

at other times.¹³⁷ In the *28 GHz First Report and Order*, we recognized that uplink power control limits would facilitate operations in the 27.5-30.0 GHz band, and we amended Section 25.204 of our rules to require that all Ka-band FSS earth stations employ adaptive uplink power control or other methods of fade compensation.¹³⁸ In the *18 GHz Report and Order*, we adopted rules for Ka-band FSS earth stations employing uplink power control which limit transmissions during conditions of uplink fading to 20 dB above those permitted under clear-sky conditions.¹³⁹ We seek comment on whether it is necessary to adopt a rule requiring 17/24 GHz BSS feeder link earth stations to employ uplink power control, similar to the FSS requirement of Section 25.204. We also seek comment on what values or conditions might be applied to the use of 17/24 GHz BSS uplink adaptive power control, including: a minimum signal attenuation required before uplink transmit power may be increased; an upper limit on permissible transmit power increase; an accuracy requirement over the range of path attenuations; or other possible parameters such as the control-loop response time or limits on system overshoot.¹⁴⁰

2. DOWNLINK POWER LIMITS

53. The downlink power levels transmitted by adjacent co-frequency satellites, in combination with the sidelobe performance characteristics of the receiving earth station antenna, will determine the carrier-to-interference ratio that an operator experiences at the receive antenna as a result of adjacent satellite interference. At present, neither the Commission nor the ITU have established power flux density requirements or other downlink power limits for BSS systems operating in the 17.3-17.7 GHz band. Article 21 of the ITU Radio Regulations does define pfd limits for the FSS in the 17.7-17.8 GHz band in its Table 21-4.¹⁴¹

54. In other frequency bands, the Commission has frequently adopted downlink power limits for space stations transmissions in order to facilitate both inter-service and intra-service sharing. For example, our rules define power flux density limits in the 4/6 GHz and 20/30 GHz FSS bands in Section 25.208,¹⁴² and impose additional pfd requirements for blanket licensing of Ka-band earth stations.¹⁴³ However, in other bands, no downlink power limits exist.¹⁴⁴ We note that one advantage of imposing a downlink power limit is to establish a relatively homogeneous transmitting environment, and to ensure that established receiving antennas are not subject to unforeseen levels of adjacent satellite interference, particularly as newer generation satellites are brought into service. Moreover, application of downlink power limits may also influence the ability of 17/24 GHz BSS systems to operate in the vicinity of co-frequency receiving DBS satellites. However, adopting such limits can to some extent restrict the ability of future satellites to increase their power levels in response to improvements in technology, or to

¹³⁷ Applicants typically propose operating with 10 to 20 dB of excess power during rain events.

¹³⁸ See 47 C.F.R. § 25.204(g) and *28 GHz First Report and Order*.

¹³⁹ See 47 C.F.R. § 25.138(a)(5).

¹⁴⁰ The term control-loop refers to a circuit that feeds back some of the output to the input of a system. This feedback allows for self-correction and adjusts the system operation on the basis of the difference between the actual and the desired output. The term overshoot refers to a transient rise in power beyond the final value. Overshoot occurs when a system transitions from a steady state to some higher value in response to a change in some factor, e.g., electrical potential.

¹⁴¹ See footnote 95, *supra*.

¹⁴² See 47 C.F.R. § 25.208(a), (c), (d), (e).

¹⁴³ See 47 C.F.R. § 25.137(a)(6).

¹⁴⁴ E.g., standard Ku-band (11.7-12.2 GHz).

compensate for interference from other sources (e.g., foreign satellites or adjacent-band radars).

55. A review of the 17/24 GHz BSS filings submitted to the Commission, indicates that applicants plan to operate digital systems with downlink maximum e.i.r.p. levels that range between 58.6 dBW and 64.7 dBW. It appears that worst case pfd levels are less than -117 dBW/MHz/m² for all systems, with the exception of certain Intelsat spot beams that may have maximum saturated pfd levels of -115 dBW/MHz/m² at the Earth's surface.¹⁴⁵ Accordingly, we seek comment on whether the Commission should adopt pfd or other downlink power level values in the 17.3-17.7 GHz band. We ask what level of downlink power would be appropriate, and in particular whether the ITU's FSS pfd limits,¹⁴⁶ with an upper limit of -115 dBW/MHz/m², should be applied in the 17.3-17.7 GHz band.¹⁴⁷ We ask whether a different, perhaps higher power level is preferable in order to provide for future generation satellites, or to compensate for anticipated interference sources. The present operating downlink transmitted power levels proposed by applicants assume an orbital spacing environment of either 4-degrees or 4.5-degrees. We seek comment on what pfd limit would be preferable if the Commission were to establish an orbital spacing regime different from either 4-degrees or 4.5-degrees.

F. REVERSE BAND OPERATIONS

56. When the Region 2 BSS allocation at 17.3-17.8 GHz becomes effective in 2007, it will be shared with the current 17.3-17.8 GHz DBS feeder-link allocation in the Earth-to-space direction.¹⁴⁸ This operating scenario, in which the same frequency band is used for both Earth-to-space and space-to-Earth transmissions, is known as "reverse band" and results in additional interference paths which are different from those found in a conventional GSO satellite sharing situation. In the typical GSO satellite sharing scenario, interference paths occur between the earth stations of one system and the satellites of another, and vice versa. In such cases, co-frequency sharing is facilitated primarily through antenna off-axis discrimination at each end of the interference path, in combination with limits on spatial proximity (orbital separation) and transmission power. The reverse-band sharing scenario is different in that two new and distinct interference paths occur: (1) between the earth stations of different systems; and (2) between the space stations of different systems. In effect, reverse-band operations create two additional interference paths: an earth station-into-earth station path (ground path), and a space station-into-space station path (space path).

1. GROUND PATH INTERFERENCE

57. Ground path interference¹⁴⁹ will occur when the signals from transmitting DBS feeder-link earth stations operating in the 17.3-17.7 GHz band are detected at the receiving earth stations of 17/24 GHz BSS subscribers. This interference situation will be the most severe in areas surrounding the DBS feeder uplink stations. In addition, 17/24 GHz BSS operators who choose to co-locate their TT&C

¹⁴⁵ Transmission bandwidths range from 24 MHz to 48 MHz. See *DIRECTV Application* at Table D-2, *Pegasus Application* at 20, *EchoStar Application* at 16, and *Intelsat Application* at Table C.8.

¹⁴⁶ See footnote 95, *supra*.

¹⁴⁷ In the 17.7-17.8 GHz band, we propose to adopt the ITU pfd limits in order to protect terrestrial services operating in the band. See para. 32 *supra*.

¹⁴⁸ The U.S. BSS allocation extends only from 17.3-17.7 GHz and becomes effective on the same date. The problem of reverse-band interference in the 17.7-17.8 GHz band, particularly into victim DBS satellites via the space-path, will result from foreign satellite transmissions, and also possibly from U.S. satellites transmitting to foreign administrations.

¹⁴⁹ In this Section III. H. 1., the terms "DBS" or "DBS earth station" refer to earth stations that are DBS feeder links.

earth stations with DBS TT&C earth stations systems may experience difficulty in receiving the downlinked telemetry signal from the 17/24 GHz BSS spacecraft.

58. At present there are a relatively small number of DBS feeder-link earth stations. If the current situation were to remain unchanged, the ground path interference problem into 17/24 GHz BSS subscriber antennas might not pose a significant problem. However, we recognize that local programming is being uplinked from a growing number of metropolitan areas.¹⁵⁰ We must anticipate that DBS feeder-link earth stations that transmit in the Earth-to-space direction may become increasingly common in populated areas, thereby escalating the potential for interference into 17/24 GHz BSS subscriber antennas. In addition, future entrants such as short-spaced DBS systems, or non-U.S. DBS satellites serving the U.S. market, could result in the deployment of an even greater number of feeder-link earth stations at multiple sites within the United States. The interference problem may be further exacerbated by the proliferation of small-diameter 17/24 GHz BSS subscriber receiving antennas with relatively poor off-axis discrimination properties.

59. There is no procedure established in the Commission's rules regarding coordination of co-frequency, DBS feeder-link satellite earth stations with BSS subscriber terminals. Instead, we note that Appendix 7 of the ITU Radio Regulations describes a procedure for determining the coordination area for an earth station transmitting in a frequency band allocated to space services in both Earth-to-space and space-to-Earth directions.¹⁵¹ In other sharing situations, the Commission has successfully relied upon the ITU Appendix 7 coordination methodologies to effect coordination between the co-frequency earth stations of different services. Specifically, Section 25.203 in combination with Section 25.251 of our rules define a mechanism for coordination between terrestrial microwave stations and satellite earth stations that share frequency bands with equal rights.¹⁵² This mechanism is based upon the procedures set forth in Appendix 7 of the ITU Radio Regulations. Similarly, in the case of coordination between co-frequency reverse-band DBS feeder-link and BSS receiving earth stations operating in the 17.3-17.7 GHz band, we propose to make use of the coordination methodology defined in Annex 3 of Appendix 7 of the ITU Radio Regulations. We seek comment on this proposal and ask whether this coordination methodology may be appropriately applied in this situation.

60. In summary, the ITU methodologies described in Section 3 of Appendix 7 define techniques for calculating a coordination area around a transmitting earth station for two propagation modes: (1) propagation phenomena in clear air; and (2) hydrometeor (*i.e.*, rain) scatter. These two methodologies are elaborated in Annex 5 (Sections 2 and 3) and make use of additional parameters defined in Table 9b to Appendix 7, which include the modulation type of the receiving earth station, various receiving earth station interference parameters and criteria, receiving earth station physical characteristics, reference bandwidth and permissible interference power levels. Unfortunately, an examination of Table 9b¹⁵³ reveals that in the case of a transmitting earth station in the FSS that operates in reverse-band mode relative to a receiving station in the BSS at 17.3-17.8 GHz, the table lacks all of the requisite data. Accordingly, we seek comment on the appropriate values to use for the coordination parameters in Table 9b as follows:

¹⁵⁰ See, e.g., In the Matter of DIRECTV Enterprises, LLC for Authority to Launch and Operate DIRECTV 7S (USABSS-18), *Order and Authorization*, 19 FCC Rcd 7754 (2004). DIRECTV sought authority to operate uplink earth stations at sites in Los Angeles, CA, Castle Rock, CO, Winchester, VA and St. Paul, MN.

¹⁵¹ See Section 3 of Appendix 7 of the ITU Radio Regulations.

