

standard.²¹¹ However, Pegasus maintains that the Commission should interpret Section 1012 of the *LOCAL TV Act* to limit MVDDS licensing to those then-pending applicants that successfully participated in the independent testing.

77. Pegasus argues that it submitted a timely-filed application and successfully subjected its technology to testing. Consequently, it asserts that it was qualified to be an MVDDS licensee and the Commission should not have dismissed its application. Northpoint similarly argues that the Commission erred by dismissing its application.

78. We disagree with these assertions because the Commission did not dismiss their applications and deny their waiver requests because they did not satisfy the testing requirement. Rather, the Commission dismissed their applications because the Commission found that notice to file applications for terrestrial services was not “reasonably comprehensible” to interested parties and could not be made by implication.²¹²

79. In fact, the Commission determined that the *Ku-Band Cut-Off Notice* was completely silent concerning terrestrial use of the Ku-band.²¹³ Accordingly, the Commission found that Pegasus, Northpoint, and SRL did not properly file their applications. As a result, the Commission dismissed the applications without prejudice to refile when the Commission announces that it is accepting applications to provide terrestrial services in the 12 GHz band.²¹⁴ Section 1012 of the *LOCAL TV Act* does not require the Commission to grant any applications. It requires the Commission to provide for independent testing of any technology proposed “by an entity that has filed an application” when the Commission has entities before it that seek to provide terrestrial service in the 12 GHz band.²¹⁵ Section 1012 of the *LOCAL TV Act* also specifies certain parameters for the testing of technology proposed by “any pending application.”²¹⁶ At no point does the *LOCAL TV Act* mandate the grant of an application (especially an application filed in a defective manner without adequate notice), although Pegasus and Northpoint seek this interpretation of the *LOCAL TV Act*. We find this interpretation is counter to the public interest because it would encourage the filing of applications without adequate notice to all interested parties.

80. Instead of challenging the application dismissal and waiver denial, Pegasus and Northpoint maintain that the testing requirement of Section 1012 of the *LOCAL TV Act* limits the scope of potential applicants for the spectrum. Pegasus argues that the *LOCAL TV Act* requires the Commission to limit MVDDS licensing to the two qualified entities – Pegasus and Northpoint – that successfully participated in independent testing required by the Act.²¹⁷ Specifically, Pegasus asserts that because Section 1012(a) of the *LOCAL TV Act* expressly states that testing is required and is applicable to “any entity that has filed an application to provide terrestrial service,” and Congress did not address what future applicants would need to do, Congress clearly intended to limit MVDDS licensing to those then-pending applicants that

²¹¹ *Id.* at 9701-9702 ¶ 228.

²¹² *Id.* at 9697 ¶ 214.

²¹³ *Id.* at 9697 ¶ 213 citing *McElroy Electronics Corp. v. FCC*, 86 F.3d 248, 257 (D.C. Cir. 1996); *Ridge Radio Corp. v. FCC*, 292 F.2d 770, 773 (D.C. Cir. 1961); *Maxcell Telecom Plus, Inc. v. FCC*, 815 F.2d 1551 (D.C. Cir. 1987).

²¹⁴ *Id.* at 9697 ¶ 214.

²¹⁵ *Id.* at 9702 ¶ 230.

²¹⁶ *Id.*

²¹⁷ Pegasus Broadband Corporation Petition for Reconsideration at 4, n.12 (filed June 24, 2002) (Pegasus Petition). Pegasus submits that SRL did not participate in the MITRE testing, and thus is not eligible to participate in the licensing process.

successfully participated in the independent testing.²¹⁸ However, as noted previously, neither application was acceptable because interested parties did not receive notice and no technical rules existed to protect DBS. Consequently, the applications were defective as prematurely filed.

81. We further note that first, and foremost, on Congress' mind when it adopted Section 1012 of the *LOCAL TV Act* was to avoid harmful interference. If Congress had intended the Commission to grant the applications, it would have mandated that result. Because Congress did not mandate grant of the applications, we believe that our interpretation complies with the intent of Section 1012 of the *LOCAL TV Act*.

82. Northpoint and SRL agree with Pegasus that we should not accept an MVDDS application from entities that did not have applications on file at the time of the enactment of the statute. However, Northpoint limits the field of applicants to one (itself), because it argues that the MITRE report based its conclusions solely on Northpoint's technology as no one else submitted any equipment for testing.²¹⁹ On the other hand, SRL believes that the Commission should reinstate all three applications.²²⁰ SRL avers that Section 1012 of the *LOCAL TV Act* simply requires the Commission to ensure that any applicant proposing to deploy terrestrial operations do so without causing harmful interference to DBS operations.²²¹ In addition, SRL avers that the Act does not require then-pending applicants to propose any technology or limit the field of applicants to those that participated in the independent testing.²²²

83. Pegasus does not contest the Commission's conclusion in the memorandum opinion and order portion of the *Second R&O* that the underlying purpose of Section 1012 *LOCAL TV Act* is to require a determination of whether any proposed terrestrial service would cause harmful interference to any DBS service.²²³ This purpose comports with the Commission's determination that Congress did not intend for the statute to limit the scope of applicants for the spectrum to those on file at the time, because we do not believe, and Pegasus does not argue, that this goal requires a limitation on prospective MVDDS providers.

84. Pegasus argues that if Congress had intended the Commission to continue to accept later-filed applications, it could have been more explicit.²²⁴ In reviewing the statute, the Commission found that Section 1012(a)'s requirement that it provide for independent testing of any technology proposed by "any entity that has filed an application" covers points in time (present or future) when the Commission has before it applications filed by entities that seek to provide terrestrial service in the 12.2 – 12.7 GHz band.²²⁵ In contrast, the Commission determined that Section 1012(b) of the *LOCAL TV Act*, which

²¹⁸ *Id.*

²¹⁹ See Consolidated Response of Northpoint Technology, LTD., and Broadwave USA, Inc., to Petitions for Reconsideration of Second Report and Order at 3-4 (Northpoint Consolidated Response) (filed Sept. 3, 2002).

²²⁰ Satellite Receivers Ltd. Opposition to Petition for Reconsideration at 3 (filed July 12, 2002) (SRL Opposition).

²²¹ *Id.*

²²² *Id.*

²²³ See *Second R&O*, 17 FCC Rcd at 9702-04 ¶¶ 229-36; see also Joint Opposition of DIRECTV, INC. and EchoStar Satellite Corporation at 20 (filed Sept. 3, 2002) (DBS Opposition); MDS America, Incorporated Opposition to Petition for Reconsideration of Pegasus Broadband Corporation at 5 (filed Sept. 3, 2002) (MDS America Opposition).

