Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
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;	)	ET Docket No. 98-206 RM-9147 RM-9245
	)	
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

Adopted: April 11, 2002 **Released: May 23, 2002**

By the Commission: Chairman Powell and Commissioner Abernathy issuing a joint statement; Commissioners Copps and Martin approving in part, dissenting in part, and issuing separate statements.

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I. INTRODUCTION

1. In this *Memorandum Opinion and Order* (*MO&O*), we address the petitions for reconsideration filed in response to the *First Report and Order and Further Notice of Proposed Rule Making* in ET Docket No. 98-206, released on December 8, 2000.[1] Our action herein encompasses all of the petitions for reconsideration but is limited to addressing the aspects that seek reconsideration of the Commission's threshold determination in the *First R&O* to authorize the new Multichannel Video Distribution and Data Service (MVDDS) under the existing primary status fixed service (FS) allocation in the 12.2-12.7 GHz (12 GHz) band. We defer consideration of the remaining issues raised by the reconsideration petitioners to a future order. We received eight petitions seeking reconsideration of

[1] *First Report and Order and Further Notice of Proposed Rule Making*, FCC 00-418, ET Docket No. 98-206, 16 FCC Rcd 4096 (2000) (*First R&O* and *Further Notice*).

various decisions that the Commission made in the *R&O*.[2] In addition, the parties filed six oppositions to the petitions for reconsideration and seven replies to the oppositions.

2. We conclude that the petitions for reconsideration are without merit with regard to the Commission's threshold MVDDS authorization decision.[3] The petitioners request that we, in effect, reverse the Commission's decision to authorize MVDDS under the existing allocation for FS in the 12 GHz band. We believe that the Commission's allocation for MVDDS in the 12 GHz band is in the public interest and reflects a carefully crafted balance of technical and policy concerns. This balance will result in an efficient reuse of spectrum and the provision of a new service to the public while affording protection to the existing Direct Broadcast Satellite (DBS) and new non-geostationary satellite orbit (NGSO) fixed-satellite services (FSS). We also believe that this new service will facilitate the delivery of new communications services, such as video and broadband services, to a wide range of populations including those that are unserved and or underserved.

3. We also adopt a *Second Report and Order* (*Second R&O*) in which we establish technical and service rules for MVDDS in the 12 GHz band. This new fixed terrestrial radiocommunications service was established in the *First R&O*, wherein the Commission also allocated NGSO FSS operations in the 12 GHz band.[4] Specifically, MVDDS providers will share the 12 GHz band with new NGSO FSS operators on a co-primary basis and on a non-harmful interference basis with incumbent Broadcast Satellite Service (BSS) providers.[5]

II. EXECUTIVE SUMMARY

4. In this *MO&O and Second R&O*, we make the following major determinations regarding the licensing of MVDDS in the 12 GHz band:

MO&O

- We find that the Commission provided clear notice that the Commission was considering authorizing MVDDS in the 12 GHz band in the *November 24, 1998 NPRM*[6] as required by the *Administrative Procedure Act.*[7]
- The MVDDS authorization complies with the provisions, and fosters the goals, of the *Satellite Home Viewer Improvement Act of 1999 (*SHVIA) and the *Rural Local Broadcast Signal Act* (RLBSA).[8]
- The technical rules and regulatory safeguards we are adopting in the *Second Report and Order* will protect the primary allocation status of incumbent DBS/BSS and the co-primary NGSO FSS operators in the 12 GHz band.
- The Commission's decision to authorize MVDDS in the 12 GHz band was carefully considered and rationally explained based upon all of the available information in the record.

[2] A list of the parties filing petitions, oppositions and replies is provided in Appendix A.

[3] *See* 47 C.F.R. §§ 1.106, 1.429 regarding the legal standards for petitions for reconsideration.

[4] *See First R&O,* 16 FCC Rcd 4160 at ¶¶ 166-167.

[5] The BSS is also referred to as DBS. In this item, we will use the terms "BSS" and "DBS" interchangeably.

[6] 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 the12.2-12.7 GHz Band by Direct Broadcast Satellite Licensees and Their Affiliates, ET Docket No. 98-206, *Notice of Proposed Rule Making*, ET Docket No. 98-206, 14 FCC Rcd 1131 (1998) (*November 24, 1998 NPRM*).

[7] *See* 5 U.S.C. Chapter 5, *et. seq.*, *Administrative Procedure Act (APA).*

[8] *See* Pub. L. 106-113 Stat. 1501 (enacting S. 1948, including the SHVIA and the RLBSA, Titles I and II of the Intellectual Property and Communications Omnibus Reform Act of 1999).

- The technical rules we are establishing for MVDDS operation are technologically neutral because they do not specify a particular equipment configuration or methodology, proprietary or not, that must be used within the fixed terrestrial MVDDS service.
- The Commission's decision to authorize MVDDS in the 12 GHz band does not violate International Telecommunications Union (ITU) recommendations and constitutes an appropriate exercise of domestic regulatory authority.
- We deny the petitions for reconsideration with respect to the Commission's decision to authorize MVDDS in the 12 GHz band.
- We find to be substantively without merit and dismiss on our own motion as procedurally untimely, the petition for consolidation and declaration of this proceeding which seeks to disallow MVDDS operation in the 12.2-12.7 GHz band and instead seeks consideration of alternative spectrum in the 12.7-13.25 GHz Cable Television Relay Service (CARS) band or the 2500-2690 MHz Multichannel Multipoint Distribution Service (MMDS) in the context of two other rule making proceedings.

R&O

- We will require an MVDDS operator to operate with a maximum power limit of 14 dBm per 24 megahertz Effective Isotropic Radiated Power (EIRP).
- We specify an equivalent power flux density (EPFD) limit for each of four regions across the United States. The regions and corresponding EPFD limits are: East: -168.4 dBW/m^2/4kHz, Midwest: -169.8 dBW/m^2/4kHz, Southwest: -171.0 dBW/m^2/4kHz, and Northwest: -172.1 dBW/m^2/4kHz.
- Using a prescribed methodology and a predictive model to calculate EPFD values, we used a criterion that would limit the amount of increased BSS unavailability due to the presence of MVDDS to a negligible level over a baseline level of BSS unavailability. The unavailability allowance ascribed to MVDDS is in addition to the unavailability allowance ascribed to NGSO FSS operations in the 12.2-12.7 GHz band.
- MVDDS must site and design its transmitting antennas to avoid causing harmful interference to existing DBS customers.
- We will require the MVDDS operator to ensure that the prescribed EPFD limits are not exceeded at any DBS customer of record location.[9] If the EPFD limits are exceeded, the MVDDS operator will be required to discontinue service until such time that the limits can be met.
- We adopt a "safety valve" in which we will consider requests to adjust the EPFD for specific locations, where due to an anomalous situation, a DBS provider can demonstrate a tangible detrimental impact on DBS caused by MVDDS operations.
- To promote MVDDS and NGSO FSS band sharing, MVDDS signals shall not exceed a power flux density (PFD) of –135dBW/m^2/4kHz measured and/or calculated at the surface of the earth at distances greater than 3 km from the MVDDS transmitting site.
- We adopt a minimum MVDDS transmitting antenna spacing of 10 km from pre-existing NGSO FSS receive antennas with the option for NGSO FSS licensee agreement to accept shorter spacing. We also conclude that NGSO FSS receivers must accept any interference from pre-existing MVDDS transmitting antennas.
- We adopt basic information sharing and coordination requirements that MVDDS and NGSO FSS operators must follow to facilitate mutual sharing of the 12 GHz band as co-primary services.
- We adopt MVDDS emission mask values for protecting NGSO FSS operations in the adjacent 11.7-12.2 GHz band and CARS and Broadcast Auxiliary Service (BAS) operations in the adjacent 12.7-13.25 GHz band from out-of-band MVDDS emissions.
- We adopt low elevation angle PFD radiation limits on NGSO FSS operations that will afford protection to MVDDS receivers from NGSO FSS interference for the portion of the non-geostationary orbital path near the horizon.

[9] *See* footnote 221 for a definition of customer of record.

- We dismiss, without prejudice, all applications for terrestrial use of the 12 GHz band. All interested parties may reapply under the new licensing rules established in this proceeding
- We adopt geographic license service areas for MVDDS on the basis of Component Economic Areas (CEAs).[10]
- We adopt a channel plan consisting of one spectrum block of 500 megahertz per service area.
- We adopt our proposal to auction MVDDS licenses in conformity with the general competitive bidding rules set forth in Part 1, Subpart Q, of the Commission's Rules.
- We permit fixed one-way operations, but exclude mobile and aeronautical operations. Permissible operations include the flexibility for two-way services whereby the 12 GHz band could be used for the downstream path, and any upstream (or return) path could be located in other spectrum or over a wireline.
- We decline to adopt must-carry rules.
- We require incumbent non-public safety Private Operational Fixed Service (POFS) licensees in the 12 GHz band to protect MVDDS and NGSO FSS operations.
- We require MVDDS and NGSO FSS operations to protect incumbent traditional public safety POFS licensees in the 12 GHz band.
- We suspend the acceptance of POFS applications for new licenses, amendments to applications for new and modified licenses and major modifications to existing licenses.
- We decline to permit dominant cable operators from acquiring an attributable interest in an MVDDS license for a service area where significant overlap is present.
- We adopt a ten-year license term for MVDDS, beginning on the date of the initial authorization grant, and adopt a renewal expectancy based on the substantial service requirement.
- We restrict the placement of transmitting systems near the Canadian and Mexican borders.

III. BACKGROUND

5. On July 3, 1997, SkyBridge LLC (SkyBridge) requested modification of the Commission's Rules to permit NGSO FSS systems to operate with geostationary orbit (GSO) systems (both FSS and BSS) and terrestrial systems in certain bands, including the 12 GHz band.[11] On March 6, 1998, Northpoint Technology, Ltd. (Northpoint) filed a Petition for Rulemaking to allow the operation of a terrestrial service in the 12 GHz band.[12] Specifically, Northpoint requested modifications to the Commission's Rules to authorize DBS licensees and their affiliates to obtain secondary, subsidiary terrestrial communications authorizations to use the 12 GHz band to provide multichannel video distribution of local television programs and broadband digital data (*e.g.*, high-speed Internet access).[13]

[10] CEAs are based on Economic Areas delineated by the U.S. Dept. of Commerce. Each CEA consists of a single economic node and the surrounding counties that are economically related to the node. The 354 CEA service areas are based on the 348 Component Economic Areas delineated by the Regional Economic Analysis Division, Bureau of Economic Analysis, U.S. Department of Commerce February 1995, with the following six FCC-defined service area additions: American Samoa, Guam, Northern Mariana Islands, San Juan (Puerto Rico), Mayagüez/Aguadilla-Ponce (Puerto Rico), and the United States Virgin Islands.

[11] SkyBridge Petition for Rule Making (filed July 3, 1997) (SkyBridge Petition).

[12] Northpoint Petition for Rule Making (filed March 6, 1998) (Northpoint Petition). On March 23, 1998, the Commission invited comment on the Northpoint Petition. *See Corrected Public Notice*, Report No. 2265 (Mar. 23, 1998). Northpoint explained that the primary benefits of its proposal included reuse of existing spectrum, facilitation of localism, and more effective DBS and cable competition. *Id.*

[13] All POF point-to-point microwave stations in the 12.2-12.7 GHz band operate on a secondary basis to DBS. Specifically, 47 C.F.R. § 101.147(p) states: *12,200-12,700 MHz*. The Commission has allocated the 12.2-12.7 GHz band for use by the broadcasting-satellite service. Private operational fixed point-to-point microwave stations authorized after September 9, 1983, have been licensed on a non-interference basis and are required to make any and (continued....)

6. On November 2, 1998, the Commission's International Bureau (IB) established January 8, 1999, as the final date for applicants to file applications for NGSO FSS systems in the 12 GHz band.[14] On November 24, 1998, the Commission initiated a proceeding in which it proposed to permit NGSO FSS operations in certain segments of the Ku-band.[15] The Commission incorporated the SkyBridge and Northpoint Petitions for Rulemaking into the *November 24, 1998 NPRM*.[16]

7. Subsequently, on January 8, 1999, Northpoint, through its subsidiary Broadwave Albany, L.L.C., *et al.*, (Broadwave USA),[17] filed waiver requests and applications for licenses for terrestrial use of the 12 GHz band, in response to the *Ku-Band Cut-Off Notice*.[18] Northpoint requested waivers of multiple provisions in Part 101 of the Commission's Rules, as well as any other rules necessary to process its applications, and asserted that its proposed service would be on a secondary, non-interfering basis to DBS services and on a co-primary basis with any new FSS, such as that proposed by SkyBridge.[19] Thus, in applying for licenses as a non-DBS affiliate, Northpoint shifted its stance from its earlier Petition for Rulemaking and also expanded the scope of the suggested video offerings beyond providing local service to supplement DBS.[20]

8. Northpoint has tested its technology in the 12 GHz band under experimental authorizations and has filed progress reports asserting that the tests demonstrate that its technology could share spectrum with incumbent DBS operations.[21] On October 13, 1999, Northpoint (under the name of Diversified Communications Engineering, Inc.) filed a technical report summarizing the results of its experimental tests in Washington, D.C.[22] On November 29, 1999, SHVIA was enacted.[23] The SHVIA legislation

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all adjustments necessary to prevent interference to operating domestic broadcasting-satellite systems. Notwithstanding any other provision, no private operational fixed point-to-point microwave stations are permitted to cause interference to broadcasting-satellite stations of other countries operating in accordance with the Region 2 plan for the broadcasting-satellite service established at the 1983 WARC.