¹⁵² See 47 C.F.R. §§ 25.203(b)-(d), 25.251(b). See also 47 C.F.R. §§ 101.21(f), 101.103.

¹⁵³ See Table 9b of Annex 7 to Appendix 7 (rev. WRC-03) of the ITU Radio Regulations.

Table 9b

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

Parameter(s)		Value	Description
Orbit		GSO	Orbit in which the space service in which receiving earth station operates (GSO or NGSO)
Modulation at receiving earth station			Analog or digital
Receiving earth station interference parameters and criteria	p_0 (%)		Percentage of the time during which interference from all sources may exceed the threshold value
	n		Number of equivalent, equal level, equal probability entries of interference, assumed to be uncorrelated for small percentages of the time
	p (%)		Percentage of the time during which the interference from one source may exceed the permissible interference power value; since the entries of interference are not likely to occur simultaneously, $p = p_0/n$
	N_L (dB)		Link noise contribution
	M_s (dB)		Link performance margin
	W (dB)		A thermal noise equivalence factor for interfering emissions in the reference bandwidth; it is positive when the interfering emissions would cause more degradation than thermal noise
Receiving earth station parameters	G_m (dBi) ¹⁵⁴		On-axis gain of the receive earth station antenna
	G_r		Horizon antenna gain for the receive earth station
	ϵ_{min}		Minimum elevation angle of operation in degrees
	T_e (K)	300K ¹⁵⁵	The thermal noise temperature of the receiving system at the terminal of the receiving antenna
Reference Bandwidth	B (Hz)		Reference bandwidth (Hz), i.e., the bandwidth in the receiving station that is subject to the interference and over which the power of the interfering emission can be averaged
Permissible interference power	$P_i(p)$ (dBW) in B		Permissible interference power of the interfering emission (dBW) in the reference bandwidth to be exceeded no more than $p\%$ of the time at the receiving antenna terminal of a station subject to interference, from a single source of interference, using the general formula: $P_i(p) = 10 \log(k T_e B) + N_L + 10 \log(10^{Ms/10} - 1) - W$

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

¹⁵⁴ This value may be calculated using the procedure of Annex 5 to Appendix 7 of the ITU Radio Regulations. If no value of G_m is specified, 42 dBi may be used.

¹⁵⁵ See § 2.1 of Annex 7 to Appendix 7 of the ITU Radio Regulations which provides a default value for two earth stations operating in opposite directions of transmission at frequencies greater than 17/24 GHz.

Section 25.203 of the Commission's rules.¹⁵⁶ Section 25.203(c)(2) requires that the earth station applicant provide each terrestrial station licensee with specific technical details. Similarly, we propose that DBS feeder-link earth station applicants provide the following information to licensees and prior-filed applicants in the 17/24 GHz broadcasting-satellite service:

- (i) The geographical coordinates of the proposed earth station antenna(s);
- (ii) Proposed operating frequency band(s) and emission(s);
- (iii) Antenna center height above ground and ground elevation above mean sea level;
- (iv) Antenna gain pattern(s) in the plane of the main beam;
- (v) Longitude range of geostationary satellite orbit (GSO) satellites at which an antenna may be pointed, for proposed earth station antenna(s) accessing GSO satellites;
- (vi) Horizon elevation plot;
- (vii) Antenna horizon gain plot(s) determined in accordance with the procedure in Section 2.1 of Annex 5 to Appendix 7 of the ITU Radio Regulations;
- (viii) Minimum elevation angle;
- (ix) Maximum equivalent isotropically radiated power (e.i.r.p.) density in the main beam in any [TBD] Hz¹⁵⁷ band;
- (x) Maximum available RF transmit power density in any [TBD] Hz¹⁵⁸ band at the input terminals of the antenna(s);
- (xi) Maximum permissible RF interference power level as determined in accordance with Annex 7 to Appendix 7 for all applicable percentages of time; and
- (xii) A plot of the coordination distance contour(s) and rain scatter coordination distance contour(s) as determined by Table 2 of Section 3 to Appendix 7.

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

62. In addition, we envision that both the DBS feeder links and 17/24 GHz BSS services will be deploying new earth stations over time, so that new stations of one service will continually be established among existing stations from the other. The Commission wants to ensure that U.S.-licensed 17/24 GHz BSS systems receive sufficient interference protection and that subscribers' receive antennas

¹⁵⁶ See 47 C.F.R. § 25.203(b)(2) (which requires that the earth station applicant provide each terrestrial station licensee with certain specific technical details).

¹⁵⁷ We note that Section 25.203 stipulates a reference bandwidth of 4 kHz for frequency bands below 15 GHz and 1 MHz for frequency bands above 15 GHz.

¹⁵⁸ Section 25.203 stipulates reference bandwidths of both 1 MHz and 4 kHz.

will work effectively in both current and future radio frequency interference environments. However, we are also committed to preserving the prospect for growth and expansion of the DBS service, and to providing for future DBS market entrants. Therefore, we seek to adopt service rules that achieve an appropriate balance between accommodating both present and future DBS feeder-link operations and ensuring protection of 17/24 GHz BBS receiving systems from interference.

63. In the *MVDDS Second R&O*,¹⁵⁹ the Commission addressed a frequency sharing situation that presented ground path interference issues and temporal build-out of interspersed earth stations, similar to those we envision resulting from reverse band satellite operations in the 17.3-17.7 GHz band. In the 12 GHz band, two co-primary, co-frequency services sought to operate in a sharing scenario where ubiquitous and ongoing deployment of stations from both services was anticipated. The Commission recognized that the incumbent DBS receive-only antennas were subject to interference from the introduction of transmitting MVDDS stations. In the *MVDDS Second R&O*, the Commission concluded that careful MVDDS system design and the use of various mitigation techniques could achieve successful sharing of the 12 GHz frequency band by both services. To accomplish this goal, the Commission adopted *inter alia* a coordination procedure that requires that an MVDDS operator entering a market where DBS receivers are already established must satisfy certain requirements in order to protect these customers.¹⁶⁰ In addition, a mechanism is established for information exchange between the operators of both services, in particular to take into account recently acquired DBS customers.¹⁶¹ Once the time period prescribed for this information exchange has passed, any new DBS receive antennas must be installed in a manner to avoid interference from the MVDDS signal. These later-installed DBS earth stations have no right of complaint against the notified MVDDS transmitting antenna.

64. We seek comment on whether we should adopt a similar approach to sharing between DBS feeder-link earth stations and 17/24 GHz BSS receiving earth stations. Under such an approach, DBS operators planning new feeder-link earth stations would be required to provide the technical information discussed above to 17/24 GHz BSS licensees, at least 90 days prior to commencing operations of the new DBS feeder-link earth station. Within 30 days after receipt of the new DBS feeder-link earth station technical information, the 17/24 GHz BSS licensees would be required to provide the DBS feeder-link earth station operator with a list of potentially-affected 17/24 GHz BSS customer locations within the coordination area described above. Before beginning operations, the new DBS feeder-link earth station operator would be required to take into account these 17/24 GHz BSS customers and to ensure that its operations do not cause them harmful interference.¹⁶² Once the 30-day time period

¹⁵⁹ See Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range; Amendment of the Commission's Rules to Authorize Subsidiary Terrestrial Use of the 12.2-12.7 GHz Band by Direct Broadcast Satellite Licensees and Their Affiliates; and Applications of Broadwave USA, PDC Broadband Corporation, and Satellite Receivers, Ltd. to Provide a Fixed Service in the 12.2-12.7 GHz Band. *Memorandum Opinion and Order and Second Report and Order*, 17 FCC Rec 9614 (2002) ("*MVDDS Second R&O*").

¹⁶⁰ See 47 C.F.R. § 101.1440(d).

¹⁶¹ See *MVDDS Second R&O*, 17 FCC Rcd at 9652, para. 88. MVDDS operators are required to provide DBS operators with specific technical information concerning their planned operation. After receipt of the MVDDS system information, the DBS licensee must provide the MVDDS licensee with a list of any new DBS customer locations that have been installed following the MVDDS notification. Before beginning operations, the MVDDS operator must take into account existing as well as the new DBS customers of record, and ensure that its operations do not cause interference. DBS licensees should also provide the MVDDS operator with information regarding affected customer locations, comment on the analysis provided, or indicate its agreement.

¹⁶² At this time, 17/24 GHz BSS licensees may also provide the DBS operator with additional information regarding affected customer locations, or comment on its analysis, including its agreement.

prescribed for this information exchange has passed, any new 17/24 GHz BSS receiving earth stations would be required to accept or mitigate any interference from the DBS feeder-link transmissions. These later-installed 17/24 GHz BSS receiving earth stations would have no right of complaint against the new DBS feeder-link transmitting earth station. We seek comment on this proposal. We recognize that there may be reluctance on the part of 17/24 GHz BSS operators to reveal their customer data, particularly to another DBS or BSS operator, and we seek comment on alternate approaches to coordinating DBS feeder-link and 17/24 GHz BSS earth station operations. We also ask whether some different approach would better facilitate sharing in the 17/24 GHz band.

65. In the *MVDDS Second R&O*, the Commission took additional steps to ensure successful sharing in the 12 GHz band and adopted various equivalent power flux density (epfd) and power density limits for MVDDS systems, as well as rules governing their application.¹⁶³ The Commission's existing rules do not specify transmitting epfd or off-axis e.i.r.p. density limits for DBS feeder-link earth stations, except in the band 17.7-17.8 GHz, which is shared co-equally with terrestrial services.¹⁶⁴ Interference into 17/24 GHz BSS receivers could be reduced if the e.i.r.p. levels emitted towards the horizon by DBS feeder link antennas were minimized. Limiting DBS feeder link off-axis transmit power levels may facilitate co-existence of 17/24 GHz BSS subscriber earth stations and DBS feeder link earth stations, while decreasing the coordination burden on both services. Accordingly, we ask whether off-axis e.i.r.p. density or other transmitting power limits should be applied to DBS feeder-link bands in order to protect 17/24 GHz BSS receiving earth stations from interference.