²²⁴ See Pegasus Petition at 7.

²²⁵ See *Second R&O*, 17 FCC Rcd at 9702 ¶ 230.

provides the parameters for the testing of technology proposed by "any pending application," is limited to applications pending as of the enactment of the *LOCAL TV Act*.²²⁶ As the Commission stated,

Had Congress intended Section 1012(a) to apply only to applications on file with the Commission at the time of enactment, it would have used terms such as "pending" and "date of enactment," which it did in Section 1012(b). Moreover, if the entities covered by Section 1012(a) were limited to applications pending at the time of enactment, then the inclusion in Section 1012(b) of the phrase "pending application" would be superfluous.²²⁷

Pegasus' proffered interpretation focuses solely on Section 1012(a) of the *LOCAL TV Act*, and ignores the rest of the statute.

85. We find that Pegasus' argument is not persuasive. We agree with the DBS operators (EchoStar Satellite Corporation and DIRECTV, Inc.) and SRL that Pegasus has no basis in concluding that Congress explicitly ordered the Commission to limit terrestrial applications in this band to those already on file and validated by independent testing.²²⁸ Further, we agree that Congress did not intend to override the Commission's normal license assignment procedures or to effectively grant a particular applicant or set of applicants a "pioneer's preference" for licenses granted outside the Commission's usual license assignment process.²²⁹ We believe that the Commission's previous determination is supported by a reasonable interpretation of the statutory provision and is in the public interest.

2. Operational Limits

86. *EIRP and EPFD limits.* MDS America seeks reconsideration of the EIRP and EPFD operational limits on MVDDS set forth in Sections 101.105 and 101.113 of the rules adopted in the *Second R&O*. MDS America argues that we should adopt a two-tiered scheme that maintains the 14 dBm EIRP limit for urban areas but would allow a higher EIRP of 39 dBm in rural areas.²³⁰ Similarly, MDS America argues that the regional EPFDs should also be increased in rural areas.²³¹ MDS America contends that the higher EIRP and EPFDs are appropriate in rural areas because they will simultaneously allow for larger MVDDS service areas while making it possible to increase DBS interference protection through control of the radiation beam (or vector) from the MVDDS transmitter.²³² In addition, MDS

²²⁶ See *Second R&O*, 17 FCC Rcd at 9702-04 ¶¶ 229-36; see also *DBS Opposition* at 13; *MDS America Opposition* at 5-6.

²²⁷ *Second R&O*, 17 FCC Rcd at 9702-03 ¶ 231 (footnotes omitted).

²²⁸ See *DBS Opposition* at 14; *SRL Opposition* at 3. We note that Congress rescinded our authority to issue "pioneer's preference" awards in 1997, under a provision of the Balanced Budget Act of 1997. Pub. L. 105-33, 111 Stat. 251 (1997); 47 U.S.C. § 309(j)(13).

²²⁹ See *DBS Opposition* at 15-16.

²³⁰ MDS America petition at i - ii, and generally at 2, 6 and 22.

²³¹ The four EPFD values specified by MDS America for rural areas are -155.7, -157.7, -158.6 and -160 dBW/m²/4kHz. *Id.* at 23

²³² MDS America contends that the MVDDS transmitter could be placed at a relatively high altitude above the surrounding terrain and the antenna beam could be shaped and pointed so that the MVDDS signal does not illuminate the ground within a significant "exclusion zone" around each MVDDS transmitter. In theory, as a result, any nearby DBS receive dishes within the "exclusion zone" would not see the MVDDS signal because it is essentially directed to travel overhead and out of the propagation line of sight for nearby DBS receivers. MDS America contends that "Exclusion zones, therefore, are not areas of higher interference, but rather areas of NO interference to DBS customers, because they are areas with the weakest MVDDS signal." Thus MDS asserts that

(continued....)

America argues that this higher power limit will allow MVDDS operators to avoid potential multipath problems that can occur with transmitters located in urban areas by making it feasible to locate transmitters farther outside an urban area while still providing service within the urban area due to the larger coverage contours achieved.²³³ Finally, MDS America also argues that these higher limits will permit service areas of sufficient size for economic viability, thereby making it more likely that MVDDS will be deployed in rural areas. Finally, MDS America argues that the EIRP limits adopted in the *Second R&O* have the effect of favoring MVDDS systems configured in a manner similar to the original Northpoint proposal.

87. We decline to modify the EIRP and EPFD limits imposed on MVDDS. Two key benefits of the adopted limits are that they are not susceptible to dispute because of their simplicity, and they effectively limit the potential for harmful interference to DBS when applied to all MVDDS transmission systems, no matter how configured. As the Commission found in the *Second R&O* and affirm herein, these limits are sufficiently conservative to ensure that any potential interference to DBS should be held below any level that can be considered harmful under our rules. As noted in the preceding paragraph, however, MDS America relies upon certain assumptions about the MVDDS transmitting antenna characteristics – particularly, the vector angle of the transmitted beam – to achieve the asserted benefits of their approach.²³⁴ In other words, the level of DBS protection claimed by MDS America will not result at the higher EIRP unless various antenna characteristics assumed by MDS America are met. In that light, we conclude that adopting rules that specify an EIRP higher than 14 dBm would inherently necessitate the adoption of additional constraints on MVDDS transmitting antenna characteristics that could unduly limit the flexibility and options of MVDDS providers to use alternative antenna configurations. By comparison, the adopted limits do not preclude the use of the MDS America approach to MVDDS transmission, although we recognize MDS America's argument that those limits could make some approaches more or less attractive for various financial and technical reasons. However, on balance, we believe it is prudent to craft a conservative criterion that protects DBS in all instances and preserves the flexibility for each MVDDS provider to make its own business decision about what type of transmission system better suits its needs. Finally, we note that the relief sought by MDS America would require the formulation of some across-the-board definition of what constitutes a "rural" area for the purpose determining when the EIRP and EPFD exceptions would apply. We conclude that making such an exception would negate the benefit of the simplicity and general applicability of the adopted rules. Accordingly, the MDS America petition for higher EIRP and EPFD limits on MVDDS is denied.