[14] *Public Notice*, International Bureau Satellite Policy Branch Information: Cut-off Established for Additional Applications and Letters of Intent in the 12.75-13.25 GHz, 13.75-14.5 GHz, 17.3-17.8 GHz and 10.7-12.7 GHz Frequency Bands, Report No. SPB-141, 1998 WL 758449 (rel. Nov. 2, 1998) (*Ku-Band Cut-Off Notice*). *See also November 24, 1998 NPRM*, 14 FCC Rcd at 1169 ¶ 71.

[15] *November 24, 1998 NPRM*, 14 FCC Rcd at 1134-42 ¶¶ 4-13. The Ku band is generally defined as frequencies in the 12-18 GHz range.

[16] We received 33 comments and 24 reply comments in response to the *November 24, 1998 NPRM*.

[17] Northpoint states that through its subsidiary BroadwaveUSA, Inc., it has an affiliate relationship with the 68 entities that have applied for licenses to deploy the Northpoint technology nationwide. The applicants refer to themselves as Broadwave, followed by their city of proposed service (*i.e.*, Broadwave Albany, L.L.C.). Broadwave proposed to use the technology developed by Northpoint to enable sharing of this spectrum with existing DBS, geostationary satellite, and fixed microwave services. For the purposes of this proceeding, we will consider Northpoint and Broadwave to be one and the same and will refer to them both as "Northpoint."

[18] *Public Notice,* Wireless Telecommunications Bureau Seeks Comment on Broadwave Albany, L.L.C., *et al*. Requests for Waiver of Part 101 Rules, DA 99-494, 14 FCC Rcd 3937 (1999) (Northpoint Waiver Request). The comment period ended on April 22, 1999.

[19] *Id*.

[20] *Id.*

[21] *See, e.g.,* Northpoint's December 1998, Progress Report WA2XMY; Northpoint's October 1999 Progress Report WA2XMY, Technical Annex to their Comments; and other *ex parte* filings. *See also* Northpoint *ex parte* filing of February 10, 2000 at 5.

[22] On October 29, 1999, DirecTV Inc. (Direct TV) and EchoStar Satellite Corporation (EchoStar) (collectively, DBS licensees) filed comments addressing Northpoint's experimental tests. On January 27, 2000, DirecTV filed a report (continued....)

generally seeks to place satellite carriers on equal footing with local cable operators concerning the availability of broadcast programming, and thus is intended to give consumers more and better choices in selecting a multichannel video programming distributor (MVPD).[24] In addition to the 1999 SHVIA legislation, Congress passed a provision entitled the Rural Local Broadcast Signal Act (RLBSA).[25] Among other things, this law required the Commission to make a determination by November 29, 2000, regarding licenses or other authorizations for facilities that will utilize, for delivering local broadcast television signals to satellite television subscribers in unserved and underserved local television markets, spectrum otherwise allocated to commercial use.[26] The RLBSA legislation also mandates that the Commission ensure that no facility licensed or authorized to deliver such local broadcast television signals "causes harmful interference to the primary users of that spectrum or to public safety spectrum use."[27]

9. Another company, MDS America, Inc. (MDSA), a newly formed licensee for North America of MDS International S.A.R.L. (MDSI), has also tested its technology under an experimental license in an effort to demonstrate successful sharing with DBS in the 12 GHz band.[28] Under this experimental license, MDSA tested MDSI's HyperCable broadband wireless technology. This technology, they assert, has been successfully deployed internationally in the 12 GHz band without causing interference to DBS operations in the same frequency band.[29] In *ex parte* filings, Northpoint alleges that MDSA's international facilities have not caused interference to DBS operations because they rely, in large part, on

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and studies asserting that Northpoint's proposal would cause unacceptable interference to DBS operations. On Feb. 4, 2000, the Commission denied an application for review and petitions for reconsideration and for a cease and desist order that DirecTV and EchoStar filed against Diversified's experimental license. Finally, on February 9, 2000, the Commission granted DirecTV and EchoStar experimental authorizations in Washington, D.C. and Denver, CO to test DBS sensitivity to fixed service transmissions, such as those proposed by Northpoint. On July 25, 2000, DirecTV and EchoStar filed a "Report of the Interference Impact on DBS Systems from Northpoint Transmitter Operating at Oxon Hill, MD, May 22 to June 7, 2000" for the Commission's consideration.

[23] *See* SHVIA, Title I of the Intellectual Property and Communications Omnibus Reform Act of 1999 (IPACORA), relating to copyright licensing and carriage of broadcast signals by satellite carriers, codified in scattered sections of 17 and 47 U.S.C.). *See*, *generally*, Implementation of the Satellite Home Viewer Improvement Act of 1999: Application of Network Nonduplication, Syndicated Exclusivity, and Sports Blackout Rules to Satellite Retransmissions, CS Docket No. 00-2, *Notice of Proposed Rule Making*, 15 FCC Rcd 434 (2000); Implementation of the Satellite Home Viewer Improvement Act of 1999, CS Docket No. 99-363, *Notice of Proposed Rule Making*, 14 FCC Rcd 21736 (1999) (*1999 SHVIA Implementation NPRM*).

[24] *See 1999 SHVIA Implementation NPRM,* 14 FCC Rcd at 21736 ¶ 1. The MVPD definition includes cable operators, multichannel multipoint distribution service, DBS service, television receive-only satellite program distributors, video dialtone service providers, and satellite master antenna television service providers that make available for purchase, by subscribers or customers, multiple channels of video programming. *See* 47 C.F.R. § 76.905(d).

[25] Act of Nov. 29, 1999, Pub. L. 106-113, 113 Stat. 1501, 1501A-544 to 1501A-545 (enacting S. 1948, Title II of the IPACORA.

[26] *Id*. While this provision does not identify the 12 GHz band specifically, MVDDS is one alternative to satisfy this demand in rural and underserved local television markets. *See also* Letter from Senator Ted Stevens, *et al.*, Committee on Commerce, Science, and Transportation to Chairman, William E. Kennard, Federal Communications Commission, dated July 27, 2000.

[27] Act of Nov. 29, 1999, Pub. L. 106-113, 113 Stat. 1501, 1501A-544 to 1501A-545.

[28] *See* Experimental License Callsign WC2XPU. *See also*, MDSA Clewiston Phase I Test Report, (Oct. 16, 2001).

[29] MDSA Comments at (i), 4-5.

band segmentation and only operate co-frequency at the DBS band edge.[30] Whether MDSA could successfully deploy their technology without causing interference to DBS operations in the U.S. is being tested under their experimental authorization. Northpoint further alleges that MDSA misrepresented the number and type of MDSI installations operating overseas and thus states that the Commission should conduct an investigation and take appropriate action.[31] We note that MDSA has submitted extensive filings in response to the Northpoint allegations.[32] Based on our review of the record before us, we conclude that this issue of determining the scope and type of the MDSI foreign installations, along with the character of the overlapping DBS signals provided by other operators and the locations of the associated DBS subscribers, is a complex matter of *bona fide* dispute between MDSA and Northpoint. We thus do not consider this dispute to constitute a case that rises to the level of a possible misrepresentation before the Commission. Accordingly, on the record before us, we conclude that further action on our part based on Northpoint's allegations in connection with this rule making is not warranted.

10. On April 18, 2000, PDC Broadband Corporation (Pegasus) filed an application for authority to provide terrestrial service in the 12 GHz band to deliver data transmission, Internet services, and MVPD services. On August 25, 2000, Satellite Receivers, Ltd. (SRL) filed an application for authority to provide terrestrial television broadcast, Internet and data services in the 12 GHz band in Illinois, Indiana, Iowa, Michigan, Minnesota and Wisconsin.

11. On November 29, 2000, the Commission adopted the *First R&O and Further Notice* in the subject proceeding.[33] In the *First R&O*, the Commission concluded, among other matters, that the new fixed terrestrial MVDDS could operate in the 12 GHz band on a co-primary non-harmful interference basis with incumbent BSS providers and on a co-primary basis with NGSO FSS entities. The Commission also concluded that NGSO FSS providers could operate service downlinks in the 12 GHz band on a primary basis. Furthermore, the Commission concluded that it would define MVDDS technical rules and requirements in a later order that would protect BSS operations and that it could establish criteria that would permit MVDDS/NGSO FSS sharing. To that end, the Commission sought detailed comment in the *Further Notice* regarding the technical sharing criteria between MVDDS and BSS and NGSO FSS, and on MVDDS service, technical and licensing rules.

12. In the *Further Notice,* the Commission sought comment on technical sharing criteria between the MVDDS, BSS and NGSO FSS, and on MVDDS service, technical, and licensing rules under Part 101 of the Commission's Rules. Finally, the Commission requested comment on the disposition of the pending 12 GHz applications filed by Northpoint, Pegasus, and SRL.

13. On December 21, 2000, Congress enacted Section 1012, "Prevention of Interference to Direct Broadcast Satellite Services," of the Commerce, Justice, State and Judiciary Appropriations Act, H.R. 5548. Section 1012 requires the Commission to arrange for independent testing of "any terrestrial service technology proposed by any entity that has filed an application to provide terrestrial service" in the

[30] S*ee, e.g.*, Letter from Michael K. Kellogg, counsel for Northpoint Technology, Ltd. to Jane Mago, General Counsel, Federal Communications Commission 1 (May 9, 2001) (*May 9, 2001 Northpoint Letter*); *see also* Letter from Michael K. Kellogg, counsel for Northpoint Technology, Ltd. to Norman Goldstein, Enforcement Bureau, Federal Communications Commission (July 3, 2001).

[31] *See, e.g., May 9, 2001 Northpoint Letter* at 5.

[32] *See, e.g.,* Letter from James W. Olson, counsel for MDSA to Jane Mago, General Counsel, Federal Communications Commission (May 21, 2001).

[33] *First R&O and Further Notice*, 16 FCC Rcd 4096.

12 GHz band. The Commission selected The MITRE Corp. (MITRE) to conduct this testing. MITRE filed its report detailing its testing on April 18, 2001.[34]

IV. MEMORANDUM OPINION AND ORDER

A. Notice under the *Administrative Procedure Act*

14. SkyBridge contends in its petition for reconsideration that the Commission violated the *APA*[35] on procedural grounds by failing to give adequate notice in the *NPRM* that it was considering authorizing MVDDS in the subsequent *R&O*.[36] SkyBridge argues in general principle that the Commission's decision to authorize MVDDS could not be anticipated from the prior record in this proceeding. Northpoint argues in response that the subject matter the Commission discussed and the comments the Commission sought in the *NPRM* provided clear notice to interested parties that it was considering authorizing MVDDS in the 12 GHz band.[37]

15. Section 553(b)(3) of the *APA* requires that a general notice of a proposed rule making shall include "either the terms or substance of the proposed rule *or a description of the subjects and issues involved*." (Emphasis added).[38] In the *November 24, 1998 NPRM*, the Commission sought comment, among numerous other issues, on the Northpoint Petition for Rulemaking to permit terrestrial use of the 12.2-12.7 GHz band.[39] In addition, the Commission sought detailed comment on whether sharing of the 12.2-12.7 GHz band by a Northpoint-type (*i.e.*, MVDDS) terrestrial service along with BSS/DBS and NGSO FSS was feasible.[40] Furthermore, the Commission sought detailed comment on the specific technical allocation and interference considerations involved in such a spectrum-sharing plan.[41] Indeed, many of the responsive comments the Commission received were predicated upon the anticipation that it would find that an MVDDS-type service could operate in the 12 GHz band. In light of the foregoing, we find that the likelihood that we would determine that MVDDS could operate under the existing FS allocation in the 12 GHz band is clearly a logical outgrowth of the comments sought and the specific issues and subject matter discussed in the *November 24, 1998 NPRM*. Furthermore, we observe that the FS allocation for the 12 GHz band, under which MVDDS would operate, already exists in our rules.[42]

16. In the *First R&O* and *Further Notice,* the Commission concluded that the record supported a threshold determination that sharing in the 12 GHz band with a new MVDDS service was feasible.[43] The Commission also indicated that current trends in spectrum usage necessitate that it consider more complicated and creative sharing arrangements.[44] At the same time, the Commission's analysis showed

[34] The MITRE Corporation, "Analysis of Potential MVDDS Interference to DBS in the 12.2-12.7 GHz Band" (filed April 18, 2001) (MITRE Report). The Commission placed the MITRE Report on public notice on April 23, 2001. Comments responsive to the study were due on May 15, 2001 and replies were due on May 23, 2001.

[35] *See* 5 U.S.C. Chapter 5, *et. seq.*, *Administrative Procedure Act (APA).*

[36] *See* SkyBridge petition for reconsideration at 2.

[37] *See* Northpoint Opposition to Petitions for Reconsideration generally at 11 et seq.

[38] *See* 5 U.S.C. § 553(b)(3).

[39] *November 24, 1998 NPRM*, 14 FCC Rcd at 1177-81 ¶¶ 91-98.

[40] *Id.*

[41] *Id.*

[42] *See* 47 C.F.R. §§ 2.106, 101.147(p).