66. Section 25.204(b) of the Commission's rules places limits on earth station e.i.r.p. in bands above 15 GHz shared coequally with terrestrial radiocommunication services, in order to facilitate sharing with these services.¹⁶⁵ This rule was not intended to facilitate sharing among DBS and BSS earth stations, and it is applicable to DBS feeder link earth stations only in the band segment 17.7-17.8 GHz that is shared with terrestrial services. We seek comment on whether the Commission should extend this requirement to DBS feeder link earth stations operating in the entire 17.3-17.8 GHz band or adopt some other, more stringent off-axis e.i.r.p. requirement. We also seek comment on whether a different approach, such as requiring DBS feeder link antenna shielding, would be more appropriate. Similarly, we

¹⁶³ Specifically, the Commission adopted: (1) a prescribed methodology and predictive model to calculate epfd values in order to ascribe an unavailability allowance to MVDDS in the 12.2-12.7 GHz band; (2) epfd limits for each of four regions across the United States; (3) an additional maximum MVDDS power density limit; (4) required MVDDS operators to ensure that the prescribed epfd limits were not exceeded at DBS customer of record locations; if the epfd limit is exceeded, MVDDS operations must be discontinued until such time as the limits can be met; and (5) an epfd "safety valve," so that if due to an anomalous situation a DBS provider can demonstrate a tangible detrimental impact on DBS caused by MVDDS operations, the Commission may consider adjustments to the epfd limit for that specific location. See *MVDDS Second R&O*, 17 FCC Rcd at 9641-9642, para 68.

¹⁶⁴ See 47 C.F.R. § 25.204(b)-(e). These limits are: +64 dBW in any 1 MHz band for $\theta < 0^\circ$; +64+30 dBW in any 1 MHz band for $0^\circ < \theta < 5^\circ$; where θ is the elevation angle of above the horizon viewed from the center of radiation of the antenna and measured in degrees.

¹⁶⁵ Section 25.204(b) states that "in bands shared coequally with terrestrial radio-communication services, the equivalent isotropically radiated power transmitted in any direction towards the horizon by an earth station operating in frequency bands above 15 GHz shall not exceed the following limits except as provided for in paragraph (c) of this section:

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

+64+30 dBW in any 1 MHz band for $0^\circ < \alpha < 5^\circ$

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

request comment on whether the Commission should afford interference protection to 17/24 GHz BSS systems only to the extent that they meet certain receive antenna performance standards. Specifically, we request comment on what type of regulation, if any, would be appropriate, such as adopting antenna off-axis discrimination requirements or minimum gain requirements. We seek comment on whether the e.i.r.p density limits of Section 25.204 (b)-(e) would be sufficient to protect 17/24 GHz BSS earth stations if applied to the 17.3-17.7 GHz band, or whether some other limits would be more appropriate. We seek comment on whether it is necessary to adopt another approach, such as stipulating epfd limits, in order to facilitate coordination between DBS feeder-link earth stations and 17/24 GHz subscriber receivers, and if so, which methodology should be used in determining such limits. We also seek comment on whether we should impose any additional requirements on either DBS feeder-link earth station operators or on 17/24 GHz BSS operators in order to mitigate interference into 17/24 GHz BSS subscriber receiving antennas.

a. GROUND PATH INTERFERENCE INTO BSS TELEMETRY EARTH STATIONS

67. Ground path interference may also occur between transmitting DBS feeder-links and the receiving TT&C stations of 17/24 GHz BSS systems that choose to co-locate their TT&C earth stations at existing DBS feeder-link earth station sites. Choice of facility site is a system design parameter that is under the control of the operator, and does not necessarily require a Commission action to remedy. Moreover, given the large financial investment required to launch and operate a satellite, we believe that BSS operators have strong incentive to make correct technical decisions with regard to their choice of TT&C facility sites and equipment design. However, we also recognize that interference into TT&C systems can present a serious problem due to the potential for loss of satellite control. Accordingly, we seek comment on whether the Commission should adopt requirements to guard against such interference scenarios.

68. We propose to require earth station applicants planning to co-locate their 17/24 GHz BSS TT&C stations with DBS feeder-links earth stations to make a technical showing to the Commission demonstrating their ability to maintain sufficient margin in their telemetry links in the presence of the interfering DBS signal. Additionally, we propose to require DBS feeder link earth station applicants planning to co-locate with their 17/24 GHz BSS telemetry earth stations to make a similar technical showing to the Commission. We seek comment on this proposal and ask what parameters would be appropriate in such a showing. We ask whether we should preclude co-location of 17/24 GHz BSS TT&C and DBS feeder-link facilities altogether, or whether perhaps we should require some minimum separation between such facilities. Finally, we seek comment on other interference measures we might consider such as mandating a level of equipment performance (e.g., filter rejection).

b. INCREASED FLEXIBILITY OF SPECTRUM

69. Footnote NG 167 of the Domestic Table of Frequency Allocations¹⁶⁶ limits use of the FSS allocation (Earth-to-space) in the 24.75-25.25 GHz band to use by feeder links for the BSS operating in the band 17.3-17.7 GHz. In the *18 GHz Report & Order*, we noted that, although we were allocating 500 megahertz for BSS feeder links at 24.75-25.25 GHz for 400 megahertz of BSS uplinks at 17.3-17.7 GHz, we declined to reduce the amount of spectrum available for feeder links for the BSS.¹⁶⁷ We stated

¹⁶⁶ Amendment of the Commission's Regulatory Policies to Allow Non-U.S.-Licensed Space Stations to Provide Domestic and International Satellite Service in the United States, *First Order on Reconsideration*, 15 FCC Rcd 7207 (1999).

¹⁶⁷ *18 GHz Report & Order*, 15 FCC Rcd at 13475-77, para. 96.

that the flexibility that this additional 100 MHz of feeder link spectrum afforded might prove useful to 17/24 GHz BSS operators in some situations including occasional difficulties that might be encountered during coordination. The ability to use spectrum in the 24 GHz band for feeder-links operating with other BSS services, such as DBS, might afford operators increased flexibility in system design and spectrum use. Providing this increased flexibility might also assist operators in designing their systems so as to avoid ground path interference problems associated with reverse band operations in the 17.3-17.8 GHz band. The benefit of alternative feeder link spectrum might be particularly useful in situations where DBS feeder-link earth stations must be located in populated areas with a high density of 17/24 GHz BSS receiving antennas, or when 17/24 GHz BSS telemetry receiving facilities are close by. We propose to modify footnote NG167 of the Domestic Table of Frequency Allocations 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. We seek comment on this proposal.

70. The 24.75-25.05 GHz band is shared on a co-primary basis with the radionavigation service and the 25.05-25.25 GHz band is similarly shared on a co-primary basis with the fixed service. Permitting migration of BSS feeder link operations from other bands (such as 17.3-17.7 GHz) into the 24 GHz band could place an increased burden on these two services, and may hinder their ability to operate or to deploy additional stations. General requirements for sharing with the radionavigation service and the fixed service in the 24 GHz band are discussed in paragraphs 91-93 of this *NPRM*. However, we seek specific comment on any impact to these other co-primary services from our proposal to permit more flexible use of the 24 GHz band by BSS feeder links. In the *18 GHz Report & Order*, we noted our belief¹⁶⁸ that the feasibility of the sharing between these 17/24 GHz BSS feeder links and the fixed service at 24 GHz is based in part on the limited number of expected 17/24 GHz BSS feeder links. We ask whether these additional feeder link operations can be accommodated in the 24.75-25.25 GHz band, or whether they will unduly restrict operation and deployment of either new radionavigation or fixed service systems. We ask whether our existing FSS/FS coordination procedures set forth in Section 25.203 of the Commission's rules are sufficient to facilitate co-existence of additional BSS feeder link earth stations with the 24 GHz Fixed Service, or whether some additional requirement(s) should be imposed.

2. SPACE PATH INTERFERENCE

71. Space path interference will occur when the signals from transmitting 17/24 GHz BSS satellites are detected by the receiving antennas of DBS satellites. The amount of interference received by the victim DBS satellite will depend on the specific orientation between the transmitting and receiving satellites, the extent of physical separation, the transmit power (*e.i.r.p.*) levels, and the off-axis gain discriminations of both transmitting and receiving antennas on the adjacent satellites. This problem is expected to be particularly problematic when satellites are nominally co-located, *i.e.*, a receiving DBS satellite is located at the same nominal GSO orbital longitude as a transmitting 17/24 GHz BSS satellite.

72. The Commission has received several applications from operators seeking to locate BSS satellites transmitting in the 17 GHz band at nominal orbital locations now occupied by DBS satellites.¹⁶⁹ Currently operating U.S. DBS satellites are located at nominal orbital locations defined in the Region 2 BSS and feeder-link Plans of Appendices 30 and 30A of the ITU Radio Regulations, which apportion spectrum and orbit locations for the 12 GHz BSS. The Region 2 Plans are based on grouping of the space stations in clusters; satellites are spaced at locations of $\pm 0.2^\circ$ from the cluster center, or nominal orbital

¹⁶⁸ *Id.* at para. 106.

¹⁶⁹ See *DIRECTV Application*, *Pegasus Application* and *EchoStar Application*. DIRECTV seeks to operate at the 101° W.L. orbit location, Pegasus seeks to operate at the 101° W.L. and 110° W.L. orbit location, and EchoStar seeks to operate at 110° W.L. and 119° W.L. orbit location.

location.¹⁷⁰ In the Region 2 BSS and feeder-link Plans, channels at a given orbital location are specified such that oppositely polarized channels (right hand circular polarization or left hand circular polarization) are located at opposite edges of the cluster, or 0.4 degrees apart.¹⁷¹ By seeking to operate at the nominal DBS location (center of the cluster) 17/24 GHz BSS applicants will be located at separations somewhere between 0.0° and 0.2° from co-frequency, reverse-band DBS satellites.¹⁷²

73. While some applicants acknowledge the difficulty in co-locating 17/24 GHz BSS satellites with DBS satellites, none presents a detailed interference analysis nor offers a comprehensive method for preventing space path interference between the nominally co-located satellites operating in the two services. Pegasus comments that interference to co-located or nearby satellites in other service bands can only be evaluated in specific circumstances and should be resolved during the normal coordination process.¹⁷³ DIRECTV cites a number of factors that it believes will mitigate potential interference including physical separation of the satellites, antenna directivity and off-axis rejection, and the recessed design of existing DBS spacecraft feeder-link receiving antennas.¹⁷⁴ EchoStar notes that it will be necessary to maintain some minimal physical separation and specific orientation between the two satellites and notes that this would be greatly facilitated by having both satellites under control of the same operator.¹⁷⁵

74. The ITU-R Working Party 6S is examining the question of required separation distance between a transmitting 17/24 GHz BSS space station and a receiving DBS satellite.¹⁷⁶ One relevant ITU-R study includes a parametric analysis which varies the amount of off-axis discrimination for transmit and receive satellite antennas, the transmitting e.i.r.p., and the amount of allowable interference. The study concludes that required geocentric angular separations ranges between 0.02° and 5.67° in order to achieve $\Delta T/T$ values of either 4% or 6%. We note however that this study makes certain simplifying assumptions (*i.e.*, a constant angle relative to boresight between transmitting and receiving satellites of approximately 90°) and does not take significant account of other complicating factors such as stationkeeping excursions. Although the study suggests that under certain conditions spacing as close as 0.2° may be possible, it does not provide a sufficiently in-depth analysis upon which a set of regulations permitting co-clustered DBS and 17/24 GHz BSS satellites can be based.