88. On the other hand, we do not prejudge herein whether the MDS America rationale for higher EIRP and EPFD limits in rural areas might have some technical merit in certain very specific circumstances. Consequently, MVDDS providers may file petitions for waiver of the general MVDDS limits adopted in the *Second R&O*.²³⁵ After we gain experience with MVDDS operations, we will entertain requests to modify the general EPFD and EIRP limits, if such experience provides sufficient justification for such action.

89. *24 megahertz bandwidth.* MDS America requests that we clarify the bandwidth restriction specified in the MVDDS emission mask rule.²³⁶ Specifically, MDS America argues that the footnote

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higher EIRPs can be utilized without causing harmful interference to nearby DBS receive dishes because the radiated MVDDS signal is not directed toward their line of sight. MDS America petition at 14.

²³³ MDS America petition at i.

²³⁴ *Id.* at 12 – 22. See also footnote 330 *supra*.

²³⁵ In these situations, we encourage MVDDS providers to consult with and hopefully secure support from each potentially affected DBS provider.

²³⁶ *Id.* at 23.

added immediately after the definition of "B" in Section 101.111(a)(2)(i) appears to restrict the channelization plan of MVDDS providers within their band. MDS America notes that while the Commission stated that the 500 megahertz MVDDS allocation could be divided into any size channels, it also adopted an emission mask equation with a maximum authorized bandwidth of 24 megahertz. That emission mask, MDS America argues, could be interpreted as a limit on in-band channelization. In that light, MDS America requests clarification of the apparent inconsistency.

90. We agree that some clarification of our rules is appropriate. The emission requirement should be applied only at the band edge to limit undesired MVDDS signals outside of the 12.2-12.7 GHz band. This out-of-band emission limit was not intended to limit channelization within the 12.2-12.7 GHz band, but is necessary to set the authorized bandwidth value "B" to 24 megahertz to ensure the equation effectively protects operations in adjacent bands (*i.e.*, if B was set to 500 megahertz, the energy permitted by Section 101.111(a)(2)(i) into adjacent bands would have been much higher). We amend the footnote to add the proviso that the emission mask only applies at the 12.2 -12.7 GHz band edges and does not restrict MVDDS channelization bandwidths within the band.

91. *MVDDS antenna pointing.* EchoStar and DIRECTV argue that the Commission ignored the findings of the *MITRE Report* concerning orientation of MVDDS transmitters.²³⁷ Specifically, they assert that our rules compound the potential for harmful interference to DBS by failing to specify any directional orientation for MVDDS transmitting antennas.²³⁸

92. *Decision.* We disagree. Petitioners do correctly point out that Northpoint's proposal involves south-pointing transmitters based upon their contention that such an orientation would avoid interference with DBS in the same spectrum.²³⁹ However, the *MITRE Report* stated that MVDDS antenna orientations, other than southward as envisioned by the original MVDDS applicants, could have beneficial effects.²⁴⁰ In other words, the *MITRE Report* found that it was not essential that MVDDS transmitters point south. The Commission stated its agreement with *MITRE* in our decision in the *Second R&O*.²⁴¹ The Commission also noted that *MITRE* found that MVDDS antenna orientations other than south, including north, created no more interference, but that care must be taken not to place the antenna too close to the line of sight between a satellite and a DBS receiver.²⁴² In other words, different antenna orientations present varying interference protection geometries that should be considered to avoid locating an MVDDS transmitter too close to the line of sight between a satellite and a DBS receiver. Taking these matters into consideration, the Commission found that of all these variables "[i]nterference protection is what is important ..."²⁴³ Therefore, the Commission concluded that it should shift the focus from proposals that specify particular antenna orientations to the objective of protecting DBS while allowing flexibility for MVDDS technical innovation - particularly in regard to antenna configurations.²⁴⁴ Since the EPFD accounts for antenna orientation, all parties are protected no matter what their relative directions are. Based upon these findings, and in light of the other interference protection criteria

²³⁷ *Id.* at 11-12. [EchoStar, DIRECTV petition] The *MITRE Report* states that "pointing the MVDDS transmitting antennas away from the satellites, rather than toward them as generally envisioned, could have beneficial effects in many situations ..." See also *MITRE Report* at 6-2.

²³⁸ EchoStar, DIRECTV petition at 12.

²³⁹ *Id.* at 12. Citing Northpoint Petition for Rulemaking (filed March 6, 1998) at 4.

²⁴⁰ *Id.* at 12. Citing *MITRE Report* at xviii, 6-2.

²⁴¹ *Second R&O* at ¶ 202.

²⁴² *Second R&O* at ¶ 202. Citing *MITRE Report* at 6-2 to 6-4.

²⁴³ *Second R&O* at ¶ 202.

²⁴⁴ *Second R&O* at ¶ 202.

adopted, the Commission concluded in the *Second R&O* that the direction of MVDDS antennas depends on the total circumstances.²⁴⁵ Our decision reflects the judgment that any potential for harmful DBS interference - regardless of the MVDDS antenna orientation - can be resolved through careful MVDDS selection of the antenna site and modest self-mitigation measures by DBS subscribers. Furthermore, by placing EFPD and EIRP limits on the MVDDS we have placed very conservative constraints on the amount of power that can be seen by the DBS antenna, and consequently limited the potential that interference could occur.

C. NGSO FSS Issues

93. In the *First Report and Order*, the Commission authorized MVDDS fixed operations and NGSO FSS service downlinks in the 12 GHz band on a co-primary basis.²⁴⁶ In the *Second R&O*, the Commission adopted technical rules to govern spectrum sharing between NGSO FSS and MVDDS in the 12 GHz band. In order to protect NGSO FSS operations, the Commission decided that the MVDDS signal must meet a power flux density (PFD)²⁴⁷ limit of $-135 \text{ dBW/m}^2/4\text{kHz}$ measured or calculated at the surface of the earth at distances greater than 3 km from the MVDDS transmitting site.²⁴⁸ The Commission adopted a minimum MVDDS transmitting antenna spacing of 10 km from pre-existing NGSO FSS receive antennas.²⁴⁹ The Commission also adopted an MVDDS emission mask for protecting NGSO FSS operations in the adjacent 11.7-12.2 GHz band and Cable Television Relay Service (CARS) and Broadcast Auxiliary Service (BAS) operations in the adjacent 12.7-13.25 GHz band from out-of-band MVDDS emissions.²⁵⁰ In order to protect MVDDS receivers from NGSO FSS interference for the portion of the non-geostationary orbital path near the horizon, the Commission adopted low elevation angle PFD radiation limits on NGSO FSS satellites.²⁵¹ Specifically, the Commission decided that NGSO FSS downlinks at angles of 0-2 degrees above the horizon shall not exceed a PFD of $-158 \text{ dBW/m}^2/4\text{kHz}$, and at angles of 2-5 degrees above the horizon shall not exceed a PFD limit of $-158+3.33(\delta-2) \text{ dBW/m}^2/4\text{kHz}$.²⁵² The Commission decided that an NGSO FSS applicant must demonstrate, prior to becoming operational, that it meets the adopted low angle PFD limits to protect MVDDS. Finally, the Commission also adopted rules requiring NGSO FSS operators to maintain and share a database of existing NGSO FSS receiver locations. Similarly, MVDDS operators are required to maintain and share with NGSO FSS operators a database of existing and proposed MVDDS transmitting locations, EIRP, tower height and related technical information.²⁵³

²⁴⁵ *Second R&O* at ¶ 202.