[43] *See First R&O*, 16 FCC Rcd at 4161 ¶167

[44] *First R&O,* 16 FCC Rcd at 4181 ¶ 224.

that development of technical rules applied to MVDDS operations would require a delicate balancing of many competing interference and spectrum utilization issues. In recognition of the complexity of these issues, the Commission exercised caution and chose to defer the adoption of additional specific technical rules pending the development of a more complete record. In furtherance of that goal, the Commission requested additional detailed comment in the *Further Notice* concerning all technical aspects of sharing in the 12 GHz band. This exercise of caution by refraining from adopting technical rules in the *First R&O* in no way alters or detracts from the fact that the Commission provided clear notice in the preceding *November 24, 1998 NPRM* that it was considering making the threshold decision to authorize MVDDS in the 12 GHz band. In view of the substance of the detailed comments sought and the specific issues and subject matter discussed in the *November 24, 1998 NPRM*, we conclude that the Commission provided clear notice that it was considering making a determination as to whether to allow MVDDS to operate in the 12 GHz band. Accordingly, the SkyBridge petition for reconsideration that asserts the Commission's decision to authorize MVDDS was improper because the Commission failed to provide adequate notice of the proposed rules as required by the *APA* is denied.

B. Compliance with SHVIA and RLBSA

17. SkyBridge argues in its petition for reconsideration that the Commission's decision to authorize MVDDS in the 12.2-12.7 GHz band violates the interference prevention provisions of the SHVIA and the *RLBSA*.[45] SkyBridge also argues that the Commission's decision to authorize MVDDS fails to promote the goals of *SHVIA* and *RLBSA* to the extent those goals seek to provide the delivery of local broadcast television signals to satellite subscribers in unserved and underserved local markets.[46] Northpoint asserts in response that MVDDS will not cause harmful interference to either DBS or NGSO FSS and, additionally, cites its public commitments to provide nationwide service in all 211 local television designated market areas (DMA's) within two years of licensing as evidence of the ability of MVDSS to provide service in rural areas.[47]

1. MVDDS vs. NGSO FSS Interference Concerns & Legislative Intent

18. SkyBridge argues that the Commision's decision to allow MVDDS to operate in the 12.2-12.7 GHz band violates the *RLBSA* provision that, "[t]he Commission shall ensure that no facility licensed or authorized under [this act] causes harmful interference to the primary users of that spectrum …"[48] Citing the legislative hearings for *SHVIA* and *RLBS*A appearing in the *Congressional Record*, SkyBridge contends that requiring NGSO FSS systems to share the 12.2-12.7 GHz band with a terrestrial service such as MVDDS inherently conflicts with the intent of the legislation. SkyBridge supports its contention with what we find herein to be the unwarranted assumption that MVDDS will cause harmful interference to co-primary NGSO FSS operations.[49] As noted above, Northpoint asserts throughout its response that MVDDS will not cause harmful interference to either DBS or NGSO FSS.

19. In light of the rules and regulatory safeguards we are adopting herein, we disagree with SkyBridge's assertion that MVDDS will cause harmful interference to NGSO FSS. In reaching this conclusion, we are confident that the rules we adopt herein will limit the interference potential from

[45] *See* SkyBridge petition for reconsideration at 11.

[46] *Id.* at 15.

[47] *See* Northpoint Opposition to Petitions for Reconsideration generally at 4, 10 & 14, et seq.

[48] *See* RLBSA, § 2002(b)(2).

[49] *See* SkyBridge petition for reconsideration at 10.

MVDDS to a level that does not rise to "harmful interference" as defined by Section 2.1 of our rules.[50] These rules will ensure that MVDDS and NGSO FSS can share the 12 GHz band while preserving the integrity of the co-primary status of both operations. Therefore, we find that SkyBridge's concern that the Commission's decision to authorize MVDDS violates the prohibition on harmful interference provisions of SHVIA/*RLBSA* is without merit.

20. Furthermore, a review of the legislative history of the RLBSA cited by SkyBridge indicates that it was fully anticipated by the legislators that the Commission might determine that a terrestrial service such as MVDDS could share spectrum with NGSO FSS operations. For example, the *Congressional Record* indicates, "… [the RLBSA] directs the FCC to consider issuing licenses, possibly in the *same bands*, for new *terrestrial* communications services …" (Emphasis added).[51] And further, that, "… this bill did not mean to interfere with the expert technical and regulatory judgment of the FCC with respect to licensing applicants …"[52] We therefore find that the Commission's decision to authorize MVDDS to share the 12 GHz band complies with both the specific requirements and legislative intent of *SHVIA* and *RLBSA*. Accordingly, the SkyBridge petition for reconsideration with regard to compliance with the non-interference provisions of *SHVIA/RLBSA* is denied.

2. Local Programming Goals of RLBSA

21. SkyBridge also argues that the Commission's decision to authorize MVDDS in the 12 GHz band does not include measures to ensure new services in rural areas or provision of local programming in areas unserved by cable systems.[53] As a result, SkyBridge asserts that a primary goal of the *RLBSA* is not fulfilled.[54] Northpoint, in response, cites its public commitments to provide nationwide service in all 211 local television DMA's within two years of licensing as evidence of the ability of MVDSS to provide service in rural areas.[55]

22. The *RLBSA* directs the Commission "to make a determination regarding licenses or other authorizations for facilities that will utilize, for delivering local broadcast television station signals to satellite television subscribers in unserved and underserved local television markets, spectrum otherwise allocated to commercial use."[56] From a technological perspective, a fixed terrestrial service such as MVDDS is clearly capable of providing local television station signals to satellite television subscribers in unserved and underserved local television markets. As contemplated by the *First R&O* and *Further Notice*, each fixed terrestrial MVDDS transmitter will be deployed to serve a specific geographic area. Because the individual MVDDS transmitters will be physically located in the immediate geographic area that they serve, each one will be ideally situated to rebroadcast available local television station signals to subscribers. Furthermore, MVDDS can utilize reception technology that is similar to that used by established satellite BSS/DBS operations.

[50] Section 2.1 defines "harmful interference" as "interference which endangers the functioning of a radionavigation service or of other safety services or *seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service* …" (Emphasis added). *See* 47 C.F.R. § 2.1.

[51] *See* Cong. Rec. 106th Cong., 1st Sess. at S-15014.

[52] *Id.*

[53] *See* SkyBridge petition for reconsideration at 15.

[54] *Id.*

[55] *See* Northpoint Opposition to Petitions for Reconsideration at 14.

[56] *See* RLBSA § 2002(a).

23. We also observe that the inability to receive local signals from DBS operators has often been cited by consumers as negatively affecting their decision as to whether to subscribe to DBS.[57] Furthermore, as of the beginning of the year 2001, the two major DBS providers, DirecTV and EchoStar, provided "local-into-local" service in only thirty-eight and thirty-four markets respectively.[58] With current growth rates, it appears possible that smaller markets and rural areas may not be provided with "local-into-local" service from DBS for the foreseeable future. The combination of these factors lead us to believe that a terrestrial service, such as MVDDS, could include transmitters sited in rural areas and thus can fill this void. At the same time, as just one example, we note that Northpoint has indicated its desire to provide nationwide service in over two hundred markets as a prospective MVDDS operator.[59] Therefore, we find that MVDDS is well suited to provide local television station signals to satellite television subscribers. However, we are not requiring MVDDS to provide local broadcast television service nor are we requiring MVDDS to serve satellite subscribers.

24. The fact that we have not proposed programming content rules for MVDDS does not detract from the fact that, among other capabilities, MVDDS is technologically well suited for fulfilling the local signal delivery goals of *RLBSA*. In the future, if we perceive it to be necessary and appropriate, we could give consideration to additional measures that might be warranted to meet the local programming goals of *RLBSA* in light of the particular facts and circumstances that prevail at the time. However, it would be both beyond the scope of this proceeding and premature to propose content-oriented rules for MVDDS operations at this time. We therefore find SkyBridge's arguments to be without merit and conclude that we have complied with the directives of *RLBSA*. Accordingly, the SkyBridge petition for reconsideration as to compliance with the local programming goals of *RLBSA* is denied.

C. Allocation Status of BSS/DBS and NGSO FSS vs. MVDDS, and Related Interference Matters

25. SkyBridge asserts in its petition for reconsideration that the co-primary authorization for NGSO FSS in the 12.2-12.7 GHz band is effectively rendered secondary by the alleged interference SkyBridge anticipates MVDDS will cause to NGSO FSS operators in the 12 GHz band.[60] Similarly, DirecTV, EchoStar, the Boeing Company (Boeing) and other reconsideration petitioners generally assert that the primary allocation status of BSS/DBS is undermined by the interference they claim will be caused to DBS operators in the 12 GHz band.[61] EchoStar argues that the Commission's decision to authorize MVDDS is inconsistent with the "rights and reasonable reliance interests" of DBS operators created by our licensing regime.[62] Some of the petitioners also generally contend that any MVDDS interference mitigation performed upon either DBS or NGSO FSS subscriber equipment would be in derogation of the primary or co-primary status of each service.[63] The petitioners further generally assert that the Commission failed to justify its decision to authorize MVDDS in the 12 GHz band in the face of alleged potential interference problems, that mitigation techniques will be either unsuccessful or objectionable, that other less harmful options such as use of other frequency bands were not considered, and that the Commission ignored the evidence in the record in reaching its decision.[64] Northpoint argues in response

[57] *See*, *generally*, Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming, CS Docket No. 00-132, *Seventh Annual Report*, 16 FCC Rcd. 6005 (2001) (*Seventh Annual Report*).

[58] *Id.*

[59] *See* Northpoint Opposition to Petitions for Reconsideration at 14.

[60] *See* SkyBridge petition for reconsideration at 6.

[61] *See*, *e.g.*, petitions for reconsideration of DirecTV at 5, 6 & 14-17, and EchoStar at 9 *et seq*.

[62] *See* EchoStar petition for reconsideration at 22.

[63] *Id.*

[64] *See*, generally, petitions for reconsideration of SkyBridge, DirecTV, SBCA, EchoStar, and Boeing.

that MVDDS will not cause harmful interference to either DBS or NGSO FSS and that the Commission carefully considered all the alternative options in reaching its decision.[65]

26. MVDDS is authorized on a co-primary, non-harmful interference basis as to BSS/DBS and on a purely co-primary basis to NGSO FSS. Each scenario requires somewhat differing approaches for addressing interference protection priorities. The interference protection rules and technical limits we are adopting herein will limit the DBS and NGSO FSS interference potential from MVDDS and avoid "harmful interference" as defined by Section 2.1 of our rules. The technical rules we adopt in the *Second R&O* are stringent. Under the DBS-related operating limits we adopt for MVDDS, any interference caused to DBS would not likely approach a level that could be considered harmful interference. Further, the rules we adopt herein, require an MVDDS licensee to discontinue service from a transmitting antenna if it causes harmful interference to DBS customers of record.[66] In the case of NGSO FSS, the MVDDS PFD will be limited and stations will be required to locate a sufficient distance from pre-existing NGSO FSS receivers to ensure their protection. In the absence of harmful interference from MVDDS, the primary or co-primary status of either DBS or NGSO operations will not derogated.

27. In light of the approach described above, we find that all of the objections raised by the reconsideration petitioners in regard to the Commission's decision to authorize MVDDS in the 12 GHz are without merit. They begin from the incorrect assumption that harmful interference will be caused to DBS and NGSO FSS services by MVDDS operations.

28. We also find that the reconsideration petitioners are incorrect in their assertion that MVDDS is purely "secondary" to DBS. Rather, MVDDS is authorized under the existing fixed allocation in the 12 GHz band to operate on a co-primary, albeit non-harmful interference, basis with DBS. The Table of Frequency Allocations appearing in our rules further supports the Commission's conclusion that MVDDS, as part of the fixed service, is not "secondary" to DBS.[67] Specifically, the fixed service allocation in the Table of Frequency Allocations for the 12.2-12.7 GHz band appears in capital letters and is, therefore, considered to be a "primary" allocation.[68] Therefore, it is appropriate for MVDDS to be allocated on a primary basis. To put this conclusion in perspective, we note that, in the early 1980's, the Commission adopted a non-harmful interference requirement on incumbent fixed point-to-point operations in this band and encouraged them to relocate to other spectrum[69] because these operations were generally incompatible with the BSS allocation that was made. Specifically, the point-to-point operations were high powered (up to 316,228 watts EIRP), two-way links that could transmit in any direction. These characteristics require that such fixed links coordinate with other uses on a case-by-case basis, which is not possible with ubiquitous BSS operations. In comparison, in this proceeding we would permit fixed service operations that are low-power (up to 0.025 watts EIRP) one-way transmissions specifically designed to share spectrum with BSS operations. As discussed below, each transmitting system would be designed to minimize impact on ubiquitous BSS receivers. However, because MVDDS and DBS would be competitors, we are mindful of the desire of the DBS licensees to limit an MVDDS operator's ability

[65] *See*, *generally,* Northpoint Opposition to Petitions for Reconsideration.

[66] *See* para. 88 and note 221, *infra*.

[67] *See* 47 C.F.R. § 2.106 (Table of Frequency Allocations).

[68] *See* 47 C.F.R. § 2.105(c)(1)(i) which states, "[s]ervices, the names of which are printed in "capitals" [example: FIXED]; these are called "primary" services;" Compare with 47 C.F.R. § 2.105(c)(1)(ii) which specifies that, "[s]ervices, the names of which are printed in "normal characters" [example: Mobile]; these are called "secondary" services."