75. The Region 2 BSS and feeder-link Plans are based on cross-polarized, adjacent channels

¹⁷⁰ See Section B of Annex 7 to Appendix 30 and Section 4.13.1 of Annex 3 to Appendix 30A of the ITU Radio Regulations.

¹⁷¹ *Id.*

¹⁷² Although the United States initially followed the ITU cluster separation scheme when assigning channels at a given orbit location, DBS licensees increasingly indicated a desire for greater flexibility regarding the placement of their satellites within the cluster. Moreover, the ITU rules allow Administrations to locate their satellites at any orbital position within the cluster, provided they obtain the agreement of Administrations having assignments to space stations in the same cluster. At locations where all 32 channels are assigned to a single operator, the Commission has been willing to allow the operator considerable freedom to locate the spacecraft anywhere within the cluster boundaries. As a result, location of U.S. DBS satellites no longer strictly adheres to a 0.4 degree even/odd channel separation scheme.

¹⁷³ See *Pegasus Application* at 27.

¹⁷⁴ See *DIRECTV Application* at 44.

¹⁷⁵ See *EchoStar Application* at 23.

¹⁷⁶ See Document WP6S/106-E, 13 January 2001, Interference Analysis Concerning Transmitting BSS Satellites in Region 2 Interfering with Receiving Feeder-link Satellite in Regions 1 and 3 in the 17.3 to 17.8 GHz Band.

that overlap in frequency¹⁷⁷ that are also the basis for our domestic channelization scheme. At a given DBS orbit location these channels may be assigned to different DBS operators. Interference between overlapping channels is avoided by transmitting in opposite polarizations.¹⁷⁸ In turn, the satellite antenna must radiate or receive power in its reference polarization, and avoid radiating or receiving significant amounts of power in the opposite, or cross-polarization.¹⁷⁹ For satellites located in the same cluster, the angle between transmitting and receiving antennas relative to boresight is on the order of 90°. While antenna cross-polarization discrimination is normally sufficient to provide adequate signal isolation on-axis, cross-polarization isolation at large off-axis angles is typically quite poor.¹⁸⁰ For this reason too, we question whether there will be sufficient polarization discrimination between the transmitted signals of 17/24 GHz BSS space stations and the feeder-link receiving antennas of DBS satellites to permit reverse band operations on a channel-by-channel basis. Moreover, 17/24 GHz BSS operators may not necessarily design a satellite system that operates with a channelization scheme (*i.e.*, same center frequencies, bandwidths and polarizations) consistent with the one specified in the Region 2 Plans, and applicable to DBS systems.

76. Recognizing the significant difficulties in preventing harmful interference in the case of co-clustered satellites, we ask whether transmitting 17/24 GHz BSS satellites should be precluded from locating in the same cluster with receiving *co-frequency* DBS satellites. We seek comment on this issue. We also ask whether co-clustering of 17/24 GHz BSS and receiving *co-frequency* DBS satellites might be possible in instances where both spacecraft are controlled by the same operator. However, we also seek comment on methods we might employ to facilitate co-location, or co-clustering of DBS and 17/24 GHz BSS satellites.

77. We seek further comment on the feasibility in general of locating transmitting 17/24 GHz BSS satellites at close distances (*i.e.*, within the same cluster, or at nearby adjacent locations) as receiving DBS satellites operating with 17 GHz feeder-links. We ask whether there is a minimum separation distance that we should mandate for the two co-frequency satellites, and if so, what that separation distance should be. We also ask whether we should impose an off-axis antenna discrimination requirement on satellites in the 17/24 GHz BSS service, the DBS service, or both, and if so what the requirement(s) should be. We ask whether we should impose either an absolute e.i.r.p. limit on transmitting BSS satellites, and if so, what that value might be, or whether an e.i.r.p. mask might be more appropriate. If the latter, we seek comment on the angular range over which such a mask should be

¹⁷⁷ See, *e.g.*, Downlink Channel 1 extends from 12.212 – 12.236 GHz, Channel 2 extends from 12.22658 – 12.25058 GHz, and Channel 3 extends from 12.24116 – 12.26516 GHz. Thus there is a 9.42 MHz overlap between Channels 1 and 2, and a similar overlap between Channels 2 and 3. See Table 4, of Appendix 30 for the Region 2 BSS channel assignments.

¹⁷⁸ "Polarization" is the property of an electromagnetic wave that describes the time-varying direction and amplitude of the electric field vector (*i.e.*, orientation). States of polarization are described in terms of the figures traced as a function of time by the projection of the extremity of a representation of the electric vector onto a fixed plane in space that is perpendicular to the direction of propagation. In general, the polarization is elliptical and is traced in a clockwise or counterclockwise sense, as viewed in the direction of propagation. If the major and minor axes of the ellipse are equal, the polarization is said to be "circular." If the minor axis of the ellipse is zero, the polarization is said to be "linear." Rotation of the electric vector in a clockwise sense is designated "right-hand polarization," and rotation in a counterclockwise sense is designated "left-hand polarization."

¹⁷⁹ The ratio of power transferred by an antenna radiating in the reference polarization to another antenna receiving in the cross-polarization is known as the cross-polarization isolation ratio and is normally measured in decibels ("dB").

¹⁸⁰ See, *e.g.*, Section 3.13.3 of Annex 5 to Appendix 30 of the ITU Radio Regulations.

applied, and what power limits would be most appropriate at different angular values. Finally, we seek comment on whether there are any other requirements we should consider in order to prevent reverse-band adjacent satellite interference in the 17 GHz band. Specifically, we ask applicants how they plan to address the problem of space path interference with the co-located satellites they have proposed.

78. Space path interference from transmitting 17/24 GHz BSS satellites has the potential to cause loss of the telecommand signal at the receiving DBS satellite. As in the ground path telemetry case, we are aware that interference into TT&C systems can present a serious problem due to the potential loss of satellite control, and we seek comment on what requirements the Commission should adopt to guard against such interference scenarios. As in the ground path case, we propose to require space station applicants planning to co-locate their 17/24 GHz BSS space stations within cluster locations occupied by DBS space stations to make a technical showing to the Commission demonstrating their ability to sufficiently minimize interference into nearby DBS systems, such that adequate margin is maintained in the DBS telecommand links in the presence of the interfering BSS signal. Similarly, we will ask DBS operators planning to locate their satellites at an orbital location already occupied by a transmitting 17/24 GHz BSS satellite to make a technical showing to the Commission demonstrating how they plan to maintain sufficient margin in their telecommand links in the presence of the interfering BSS signal. We seek comment on this proposal and ask what parameters would be appropriate in such a showing.

79. Section 25.202(g) of the Commission's rules requires that TT&C functions for U.S. domestic satellites be conducted at either or both edges of the allocated band.¹⁸¹ The Region 2 BSS and Feeder-link Plans provide 12 MHz of guardband spectrum at both the upper and lower bounds of the frequency band where DBS TT&C operations are typically conducted. We note that although both the DBS and the 17/24 GHz BSS services may transmit in the lower guardband (just above 17.3 GHz) the upper guardband of the DBS feeder-link plan falls outside of the present 17/24 GHz BSS allocation, in the 12 MHz of spectrum just below 17.8 GHz. We ask whether sufficient advantage can be taken of this situation (in combination with the shared 12 MHz of frequency at the lower edge of the band) to avoid interference into DBS telecommand links, and what effect our proposal to permit limited use of the 17.7-17.8 GHz band might have on this issue.¹⁸² We ask whether we should preclude 17/24 GHz BSS satellites that co-locate at DBS locations from transmitting in the lower band-edge DBS guardbands, or whether we should limit such BSS transmission to TT&C functions and require coordination between the two services. We seek comment on these issues.

G. OTHER TECHNICAL REQUIREMENTS

80. We note that TT&C issues have been raised in some of the 17/24 GHz applications filed with the Commission, and below, seek comment on need to establish requirements for these activities. Also, discussed below, we seek comment on the need for polarization and frequency re-use requirements. In addition to these issues, we invite parties to comment on other technical matters that the Commission should address in this rulemaking, and seek comment on any further changes to our rules that should be adopted for 17/24 GHz BSS systems.

1. TRACKING, TELEMETRY AND COMMAND (TT&C) FREQUENCIES

81. Several applicants have indicated plans to use other frequency bands for certain tracking, telemetry and command (TT&C) activities during various phases of the satellite's operation. DIRECTV

¹⁸¹ See 47 C.F.R. § 25.202(g).