²⁴⁶ *First R&O*, 16 FCC Rcd 4160 at ¶¶ 166-167.

²⁴⁷ PFD is a measure of the amount of energy emitted by a transmitter that is present over a unit area at the Earth's surface or at the satellite, and is a critical factor in determining whether satellite systems can successfully share spectrum with other services or satellite systems.

²⁴⁸ *Second R&O* at ¶ 112. 47 C.F.R. §101.105(a)(4)(i).

²⁴⁹ *Id.* at ¶ 123. 47 C.F.R. §101.129(b).

²⁵⁰ *Id.* at ¶ 120. 47 C.F.R. §101.111(a)(2)(i).

²⁵¹ *Id.* at ¶ 120. 47 C.F.R. §25.208(k). [*Second R&O*] Satellites in non-geostationary orbit are in constant motion around the Earth. When they are near the horizon, their elevation angles are sufficiently low that it is possible for the satellite transmitter to be pointed at a terrestrial MVDDS receiving antenna.

²⁵² Where δ is defined as the angle of arrival above the horizontal plane.

²⁵³ *Second R&O* at ¶ 124. 47 C.F.R. §§ 25.139 and 101.103

1. MVDDS Limits.

94. *Positions of the Parties.* SkyBridge argues that the PFD limit imposed on MVDDS operations fails to provide any meaningful protection to later-in NGSO FSS systems²⁵⁴ because, they assert, it is the percentage of affected NGSO FSS user terminals within an MVDDS service area that is the critical parameter for assessing the burden on NGSO FSS systems. To remedy this, SkyBridge urges the Commission to adopt rules that reflect its originally proposed sharing scheme that focuses upon multiple PFD and EPFD limits in prescribed percentages of MVDDS service area.²⁵⁵ SkyBridge argues that the Commission failed to demonstrate that the SkyBridge proposal is overly complex or burdensome and failed to show any relationship between the adopted rules and the protection requirements of NGSO FSS systems.²⁵⁶ Additionally, SkyBridge objects to the Commission's conclusion that NGSO FSS systems can employ frequency diversity²⁵⁷ and can prevent saturation when doing so via sufficient signal discrimination characteristics and/or narrower receiver front ends.²⁵⁸ SkyBridge argues that the cost of such modifications on system design together with other engineering constraints of supporting frequency diversity would effectively result in a bar on economically viable NGSO FSS operations in the 12.2-12.7 GHz band, and relinquishment of the band to the unrestricted use of MVDDS operations.²⁵⁹ This, they contend, would effectively relegate NGSO FSS to *de facto* secondary status because MVDDS is likely to deploy before NGSO FSS in most areas.²⁶⁰ In that connection, SkyBridge contends that its sharing scheme would allow both NGSO FSS and MVDDS operators to co-exist, no matter which service deployed first in a given area. Finally, SkyBridge argues that the Commission adopted the -135 dBW/m²/4kHz PFD limit at 3 km merely to accommodate the EIRP of 14 dBm recommended in the MITRE Report regarding DBS protection rather than for the purpose of protecting NGSO FSS. It asserts that the adopted limits only protect NGSO FSS receivers from saturation, but do not protect against unacceptable interference.²⁶¹

95. Arguing against the requests of SkyBridge, MDS America asserts that SkyBridge's petition merely repeats arguments that were fully considered and rejected by the Commission in the *Second R&O*. It also argues that mere disagreement with Commission decisions does not support reconsideration and that the Commission's decisions demonstrate a careful consideration of the record and a reasonable policy decision that should be accorded a substantial degree of deference.²⁶² Similarly, Northpoint argues that

²⁵⁴ SkyBridge petition at 4.

²⁵⁵ SkyBridge proposed a scheme involving multiple in-band PFD contours and EPFD defined zones and out-of-band emission limitations. The three in-band limits SkyBridge proposed were: 1) a PFD limit of -120 dBW/m²/MHz (which equates to -144 dBW/m²/4kHz) corresponding to an NGSO FSS frequency diversity zone that SkyBridge suggests should not be exceeded over ten percent of the MVDDS service area; 2) an EPFD limit of -135 dBW/m²/4kHz corresponding to a NGSO FSS receiver saturation buffer zone that should not be exceeded over 0.2% of the MVDDS service area; and 3) an EPFD limit of -132 dBW/m²/4kHz corresponding to a NGSO FSS receiver saturation threshold limit not to be exceeded into any operational NGSO FSS receiver. See SkyBridge comments at 33-47. See, also, SkyBridge *ex parte* letter from Jeffrey H. Olson to Magalie Roman Salas, Secretary, FCC (filed Jul 10, 2000).

²⁵⁶ SkyBridge petition at 10.

²⁵⁷ NGSO FSS is allocated the entire 11.7-12.7 GHz band for downlink operation. Frequency diversity techniques would enable dynamic switching to the lower 11.7-12.2 GHz band for downlink service to avoid potential MVDDS interference in the 12.2-12.7 GHz band.

²⁵⁸ SkyBridge petition at 12.

²⁵⁹ *Id.* at 13.

²⁶⁰ *Id.* at 13.

²⁶¹ *Id.* at 8.