[69] While there were over 10,000 incumbent fixed point-to-point links originally in the band, approximately 370 licensees remain on a non-harmful interference basis because they are in locations that have not caused a problem for BSS deployment.

to access their customers. To that end, we adopt rules in the *Second Report and Order* which require MVDDS licensees to meet specified EPFD levels at each DBS subscriber location.[70]

29. We further observe that NGSO FSS and MVDDS are authorized on a purely co-primary basis. We conclude that standard mitigation techniques will not be appropriate or sufficiently effective in this situation due to the particular interference mechanisms involved when, for example, an NGSO FSS receiver points directly at an MVDDS transmitting antenna. Instead of mitigation requirements, we conclude elsewhere herein that specifying a minimum MVDDS transmitting antenna spacing from pre-existing NGSO FSS receivers[71] and carefully selecting maximum MVDDS PFD limits[72] can provide similar protection without placing undue burdens upon NGSO FSS operators or requiring mitigation to be performed on any NGSO FSS receiver. In that light, we find that there is no basis for the petitioners' objection to mitigation that they believe might be performed on NGSO FSS equipment by an MVDDS provider because we are not requiring mitigation on these services.

30. We find that the Commission's decision to authorize MVDDS in the 12 GHz band subject to the technical restrictions adopted herein do not undermine the allocation status of either DBS or NGSO FSS. Therefore, we also conclude that the petitions for reconsideration are without merit concerning the alleged interference, allocation status and mitigation issues raised therein. Accordingly, the petitions for reconsideration in those respects are denied.

31. EchoStar also argues that the Commission's decision to authorize MVDDS is inconsistent with the "rights and reasonable reliance interests" of DBS operators created by our licensing regime.[73] They assert that DBS licensees have designed their systems to maintain a certain degree of reliability for DBS customers based upon reasonable expectations about certain amounts of interference protection and the range of technological options for which the spectrum might be developed.[74] EchoStar concludes that, "DBS licensees acquired the right to be the primary service providers in the 12.2-12.7 GHz band, and consequently, reasonably expected that the Commission would not authorize any other service in that band that would create ***harmful*** interference to DBS service in accordance with the Commission's rules." (Emphasis added).[75]

32. To whatever extent we might, *arguendo,* accept EchoStar's characterization of the asserted rights and reliance interests of DBS operators, we note that even by EchoStar's own terms there would need to be a finding that harmful interference has been suffered by DBS for those interests to be compromised.[76] Consequently, we believe that this argument, similar to the other petitioner's concerns addressed immediately above, is dependent upon the incorrect assumption that MVDDS operation will cause *harmful* interference to the DBS service. As a fundamental matter, we believe that the rules we adopt in this proceeding will prevent harmful interference to DBS. In the absence of harmful interference to DBS, no cognizable interest of DBS licensees will be undermined. Stated in slightly different terms, the relatively small theoretical changes in DBS unavailability or system link budget margins that might result from MVDDS operations under the rules we adopt herein simply do not rise to a level that can be considered harmful interference under our rules. This result is consistent with past Commission actions wherein the Commission has found that impacting some existing customers of a service to an extent that

[70] *See* para. 90, *infra*.

[71] *See* para. 123, *infra*.

[72] *See* para. 112, *infra*.

[73] *See* EchoStar petition for reconsideration at 22.

[74] *Id*. at 23.

[75] *Id.* at 23-24.

[76] *See* note 43, *supra*, for a definition of harmful interference.

did not rise to the level of harmful interference was outweighed by the benefits of adding new services or capabilities to a frequency band.[77] Therefore, we conclude that EchoStar's petition for reconsideration is without merit with regard to the allegation that the Commission's decision to authorize MVDDS is inconsistent with the "rights and reasonable reliance interests" of DBS operators. Accordingly, EchoStar's petition for reconsideration in that respect is denied.

33. We also find that the various assertions made by the petitioners that the Commission failed to explain its decision, failed to explore other alternatives, or ignored evidence in the record are without merit. Contrary to petitioners' assertions, the Commission carefully articulated reasons for its basic threshold decision to authorize MVDDS in the 12 GHz band. For example, the Commission explained that factors such as propagation constraints in various frequency bands, the degree of encumbrance by existing operations, relative equipment costs, and whether a particular frequency band would provide sufficient spectrum to permit competition with cable and DBS operations were central to its decision.[78]

34. At the same time, the Commission has made it abundantly clear that it wished to further develop the record before proposing final rules and protection criteria to govern MVDDS operation. In that context, the Commission utilized the vehicle of the *Further Notice* to solicit additional relevant comments from all interested parties concerning 12 GHz band sharing so that it could fully explore the specific technical considerations before proposing final rules governing MVDDS. Accordingly, the petitions for reconsideration insofar as they assert that the Commission failed to explain its decision, failed to explore other alternatives, or ignored evidence in the record are denied.

35. Finally, we disagree with the assertions of DirecTV, the Satellite Broadcasting and Communications Association (SBCA), EchoStar and others that the Commission's decision to authorize MVDDS in the 12 GHz band cannot be reconciled with its past findings that sharing between ubiquitous satellite and terrestrial services is not feasible. Northpoint argues in response that there is no inconsistency with the Commission's previous decisions and describes distinguishing factors that it contends supports the Commission's decision.[79] The Commission, as petitioners observe, has previously been reluctant to authorize multiple satellite and terrestrial services in the same bands due to the extremely complex engineering and interference concerns involved. However, the Commission noted in the *First R&O & Further Notice* the increasing demand for spectrum access necessitates that it consider more complicated and creative sharing arrangements.[80]

36. In this instance, we note that we have the benefit of the extensive analytic record derived from the MITRE Report as well as the experimental MVDDS test operations in the 12 GHz band. The results support the Commisison's conclusion that sharing is feasible in the 12 GHz band. Moreover, we find that the 12 GHz band is well suited for the nature of the service to be provided by MVDDS in light of the present use of this band. Taking all these factors together, we find that sharing of the 12 GHz band

[77] This was done, for example, in the case of DTV where we balanced new interference to existing TV service against new digital TV capabilities. *See* Advanced Television Systems and Their Impact Upon The Existing Television Broadcast Service, MM Docket No. 87-268, *Sixth Report and Order*, 12 FCC Rcd 14,588 (1997). Similarly, for the Location and Monitoring Service (LMS) in the 902-928 MHz band, we conditioned operation of certain stations upon the licensee's ability to demonstrate that their systems do not cause unacceptable levels of interference to 47 C.F.R. Part 15 devices. *See* 47 C.F.R. § 90.353(d). Also, we have allowed automated maritime telecommunication systems (AMTS) on frequencies near TV channels 10 and 13 and required the licensee to make such adjustments as may be necessary to fix any interference to household TV receivers. *See* 47 C.F.R. § 80.215(h).

[78] *See, e.g., First R&O*, 16 FCC Rcd at 4161 ¶ 168.

[79] *See* Northpoint Opposition to Petitions for Reconsideration at 13.

[80] *First R&O*, 16 FCC Rcd at4181 ¶ 224.

presents a unique situation that, while technically challenging, has the potential for significant benefit to the public in the provision of a new service. Therefore, we find that the Commission's decision to authorize MVDDS in the 12 GHz band is consistent with its continuing effort to find the highest and most efficient use of spectrum that is supported by the record in a given proceeding. Accordingly, the petitions for reconsideration of SkyBridge, DirecTV, EchoStar, SBCA, and Boeing with respect to the Commission's decision to allocate MVDDS in the 12 GHz band are hereby denied.

D. Technology Neutrality and Patent Issues

37. Boeing argues that allowing MVDDS in the 12 GHz band violates the Commission's practice of not basing new services on patented technologies.[81] Boeing cites references by Northpoint that its antenna designs and equipment incorporate patented technology.[82] SkyTower, the proponent of a novel solar-powered aircraft (or "stratospheric platform") delivery system, opines that the decision to allow the MVDDS terrestrial service in the band is not "technologically neutral" because it excludes new, non-terrestrial technologies such as that which it proposes.[83]

38. As discussed more fully in the attached *Second R&O*,[84] we conclude that the rules we adopt effectively define and encompass a family of terrestrial service technology – some particular implementations of which may or may not be subject to patents or, possibly, not yet even developed or envisioned – that, consistent with the MITRE test results, are capable of operation without causing harmful interference. These rules do not constrain MVDDS to any particular equipment configurations or methodologies to deliver the service so long as they comply with the technological operating requirements we adopt herein. In other words, we distinguish the definition of MVDDS "technology" in this context (as it relates to patent, statutory and "technology neutrality" issues) from the use of the term by petitioners to casually refer in shorthand fashion to just one of potentially many methods or configurations of equipment. Thus, we find that the rules we adopt in the *Second R&O* define a set of technical operating parameters (a family of terrestrial service technology) to which prospective MVDDS providers must conform independent of the particular equipment or implementation method employed.

39. Consequently, while prospective MVDDS providers, such as Northpoint, might choose to utilize proprietary methods or equipment in their own systems to deliver the new service, it is clear from the rules we have adopted in the *Second Report and Order* that we do not require them to do so. However, due to the interference concerns described elsewhere herein, we conclude that the 12.2-12.7 GHz band may not be used for aeronautical and mobile operations.[85] Accordingly, the Boeing and SkyTower petitions for reconsideration as to the patent and technology neutrality issues raised therein are hereby denied.

E. Applicability of ITU Recommended NGSO FSS Criteria to MVDDS

40. EchoStar, SkyBridge and SBCA argue in their petitions for reconsideration that the Commission's decision to authorize MVDDS in the 12 GHz band violates ITU recommendations regarding international protection concerns for NGSO FSS.[86] Petitioners cite the ITU recommendation that specifies a ten percent cap on the increase in unavailability caused by NGSO FSS systems to GSO

[81] *See* Boeing petition for reconsideration at 20.

[82] *Id.* at 21.

[83] *See* SkyTower petition for reconsideration at 2.

[84] *See* "Independent Testing" at para. 229 *et. seq. infra*.

[85] *See* "Permissible Operations for MVDDS" at para. 136 *infra*.

[86] *See* Petitions for Reconsideration of EchoStar at 12-19; SBCA at 7-9; and SkyBridge at 6-7.

BSS systems.[87] They argue that the ITU recommendation does not contemplate the addition of any new sources of interference to GSO BSS beyond the ten percent attributable to NGSO FSS. From this interpretation, petitioners aver that the ITU recommendations prohibit the addition of another service, such as MVDDS, that would further increase the unavailability of GSO BSS systems. As a consequence, petitioners argue that the Commission's decision to authorize MVDDS is in contravention of the ITU recommendations.[88]

41. We do not agree. As an initial matter, we observe that recommendations resulting from ITU-R deliberations are not necessarily binding for purely domestic allocation decisions such as are involved with the terrestrial-based MVDDS service. As the Commission stated in the *First Report and Order,* "… ITU-R deliberations are based on the technical input of many Administrations that often have different domestic spectrum uses than those in the Unites States. Thus, while the conclusions of the CPM ["Conference Preparatory Meeting"], the ITU-R study groups, and WRC-2000 may have general technical applicability, based upon each Administration's input and the resultant compromise, they may not adequately address specific, domestic sharing conditions such as those prevalent in the U.S."[89]

42. Furthermore, we disagree with the petitioner's interpretation of the cited ITU recommendation. We find that the cited ITU recommendation is not applicable to the terrestrial-based MVDDS. This conclusion is supported by the fact that the cited ITU recommendation explicitly states that the ten percent cap on the increase in baseline unavailability applies to NGSO FSS.[90] There is nothing in the ITU recommendation that indicates the cap is applicable to any service other than the satellite-based NGSO FSS. EchoStar itself acknowledges that the ten percent cap was determined specifically upon the occasion of interference from NGSO systems into DBS.[91]

43. Petitioners hinge their argument largely upon out-of-context quotations from the cited ITU recommendation to the effect that all contributions to DBS unavailability should be limited. We do not find fault with the proposition that the ITU recommendation reflects the position that it is desirable that the unavailability contributions of all systems affecting DBS should be quantified and limited in some manner. Indeed, we are establishing very conservative limits on MVDDS elsewhere herein. However, it is equally clear from a plain reading of the ITU recommendation that the ten percent cap refers only to the contribution attributable to NGSO FSS systems. Beyond that, the ITU recommendation simply does not purport to address, or to exclude from possible future consideration, whatever link budgets might be appropriate for systems other than NGSO FSS.

44. As even SkyBridge and SBCA concede, all the relevant agreements and recommendations clearly limit their consideration to the interference contribution of NGSO FSS alone, and that no conclusions were reached regarding MVDDS or other such services.[92] We agree with Northpoint that to suggest that the ten percent cap applies to every other possible source of interference - despite explicit

[87] *See* Recommendation ITU-R BO.1444, "Protection of The BSS In The 12 GHz Band And Associated Feeder Links In The 17 GHz Band from Interference Caused by Non-GSO FSS Systems."

[88] To the extent that the petitioners' arguments on reconsideration rely on proposals that were raised in the *Further Notice* and not the *First R&O*, our decision on reconsideration does not go to the merits of their arguments on the unavailability criteria. Those issues are properly addressed in the *Second R&O*.

[89] *See First Report and Order*, 16 FCC Rcd at 4107 ¶ 15.

[90] *See* Recommendation *ITU-R BO.1444* at "*recommends*" 1 and 1.1 that reads, in part, " … [the] emissions of all *non-GSO FSS satellite networks* operating in the same frequency band, should: be responsible for at most ten percent of the time allowance(s) for unavailability …" (Emphasis added).

[91] *See* EchoStar petition for reconsideration at 13.