¹⁸² This situation could change if the Commission should decide to permit 17/24 GHz BSS operations for international service in the 17.7-17.8 GHz band segment.

requests to use the 12.2-12.7 GHz and 14.0-14.5 GHz band for both transfer orbit and on-station TT&C, citing the need to avoid interference between DBS feeder-links in the 17.3-17.8 GHz band at sites where these TT&C stations are co-located. DIRECTV also seeks to operate transfer orbit command frequencies in the Ku-band to avoid the risk presented by the greater atmospheric attenuation during this critical phase, and cites the lack of ground facilities in the 24 GHz band. DIRECTV further argues that on-station Ku-band TT&C is necessary to avoid flying two sets of command receivers as well as the need to prevent the loss of reliability associated with switching, as well as the need to compensate for decreased command link availability due to atmospheric effects.¹⁸³ EchoStar proposes various options for its TT&C operations with uplink telecommand in the 17.3-17.8 GHz band (reverse band) and telemetry in the 12.2-12.7 GHz band for both the launch, early operations and on-orbit operations, or switching to in-band TT&C operations during on-station operations. EchoStar also notes the problem of potential interference from DBS uplink earth stations into 17/24 GHz BSS receiving earth station.¹⁸⁴ In contrast, Pegasus plans to use frequencies in the 17/24 GHz BSS bands for its TT&C operations, noting the availability of ground facilities following the deployment of Ka-band FSS satellites.¹⁸⁵ Intelsat proposes multiple options for operating its TT&C links in both the C-band and Ka-band, with some launch and early operations links also planned for the Ku-band.¹⁸⁶

82. Section 25.202(g) of the Commission's rules requires that tracking, telemetry and telecommand functions for U.S. domestic satellites be conducted at either or both edges of the allocated band(s).¹⁸⁷ In this *NPRM*, we are not proposing to change our requirement for satellites operating in the 17/24 GHz BSS service but we seek comment on this issue. We recognize the present lack of 24 GHz ground facilities needed to support launch, transfer, and testing operations, however we note that this issue has been faced in the past by other new services, typically through the use of case-by-case waivers.¹⁸⁸ We seek comment on the feasibility of employing such a case-by-case approach until ground facilities become more widely available. We ask whether a permanent rule change is necessary to accommodate what may only be a temporary situation. We also seek comment on the issue of atmospheric attenuation in the 24 GHz band and the associated loss of uplink command reliability. We ask whether this difficulty presents a significant problem for all operators and if so, during what phase of operations. Specifically, we ask if the problem is limited to certain "critical phases" such as the launch phase, and we seek comment on methods that might be adopted to mitigate loss of command link reliability.

83. Finally, we note that several applicants anticipate difficulties with interference into their 17/24 GHz BSS telemetry links from DBS feeder uplinks, both of which operate in the 17.3-17.7 GHz bands. This earth-station-into-earth station interference is encountered when the DBS uplink facility is co-located with (or located in close proximity to) the 17/24 GHz BSS TT&C facility. This problem is part of the larger issue of reverse band operation in the 17 GHz band, which is discussed previously in Section H.1.a of this item. However, we seek comment on its ramifications specific to TT&C operations. We ask whether there are means to avoid reverse band interference into telemetry receivers such as site

¹⁸³ See *DIRECTV Application* at 6.

¹⁸⁴ See *EchoStar Application* at 17.

¹⁸⁵ See *Pegasus Application* at 21.

¹⁸⁶ See *Intelsat Application* at Table C.4.

¹⁸⁷ See 47 C.F.R. § 25.202(g).

¹⁸⁸ See, e.g., In the Matter of EchoStar L.L.C. for Modification of its License to Select TT&C Frequencies for its Ka-Band GSO Satellite at 117^o W.L., *Order and Authorization*, DA 05-536, paras. 4-10 (released March 2, 2005).

separation, antenna shielding or frequency/polarization isolation.

84. The DBS service is subject to the channelization scheme outlined in the Region 2 Plan of Appendix 30 and 30A of the Radio Regulations. The Plan provides guardbands with 12 MHz of spectrum which are used only for DBS TT&C (command) uplinks at both the upper and lower bounds of the allocated band.¹⁸⁹ We believe that there is sufficient spectrum available in the guardbands to accommodate the TT&C transmissions of multiple satellites.¹⁹⁰ With careful planning, it may be possible to use these guardbands for both 17/24 GHz BSS telemetry and DBS command signals, in particular if both transmissions are from satellites licensed to the same operator. We seek comment on whether advantage can be taken of these guardbands, especially at the lower edge of the band,¹⁹¹ in order to avoid ground path interference between the TT&C transmissions of co-located DBS and 17/24 GHz BSS systems.

85. EchoStar has proposed using standard DBS frequency bands for all or part of its TT&C operations; command uplinks would be in the 17.3-17.8 GHz band, and telemetry downlinking would be in the 12.2-12.7 GHz band.¹⁹² We recognize that this approach may have some merit in cases where a single operator has both DBS and 17/24 GHz BSS satellites at the same nominal orbital longitude. In these cases the operator is already authorized to use DBS guardband spectrum, however, we question whether such an approach would provide sufficient TT&C spectrum for other DBS operators that may be operating at the same nominal position. We seek comment on this issue, and ask whether a case-by-case approach to licensing such TT&C operations would be sufficient, or whether a Commission rule change is needed.

86. Finally, we ask whether the Commission should consider other changes to its rules in order to facilitate reverse band operations in the 17.3-17.7 GHz band, specifically with regard to TT&C operations. We note that a significant number of 17/24 GHz BSS applicants are also DBS operators, and recognizing that these parties have likely given considerable thought to addressing these same problems, we invite comment on possible solutions.

2. POLARIZATION AND FULL FREQUENCY RE-USE REQUIREMENTS

87. We seek comment on what polarization requirements, if any should be established for 17/24 GHz BSS systems. We recognize that most operators prefer to operate with circularly polarized signals in the space-to-Earth direction because this facilitates installation of receiving antennas in the direct-to-home market. In the Earth-to-space direction, applicants have indicated plans to use both linearly and circularly polarized transmissions.¹⁹³ In the FSS, the Commission mandates use of orthogonal linearly polarized signals for standard C-band¹⁹⁴ operations, limits Ka-band transmissions to

¹⁸⁹ See Section 3.9 of Annex 5 to Appendix 30 and Section 4.1 of Annex 3 to Appendix 30A.

¹⁹⁰ Typical TT&C transmissions are on the order of 1 MHz in bandwidth.

¹⁹¹ The upper edge of the 17/24 GHz BSS allocation lies just below 17.7 GHz and is not coincident with the upper edge of the DBS feeder link band, *i.e.*, 17.8 GHz. BSS downlink transmissions in this guardband would fall within DBS channel 26 (17.6765-17.7005 MHz).

¹⁹² See *EchoStar Application* at 17.

¹⁹³ See *DIRECTV Application* at Table D-1, *Pegasus Application* at 6, *EchoStar Application* at Table A.4-1, and *Intelsat Application* at Table C.4.1.1.

¹⁹⁴ See 47 C.F.R. § 25.210(a)(1).

either orthogonal linear or circular transmissions,¹⁹⁵ and permits any type of orthogonal polarization for extended C-band and Ku-band transmissions.¹⁹⁶ For 12 GHz DBS systems the Commission requires that they conform to the technical characteristics contained in Appendices 30 and 30A of the ITU Radio Regulations (the BSS and feeder link Plans), which specify circularly polarized transmissions in both the uplink and downlink directions.¹⁹⁷ In addition, Appendices 30 and 30A precisely define all 32 channels at a given orbital location. Adjacent channels overlap partially in frequency and interference is avoided in part by specifying opposite polarizations (Right-hand circular polarization or "Left-hand circular polarization) on overlapping channels.¹⁹⁸

88. At this time we do not plan to impose channelization or polarization requirements on 17/24 GHz BSS transmissions other than requiring that orthogonally polarized signals be employed. Nor do we intend to require that 17/24 GHz receivers be interoperable with the 17/24 GHz networks of other operators. We seek comment on this approach. We ask whether there is a need to establish more specific polarization requirements for satellites in this service. We prefer to leave as many aspects of system design to the discretion of the operator as possible. However, we seek comment on whether there is a need to institute a standardized convention with regard to transponder bandwidth, center frequency or signal polarization throughout the allocated band. In particular, we ask whether co-location or adjacent-location of reverse-band operating satellites may be facilitated by harmonization of the frequency and polarization schemes employed by the space stations in the two services. We seek comment on whether other technical goals such as facilitating an orbital spacing regime or interference mitigation might be improved through adopting more stringent channel and polarization requirements.

89. We also propose to require that space stations operating in the 17/24 GHz BSS service employ full frequency re-use either through the use of orthogonal polarizations in the same beam and/or the use of spatially independent beams. This requirement is in keeping with past Commission practice for other GSO satellite services,¹⁹⁹ and is based on our goal of encouraging the highest and best use of limited spectrum resources. We seek comment on our proposal in general. We seek comment on whether this requirement is appropriate for the 17/24 GHz BSS band or whether some other requirement should be adopted. We ask if issues unique to this service such as reverse band operations, and in particular the possibility of location in the vicinity of co-frequency DBS systems might affect the means or ability of operators to fully use the allocated spectrum. If so, we ask what requirement might better ensure full use of the resource. Although we do not propose adopting a transponder-by-transponder polarization plan or mandating polarization switching capability, we also seek comment on the need for these or other possible polarization requirements.

90. We seek comment on the need for a cross-polarization requirement in the 17/24 GHz BSS service, and if adopted, how stringent such requirement should be. We recognize that in order to achieve full frequency re-use, some degree of polarization isolation is necessary. The Commission now

¹⁹⁵ See 47 C.F.R. § 25.210(b).

¹⁹⁶ See 47 C.F.R. § 25.210(f).

¹⁹⁷ Other polarizations may be permitted if a Plan modification has been submitted to the ITU and an adequate technical showing is made to the Commission. See 47 C.F.R. § 25.148(f). See also Annex 5 (Section 3.2) of Appendix 30 and Annex 3 (Section 4.8) of Appendix 30A of the ITU Radio Regulations.

¹⁹⁸ In addition, spatial separation is employed by locating even and odd channels at opposite edges of a cluster centered around the nominal orbital position. See Article 10 of Appendix 30 and Article 9 of Appendix 30A of the ITU Radio Regulations.

¹⁹⁹ See 47 C.F.R. § 25.210(a), (b), (f).

requires that both FSS and DBS space stations operate with antennas designed to provide 30 dB of cross-polarization isolation in the primary coverage area.²⁰⁰ Because BSS feeder-links operate in the FSS, this requirement can be assumed to apply to the uplink already. However, most of our present rules were written prior to the widespread use of shaped antenna beams or multi-spot beam satellites. Moreover, we recognize that cross-polarization interference has historically been viewed as primarily an intra-system problem and did not typically cause significant levels of harmful interference to adjacent operators. However, the possibility of space-to-space interference scenarios between 17/24 GHz BSS and DBS satellites requires a closer examination of our existing approach to cross-polarization requirements. Accordingly, we ask whether we should adopt a cross-polarization isolation requirement, and if so, should 30 dB or some other ratio of co-polar to cross-polar gain be imposed.