²⁶² MDS America opposition at 3.

the Commission properly considered and rejected Sky Bridge's proposed MVDDS protection scheme as being needlessly complex.²⁶³

96. Northpoint states that SkyBridge never placed its receiver specifications in the record and, consequently, there is insufficient evidence of the claimed receiver characteristics relied upon by SkyBridge to support its approach. As to the limits that were adopted, Northpoint and MDS America argue that the PFD limit at 3 km is too restrictive and should be repealed.²⁶⁴ Northpoint adds that the PFD limits were adopted without adequate support in the record and are unnecessarily restrictive on MVDDS given that NGSO FSS receivers will have unfettered access to the sub-adjacent 11.7-12.2 GHz band.²⁶⁵ MDS America argues that the potentially preclusive effect of the PFD limit on MVDDS operations could be considerable – especially in rural areas, yet may be of little benefit for NGSO FSS given that the limit applies regardless of whether an NGSO FSS receiver is ever deployed near the MVDDS transmitter. As an alternative, MDS America asks that the PFD limit be modified for rural areas to -109 dBW/m²/4kHz at a distance greater than 3 km from the MVDDS transmitter to accommodate its request for higher MVDDS transmitter EIRP limits.²⁶⁶

97. *Decision.* We decline to reconsider the MVDDS limits adopted in the *Second R&O* and find SkyBridge's assertion that the -135 dBW/m²/4kHz PFD limit at 3 km fails to provide later-in NGSO FSS systems with meaningful protection to be without merit. While SkyBridge might disagree with the PFD limits that were adopted, mere disagreement in the absence of new information does not merit reconsideration in light of our balanced consideration of the interests of both NGSO FSS and MVDDS. The Commission found in the *Second R&O* that the PFD limit was a sensible compromise between NGSO FSS and MVDDS proposals that would provide reasonable protection to NGSO FSS systems without limiting the service area of each MVDDS transmitter. We find that SkyBridge presents no new information in its petition that was not previously considered in the *Second R&O*. Nevertheless, we note that in the *Second R&O*, the PFD limit was analyzed in terms of SkyBridge's multi-limit scheme and found to provide qualitatively similar protection to that sought by SkyBridge.²⁶⁷ Concerning SkyBridge's questioning of the relationship between the PFD limit and the 14 dBm EIRP limit, we find that it was reasonable for the Commission to analyze whether MVDDS operating at the EIRP limit originally conceived and ultimately adopted for DBS protection would similarly provide adequate protection for NGSO FSS. The Commission concluded that such MVDDS operation was both compatible with the PFD limit and consistent with a reasonable level of NGSO FSS protection.

98. Concerning the relative merits of SkyBridge's proposed scheme and why it was not adopted, the Commission concluded in the *Second R&O* that the SkyBridge scheme was technically unsound and

²⁶³ Northpoint consolidated response at 15-17.

²⁶⁴ See generally, MDS America's June 24, 2002 Petition for Reconsideration at 12 and the September 3, 2002 Consolidated Response of Northpoint Technology, LTD., and Broadwave USA, Inc., to Petitions for Reconsideration of the Second Report and Order at 8, 13, and 15-17.

²⁶⁵ Northpoint consolidated response at 13.

²⁶⁶ MDS America petition at 26.

²⁶⁷ Based upon worst case assumptions without frequency polarization constraints on MVDDS, the adopted technical limits should allow NGSO FSS deployment across 80% of the MVDDS service area in the entire 11.7-12.7 GHz band and up to 97.5% of the MVDDS service area if the NGSO FSS terminal uses frequency diversity to operate in the adjacent 11.7-12.2 GHz band. See *Second R&O* at ¶116. SkyBridge has argued that it was desirable to avoid use of frequency diversity "over a large proportion" of the MVDDS service area, and that the NGSO FSS "saturation zone" should be "small." SkyBridge comments to *FNRPM* at 33-34. As shown, under worst case assumptions the saturation zone corresponding to our adopted rules is approximately 2.5% of the MVDDS service area. Although not as small as the 0.2% of the MVDDS service area that SkyBridge proposed, it is sufficiently small as to not substantially hinder NGSO FSS deployment.

needlessly complex. First, as a practical matter, we continue to find that basing PFD limits on a percentage of MVDDS service area would be inordinately burdensome and could be susceptible to litigation dispute and manipulations among competing licensees with respect to parameters such as MVDDS service area size.²⁶⁸ In this regard, SkyBridge has provided little plausible guidance about how their approach could be effectively implemented and enforced. Second, we are not persuaded by SkyBridge's assumptions that imply a direct correlation between the percentage of MVDDS service area and a numerical percentage of NGSO FSS terminals that either may experience interference or be required to make use of frequency diversity. SkyBridge appears to base its arguments either on an assumption of uniform NGSO FSS deployment across an MVDDS service area or on the assumption that both NGSO FSS and MVDDS will be uniformly distributed across the Nation. We believe that neither assumption is realistic. Finally, as SkyBridge itself implicitly confirmed, the percentage limits for the various PFDs sought are not physically realizable over a wide range of MVDDS operating parameters unless MVDDS transmissions are restricted to cross-polarized transmission modes with respect to NGSO FSS.²⁶⁹ The Commission rejected polarization constraints on MVDDS as being too burdensome and likely to hinder evolution of that service.²⁷⁰ Moreover, the Commission determined that defining NGSO FSS protection in terms of MVDDS service area percentages was illusory as a technical sharing rule because virtually any reasonable combination of EIRP and tower height limits would result in a nearly constant percentage of affected MVDDS service area.²⁷¹ In other words, no matter how large or small the MVDDS EIRP or antenna height, the result in terms of affected service area percentages would be nearly unchanged. Furthermore, as demonstrated in the *Second R&O*,²⁷² the actual physical extent of all three of the complex protection contours described by SkyBridge could be just as completely characterized, and more effectively regulated, by specifying a single, easily controllable, PFD limit on an MVDDS transmitter.

99. In essence, we find that SkyBridge's complaint regarding the adopted PFD limit reduces to little more than dissatisfaction that it will not have unfettered use of the 12 GHz band in locations where it is deployed after MVDDS and that this renders NGSO FSS secondary to MVDDS. We find that the fact that NGSO FSS interests might not be ready to deploy before MVDDS due to marketplace, financial or other concerns is insufficient basis for reconsideration of our balanced approach. SkyBridge cites no authority to support such preferential treatment under such circumstances. We similarly reject SkyBridge's complaint that additional expense for equipment design might be required to take full advantage of frequency diversity under these circumstances. As the Commission stated in the *Second R&O*, "[i]n these circumstances, each NGSO FSS operator can make its own business decision whether to employ receivers with sufficient signal discrimination characteristics and/or narrower bandwidth front-

²⁶⁸ *Second R&O* at ¶ 118.