[92] *See* petitions for reconsideration of SkyBridge at 6 and SBCA at 7.

qualifying language limiting the cap to NGSO FSS - is unwarranted and misreads the ITU proceedings.[93] Consequently, we conclude that the cited ITU recommendation must be narrowly construed by its own terms, namely, that the ten percent cap applies to NGSO FSS alone.

45. Therefore, we conclude that the Commission's decision to authorize MVDDS in the 12 MHz band reflects an appropriate exercise of its regulatory authority to tailor interference standards to particular domestic requirements. We further conclude that the Commission's decision is not inconsistent with the ITU recommendations cited by petitioners. Accordingly, to the extent that EchoStar, SBCA and SkyBridge allege that the the Commission's decision to authorize MVDDS in the 12 GHz band is inconsistent with or violates ITU agreements and recommendations, the petitions for reconsideration are denied.

F. DBS Petition for Consolidation and Declaration

46. Subsequent to the deadline for filing petitions for reconsideration of the *First R&O*, DirecTV and EchoStar submitted a petition[94] that seeks consolidation of this proceeding with dockets CS 99-250[95] and ET 00-258.[96] The petitioners also urge the Commission to declare that either the 12.7-13.2 GHz segment of the CARS band or, alternatively, the 2500-2690 MHz segment of the MMDS band, is available to MVDDS instead of the 12 GHz band.[97]

47. Northpoint opposes the DBS Petition for Consolidation and Declaration on procedural grounds because of the lateness of filing, and on the merits because Northpoint argues that neither of the proposed alternative spectrum options are technically suitable for MVDDS.[98] The National Cable Television Association (NCTA) points out that the petition to declare spectrum in the CARS band for MVDDS runs counter to Section 308 of the Communications Act of 1934 (the Act) which provides, in part, that the *applicant* for a license must specify the desired frequency of operation.[99] NCTA also argues that the petition should be rejected because, by requesting a declaration that alternative spectrum is available in other frequency bands, it seeks a change to the Commission's Table of Frequency Allocations in a manner that conflicts with basic notice and comment rule making procedures.[100] MDS America argues that the petition raises issues that are beyond the scope of this proceeding, and that MDS America

[93] *See* Northpoint Opposition to Petitions for Reconsideration at 5.

[94] *See* Petition for Consolidation of Rulemaking Proceedings and for a Declaration that Alternative Spectrum is Suitable for the Proposed "Multichannel Video Distribution and Data Service," received Dec. 3, 2001 (DBS Petition for Consolidation and Declaration).

[95] *See* Petition for Rulemaking to Amend Eligibility Requirements in Part 78 Regarding 12 GHz Cable Television Relay Service, CS Docket No. 99-250; RM-9257.

[96] *See* Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless System, ET Docket No. 00-258.

[97] *See* DBS Petition for Consolidation and Declaration at 5 et seq.

[98] *See* Opposition of Northpoint Technology, Ltd., and Broadwave USA, Inc., to DBS Petition for Consolidation and for Declaration that Planned Terrestrial Services in the 12.2–12.7 GHz Band Should be Moved to Alternate Spectrum, received Dec. 21, 2001.

[99] *See* Letter from NCTA to Magalie R. Salas, Secretary, Federal Communications Commission (FCC), dated Jan. 11, 2002.

[100] *Id.*

would only support an effort to identify additional, but not replacement, spectrum for MVDDS and, then, only if licensing of MVDDS in the 12 GHz band were not delayed.[101]

48. We find the DBS Petition for Consolidation and Declaration to be untimely and without merit. Although styled as a petition for consolidation of three rulemaking proceedings and for a declaration that other frequencies are suitable for MVDDS, the petition essentially asks the Commission to reconsider its threshold decision to authorize MVDDS in the 12 GHz band. The deadline for filing petitions for reconsideration of the Commission's *First R&O* lapsed in March 2001. Therefore, we find that the petition for consolidation and declaration is untimely and it is hereby dismissed on that ground.

49. Notwithstanding that we dismiss the petition as untimely, we will briefly discuss the merits on our own motion. We do so because we wish to forestall further delays to the implementation of MVDDS.

50. As an initial consideration, we observe that NCTA is correct in noting that Section 308 of the Act provides, in part, that the *applicant* for a license must specify the desired frequency of operation.[102] Furthermore, by requesting a "declaration that alternative spectrum is suitable," the petition appears to seek a change in our Table of Frequency Allocations without the benefit to interested parties that is afforded by basic administrative notice and comment rule making procedures. As NCTA aptly points out, in taking both of these considerations into account, it is implicit that the applicant must be satisfied that the available frequencies are suitable for the intended service. No indication exists that this is the case here. In fact, quite the opposite appears to be true inasmuch as Northpoint has made it very clear in the record that it does not perceive alternate frequencies outside the 12 GHz band to be desirable. Therefore, we conclude that it would not serve the public interest at this late point in time to engage in a further search for alternative spectrum that we know, *a priori*, is not deemed satisfactory by prospective MVDDS licensees merely to appease the petitioners' objection to the Commission's original 12 GHz decision.

51. We also note that DirecTV and EchoStar plainly do not agree with the Commission's threshold decision or rationale for authorizing MVDDS in the 12 GHz band. Earlier in this *MO&O* and in the *First R&O*, the Commission enumerated some of the spectrum efficiency and public interest considerations that were balanced in deciding to authorize MVDDS in the 12 GHz band.[103] Those considerations include, *inter alia*, the degree of encumbrance by existing operations and other related factors. We also affirmed above in this *MO&O* our conclusion that those considerations warranted denying the petitions for reconsideration of that decision. The same considerations apply here. DirecTV and EchoStar desire that we identify yet other spectrum - namely segments of the CARS and MMDS bands - to which we should relegate MVDDS. Their arguments are repetitive of the same arguments made in their original reconsideration petitions that we have already addressed in this *MO&O* and have found to be unpersuasive.

52. We find that neither the CARS nor the MMDS bands would be more advantageous for MVDDS operations as compared with the spectrum efficiency and public interest benefits of the 12 GHz band. Both the CARS and MMDS bands are widely used by different services. Beyond asserting purported benefits to MVDDS of using these two bands, DirecTV and EchoStar fail to offer any specific technical information as to how to resolve potential interference and coordination issues that would inevitably arise from sharing these bands with MVDDS. We also find that DirecTV and EchoStar's simplified characterization of the present use of these two bands greatly underestimates the potential

[101] *See* MDSA, *Ex Parte* FCC, letter to Secretary Magalie Roman Salas, FCC, dated Dec. 10, 2001.

[102] *See* 47 U.S.C. § 308(b). "All applications for station licenses … shall set forth such facts as … the *frequencies and power desired to be used* … " Emphasis added).

[103] *See, e.g., First R&O, 16 FCC Rcd* at 4161 ¶ 168.

problems were MVDDS to be authorized to share that spectrum. The CARS band currently supports four radio services.[104] The most active user of the band is CARS with over 121,000 links. The second most active user is the BAS with 4,900 links, followed by Fixed Service point-to-point operations with 1,300 links and the Fixed-Satellite Service with 130 earth station uplinks. Also, the Commission recently decided in the *First R&O* in this proceeding to authorize NGSO FSS earth stations in this band. Unlike the current DBS usage in the 12 GHz band, where sharing is enabled by DBS receive antennas that point generally southwards and upwards toward the geostationary arc, the antennas in the CARS band point in many different directions. Furthermore, BAS licensees in particular are authorized to use this band, *inter alia*, for itinerant, mobile operations over wide ranging and constantly changing geographic areas across the entire nation for such purposes as electronic news gathering (ENG) and broadcast event production purposes. Taking all of these services together, we conclude that coordination of MVDDS in that band is likely to be far more complicated in many locations than is the case in the 12 GHz band. In short, we find that the CARS band is currently so encumbered by a multitude of different services, including two-way and itinerant area-wide operations, that authorizing MVDDS in that band appears to present significantly complex sharing issues at this time. Similarly, we note that while the MMDS band already has some wide-area video transmitters that provide direct service to consumers, the band is being changed to two-way broadband use. In addition, the band also is extensively used for Instructional Television Fixed Service (ITFS). For example, ITFS makes pervasive use of the spectrum to provide formal classroom instruction, distance learning, and videoconferencing capability to a wide variety of educational users throughout the nation. Therefore, we also find that the MMDS band is so encumbered by existing services that it too appears to present significantly complex sharing issues. Accordingly, we find the substance of the petition for consolidation and declaration to be without merit.

V. SECOND REPORT AND ORDER

A. Technical Criteria for Sharing and Operations in the 12.2-12.7 GHz Band

53. In this *Second Report and Order*, we adopt technical criteria for MVDDS that enable a new terrestrial service to be deployed in the 12.2-12.7 GHz band while protecting the operations of incumbent BSS and new NGSO FSS. In reaching our decision, we have carefully considered the extensive record in this proceeding, and we believe that the technical criteria we are adopting are a reasonable balance of the parties' competing interests. Our decision recognizes that successful sharing of spectrum in this case requires each service to make some accommodation for the other services in the band. We conclude that any impacts on incumbent BSS or new NGSO FSS to accommodate MVDDS in this band are outweighed by the potential benefit to the public of providing for a new potential competitor in the multichannel video and data markets.

1. MVDDS/BSS Sharing

a. Technical Criteria for MVDDS/BSS Sharing

54. Background. In the *Further Notice*, the Commission sought comment on the technical criteria needed to deploy MVDDS so that the 12.2-12.7 GHz band can be shared successfully with incumbent BSS operations.[105] Specifically, the 12.2-12.7 GHz band is allocated to the fixed service on a co-primary basis; however, the service is prohibited from causing harmful interference to BSS.[106] The Commission tentatively concluded in the *Further Notice* that this could be accomplished through careful MVDDS system design and the use of mitigation techniques. The Commission proposed a regulatory structure for

[104] CARS, BAS, FS, and FSS uplinks.

[105] *See Further Notice,* 16 FCC Rcd at 4196 ¶¶ 267-268.

[106] *See* 47 C.F.R. § 2,106, footnote S5.490. *See also First R&O*, 16 FCC Rcd at 4177 ¶ 213.

MVDDS similar to that adopted to protect BSS from NGSO FSS operations in this band. For NGSO FSS systems, we adopted EPFD limits based on limiting the maximum amount of increased DBS service unavailability over a baseline level of service unavailability due to the presence of the new service. This approach was taken to ensure a *de minimis* impact to DBS operations that would not be perceptible to customers nor hinder DBS operations.[107] Accordingly, we proposed that MVDDS also be held to limits designed for a similar result. Specifically, the Commission stated that it intended to adopt technical limits for MVDDS that would keep the increased DBS unavailability below a permissible level. This permissible level would not approach a level that could be considered harmful interference under our rules.[108] Several options for technical limits were discussed in the *Further Notice* including, allowing MVDDS to cause an increase in DBS outage equal to a percentage of DBS's baseline outage, allowing MVDDS to cause an increase in DBS outage equal to a fixed number of minutes over DBS's baseline outage, and establishing a DBS carrier to MVDDS interference (C/I) ratio.[109] As an alternative to setting specific interference criteria, the *Further Notice* sought comment on whether an MVDDS provider should simply respond to and provide remedies for DBS consumers who complain of interference.

55. In addition to the central issue of defining interference criteria, the *Further Notice* proposed to define an analytical model for calculating the baseline outage of a DBS system and the increased outage due to the presence of an MVDDS system.[110] Regardless of the criteria selected, most parties to this proceeding recognize that there will likely be an area surrounding the MVDDS transmitting antenna where the interference criteria may not be met without some form of mitigation being performed.[111] Therefore, the Commission also proposed a model for calculating this mitigation zone. These models were proposed to ensure that parties use consistent methods to analyze potential interference. The Commission sought comment on the validity of its model and asked commenters to suggest modifications or alternative models. The Commission also proposed and sought comment on procedures for identifying and mitigating interference to DBS customers.

56. The record in this proceeding regarding the potential for MVDDS to successfully share the 12.2-12.7 GHz band with DBS has been supplemented by a Congressionally mandated study performed by MITRE.[112] Generally, the MITRE Report concluded that terrestrial use of the 12.2-12.7 GHz band could pose a significant interference threat to DBS, but that the interference could be mitigated to allow spectrum sharing within the band. In addition, MITRE made several recommendations regarding how such band sharing could be accomplished.

57. MITRE's recommendations were based on its performance of the following tasks: measurement of DBS and MVDDS equipment, including antennas and receivers; simulation of satellite receivers; propagation and rain attenuation modeling; and interference predictions. More specifically,

[107] DBS reception in any given geographic area is dependent on the satellite downlink power budget and the frequency, duration, and intensity of rain. During a period of significant rain, the presence of interference from a terrestrial fixed service could advance the onset of picture loss and could cause the duration of this picture loss to last longer than experienced from rain alone.

[108] *See First R&O*, 16 FCC Rcd at 4177 ¶ 213.

[109] *See Further Notice,* 16 FCC Rcd at 4196-98 ¶¶ 268-271.

[110] *See Further Notice,* 16 FCC Rcd at 4198 ¶ 272 and Appendix H.

[111] *See*, *e.g.*, Northpoint Comments at Technical Appendix, p. 7; Pegasus Reply Comments at 7. Northpoint proposes a plan in which it would be required to mitigate interference on a customer complaint basis in the first eighteen months after deployment within a mitigation zone based on an EPFD contour. *See also*, EchoStar Comments at 20; DirecTV Reply Comments at 18. EchoStar and DirecTV assert that shielding or relocation of the MVDDS transmitter is the only acceptable mitigation to protect DBS subscribers.