H. TECHNICAL REQUIREMENTS FOR INTER-SERVICE OPERATIONS

1. SHARING IN THE 24 GHz BAND

91. In 1997, the Commission modified the Domestic Table of Frequency Allocations to provide a primary allocation in the frequency band 25.05-25.25 GHz to support the 24 GHz Fixed Service, formerly known as the Digital Electronic Messaging Service (DEMS).²⁰¹ This band is now allocated on a co-primary basis to both the FS and to the FSS (Earth-to-space). Several 24 GHz FS systems have already been licensed and we must therefore consider the likelihood that additional systems will be deployed in the future. The potential exists for 17/24 GHz BSS feeder-link earth stations operating in the 25.05-25.25 GHz band to interfere with existing and future 24 GHz FS hub and user stations that operate in the same frequency band. When we adopted this shared allocation at 24 GHz, we stressed that while the full extent of the interference was unknown at that time, our belief in the feasibility of sharing was based on limitations on the number of expected 17/24 GHz BSS feeder link facilities and on the fact that potential interference to the 24 GHz service would be limited to hub stations. It was noted that the rules relevant to the 24 GHz service are subject to the outcome of the 24 GHz service rules proceeding.²⁰² We noted that the successful implementation of this allocation would require the development of sharing criteria that will be considered in a future rulemaking.²⁰³ In light of the proposed expansion in this band for 12 GHz BSS feeder links in this NPRM²⁰⁴ and the nature of the 24 GHz service, we seek to develop sharing criteria that would assure successful implementation of BSS feeder links and the 24 GHz service and request comment on what these criteria should be. Accordingly, we request comment on the feasibility of operating BSS feeder-links in this band on a co-frequency basis with 24 GHz FS systems and whether existing power levels and coordination procedures are sufficient given that 24 GHz FS systems have been licensed by geographic area and are not required to file site specific data.

92. At present, Section 25.203 of the Commission's rules provides a coordination mechanism for minimizing interference between satellite earth stations and FS stations, in bands where both services

²⁰⁰ See 47 C.F.R. §§ 25.210(i), 25.215.

²⁰¹ See Amendment of the Commission's Rules to Relocate the Digital Electronic Message Service from the 18 GHz Band to the 24 GHz Band and to Allocate the 24 GHz Band for Fixed Service, *Order*, 15 FCC Rcd 3471 (1997).

²⁰² *18 GHz Report & Order*, 15 FCC Rcd at 13479, para. 105 (referring to Amendments to Parts 1, 2, 87 and 101 of the Commission's Rules to License Fixed Services at 24 GHz, *Report and Order*, 15 FCC Rcd 16934 (2000)).

²⁰³ *Id.* at 13477, para. 98.

²⁰⁴ See para. 69 *supra*.

share equal rights.²⁰⁵ In addition, Section 25.204 sets forth power limits for satellite earth stations in bands shared co-equally with terrestrial radiocommunication services.²⁰⁶ Moreover, the antenna pattern requirements of Section 25.209 (*i.e.*, $29-25 \cdot \log_{10} \theta$) apply to BSS feeder-link stations because these antennas operate by definition in the FSS. We seek comment on whether these rules provide sufficient protection to hub and user stations of 24 GHz FS systems. We ask whether other requirements such as different power limits, or perhaps some other changes in our rules, may be necessary to facilitate sharing in the band. We also recognize that BSS feeder-link antennas may be less widely deployed than BSS receiving antennas. In addition, BSS feeder-link earth stations will typically employ relatively large diameter antennas with antenna off-axis rejection characteristics sufficient to minimize interference into 24 GHz FS systems. These factors should help decrease the likelihood of interference events with 24 GHz FS receiving stations. For these reasons we also seek comment on whether the existing rules are appropriate, or might be relaxed in some manner in order to relieve the coordination burden on either or both services.

93. In Region 2, the International Table of Frequency Allocations provides only the FSS with primary status in the frequency band 24.75-25.05 GHz. In the Domestic Table of frequency allocations however, primary status is shared by both the FSS and the radionavigation service.²⁰⁷ At this time we are aware of no operational radionavigation systems in the band. However, it is not inconceivable that future radionavigation systems might be deployed. Furthermore, we are aware of no specific sharing criteria or rules governing co-frequency operation of FSS and radionavigation systems. We seek comment on the feasibility of operating BSS feeder-links (Earth-to-space) in this band on a co-primary basis with potential future radionavigation systems. We seek comment on what are the most likely interference scenarios, and ask what measures might best provide for future operation of both services. We ask whether any changes to our rules such as power limits, coordination requirements, or antenna performance requirements might be considered in order to minimize inter-service interference in the 24.75-25.05 GHz band. We seek comment on technical or operational measures that might be adopted by either satellite system operators or by radionavigation system operators in order to facilitate co-frequency operation of these two services.

2. SHARING IN THE 17 GHz BAND

94. In the Domestic table of Frequency Allocations, the Radiolocation Service is allocated use of the 15.7-17.3 GHz band on a primary basis for U.S. Government systems.²⁰⁸ Military services are the largest users of the band and have a considerable investment in radiolocation operations in this frequency range, which include a large number of radar systems that perform ground-mapping, terrain-following maritime and target-identification functions.²⁰⁹ Numerous high-powered synthetic aperture

²⁰⁵ See 47 C.F.R. § 25.203.

²⁰⁶ See 47 C.F.R. § 25.204. Specifically, for bands above 15 GHz the e.i.r.p towards the horizon is limited to +64 dBW in any 1 MHz band for $\theta < 0^\circ$, and +64 + 30 in any 1 MHz band for $0 < \theta < 5^\circ$, where θ is the elevation angle of the horizon as viewed from the center of radiation of the earth station antenna, and measured in degrees as positive above the horizontal plane and negative below it. Section 25.204(b) provides for the use of uplink power control in the presence of rain-fade.

²⁰⁷ See 47 C.F.R. § 2.106. In addition, the International Table permits *all* FSS operations in the 24.75-25.25 GHz band, with priority given to use by BSS feeder-links; the associated downlink band is not specified. By contrast, the domestic allocation limits use of the FSS allocation only to feeder-links for the broadcasting-satellite service operating in the band 17.3-17.7 GHz.

²⁰⁸ See 47 C.F.R. § 2.106.

²⁰⁹ These radiolocation systems include land-based, transportable, shipborne and airborne platforms.

radars (SARs) operate near the band edge adjacent to 17.3 GHz. At present, these SARs are largely airborne, and are employed primarily for ground mapping and detection of airborne objects.²¹⁰ The National Telecommunications and Information Administration (NTIA) has stated that future radar systems are likely to resemble existing radars, including the capability to operate differently in different azimuth and elevation sectors, and that future designs may seek to operate in a wide band extending to the edge of the authorized allocation.²¹¹ Future radar systems will likely employ electronically-steerable antennas, and the NTIA maintains that the introduction of newer phase-steered radars could facilitate electromagnetic compatibility in some circumstances. In addition, newer radar systems are expected to have average-power capabilities at least as high as those of current systems, although the NTIA expects that future designs will strive to reduce wideband noise emissions through the use of solid-state transmitter/antenna systems. These would employ longer pulse transmissions with substantially higher duty cycles, but probably at lower peak power levels, as compared to tube-type radar transmitters.²¹²

95. We anticipate that unwanted emissions from high-power, adjacent-band radiolocation systems, especially those on board aircraft, may pose a significant harmful interference threat to 17/24 GHz BSS subscriber earth stations. The NTIA has expressed to the Commission its concern that interference from these high-powered radars into 17/24 GHz BSS receivers may occur even though the radiolocation systems meet current regulations²¹³ with respect to unwanted emissions.²¹⁴ Recognizing the long lead development and life cycle of radiolocation and BSS systems, the NTIA requests that the BSS and radiolocation communities begin discussions that would include the possibility of mitigation techniques in both services, in order to ensure adjacent band compatibility.²¹⁵ The Commission acknowledged the NTIA's concerns, and agreed that discussions between the radiolocation and BSS communities at an early stage would be beneficial to ensuring adjacent band compatibility.²¹⁶ The Commission has traditionally encouraged operator-to-operator discussions as a means to resolve interference issues, and we seek comment on this approach in this context, and ask how best to address the issue of potential adjacent-band interference into 17/24 GHz BSS receivers.

96. The NTIA has provided the Commission with information concerning technical and operating characteristics of certain adjacent-band radiolocation systems that it considers likely to impact 17/24 GHz BSS receiving earth stations and sufficient for general calculations to assess the compatibility

²¹⁰ See Letter to Edmond J. Thomas, Chief, Office of Engineering and Technology, Federal Communications Commission, from Fredrick R. Wentland, Associate Administrator, Office of Spectrum Management, National Telecommunications and Information Administration, (April 8, 2005) ("*April 8 NTIA Letter*"). See also U.S. Department of Commerce, NTIA Special Publication 00-40, Federal Radar Spectrum Requirements, May 2000.

²¹¹ See *April 8 NTIA Letter*.

²¹² *Id.*

²¹³ Standards for levels of unwanted emission for government radio determination systems are addressed in Section 5.5 of the NTIA Manual of Regulations & Procedures for Federal Radio Frequency Management (May 2003 Edition, September 2004 Revisions).

²¹⁴ See Letter from Karl Nebbia, Deputy Associate Administrator, Office of Spectrum Management, NTIA, United States Department of Commerce, to Donald Abelson, Chief, International Bureau, Federal Communications Commission, dated June 21 2002 ("*June 21 NTIA Letter*").

²¹⁵ See *June 21 NTIA Letter*.

²¹⁶ See Letter to Karl Nebbia, Deputy Associate Administrator, Office of Spectrum Management, NTIA, from Donald Abelson, Chief, International Bureau, Federal Communications Commission, (July 15, 2002).

between these radars and BSS systems.²¹⁷ The technical characteristics of the radiolocation systems operating in the 15.7-17.3 GHz band are provided in Appendix C. The NTIA has also identified two interference coupling scenarios that it believes are likely to exist between radiolocation systems and BSS receiving antennas in the 17 GHz band: earth station receiver front-end overload²¹⁸ and out-of-band interference from high-power pulsed emissions.²¹⁹ With regard to adjacent band interference due to high power pulsed emissions, the NTIA cites measurements that it performed²²⁰ on a 4 GHz digital earth station receiver that employed error correction signal processing.²²¹ However, as the NTIA also notes, the applicability of these results to 17 GHz systems requires further study. Accordingly, we seek comment on the interference scenarios that are most likely to be encountered between adjacent-band radiolocation systems and BSS receiving antennas, and on the general applicability of the NTIA's findings. Specifically, we ask what differences in 17/24 GHz BSS receiver design and signal processing should be taken into account when assessing interference from adjacent-band radiolocation systems. We also ask 17/24 GHz BSS operators for comment on their systems' sensitivity to unwanted adjacent-band emissions, and on the level of protection they may require.