²⁶⁹ *Id.* at ¶ 115, footnote 256, citing SkyBridge *ex parte*, Letter from Jeffrey H. Olson, Paul, Weiss, Rifkind, *et al.* to Magalie Roman Salas, Secretary, FCC (filed Nov. 15, 2001). In particular, SkyBridge assumed that MVDDS would use a single polarization mode of transmission dissimilar to that used for NGSO FSS. We find this assumption unrealistic because, among other reasons, there are no guarantees regarding which polarization different NGSO FSS licensees may use to share the band and it does not consider polarization effects on sharing with DBS. Moreover, for example, such constraints on MVDDS transmissions could seriously impede a provider's flexibility to utilize lower power spreading modulation techniques that may use both polarizations to achieve greater capacity needs.

²⁷⁰ *Second R&O* at ¶ 115. In addition, For example, Northpoint argues that to meet SkyBridge's -120 dB W/m²/MHz) limit over 90% of its service area, it would have to reduce its overall maximum PFD on the ground to the -120 dB W/m²/MHz level with a corresponding EIRP of -33.5 dBW, which would reduce its predicted service area radius to 1.5 miles, greatly increasing the number of transmit sites needed. Northpoint January 14, 2002 *ex parte* at 5.

²⁷¹ *Second R&O* at ¶ 117.

²⁷² *Id.* at ¶¶ 115-117.

ends to enable operation in close proximity to pre-existing MVDDS transmitting antennas.²⁷³ Furthermore, we find that it is unrealistic for later-in NGSO FSS systems to expect total technical flexibility and to also have unfettered access to the 12.2 GHz band without consideration of existing co-primary MVDDS transmitters. As stated in the *Second R&O*, it was our intention to afford more and easier use of spectrum to the first-in service in any particular area.²⁷⁴ We find that adopting the level of NGSO FSS protection desired by SkyBridge would undermine that goal and would place severe restrictions on MVDDS operations that could preclude viable MVDDS operations. As Northpoint aptly observes, in the few instances where interference might pose a problem to NGSO FSS/MVDDS sharing of the 12 GHz band, the NGSO FSS systems can operate in adjacent spectrum - just as they might be required to do whenever an NGSO FSS receiving antenna might be pointed at another NGSO FSS system's transmitter.²⁷⁵ In short, we conclude that the adopted limits strike a balance between the interests of enabling the widespread deployment of these two new services while affording a reasonable degree of protection to whichever service is later to enter a particular market. We find that the adopted limits are consistent with the co-primary status of MVDDS and NGSO FSS in the 12.2-12.7 GHz band and reject SkyBridge's argument to the contrary.

100. Therefore, we affirm the conclusion reached in the *Second R&O* that the approach which limits the MVDDS PFD at a specified distance affords NGSO FSS adequate interference protection from MVDDS. Moreover, it is relatively simple to determine and easy to apply because it will not be susceptible to arbitrary assumptions by licensees.²⁷⁶ Finally, the Commission found that the adopted approach fixes the potential worst-case NGSO FSS interference regardless of MVDDS transmitter or antenna design.²⁷⁷ Consequently, the Commission concluded that both MVDDS and NGSO FSS licensees would benefit from the predictability of being able to anticipate and plan around the potential sharing issues that might arise.²⁷⁸ We recognize that the adopted PFD limit is not as favorable for NGSO FSS as SkyBridge desired, however we affirm our conclusion that the adopted PFD limit at 3 km for MVDDS represents a reasonable compromise that will allow NGSO FSS access to a large percentage of any area where a MVDDS transmitter is deployed. At the same time, this limit should allow each MVDDS transmitter to viably serve a reasonably adequate geographic area without resorting to an excessive number of transmitters. In light of the discussion and findings in the preceding paragraphs, we find no merit in SkyBridge's contention that its percentage based approach failed to receive sufficient consideration or that it is superior to the method adopted in the *Second R&O*.

101. With respect to MDS America's petition to relax or repeal the MVDDS PFD limit, we find that the preceding discussion about why the PFD limit of $-135 \text{ dBW/m}^2/4\text{kHz}$ at 3 km should not be tightened as requested by NGSO FSS petitioners simultaneously militates against relaxing the PFD limit as requested.²⁷⁹ In short, we conclude that relaxing the PFD limit could have a sufficiently deleterious effect on the ability of future NGSO FSS systems to provide service within significant portions of an MVDDS transmitter's service area. Therefore, for the same reasons discussed above, we affirm the conclusion that the adopted PFD limit ultimately reflects our best judgment of what standards would, on

²⁷³ *Id.* at ¶ 109.

²⁷⁴ *Id.* at ¶ 111.

²⁷⁵ Northpoint consolidate response at 18. *See also*, *Second R&O* at ¶ 108.

²⁷⁶ *Second R&O* at ¶ 113.

²⁷⁷ *Id.* The Commission also found that the PFD limit is technology neutral for MVDDS because it allows for the use of any antenna type, tower height and EIRP combination (up to the maximum 14 dBm) so long as the PFD limit is not exceeded at the specified distance.

²⁷⁸ *Id.* at ¶ 113.

²⁷⁹ *See* para. 86, *supra* for a discussion of MDS America's request for higher MVDDS EIRP limits.

balance, be both workable and beneficial for both services. Moreover, given that neither MVDDS nor NGSO FSS are currently operational, we find that it was prudent, based upon the best information of record, to craft the technical rules in a conservative manner that strikes what we judge to be a reasonable compromise between the competing interests of each service. Therefore, we deny MDS America's request to relax the PFD requirements in rural areas.

102. Finally, we note that Northpoint's consolidated response included a request that we repeal the rule requiring later installed MVDDS transmitters to maintain a 10 km separation from established NGSO FSS receive sites. Because this request was first raised in Northpoint's response to SkyBridge's petition for reconsideration, it cannot be considered as a timely filed request for reconsideration. Therefore, we dismiss this request as untimely. Nevertheless, for the purpose of clarity, we note that the adopted rules are designed to provide the first-deployed service with interference protection from the later-deployed service. In this instance, if NGSO FSS is first deployed, it will likely make use of the full 12.2-12.7 GHz band available to it. The nearby presence of later deployed MVDDS transmitters in an area already served by NGSO FSS could require both existing and future NGSO FSS receivers within that area to tune out of the 12.2-12.7 GHz band then being used and into the lower 11.7-12.2 sub-band available to NGSO FSS in order to avoid interference from MVDDS. We also note that Section 101.129(b) of the adopted rules allow for NGSO FSS and MVDDS licensees to agree to separations less than 10 km without limit. Moreover, since MVDDS is co-primary with NGSO FSS, MVDDS will be able to deploy in any location wherever they are the first entrant.

