBW/m²/MHz.

(2) In the region of the contiguous United States, located north of 38° North Latitude and east of 100° West Longitude: –118 dBW/m²/MHz.

(3) In the region of the contiguous United States, located west of 100 West Longitude: –121 dBW/m²/MHz.

(4) For all regions outside of the contiguous United States including Alaska and Hawaii: –115 dBW/m²/MHz.

■ 14. Amend § 25.209 by revising paragraph (c) to read as follows:

§ 25.209 Antenna performance standards.

* * * * *

(c) (1) Earth station antennas licensed for reception of radio transmissions from a space station in the fixed-satellite service are protected from radio interference caused by other space stations only to the degree to which harmful interference would not be expected to be caused to an earth station employing an antenna conforming to the referenced patterns defined in paragraphs (a) and (b) of this section, and protected from radio interference caused by terrestrial radio transmitters identified by the frequency coordination process only to the degree to which harmful interference would not be expected to be caused to an earth station conforming to the reference pattern defined in paragraph (a)(2) of this section.

(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 § 25.224 of this part.

* * * * *

■ 15. Amend § 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 § 25.212 by adding paragraph (f) to read as follows:

32.5–25log(θ)	dBW/MHz
11.4	dBW/MHz
35.5–25log(θ)	dBW/MHz
3.5	dBW/MHz

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

35.5–25log(θ)	dBW/MHz
14.4	dBW/MHz
38.5–25log(θ)	dBW/MHz
6.5	dBW/MHz

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 $\theta > 10^\circ$,

22.5–25log(θ)	dBW/MHz
1.4	dBW/MHz

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

§ 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 § 25.220 by revising paragraph (a)(1) introductory text 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. Section 25.223 is added to read as follows:

(2) 17/24 GHz BSS earth station antenna off-axis EIRP spectral density for co-polarized signals shall not exceed

35.5–25log(θ)	dBW/MHz
14.4	dBW/MHz
38.5–25log(θ)	dBW/MHz
6.5	dBW/MHz

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

22.5–25log(θ)	dBW/MHz
1.4	dBW/MHz

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 $\pm 6^\circ$ 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 $\pm 10^\circ$ away. No power levels greater than 6 dB in

§ 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 $\pm 3^\circ$ of the GSO arc, under clear sky conditions:

for $2^\circ \leq \theta \leq 7^\circ$
for $7^\circ \leq \theta \leq 9.2^\circ$
for $9.2^\circ \leq \theta \leq 48^\circ$
for $48^\circ \leq \theta \leq 180^\circ$

the following values, for all directions other than within $\pm 3^\circ$ of the GSO arc, under clear sky conditions:

for $2^\circ \leq \theta \leq 7^\circ$
for $7^\circ \leq \theta \leq 9.2^\circ$
for $9.2^\circ \leq \theta \leq 48^\circ$
for $48^\circ \leq \theta \leq 180^\circ$

for cross-polarized signals shall not exceed the following values, in all directions greater than $\pm 3^\circ$ relative to the GSO arc, under clear sky conditions:

for $2^\circ \leq \theta \leq 7^\circ$
for $7^\circ \leq \theta \leq 9.2^\circ$

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. Section 25.224 is added to read as follows:

§ 25.224 Protection of receive-only earth stations in the 17/24 GHz BSS.

(a) Notwithstanding § 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:

$$G_{CO}(\varphi) = G_{max} - 2.5 \times 10^{-3} \left(\frac{D}{\lambda} \varphi \right)^2 \quad \text{for } 0 \leq \varphi < \varphi_m$$

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 $\varphi_m \leq \varphi < \varphi_r$
$G_{CO}(\varphi) = 29 - 25 \log \varphi$	for $\varphi_r \leq \varphi < \varphi_b$ where $\varphi_b = 10^{(34/25)}$
$G_{CO}(\varphi) = -5 \text{ dBi}$	for $\varphi_b \leq \varphi < 70^\circ$
$G_{CO}(\varphi) = 0 \text{ dBi}$	for $70^\circ \leq \varphi < 180^\circ$

(2) Cross-polar pattern:

$$G_{cross}(\varphi) = G_{max} - 25 \quad \text{for } 0 \leq \varphi < 0.25 \varphi_0$$

where:

$$\varphi_0 = 2 \frac{\lambda}{D} \sqrt{\frac{3}{0.0025}} = 3 \text{ dB beamwidth}$$

$$G_{cross}(\varphi) = G_{max} - 25 + 8 \left(\frac{\varphi - 0.25 \varphi_0}{0.19 \varphi_0} \right) \quad \text{for } 0.25 \varphi_0 \leq \varphi < 0.44 \varphi_0$$

$$G_{cross}(\varphi) = G_{max} - 17 \quad \text{for } 0.44 \varphi_0 \leq \varphi < \varphi_0$$

$$G_{cross}(\varphi) = G_{max} - 17 + C \left| \frac{\varphi - \varphi_0}{\varphi_1 - \varphi_0} \right| \quad \text{for } \varphi_0 \leq \varphi < \varphi_1 \text{ where } \varphi_1 = \frac{\varphi_0}{2} \sqrt{10.1875}$$

$$\text{and } C = 21 - 25 \log(\varphi_1) - (G_{max} - 17)$$

$$G_{cross}(\varphi) = 21 - 25 \log \varphi \quad \text{for } \varphi_1 \leq \varphi < \varphi_2 \text{ where } \varphi_2 = 10^{(26/25)}$$

$$G_{cross}(\varphi) = -5 \text{ dBi} \quad \text{for } \varphi_2 \leq \varphi < 70^\circ$$

$$G_{cross}(\varphi) = 0 \text{ dBi} \quad \text{for } 70^\circ \leq \varphi < 180^\circ$$

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 = 0.65

standards of §§ 25.209(a) and (b) of this part.

■ 20. Section 25.225 is added 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 United 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. Section 25.262 is added 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(w) 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(w) of this part and located within ± 6 degrees of the licensee's satellite.

(2) If the licensee's operations exceed the power flux-density limits set forth in § 25.208(w) 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(w) of this part and located within ± 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(w) of this part shall reduce its space station power flux-density levels to be compliant with those specified in § 25.208(w) 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. Section 25.601 is revised 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 § 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 noncommercial 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 noncommercial 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 noncommercial programming pursuant to paragraph (e) of this section.

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