[112] *See* para. 13, *supra*.

MITRE used an anechoic chamber to measure antenna gain patterns of various MVDDS transmit and DBS receive antennas.[113] With respect to DBS receivers, MITRE used signal processing software tools to model the characteristics of DirecTV and EchoStar's signals and the performance of DBS receivers both with and without an MVDDS signal being present.[114] Through this effort, MITRE developed recommendations for the correct signal threshold values necessary for DBS operation.[115] Using all of these measurements, along with a propagation and rain attenuation model, MITRE made predictions regarding the additional DBS outage time that may occur within an MVDDS service area.[116]

58. MITRE considered ten different locations for their simulations; stating that they were geographically diverse and thus representative of the entire U.S. in terms of rain characteristics and DBS signal availability. In addition, MITRE ran simulations varying parameters such as satellite power, MVDDS antenna height and elevation tilt angles, and frequency offset.[117] Based on their work, MITRE concluded that MVDDS sharing could occur if suitable mitigation techniques are applied to reduce the potential of interference to DBS customers.[118] They stated that these mitigation techniques could include adjustment of MVDDS operational parameters,[119] MVDDS system design changes,[120] and corrective measures at DBS receiver locations.[121] Finally, MITRE enumerated policy issues (along with recommendations) on which the Commission would have to decide.

59. Commenters had different approaches on the appropriate technical criteria for MVDDS to ensure adequate interference protection of DBS systems. The major disagreements among commenters are the criterion to use as a basis for establishing an interference limit, the method used to calculate that limit, and the specific requirement that should be placed in our rules.

60. DBS proponents argue that MVDDS is a secondary service and thus should be held to strict non-interference criteria.[122] DirecTV, for example, argues that the impact of MVDDS on BSS must be

[113] Pictorial representations of the antenna patterns can be found in the MITRE Report, Section 4. The measured data, in a format suitable for use in a simulation, is available on the FCC's web site at http://www.fcc.gov/oet/info/mitrereport/.

[114] *See* MITRE Report at Section 3.

[115] In general, a threshold is the minimum value of a signal that can be detected by the system under consideration.

[116] *See* MITRE Report at Section 5.

[117] For example, MITRE predicted that a DBS customer viewing the satellite at 101° W longitude would experience additional outages of less than 18 minutes per year over the entire MVDDS service area. For the satellite at 110° W longitude, an additional outage of 18 minutes per year would be experienced in a small zone approximately 1 km x 0.2 km in front of the MVDDS transmitting antenna; additional outages would be less than 18 minutes over the rest of the MVDDS service area. For the satellite at 119° W longitude, a DBS customer would experience additional outages of 3 hours per year in a zone approximately 1 km x 0.2 km; of 1 hour per year in a zone approximately 1.75 km x 0.4 km; and of 18 minutes per year in a zone approximately 6.2 km x 1 km. Variations occur due to differences in satellite power levels and the elevation angle of the DBS receive dish. *See* MITRE Report at Section 5 and Appendix B for all simulation results.

[118] *See* MITRE Report at 6-1.

[119] These include using low power, using a 7 megahertz frequency offset from the satellite carrier frequencies, increasing the MVDDS antenna height, and adjusting the MVDDS antenna elevation tilt angle. *See* MITRE Report at 6-2.

[120] These include using real time power control, using multiple MVDDS transmitting antenna beams, using circularly polarized transmitting antennas, and using larger receive antennas. *See* MITRE Report at 6-3.

[121] These include relocation of the DBS receive antenna, use of clip on shielding on the DBS receive antenna, replacement of the DBS receive antenna, and replacement of older DBS set-top boxes. *See* MITRE Report at 6-4.

[122] DirecTV Comments at 6-7; EchoStar at 18.

imperceptible, so that the quality of service is essentiality unchanged and DBS operators will not have to design around this new interference source.[123] The DBS proponents generally support an approach that would limit the amount of increased BSS unavailability due to the presence of MVDDS over a baseline level of BSS unavailability. Although this approach is similar to that adopted for NGSO FSS/BSS sharing and the proposals in the *Further Notice*, some of the DBS proponents' proposals are significantly different in certain respects. For example, DirecTV and EchoStar argue that the Commission's rules should specify an interference criterion for MVDDS that would limit the increase in DBS unavailability to 2.86% over the baseline at every DBS subscriber site,[124] rather than specify EPFD limits as was done for NGSO FSS operations.[125] Further, these parties argue that BSS should be subjected to no more than ten percent increased unavailability from all new interference sources, *i.e.*, both NGSO FSS and MVDDS. Thus, the 2.86% allowance for MVDDS would be only a portion of the ten percent allowance that, the parties argue, is the recommended ITU protection level for BSS systems from all interfering sources.[126] EchoStar contends that increased unavailability in excess of ten percent would violate the ITU's findings regarding DBS system performance and spectrum sharing expectations.[127] Consequently, these parties argue, the Commission would have to adjust the number of potential NGSO FSS systems authorized in this band because the EPFD limits adopted for those systems were based on applying the ten percent allowance only to those systems.[128]

61. DirecTV and EchoStar also propose that compliance with the 2.86% criterion would be measured by requiring that, at each MVDDS transmitting site, an EPFD limit be calculated for all DBS satellite links in view of the MVDDS transmitting antenna, including those orbital slots that are not now used for providing DBS service in the U.S.[129] Thus, the EPFD limit at each MVDDS transmitting antenna site will be the "worst case" at that location. DirecTV argues that MVDDS should protect all potential BSS orbital locations capable of United States coverage, including those, which are not now used to provide service in the United States.[130] The EPFD values would be derived by using a prescribed methodology to protect a database of identified DBS links and link budgets, current and future, which show satellite EIRP values. The EPFD value necessary to protect the weakest satellite link to the 2.86% criteria would have to be met at all DBS subscriber locations in that area. Finally, DirecTV argues that

[123] DirecTV Reply Comments at Appendix C.

[124] Specifically, DirecTV proposes that MVDDS systems be limited to 2.86% of the time allowance for unavailability of the carrier-to-noise (C/N) value specified for operational performance objectives of the BSS network, where N is the total noise level in the noise bandwidth associated with the wanted carrier including all other non-time varying sources of interference. DirecTV also proposes that there be no loss of video picture continuity under clear sky conditions, and that the criteria be met over all habitable land. DirecTV Comments at 20-21.

[125] DirecTV Reply Comments at 20.

[126] DirecTV Comments at 7, citing Recommendation ITU-R BO.1444; EchoStar Comments at 10. All NGSO FSS systems in this band are not to cause more than a ten percent increase in unavailability to BSS networks. Single entry (per system) limits were derived based on a factor of 3.5 systems, *i.e.*, each NGSO FSS system should not contribute more than a 2.86% increase in unavailability. *See* Recommendation ITU-R BO.1444.

[127] EchoStar Comments at 15.

[128] DirecTV Comments at 20-21.

[129] *Id*. DirecTV notes that EPFD is an interference limit that can be measured in the field, and is an acceptable means to determine if the 2.86% criteria are met. *Id.* at 18-19.

[130] *Id*. at 17.

MVDDS initial deployment should be limited to one city pending further evaluation of interference to BSS and NGSO FSS.[131]

62. In contrast to DirecTV and EchoStar, Pegasus, a reseller of DBS service that also is interested in providing MVDDS, generally supports the Commission's proposal to set an interference threshold for MVDDS that is separate from the allowances provided for NGSO FSS systems. Pegasus would limit the amount of increased unavailability on a DBS subscriber to 2.86% from a single MVDDS system and to no more than ten percent from all MVDDS providers.[132] Pegasus states that, under this approach, if the interfering C/I associated with a 2.86% increase in unavailability at any DBS receive site is less than the value calculated from a Commission-prescribed model, then the impermissible interference must be mitigated.[133] Pegasus also recommends that because DBS antennas were not designed to suppress interference from terrestrial sources, MVDDS systems must be designed such that existing or future DBS receivers experience a worst case C/I of 23 dB. However, Pegasus would allow for other C/I levels if the MVDDS provider proposes new equipment and mitigation techniques, so long as the measures are acceptable to the DBS service providers and their subscribers. Pegasus' approach also entails other technical requirements for MVDDS, including specifying a maximum power limit and clarifying the "southerly" pointing for the MVDDS antenna azimuth.[134] DirecTV disagrees with Pegasus's views, stating that any interference beyond the ten percent allowance agreed to for NGSO FSS operations will degrade DBS service quality and competitiveness.[135]

63. Northpoint supports a different approach than those proposed by the DBS entities. Northpoint argues that the appropriate and required standard is "harmful interference" as defined by the Commission's rules.[136] Northpoint proposes that the Commission adopt regional EPFD limits based upon an assumed C/I ratio of 20 dB between BSS and MVDDS.[137] Northpoint supports the use of EPFD as the required interference criteria because EPFD is measurable in the field, takes into account the operating environment, including the DBS receiver antenna gain, and is the metric adopted in this proceeding[138] to protect DBS from NGSO FSS interference.[139] The EPFD values would be calculated using a prescribed methodology that assumes a C/I of 20 dB, which Northpoint claims is approximately the level of

[131] *Id*. at 26-27, citing the RLSBA and the deployment of Local Multipoint Distribution Service (LMDS) as precedents.

[132] Pegasus Comments at 4-7; Pegasus Reply Comments at 5.

[133] Pegasus Comments at 4. Pegasus would accept an EPFD value, rather than a C/I value, because they have a one-to-one relationship. Pegasus Reply Comments at 6.

[134] Pegasus proposes: (a) a maximum power limit of 12.5 dBm EIRP, with a corresponding PFD limit at any DBS receiver of –181.5 dBW/m^2/MHz (at 2 km for a 500 MHz bandwidth); and (b) clarifying that the "southerly" pointing for the MVDDS antenna azimuth, *e.g.*, transmitter radiation of a 3 dB beamwidth should be at least 48 degrees from the boresight azimuth of the DBS antenna. Pegasus Comments at 4-6.

[135] DirecTV April 5, 2001 Reply Comments at 14.

[136] Northpoint Reply Comments at Technical Appendix, 1-2. *See also* note 50, *supra* for the definition of harmful interference.

[137] It is important to note that EPFD as used with respect to MVDDS is slightly different from the EPFD associated with NGSO FSS systems. In the NGSO FSS case, EPFD considered the time varying case of multiple NGSO FSS satellites that may be in view into various DBS dishes on the ground at different locations around the world. With respect to MVDDS, EPFD calculations consider static sources of MVDDS signal energy to a worst case DBS receive antenna, so there are no cases of time variance and the analysis is greatly simplified. *See* Northpoint Comments Technical Appendix, at 5, 15-16.

[138] *See First R&O,* 16 FCC Rcd at 4129 ¶¶ 77-80.

[139] Northpoint Comments Technical Appendix at 5.

interference accepted by each DBS system from other DBS systems[140] and is consistent with DBS operators' own estimates of acceptable interference protection from terrestrial systems over the years.[141] Northpoint states that a regional approach for EPFD values can be used to account for regional variations in rain rate and DBS signal power.[142] Accordingly, Northpoint proposes a specific EPFD limit, based on a C/I of 20 dB, for each of four regions of the U.S. Specifically, Northpoint proposes EPFD limits of –156.7 dBW/m^2/40 kHz in the southeastern U.S.;[143] –158.7 dBW/m^2/40 kHz in the southern U.S.;[144] –160.5 dBW/m^2/40 kHz in the northeastern U.S.;[145] and –163.0 dBW/m^2/40 kHz in the western U.S.[146]

64. Northpoint criticizes the DBS proponents' approach of requiring compliance with a limitation on increased BSS unavailability as unrealistic because of the wide variability in DBS reliability across the country due to natural propagation characteristics and DBS system changes.[147] They contend that because there is not a database of baseline availability at each customer location and rain rates (the major contributor to DBS outages) may vary by up to thirty percent from year to year, there is no way to calculate compliance with a percentage based criterion.[148] Furthermore, they state that under the proposed percentage based criterion, outages due to terrestrial operations would be essentially undetectable and cannot be measured with the degree of accuracy needed to enforce the regulations.

65. DirecTV disagrees with Northpoint's suggested method for deriving and for applying EPFD limits. DirecTV states that using an assumed 20 dB C/I as the basis for calculating EPFD limits is insufficient to protect DBS because it does not account for variations in satellite EIRP values and link parameters from subscriber to subscriber across the country for a given DBS operator. Further, DirecTV argues that Northpoint's suggested EPFD limits will not provide adequate protection to DBS because they are calculated over a limited set of DBS links and do not take into account variations in satellite EIRP across the Earth's surface, future DBS links, and different DBS customer antennas.[149] DirecTV also argues that, because Northpoint suggests using regional EPFD limits, the suggested EPFD values do not reflect the 20 dB C/I criteria[150] and DBS link unavailability would increase by more than 2.86%.[151] They

[140] Northpoint Comments Appendix 2 at 13.

[141] Northpoint Reply Comments at Technical Appendix, 4-5, citing a 1994 DirectTV report on terrestrial interference, 1998 Tempo Comments filed in this proceeding, and 1998 EchoStar Comments filed in this proceeding.

[142] Northpoint Comments Technical Appendix at 6.