2. NGSO FSS Limits.

103. *Positions of the Parties.* SkyBridge argues that the low angle PFD limits of Section 25.208(k) imposed on NGSO FSS downlink transmissions in the 12 GHz band to protect MVDDS receivers are unnecessarily burdensome because they based on worst case assumptions and would apply at all times (*i.e.* "hard limit").²⁸⁰ SkyBridge explains that it previously accepted Northpoint's proposed PFD limits,²⁸¹ which are 10 dB tighter than those specified in Article 21 of the International Radio Regulations for protecting fixed service receivers in the 12.2-12.7 GHz band, in an effort to meet a mutual sharing agreement, provided that the method adopted for implementing the tighter limits would not impose unnecessary constraints on NGSO FSS systems. While acknowledging that its system would meet the more restrictive limits in most cases, SkyBridge argues that adopting the PFD limit as a "hard limit" requires that the NGSO FSS system be designed to meet the limit under worst-case conditions. SkyBridge contends that such a constraint means that NGSO FSS systems must operate at power levels lower than the PFD limit needed to protect the majority of MVDDS receivers.²⁸² SkyBridge states that it would not oppose rules that would require an NGSO FSS licensee to provide the Commission with an assurance of an NGSO FSS system's ability to comply with limits prior to the start of service. However, SkyBridge urges that an NGSO FSS licensee should only have to demonstrate compliance with adopted limits on an "operational" basis; that is, upon a credible claim of harmful interference into identified operational MVDDS receivers.²⁸³ SkyBridge recommends that instead of requiring a demonstration of compliance with the tighter limits prior to commencement of operation, the Commission should require only the information it needs to insure that an NGSO FSS operator has taken into account the need to

²⁸⁰ SkyBridge petition at 14. SkyBridge asserts that the worst case for sharing between MVDDS and NGSO FSS would occur when the MVDDS receive site is at the edge of the coverage area (*i.e.*, receiving a weak signal), and the NGSO FSS satellite is operating at maximum power and the NGSO satellite transmit antenna is aligned with the MVDDS receive antenna. SkyBridge contends that this scenario rarely occur.

²⁸¹ The Commission adopted the PFD limits proposed by Northpoint and agreed to by SkyBridge.

²⁸² SkyBridge Petition at 15-16.

²⁸³ *Id.* at 19.

comply with the limits and has equipped its system with the means to do so.²⁸⁴ Finally, SkyBridge argues that the Commission provides no guidance on how a licensee would demonstrate compliance with the PFD limit. In the absence of an agreed to methodology for demonstrating compliance, SkyBridge asserts that any showing would be susceptible to considerable dispute.

104. Northpoint opposes SkyBridge's request that PFD limits be applied as "operational limits" rather than "hard limits" because doing so would give free reign to NGSO FSS to cause harmful interference to MVDDS receivers until the MVDDS licensee can prove that NGSO FSS is the source of the problem.²⁸⁵ Northpoint supports the Commission's finding that making PFD limits dependent upon complaints or demonstration of violation would not provide adequate or uniform protection and states that SkyBridge provides no sound reason to reverse the decision.

105. SkyBridge replies that designating limits as "operational" is a recognized tool in instances where the likelihood of a system exceeding the limits is low and demonstrating compliance introduces artificial constraints.²⁸⁶ SkyBridge clarifies that designating limits as "operational" will not require MVDDS entities to "prove" that an NGSO FSS system is exceeding the limits. The NGSO FSS bears the burden to demonstrate compliance with respect to a particular MVDDS receiver in response to a credible claim of interference. SkyBridge argues that this is how other PFD limits in Section 25.208 of the Commission's rules are enforced in that FSS operators are not required to demonstrate in advance that the limits will not be exceeded.²⁸⁷

106. *Decision.* Upon review of the *Second R&O*, we find that clarification of our low angle PFD compliance requirement of Section 25.208(k) is appropriate. We agree with SkyBridge that the adopted requirement does not necessarily apply in all cases. We believe that it would be better to treat the adopted low angle PFD in a manner consistent with the rules for NGSO FSS and BSS sharing where validation (*i.e.*, "hard limit") and operational (*i.e.*, can be exceeded so long as they are not exceeded into an operational receiver) EPFD limits were adopted.²⁸⁸ The PFD hard limit that NGSO FSS can never exceed is specified in Article 21 of the Radio Regulations.²⁸⁹ The limit we adopted in the *Second R&O*, is an operational limit which means that it does not need to be met in all cases so long as it is not exceeded into an operational MVDDS receiver. Thus, the NGSO FSS system needs to be designed so that it can adjust its power to meet the operational limit to protect MVDDS in the worst case circumstance.

107. We disagree, however, with SkyBridge's argument that demonstrating compliance with operational limits is necessary only upon a credible claim of harmful interference into identified operational MVDDS receivers. As the Commission recently stated, in rejecting a similar argument from SkyBridge regarding NGSO FSS/BSS sharing, demonstration of compliance prior to operation provides assurance to the Commission and other operators that the system will be built to operate in accordance with the PFD limits.²⁹⁰ Therefore, we will require NGSO FSS licensees to demonstrate prior to operation, as SkyBridge suggests, that their system is capable of meeting the adopted limits. Licensees should

²⁸⁴ *Id.* at 20.

²⁸⁵ Northpoint consolidated response at 19.

²⁸⁶ SkyBridge reply at 4.

²⁸⁷ See 47 C.F.R. § 25.208.

²⁸⁸ See Third Memorandum Opinion and Order, ET Docket No. 98-206, FCC 03-25 (rel. Feb. 6, 2003) at ¶¶ 19-22 (*Third MO&O*).

²⁸⁹ In Region 2, the limit for the 12.2-12.7 GHz band is -148 dBW/m²/4 kHz at angles between 0 and 5 degrees above the horizon. See ITU Radio Regulations, Article 21.