97. We also seek comment on what measures 17/24 GHz BSS operators might adopt in order to mitigate such interference. In its April 8, 2005 letter to the Commission, the NTIA suggested various mitigation techniques that BSS operators might implement to mitigate adjacent-band radiolocation transmission interference.²²² The NTIA also recommends that BSS operators at least employ adequate radio frequency filtering to avoid front-end overload from adjacent-band radar signals, and that BSS operators investigate altering inter-leaving²²³ and/or other error correction techniques to improve survivable pulsed interference-to-carrier levels.²²⁴ We seek comment on the feasibility of the NTIA's recommendations, particularly with regard to their effects upon BSS system performance and cost. We ask what other mitigation techniques might be considered to diminish adjacent-band radiolocation transmission interference. We also seek comment on what limits or other measures the Commission might adopt in order to protect receiving earth stations from harmful interference caused by unwanted

²¹⁷ See April 8 NTIA Letter.

²¹⁸ Front-end overload is a condition that occurs when out of band energy is captured and amplified. Front-end overload typically results when the receiver's front-end amplifier filtering is overly broad, and allows energy outside of the desired receiving band to enter the first amplifier stage. Front-end overload can also occur when strong interfering signals are present inside the desired receiving band.

²¹⁹ See April 8 NTIA Letter.

²²⁰ See National Telecommunications and Information Administration, NTIA Report 02-393, *Measurements of Pulsed Co-Channel Interference in a 4 GHz Digital Earth Station Receiver* (May 2002). This receiver employed error correction signal processing. The measurements show that degradation of performance is directly related to the carrier-to-peak interference ratio (C/I). These measurements also show that the potential interference impact is a function of the pulsed characteristics (pulse width, pulse repetition frequency, duty cycle) of the radar systems.

²²¹ In digital communication systems, error correction is the process of detecting bit errors and correcting them. Error correction is employed to ensure the accuracy and integrity of the received data.

²²² These include antenna shielding techniques to reduce side-lobes, auxiliary side-lobe blanking in receive antennas upon detection of interference, or frequency diversity (*i.e.*, adaptive selection of operating frequencies in response to detected interference). See April 8 NTIA Letter.

²²³ Interleaving is a component of many digital communication systems used in conjunction with forward error correction coding. Interleaving the encoded symbols provides a form of time diversity to guard against localized corruption or bursts of errors.

²²⁴ See April 8 NTIA Letter.

adjacent-band emissions, and we ask in particular whether the Commission should adopt requirements to limit 17/24 GHz BSS receiver susceptibility to unwanted emissions, and specifically what requirements might be appropriate.

98. The Commission's rules do not establish unwanted emission limits for radiolocation systems operating in the 15.7-17.3 GHz band. Appendix 3 of the ITU Radio Regulations defines limits for an attenuation value used to calculate maximum permitted power levels of unwanted emissions²²⁵ in the spurious domain in Table II of Section II. For the Radiolocation Service²²⁶ this attenuation below the radiated emission power level is defined as $43 + 10\log_{10}(\text{PEP})$, where PEP is the peak envelope power in watts.²²⁷ We seek comment on the suitability of this value to protect 17/24 GHz BSS receivers from interference caused by unwanted emissions from adjacent-band radars.

99. In addition, the band 17.3-17.7 GHz is allocated on a secondary basis to the Radiolocation Service for use by Federal Government systems.²²⁸ Numerous types of radiolocation stations have been operated in this band, including ship, ground and airborne equipment. There may be future radiolocations systems that seek to operate in this spectrum on a secondary basis, and the potential for interference into 17/24 GHz BSS subscriber receiving antennas exists. We intend to ensure that 17/24 GHz BSS receivers are adequately protected. However, the Commission is also committed to encouraging efficient use of spectrum whenever possible. Accordingly, we seek comment on approaches we might adopt to accommodate future secondary radiolocation operations in this band. We ask what types of interference scenarios may be anticipated and what criteria might be adopted to ensure protection of BSS systems while allowing for future secondary operation of radiolocation systems in the 17.3-17.7 GHz band. We also ask 17/24 GHz BSS operators to address the level of protection required for their receiving earth stations and whether 17/24 GHz BSS and secondary radiolocation services could co-exist if appropriate protection criteria were in place. Finally, we note that Footnote US259 to the United States Table of Frequency Allocations requires that stations in the radiolocation service in the 17.3-17.7 GHz band be restricted to operating powers of less than 51 dBW e.i.r.p. after feeder-link stations for the broadcasting-satellite service are authorized and brought into use.²²⁹ This requirement was developed to protect GSO satellites operating with feeder-link transmissions defined by the Region 2 planned bands, and was not designed with protection of small-diameter 17/24 GHz BSS receiving earth stations in mind. Nonetheless, we seek comment on whether this restriction is adequate to protect 17/24 GHz BSS subscriber earth stations from harmful interference caused by transmitting radiolocation systems.

100. The allocation to the radiolocation service is secondary relative to the BSS in the 17.3-17.7 GHz band. Accordingly, secondary radiolocation stations are precluded from causing harmful

²²⁵ Unwanted emissions include both spurious and out-of-band emissions.

²²⁶ The requirement is defined for the Radiodetermination Service as a whole. Radiolocation is a particular type of Radiodetermination.

²²⁷ See Appendix 3, Section II, Table II of the ITU Radio Regulations. This value is applicable to transmitters installed after January 1, 2003, and for all transmitters after January 1, 2012. The limits of Appendix 3, Section I, Table I apply for transmitters installed on or before January 1, 2003, and are valid until January 1, 2012. The ITU does not specify emission limits for the out-of-band domain.

²²⁸ Prior to the 1979 World Administrative Radio Conference (WARC), the 15.7-17.7 GHz band was allocated to the radiolocation service on a primary basis. At WARC 79, the band 17.3-17.8 GHz was reallocated to the fixed satellite-service (Earth-to-space) limited to feeder links for the BSS, and the radiolocation service was downgraded to a secondary allocation in the 17.3-17.7 GHz band in all three International Telecommunication Union regions.

²²⁹ See 47 C.F.R. § 2.106, footnote US259.

interference to the stations of a primary service such as the 17/24 GHz BSS.²³⁰ However, we recognize that Federal radiolocation systems are now operating in this band and have been in operation for some time. Further, in its March 29, 2000 letter to the Commission, NTIA stated that radiolocation systems continuing to operate in the 17.3-17.7 GHz band after April 1, 2007 may have to be accommodated, notwithstanding their allocation status with respect to BSS stations.²³¹ Recently, NTIA again noted that it anticipates continued operation of Federal radiolocation systems in certain portions of the 17.3-17.7 GHz band, in a limited number of geographic areas after April 1, 2007.²³² The Commission is committed to protecting 17/24 GHz BSS consumers from harmful interference. However we also wish to accommodate national defense interests and appreciate the Defense Department's need to continue operating a limited number of existing radars in the 17.3-17.7 GHz band after April 1, 2007. Accordingly, we seek comment on what methods or criteria might be adopted to accommodate continued operation of these currently operating Federal radiolocation systems. Specifically, we seek comment on the typical interference scenarios that could occur between receiving 17/24 GHz BSS earth stations and existing Federal radiolocation systems. We ask whether case-by-case coordination or some other approach might best permit continued operation of Federal radiolocation systems in portions of the 17.3-17.7 GHz band following the introduction of 17/24 GHz BSS systems after April 1, 2007.

VI. CONCLUSION

101. The proposed licensing and service rules described above for the 17/24 GHz BSS bands reflect our interest in facilitating the deployment of new and enhanced services. The proposals set forth in this *NPRM* are designed to address: 1) issues regarding licensing; 2) service obligations; 3) facilitating service to the states of Alaska and Hawaii; 4) allocation issues; 5) orbital spacing; 6) reverse band operations; and 7) sharing with other services. Based on the considerations discussed above, we conclude that the proposals set forth in this *NPRM* will facilitate the implementation of service in the 17/24 BSS GHz bands. We seek comment on all aspects of these rules and anticipate an extensive record on which to base decisions on final policies and rules.

V. PROCEDURAL MATTERS

A. EX PARTE

102. This proceeding shall be treated as a "permit-but-disclose" proceeding in accordance with the Commission's ex parte rules.²³³ 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.²³⁴ Other rules pertaining to oral and written presentations are set forth in Section 1.1206(b) of the Commission's rules as well.

²³⁰ See 47 C.F.R. § 2.105c)(2)(i).

²³¹ See Letter to Dale M. Hatfield, Chief, Office of Engineering and Technology, Federal Communications Commission, from William T. Hatch, Associate Administrator, Office of Spectrum Management, National Telecommunications and Information Administration, (March 29, 2000).

²³² See April 8 NTIA Letter.

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

²³⁴ 47 C.F.R. § 1.1206(b)(2).

B. INITIAL REGULATORY FLEXIBILITY ANALYSIS

103. Pursuant to the Regulatory Flexibility Act (RFA),²³⁵ the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on small entities by the proposals considered in this *NPRM*. The text of the IRFA is set forth in Appendix A. Written public comments are requested on this IRFA. Comments must be filed in accordance with the same filing deadlines for comments on the *NPRM*, and they should have a separate and distinct heading designating them as responses to the IRFA. The Commission will send a copy of the *NPRM*, including the IRFA, to the Chief Counsel for Advocacy of the Small Business Administration.²³⁶

C. INITIAL PAPERWORK REDUCTION ACT OF 1995 ANALYSIS

104. *Paperwork Reduction Act*. This *NPRM* contains proposed new and modified information collections. The Commission, as part of its continuing effort to reduce paperwork burdens, invites the general public and the Office of Management and Budget (OMB) to comment on the information collections contained in this *NPRM*, as required by the Paperwork Reduction Act of 1995, Public Law No. 104-13. Public and agency comments are due 60 days from the date of publication of the *NPRM* in the Federal Register. Comments should address: (a) whether the proposed collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility; (b) the accuracy of the Commission's burden estimates; (c) ways to enhance the quality, utility, and clarity of the information collected; and (d) ways to minimize the burden of the collection of information on the respondents, including the use of automated collection techniques or other forms of information technology. In addition, pursuant to the Small Business Paperwork Relief Act of 2002, Public Law No. 107-198, *see* 44 U.S.C. § 3506(c)(4), we seek specific comment on how we might "further reduce the information collection burden for small business concerns with fewer than 25 employees."