[143] Northpoint defines the southeastern region to include Florida, Georgia, Alabama, Mississippi, and Louisiana. In satellite applications, measurements are generally referenced to a 4 kHz bandwidth, rather than the 40 kHz used by Northpoint. The equivalent EPFD for this region based on a 4 kHz bandwidth is -166.7 dBW/m^2/4 kHz.

[144] Northpoint defines the southern region to include New Mexico, Texas, Oklahoma, Arkansas, Tennessee, South Carolina, and North Carolina. The equivalent EPFD for this region based on a 4 kHz bandwidth is -168.7 dBW/m^2/4 kHz.

[145] Northpoint defines the northeastern region as bounded by and inclusive of North Dakota, Kansas, Virginia, and Maine. The equivalent EPFD for this region based on a 4 kHz bandwidth is –170.5 dBW/m^2/4 kHz.

[146] Northpoint defines the western region as bounded by and inclusive of California, Arizona, Colorado, Montana, and Washington. The equivalent EPFD for this region based on a 4 kHz bandwidth is –173.0 dBW/m^2/4 kHz.

[147] Northpoint Comments at 34.

[148] *Id*.

[149] DirecTV Reply Comments at 19.

[150] *Id*. at 12-13.

[151] DirecTV Comments at 27. DirecTV argues that the 20 dB C/I would result in a 37% increase in unavailability in Washington, DC and a 16.6% increase in Seattle, WA. DirecTV Reply Comments at 11.

also suggest that regional EPFD values would actually be more stringent for MVDDS because they would have to protect to the "worst case." Rather, DirecTV contends that EPFD limits should be calculated for each MVDDS site, and that this approach would allow MVDDS to take advantage of differences in satellite EIRP at different points on the Earth.[152] They argue that, contrary to Northpoint's assertion, the EPFD calculation for each site does not require a database of field availability measurements, does not require extreme precision, and is not unduly sensitive to changes in rain models. They contend that Northpoint ignores the record on the use of predictive modeling of DBS availability calculations in order to establish protection criteria.[153]

66. In its report, MITRE states that using a relative or percentage increase in unavailability as a measure of degradation is "attractive."[154] MITRE recognizes that although the "baseline unavailability varies dramatically depending on which satellite is used," this approach has the benefit of "reduc[ing] some of the variability that exist for other measures of interference outage time and thus the relative increase in unavailability is more attractive as a measure of degradation."[155] Further, they note, such an approach recognizes that the increase in unavailability that is noticeable to the consumer depends on the amount of outage the consumer currently experiences.[156] MITRE recommends that the MVDDS interference criterion be a ten percent relative increase in DBS unavailability rather than 2.86% because "[a]n increase of 2.86% seems very small and there is precedent for a ten percent increase …"[157] MITRE recommends that the criterion be implemented by having the MVDDS provider calculate the C/I consistent with a ten percent increase in relative unavailability for each service area and for the DBS satellite at each longitude that has the largest baseline unavailability (limited to those with 100 hours/year unavailability or less).[158]

67. Discussion. To place this matter in perspective, it is important to bear in mind that DBS is, on the whole, extremely reliable with typical service availabilities on the order of 99.8 to 99.9 percent.[159] Thus, when availability changes even slightly (*e.g.*, from 99.9 percent to 99.8 percent), the correspondingly small change in unavailability (from 0.1 percent to 0.2 percent), can be expressed as a percentage change that appears deceivingly large (*i.e.*, a 100 percent change in unavailability). Unavailability fluctuations of this degree (and higher) are commonplace, result in higher DBS unavailability rates in some locations in the country than others, and are well tolerated by DBS

[152] DirecTV Reply Comments at Appendix C.

[153] *Id*. at 10.

[154] MITRE Report at 5 to 34.

[155] *Id.*

[156] *Id*. at 6-5 to 6-6.

[157] *Id* at 6-6.

[158] *Id*. at 6-5 to 6-7.

[159] *See* Satellite Outage Analysis Results in Appendix G, which show in all our calculations baseline service availability exceeding 99.5% from the CONUS satellites. For the thirty-two cities analyzed, the data show the following:

Satellite Location (Degrees West Longitude)	Availability		
	Mean (%)	Standard Deviation (%)	Median (%)
101	99.90	0.08	99.92
110	99.79	0.10	99.79
119	99.83	0.11	99.83

subscribers in light of the overall dependability of the service.[160] The variability inherent in the DBS service is due to many factors, including satellite orbital location, satellite power, rain rate, and receiver location. Of these, the principal contributor to DBS service outages is rain.

68. The introduction of MVDDS will constitute another factor that will likely affect DBS availability to some degree. We have previously determined, however, that this factor can be controlled to a sufficient degree so that any interference with DBS service will be minimized to permissible levels. After careful consideration of the extensive record in this proceeding and our own analysis, we are adopting technical requirements that strike the appropriate balance between protecting DBS customers from interference, minimizing the impact on DBS operators' ability to make adjustments to their networks,[161] and not unduly constraining the deployment of MVDDS. We believe that these technical requirements will limit the overall impact of MVDDS on DBS operations and will ensure that the presence of an MVDDS signal would not be perceptible to the DBS customer in most cases.[162] Of primary importance, these technical requirements will ensure that any interference caused to DBS customers will not exceed a level that is considered permissible. We are taking the following steps to achieve these results:

- We used a prescribed methodology and a predictive model to calculate EPFD values, based on a criterion that would limit the amount of increased BSS unavailability to a negligible level over a baseline level of BSS unavailability due to the presence of MVDDS. The unavailability allowance ascribed to MVDDS is in addition to the unavailability allowance ascribed to NGSO FSS operations in the 12.2-12.7 GHz band.

[160] This tolerance is reflected by the fact that the subscriber rates in areas experiencing the highest rates of unavailability are comparable to those in areas with the lowest such rates. *See* Comments of SBCA in CS Docket No. 01-129 (In the Matter of Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming). In Appendix A of their comments, SBCA provides state-by-state penetration rates for DBS. This data show penetration rates of 41.27% for Vermont to 1.80% for Hawaii; half of the States have penetration rates between 20 and 30 percent. From the data, it appears that the penetration rate for DBS is not sensitive to the amount of baseline outage for a particular location. Examples are provided below:

State/City	State Penetration Rate (%)	Baseline Outage Per Satellite (Minutes/Year)		
		101° W.L.	110° W.L.	119° W.L.
Colorado Denver	21.78	148	156	71
Washington Seattle	17.12	741	689	828
Florida Miami Tampa Orlando	17.85	 1720 1427 1480	 1930 1598 1668	 2614 2142 2255
Texas Houston Dallas	24.88	 1040 820	 2476 2016	 1380 1099

[161] *See* para. 76, *infra* for discussion regarding the impact on DBS networks.

[162] The presence of an MVDDS signal could be detected under some circumstances even under the relatively strict limits we are adopting. For example, in certain rain events, the DBS signal from the satellite could be faded significantly while the terrestrial MVDDS signal is not, which could cause a rain induced DBS outage to last slightly longer than it would have if MVDDS were not present.

- We are specifying an EPFD limit for each of four regions across the United States. The regions and corresponding EPFD limits are: East: -168.4 dBW/m^2/4kHz, Midwest: -169.8 dBW/m^2/4kHz, Southwest: -171.0 dBW/m^2/4kHz, and Northwest: -172.1 dBW/m^2/4kHz.

- The EPFD limits we adopt, in conjunction with a maximum MVDDS power limit of 14 dBm per 24 megahertz EIRP[163] will ensure that the DBS service is protected from harmful interference.

- We will require the MVDDS operator to ensure that the prescribed EPFD limits are not exceeded at any DBS customer of record location. If the EPFD limits are exceeded, the MVDDS operator would be required to discontinue service until such time that the limits can be met.

- We adopt 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, we will consider adjustments to the EPFD limit for that specific location.

69. We conclude that specifying EPFD limits that define the impact of MVDDS on DBS subscribers is the most reasonable approach for several reasons. First, EPFD is a measure of the amount of signal power from a terrestrial transmitter that is detected by the DBS receiver and thus, capable of causing interference. As such, it directly measures the effect of the terrestrial station on the DBS receiver. Second, an EPFD limit can be measured and enforced. Third, calculating and measuring EPFD is simpler than other approaches, such as compliance with a C/I ratio, as the majority of the parties recognize. To calculate EPFD, one only needs to know the parameters of the terrestrial station (*e.g.*, power, antenna height, and antenna gain pattern) and its relative position to the DBS receive antenna in question; information regarding the satellite signal strength at each DBS receive antenna is not relevant to the calculation. Under a C/I approach, one also needs information regarding the specific satellite to which the DBS receive antenna is pointing (*e.g.*, power of the DBS signal in the direction of the DBS receive antenna).[164] Finally, we note that an EPFD limit is consistent with the approach used for limiting interference from NGSO FSS to DBS operations in this same frequency band.

70. We do not believe that it would be practical to require MVDDS operators to demonstrate compliance with a percentage criterion *per se*, as suggested by DirecTV and EchoStar. It would be very difficult to measure compliance of a percentage increase over a baseline with sufficient accuracy to enforce such a regulation.[165] Further, the DBS entities themselves recognize that an EPFD value is a reasonable metric to use for measurements in the field. Nonetheless, we find merit in using a percentage criterion as we develop appropriate EPFD limits. As MITRE noted, "the increase in unavailability that is noticeable to the consumer depends on what the consumer is used to."[166]

71. As a starting point, we applied the very conservative technical parameters and assumptions described below to derive EPFD values that would limit unavailability to a 10 percent increase for

[163] *See* para. 196, *infra*.

[164] EPFD and C/I are directly related. For a given satellite link the C/I is the difference between the satellite PFD and MVDDS EPFD.

[165] The actual percentage increase in unavailability can only be determined after the specified time period elapses and then only if each outage can be attributed to either natural phenomena (*e.g.*, rain fade, solar outage) or the presence of an MVDDS signal. For example, if the criterion is that MVDDS can cause no more than an increase in outage of 2.86% per year, then outages must be monitored for an entire year and the cause of each determined. From that data, the baseline outage due to natural phenomena and the increase due to MVDDS can be determined.

[166] MITRE Report at 6-6.

representative DBS receive antenna locations across the country and for several DBS satellites currently in service. More specifically, we began our analysis with 32 sample cities and for each of the DBS satellites at 101º, 110º, and 119º.[167] The EPFD values for each location were then averaged. The data show four distinct regions where the EPFD values had little variance. The EPFD values for locations within each region were then averaged, resulting in four regional EPFD limits. We determined that, consistent with sound engineering and effective regulatory practice, the four regional EPFD limits we adopt here will ensure that an MVDDS signal will only result in a small increase in the DBS service outages that occur during heavy precipitation, *e.g.,* the onset of a rain outage may begin sooner or a rain outage may last somewhat longer. These outage increases are significantly less than the seasonal or yearly variability in DBS outages customers currently experience due to the variability in actual rainfall rates. We believe the increased unavailability will not be perceptible to DBS customers in most cases and, in any event, do not rise to the level of harmful interference.

72. In adopting these EPFD limits, we find that an increase of ten percent over current DBS unavailability is the appropriate starting point for our analysis but need not be a strict limit. The ten percent benchmark represents an insubstantial amount of increased unavailability and does not approach a level that could be considered harmful interference. Our EPFD limits result in increased unavailability of approximately ten percent -- in some instances it is greater than ten percent of current unavailability, while in others it is less than ten percent. Taking into account the overly conservative assumptions used in our modeling, the reality that DBS outage rates vary widely around the country and from season to season, and the fact that outages occur at all times of the day – *i.e.,* not just when subscribers are watching DBS, we find that the additional service outage that may result here over and above the 10 percent starting point falls within the permissible level. As noted above, we believe that our MVDDS technical requirements create an appropriate balance – protecting DBS customers from harmful interference, minimizing the impact on DBS operators' ability to make future adjustments to their network, and not unduly constraining the deployment of MVDDS.

73. In response to the comments, we note as an initial matter that the parties suggest two different approaches for implementing the MVDDS interference criteria. The DBS entities suggest that the MVDDS operator calculate the EPFD limits for each DBS link within view of the area served at each terrestrial transmitting location, while Northpoint argues that specific EPFD limits should be applied to any MVDDS transmitter within defined regions. To understand the implications of these approaches, we conducted our own analysis of EPFD levels using the top 32 television markets. These particular cities were chosen because they represent population, geographic and climatic diversity across the United States. We used two analytical models to evaluate EPFD limits: one model calculates the baseline unavailability of a DBS system for a given location and the increased outage due to the presence of an MVDDS system; the other model calculates the contour within which the specified EPFD may potentially be exceeded.[168] This methodology is generally the same as those used by DirecTV,[169] MITRE, and the Commission in its *Further Notice.*[170]

74. As a threshold matter, we note that Northpoint objects to the Commission's use of a Mathcad program for the analytical model to calculate DBS outage time, claiming that the program itself produces

[167] *See* Appendix G.

[168] *See* Appendices E and J, respectively.

[169] *See* DirecTV Comments at Appendix I.