²⁹⁰ See *Third MO&O* at ¶ 26.

provide any information they deem necessary to meet this showing. As the Commission recently stated regarding NGSO FSS/BSS sharing, the demonstration can rely on anticipated or actual operational parameters.²⁹¹ As SkyBridge further suggests, if an MVDDS station experiences interference, we will require NGSO FSS operators to expeditiously either demonstrate, using its actual operating parameters, that it is not violating the limits into that receiver, or take steps to reduce its PFD into that receiver. If it cannot do so, the alternative is that its system must remain within the operational limit at all times.²⁹²

108. The PFD limits were codified in Section 25.208 of our rules, however, the Commission neglected to codify the demonstration requirement in Section 25.146 as discussed in the text of the *Second Report and Order*.²⁹³ Therefore, we are modifying Sections 25.146 and 25.208 to clarify the points discussed above.

3. MVDDS and NGSO FSS Information Sharing

109. *Positions of the Parties.* In its petition, SkyBridge states that Section 25.139 of the rules requiring information exchange is not sufficiently clear regarding the amount and timing of the information that should be given to an MVDDS operator.²⁹⁴ Because subscriber information could be proprietary, SkyBridge requests that the Commission clarify that the information not be construed as public information and that NGSO FSS operators may require MVDDS operators to execute an appropriate non-disclosure agreement prior to releasing any data. Further, it asserts that NGSO FSS operators should not be required to disclose more information than is required to meet Section 25.139(b) (*i.e.*, sufficient information for the MVDDS licensee to determine whether a new transmitter will meet the separation requirement). Finally, SkyBridge requests that MVDDS operators be prohibited from using the information for any purposes other than the technical coordination required by the Commission.

110. Northpoint does not oppose SkyBridge's request to clarify the information exchange needed to meet the separation requirement.²⁹⁵ Northpoint contends that a bare minimum of information needed would be the latitude, longitude (within 100 feet) and frequency of NGSO FSS receivers.²⁹⁶ Provided that such information is readily available, Northpoint does not object to nondisclosure agreements and limiting the use of the information only to compliance with the separation requirements.

111. *Decision.* We find that the concerns of SkyBridge regarding our required information exchange for coordination between MVDDS and NGSO FSS operations have merit.²⁹⁷ Because certain NGSO FSS subscriber information could be considered proprietary information (*e.g.*, for competitive reasons), we clarify that the information exchange requirement should be construed narrowly and that only information necessary to achieve the required separation under Section 25.139(b) (*i.e.*, "sufficient information from the database to enable the MVDDS licensee to determine whether the proposed MVDDS transmitting site meets the minimum spacing requirement") needs to be provided. The information provided should include, as a minimum, the NGSO FSS latitude, longitude (within 30.5 m

²⁹¹ *Id.*

²⁹² *Id.* at ¶ 27

²⁹³ *Second R&O* at ¶ 121.

²⁹⁴ SkyBridge Petition at 20.

²⁹⁵ Northpoint Response at 20.

²⁹⁶ *Id.*

²⁹⁷ SkyBridge Petition at 20. Specifically, our rules required that the NGSO FSS licensee maintain a database of its deployed receivers that can be readily shared with MVDDS licensees for the purpose of determining compliance with the MVDDS transmitter spacing requirements.

(100 ft)) and frequency of operation.²⁹⁸ We also find that the MVDDS operators shall be prohibited from using this information for any purposes other than for the technical coordination required by our Rules. Further, the NGSO FSS database information should be made readily accessible to the designers of the MVDDS system so that restrictions can be considered in the design of the system. Therefore, we are modifying Section 25.139(a). We believe that this action is adequate to address SkyBridge's concerns. As far as parties executing non-disclosure agreements, we observe that that parties are free to use such agreements to facilitate the coordination process.

V. PROCEDURAL MATTERS

A. Final Regulatory Flexibility Certification

112. The Final Regulatory Flexibility Certification is contained in Appendix C.

B. Paperwork Reduction Analysis

113. The Fourth Memorandum Opinion and Order contains new or modified information collection(s) subject to the Paperwork Reduction Act of 1995 (PRA) Public Law 104-13. The information will be submitted to the Office of Management and Budget (OMB) for review under Section 3507(d) of the PRA. OMB, the general public, and other Federal agencies are invited to comment on the new or modified information collections contained in this proceeding.

C. Further Information

114. For further information concerning this Fourth Memorandum Opinion and Order, contact the Office of Engineering and Technology, Gary Thayer, (202) 418-2290, TTY (202) 418-2989, email gthayer@fcc.gov, or Jennifer Burton, (202) 418-7581, TTY (202) 418-2989, email jburton@fcc.gov.

VI. ORDERING CLAUSES

115. Accordingly, IT IS ORDERED that pursuant to Sections 4(i), 302, 303(e) 303(f), 303(g), 303(r) and 405 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 302, 303(e), 303(f), 303(g) and 405, the petitions for reconsideration filed by Pegasus Broadband Corporation, MDS America, Inc., EchoStar Satellite Corporation and DIRECTV, Inc., SkyBridge L.L.C., SES Americom, Inc., and Satellite Broadcasting and Communications Association ARE DENIED.

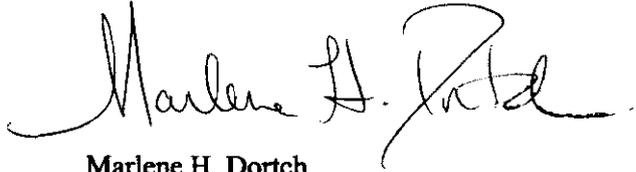
116. IT IS FURTHER ORDERED that Parts 25 and 101 of the Commission's Rules ARE AMENDED as specified in Appendix D. Parts 25 and 101 contain information collection requirements which have not been approved by the Office of Management and Budget ("OMB"). The Commission will publish a document in the Federal Register announcing the effective date of these rule parts. This action is taken pursuant to Sections 4(i), 303(c), 303(f), 303(g) 303(r) and 309(j) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 303(c), 303(f), 303(g), 303(r) and 309(j).

117. IT IS FURTHER ORDERED that the Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this *Fourth Memorandum Opinion and Order*, including the Final Regulatory Flexibility Certification, to the Chief Counsel for Advocacy of the Small Business Administration.

²⁹⁸ Northpoint Response at 20.

118. IT IS FURTHER ORDERED that the proceeding in ET Docket No. 98-206 IS TERMINATED.

FEDERAL COMMUNICATIONS COMMISSION

A handwritten signature in black ink, appearing to read "Marlene H. Dortch". The signature is fluid and cursive, with a large initial "M" and a long, sweeping tail.

Marlene H. Dortch
Secretary