105. A copy of any comments on the information collections contained herein should be submitted to Judy Boley Herman, Federal Communications Commission, Room 1-C804, 445 12th Street, S.W., Washington, DC 20554, or via the Internet to jbHerman@fcc.gov and to Kristy L. LaLonde, OMB Desk Officer, Room 10234 NEOB, 725 17th Street, N.W., Washington, DC 20503, or via the Internet to Kristy.L.LaLonde@omb.eop.gov, or via fax at 202-395-5167.

D. COMMENT FILING PROCEDURES

106. Pursuant to Sections 1.415 and 1.419 of the Commission's rules, 47 C.F.R. §§ 1.415, 1.419, interested parties may file comments in response to this *NPRM* no later than on or before 75 days after Federal Register publication. Reply comments to these comments may be filed no later than on or before 105 days after Federal Register publication. All pleadings are to reference **IB Docket No. 06-90**. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS) or by filing paper copies. Parties are strongly encouraged to file electronically. *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 Fed. Reg. 24,121 (1998).

107. Comments filed through the ECFS can be sent as an electronic file via the Internet to <http://www.fcc.gov/e-file/ecfs.html>. Parties should transmit one copy of their comments to the docket in

²³⁵ See 5 U.S.C. § 603. The RFA has been amended by the Contract with America Advancement Act of 1996, Pub. L. No. 104-121, 110 Stat. 847 (1996) (CWAAA). Title II of the CWAAA is the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA).

²³⁶ 5 U.S.C. § 603(a).

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

108. Parties choosing to file by paper must file an original and four copies of each filing in IB Docket No. 06-90. Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail (although we continue to experience delays in receiving U.S. Postal Service mail). If more than one docket or rulemaking number appears in the caption of this proceeding, commenters must submit two additional copies for each additional docket or rulemaking number. The Commission's mail contractor, Vistronix, Inc. will receive hand-delivered or messenger-delivered paper filings for the Commission's Secretary at 236 Massachusetts Avenue, N.E., Suite 110, Washington, D.C. 20002. The filing hours at this location are 8:00 a.m. to 7:00p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes must be disposed of before entering the building. Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743. U.S. Postal Service first-class mail, Express Mail, and Priority Mail should be addressed to 445 12th Street, S.W., Washington, D.C. 20554. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

109. Comments submitted on diskette should be on a 3.5 inch diskette formatted in an IBM-compatible format using Word for Windows or compatible software. The diskette should be clearly labeled with the commenter's name, proceeding (including the docket number, in this case, IB Docket No. 05-20), type of pleading (comment or reply comment), date of submission, and the name of the electronic file on the diskette. The label should also include the following phrase "Disk Copy - Not an Original." Each diskette should contain only one party's pleadings, preferably in a single electronic file.

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

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

112. Comments and reply comments must include a short and concise summary of the substantive arguments raised in the pleading. Comments and reply comments must also comply with Section 1.49 and all other applicable sections of the Commission's rules.²³⁷ All parties are encouraged to utilize a table of contents, and to include the name of the filing party and the date of the filing on each page of their submission. We also strongly encourage that parties track the organization set forth in this *NPRM* in order to facilitate our internal review process.

²³⁷ 47 C.F.R. § 1.49.

113. Commenters who file information that they believe is proprietary may request confidential treatment pursuant to Section 0.459 of the Commission's rules. Commenters should file both their original comments for which they request confidentiality and redacted comments, along with their request for confidential treatment. Commenters should not file proprietary information electronically. *See Examination of Current Policy Concerning the Treatment of Confidential Information Submitted to the Commission, Report and Order*, 13 FCC Rcd 24816 (1998), *Order on Reconsideration*, 14 FCC Rcd 20128 (1999). Even if the Commission grants confidential treatment, information that does not fall within a specific exemption pursuant to the Freedom of Information Act (FOIA) must be publicly disclosed pursuant to an appropriate request. *See* 47 C.F.R. § 0.461; 5 U.S.C. § 552. We note that the Commission may grant requests for confidential treatment either conditionally or unconditionally. As such, we note that the Commission has the discretion to release information on public interest grounds that does fall within the scope of a FOIA exemption.

VI. ORDERING CLAUSES

114. 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. Sections 151, 154(i), 154(j), 157(a), 301, 303(c), 303(f), 303(g), 303(r), 303(y), 308, this Notice of Proposed Rulemaking IS ADOPTED.

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

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A

INITIAL REGULATORY FLEXIBILITY ANALYSIS

As required by the Regulatory Flexibility Act of 1980, as amended (RFA),²³⁸ the Commission has prepared this present Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on a substantial number of small entities by the policies and rules proposed in this item, the Establishment of Policies and Service Rules for the Broadcasting-Satellite Service at the 17.3-17.7 GHz Frequency Band and at the 17.7-17.8 GHz Frequency Band Internationally, and at the 24.75-25.25 GHz Frequency Band for Fixed Satellite Services Providing Feeder Links to the Broadcasting-Satellite Service and for the Broadcasting Satellite Service Operating Bi-Directionally in the 17.3-17.8 GHz Frequency Band, Notice of Proposed Rulemaking (NPRM).²³⁹ Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments on the NPRM provided in paragraph 106 of this NPRM. The Commission will send a copy of the NPRM, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA).²⁴⁰ In addition, the NPRM and IRFA (or summaries thereof) will be published in the Federal Register.²⁴¹

A. Need for, and Objectives of, the Proposed Rules

In this NPRM the Commission makes proposals and seeks comment on service rules that will apply to U.S. licensees authorized to operate in the 17/24 GHz BSS band. Our objective in this proceeding is to promote prompt commencement of services in the 17/24 GHz BSS band. This newly allocated band is expected to 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 residential and business subscribers in the United States. As discussed in greater detail below, the Commission is provisionally considering a rulemaking which proposes rules and procedures for operation in the 17/24 GHz BSS band, including requirements for licensing, service obligations, orbital spacing, adjacent band operations, reverse band operations, and shared band operations. Potential interference from primary adjacent-band radiolocation systems and in-band secondary radiolocation systems is also addressed. In addition, the NPRM also considers proposals for use of the 17.7-17.8 GHz BSS spectrum for provision of international services outside the United States.

The Commission is provisionally considering whether to apply the processing rules and requirements set forth in the *Space Station Licensing Reform Orders* to the 17/24 GHz BSS or whether to adopt another licensing mechanism, such as competitive bidding. If the Commission decides to apply the *Space Station Licensing Reform* framework, it is provisionally considering that the 17/24 GHz BSS will be classified as a "GSO-like" service and therefore a "first-come, first-served" licensing framework will apply to the service. Under this processing option, the Commission is considering applying the package

²³⁸ See 5 U.S.C. § 603. The RFA (see 5 U.S.C. § 601 – 612), has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

²³⁹ See The Establishment of Policies and Service Rules for the Broadcasting-Satellite Service at the 17.3-17.8 GHz Frequency Band 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 Direct Broadcasting Satellite Service Operating Bi-Directionally in the 17.3-17.8 GHz Frequency Band, IB Docket No. 06-90, *Notice of Proposed Rulemaking (NPRM)*.

²⁴⁰ See 5 U.S.C. § 603(a).

²⁴¹ See 5 U.S.C. § 603(a).

of safeguards that are contained within the first-come, first-served processing scheme. These safeguards include a requirement that all GSO-like applicants awarded a license under this procedure to post a \$3 million performance bond with the Commission within 30 days of license grant. They also require licensees to construct and launch the satellite consistent with a specified milestone schedule. If the licensee fails to meet an implementation milestone, the license becomes null and void and the bond is executed. The rules also limit applicants to a total of five pending applications and licenses for unbuilt satellites in a specific frequency band at any one time. In addition, the Commission is considering making 17/24 GHz BSS licensees subject to the same annual reporting requirements as most of our current space station licensees are subject to. These reports include, among other things, the status of space station construction and anticipated launch dates.

The Commission is also provisionally considering the adoption of a ten-year license term for all non-broadcast 17/24 GHz BSS licensees and an eight-year license term for 17/24 GHz BSS satellites that will operate as broadcast facilities. In addition, the Commission is provisionally considering the adoption of the grant-stamp procedure to process unopposed replacement 17/24 GHz BSS applications with technical characteristics consistent with those of the satellite to be retired.

Regarding non-U.S.-licensed satellite operators, the Commission is provisionally considering to evaluate requests for U.S. access by foreign-licensed 17/24 GHz BSS systems on a service-specific basis consistent with the framework established in the 1997 *DISCO II Order*. Thus, if this approach is adopted, in cases where systems licensed by World Trade Organization (WTO)-member countries seek to provide FSS to U.S. customers from their 17/24 GHz BSS systems, we will presume that entry will further competition. In cases where non-WTO-member countries seek to use these systems to serve the United States or where WTO-member countries seek to provide services such as DTH and DBS over 17/24 GHz BSS systems, we will apply the effective competitive opportunities test (ECO-SAT) to ensure that entry will not distort competition in the U.S. market.

The Commission is also provisionally considering whether 17/24 GHz BSS licensees should be subject to public interest obligations, such as those currently imposed on providers of direct broadcast satellite services. Under these obligations, these providers are required to meet certain political broadcast requirements, compliance with children's television advertising limits, and to set aside four percent of channel capacity for noncommercial, educational or informational programming. Also, the Commission is provisionally considering rules that would result in the equal employment opportunity requirements set forth in Part 76 of the Commission's rules being applied to 17/24 GHz BSS licensees. In addition, the Commission is provisionally considering adopting rules that would require 17/24 GHz BSS licensees to provide service to Alaska and Hawaii where such service is technically feasible from the authorized orbit location. In addition, the Commission is provisionally considering applying EAS requirements on 17/24 GHz BSS operators.

The Commission is also provisionally considering rules that may apportion a specific frequency band for tracking, telemetry and command operations for 17/24 GHz BSS satellites. Also, the Commission is provisionally considering the adoption of rules for orbital spacing for 17/24 GHz BSS satellites.

The Commission is also provisionally considering rules regarding adjacent band operations, reverse band operations, and shared band operations. If adopted, these rules would:

- Require Direct Broadcast Satellite (DBS) service applicants seeking to operate within [TBD] degrees of a geostationary orbital location where a space station has already been authorized to operate in the Broadcasting Satellite Service (BSS) in the 17.3-17.8 GHz band (space-to-Earth) to submit a technical showing demonstrating their ability to