[170] *See Further Notice,* 16 FCC Rcd at Appendix H and MITRE Report at Section 2. MITRE's model differed from the Commission's in that it added a value for cross polarization isolation and a reference DBS antenna horizontal gain pattern. Those patterns are accounted for in the model used for this analysis. *See* Appendix J for detailed information on the model.

inaccurate results.[171] In addition, DirecTV and Northpoint observe that MITRE, which used a MATLAB program for its analytic model, did not make the program available; thus, no party has been able to check whether the system measurements were used correctly in the model.[172] Because MITRE did not make its program available, we continued to develop and use our own model for analysis and to confirm the modeling results of the parties. Contrary to Northpoint's assertion, we believe that the software used to calculate outage results is inconsequential, so long as the methodology is correct.[173] The model used follows the methodology laid out in the relevant ITU recommendations, and our results are consistent with those of the parties.[174]

75. The parties' primary differences concern the various input assumptions used in the analytic models. These include the unavailability criterion, threshold value of DBS signal quality, rain model, and DBS orbital locations to be protected. These issues are discussed in detail below.

76. At the outset, we conclude that the appropriate criterion on which to base EPFD levels is increased DBS unavailability expressed as a percentage of the baseline unavailability, and that this increase in unavailability would be in addition to the unavailability allowance relied upon for developing NGSO FSS limits. We believe that using a percentage increase in baseline unavailability as the criterion in developing EPFD limits has several advantages over a criterion based on a fixed C/I, as suggested by Northpoint. It allows entry of MVDDS while minimizing the impact to current DBS operations. DBS licensees currently apportion the satellite's resources to different customer locations based on a variety of factors such as DBS receive antenna elevation angles, average yearly rain rates in different regions of the country, and the amount of programming being made available to different markets. The results of these decisions can be seen when examining the link budgets for various cities. For example, the satellite transmit power or EIRP towards Washington, DC from DirecTV's satellite located at 101^{o} W longitude is 55.8 dBW, but only 51.8 dBW towards Seattle, WA.[175] By adjusting these link budgets, DBS providers can adjust the amount of outage customers experience due to rain. A percentage based criterion generally preserves the current relationship between different areas with regard to their relative DBS service levels, *i.e.*, the outages in any given area will increase by different amounts, but the increase will be less in areas that currently experience less outage than in areas that currently experience more outage.[176] If a constant C/I criterion were used, the relationship between the relative level of outage between locations would not be preserved. Thus, DBS licensees would have to modify their current link budgets to maintain the current relationship of relative outage times between areas. Further, as new entrants, MVDDS providers

[171] Northpoint Comments at Appendix 2, pp. 17-24.

[172] DirecTV Reply Comments on the MITRE Report at 19; Northpoint Reply Comments on MITRE Report at Technical Appendix, p. 4 (argues that because the program code was not made available publicly, the Commission cannot rely on the MITRE estimates of unavailability or impact).

[173] For example, Northpoint and DirecTV use a spreadsheet for their computations. However, inputs to that spreadsheet come from the computational methods of ITU-R Recommendation P.618. *See, e.g.*, DirecTV Comments at Appendix I, Table A, Lines 42 and 47. Under that approach, separate calculations would be needed to determine the necessary inputs. The Commission's Mathcad model combines all the calculations into one self-contained module, which incorporates the same methodology as DirecTV and Northpoint, but also incorporates the computations of the ITU Recommendation. A description of the Commission's model is provided in Appendix J.

[174] *See* Appendix G for analysis results.

[175] DirecTV Comments at Appendix I.

[176] For example, a DBS customer in Denver, CO viewing the satellite at 101^{o} W longitude currently experiences an average outage of 148.6 minutes per year and a DBS customer in Washington, DC viewing the same satellite currently experiences an average yearly outage of 220.0 minutes per year. With an increase in unavailability due to MVDDS of approximately ten percent, these customers would experience average outage increases of 14.9 and 22.0 minutes per year for Denver and Washington, respectively.

can vary their system design and deployment (*e.g.,* antenna type, tower height) to "design around" the characteristics of already deployed satellites. Therefore, we adopt a percentage based approach because it provides maximum protection to incumbent DBS licensees by allowing them to maintain their current business practices while still providing for new MVDDS service.

77. We also conclude that our decision to adopt a percentage increase in unavailability as a criteria for developing EPFD limits for MVDDS, in addition to the unavailability allowance relied upon for developing NGSO FSS limits, strikes an appropriate balance among the three services that will share this frequency band. Initially, as discussed in the *MO&O* portion of this document, we reject DirecTV's and EchoStar's argument that the ITU findings in ITU-R Rec. BO.1444, which set forth sharing parameters for DBS and NGSO FSS, limits increases in DBS unavailability from any source to ten percent and thus controls our decision in this proceeding. Furthermore, adopting this approach here would delay and unduly constrain the deployment of new NGSO FSS systems. In order to apportion some of the NGSO FSS unavailability allowance to MVDDS, we would have to revise the EPFD limits for NGSO FSS or limit the number of NGSO FSS systems in the band to less than the 3.5 factor used in developing these technical limits. These limits also have been adopted internationally because the NGSO FSS systems that plan to use this frequency band are global satellite systems, and thus, these limits also would have to be revised internationally. The EPFD limits for NGSO FSS were the result of a multi-year negotiation process among various countries, and we are not persuaded that the interests of the United States would be well served by revisiting these agreements at this time.

78. In the *Further Notice* the Commission sought comment on the different criteria that could be used to develop MVDDS technical limits, including a percentage increase in DBS unavailability, such as 2.86%, ten percent or any other percentage, or a fixed amount of minutes increase in DBS unavailability.[177] This percentage of time criteria must be considered in conjunction with all other operating parameters of the DBS and MVDDS systems (*e.g.*, DBS performance threshold,[178] satellite location and EIRP, MVDDS power, transmit and receive antennas, etc.) to calculate the EPFD necessary to protect DBS subscribers against impermissible interference. The DBS proponents wanted the increase in unavailability to be limited to 2.86% because the 2.86% allowance for MVDDS would be only a portion of the ten percent allowance that, the parties argue, is the recommended ITU protection level for BSS systems from all interfering sources. We now conclude, based on further analysis of these issues by Commission staff and the independent analysis performed by MITRE, that calculating MVDDS EPFD limits that allow additional increased unavailability in the range of ten percent ensures DBS of protection from harmful interference while creating an opportunity to deploy MVDDS.

79. Based on our analysis, we conclude that the EPFD limits we adopt here result in relatively modest increases in outage times that should not be readily perceptible to DBS customers. We observe that the increase in unavailability due to this potential interference is much less than the seasonal, yearly, and city-to-city variability that already exists in the unavailability within the DBS service.[179] Thus, the

[177] *See Further Notice,* 16 FCC Rcd at 4196-97 ¶¶ 268-270.

[178] The performance threshold is used to define when an outage occurs, as discussed in para. 79, *infra*.

[179] Although DBS licensees attempt to equalize service levels across various areas of the country, differences in geography and climactic conditions limit the ability to achieve this goal. Variations exist on a city-to-city basis due to a combination of these factors. In addition, variations exist within cities due to seasonal and yearly variations in the amount of rain. This is shown in the following tables. The first table shows the variation in the amount of rain for January and August for Reno, NV and Allentown, PA over a 12 year period (1990-2001) (Source: National Climatic Data Center http://lwf.ncdc.noaa.gov/oa/climate/research/cag3/city.html). The second table shows the variation in baseline outage time due to differences in geography (elevation above mean sea level) and rain rate. Note: some of the variation of the second table can also be attributed to differences in the elevation angle of the DBS receive antenna.

(continued....)

additional unavailability that may be attributed to MVDDS is only a marginal increase over the variability that already exists within this satellite service. In making this determination, we also take into account the very conservative parameters and assumptions used in our modeling. For example, as discussed below, we use a conservative performance threshold value of DBS signal performance to calculate the EPFD. In addition, we do not believe that the effect of NGSO FSS and MVDDS operations on DBS unavailability will be directly cumulative (*i.e.,* the total DBS unavailability will actually be less than the sum of the individual increases in unavailability caused by the NGSO FSS systems and an MVDDS system). We base this finding on our analysis, which (for computational simplicity) evaluated the effects of NGSO FSS and MVDDS independently. However, in some cases, the interference events caused by MVDDS and NGSO FSS signals will coincide. Thus, our assumption of independence overstates the actual outage to DBS, *i.e.*, our analysis calculated outage time due to MVDDS and NGSO FSS separately, but did not compute the amount of time the outages would occur simultaneously. Finally, our analysis assumed worst case operating conditions – a rain faded DBS signal and a full strength MVDDS signal. In practice rain will generally affect both the MVDDS and the DBS signals in an area. Because, in many cases, a faded MVDDS signal would be received by the DBS system, the total increase in DBS unavailability due to MVDDS will be less than the amount calculated in our analysis. We believe that in this band, under these circumstances, using an increase of ten percent in DBS unavailability is the correct starting point from which to calculate EPFD limits for MVDDS. On a going forward basis, the DBS operators should take this into account in designing future satellites.

80. Another point of contention among the parties was the correct threshold value of DBS signal performance to use as an input assumption in the predictive model. Essentially, the threshold value is a measure of the audio and video signal quality.[180] DirecTV argues that it is proper to use the operating threshold[181] of the system, while Northpoint states that the freeze-frame[182] threshold is the correct value to

(...continued from previous page)

Table 1

	Rain (inches/month)			
	Reno, NV		Allentown, PA	
Year	January	August	January	August
2001	0.18	0.00	2.37	2.50
2000	2.14	0.79	1.99	5.22
1999	0.76	0.82	5.44	3.81
1998	1.10	0.00	3.42	3.12
1997	3.32	0.00	3.38	5.12
1996	1.33	0.16	7.32	0.91
1995	3.31	0.00	3.49	0.76
1994	0.06	0.00	5.69	6.18
1993	2.42	0.00	1.98	5.39
1992	0.13	0.28	1.73	4.08
1991	0.01	0.24	2.77	2.54
1990	0.62	0.21	4.57	6.47

Table 2

	Elevation (km)	Rain Rate* (mm/hr)	Baseline Outage** (min)
Denver	1.58	30.29	50.0
San Francisco	0.03	33.63	225.3
Miami	0.00	95.76	550.4

* Rain rate exceeded 0.01% of time in an average year.

** For the satellite at 101o W longitude.

[180] *See* MITRE Report at 3-12 to 3-13.

[181] The minimum signal level for GSO satellite to maintain communications is defined by an operational threshold in terms of a given carrier-to-noise ratio (C/N). The operating threshold defines the minimum C/N required for the link to achieve desired communications.

[182] When the bit error rate of the demodulated MPEG video bit stream is sufficiently high to cause the associated video MPEG decoder to cease to provide one or more pictures, the video decoder initiates error concealment techniques, such as the presentation of the last available MPEG picture (freeze frame).

use.[183] As an alternative, MITRE established a 9-level video/audio criterion to measure signal quality.[184] Based on their analysis, MITRE recommends basing the threshold value at signal level 6 (or video quality 6 (VQ6), less than one error per 15 seconds, but more than one error per minute).[185] EchoStar disagrees with MITRE's approach, claiming that this factor is arbitrary and much less severe than the level of performance they guarantee their customers. Instead of VQ6, they argue that the threshold should be set to a level equivalent to quasi-error free (QEF) performance (1 uncorrectable error per hour). They state that this is the level of performance they guarantee to their customers.[186] Northpoint, in contrast, argues that the VQ6 standard is too strict. They state that a certain amount of pixelation of the video image will occur due to incompatibility between the video compression rate and the channel bandwidth.[187] Therefore, they argue, the DBS link is available even below these levels and a less stringent threshold can be used.[188] After consideration of this matter, we conclude that the operational or QEF threshold is the appropriate value to use as an input assumption in the predictive model.[189] The QEF value represents an audio/video signal that appears essentially error-free to the DBS customer; errors that occur in transmission can be corrected using forward error correction[190] at the DBS customer's decoder. Because one of our primary objectives here is to identify a level of interference from MVDDS that would be essentially imperceptible to a DBS customer, using the highest threshold value in the predictive model is closer to calculating the worst case impact on DBS signal quality. We note however, that the QEF threshold values used in our analysis are, in general, stricter than the threshold values that the DBS entities submitted to the ITU for use in developing EPFD limits for DBS/NGSO FSS sharing. For that analysis, EchoStar assumed an operating threshold of 6.1 dB for all links and DirecTV assumed threshold values of 5 dB or 7.6 dB.[191] In addition, in their comments, DirecTV suggests using threshold values of 5.5 dB and 7.6 dB.[192] Although these values closely correlate with the VQ6 value used by MITRE,[193] we do not believe that the VQ6 value is appropriate to use in our analysis. MITRE devised its own scale to meet specific objectives of its testing environment[194] and stated that the VQ6 level may not represent an

[183] *See* DirecTV Comments at 20-21 and Appendix I; Northpoint Comments at Technical Appendix, Page 19.

[184] *See* MITRE Report at 3-13.

[185] *Id*. at 3-12 to 3-13 and 6-5.

[186] *See* EchoStar Comments to MITRE Report at 11.

[187] *See* Northpoint Comments to MITRE Report at Technical Appendix, Page 8.

[188] *Id*. at 10-11.

[189] QEF threshold values of 8.1 dB and 8.4 dB are used for EchoStar and DirecTV's systems, respectively. *See* MITRE Report at 3-18.

[190] Forward error correction (FEC) is a technique used for data transmission wherein the receiving device has the capability to detect and correct any character or code block that contains fewer than a predetermined number of symbols in error. FEC is accomplished by adding bits to each transmitted character or code block, using a predetermined algorithm.

[191] *See* ITU-R Recommendation BO.1444, Annex 1. The database of representative links is available on the ITU's website at http://www.itu.int//itudoc/itu-r/sg11/docs/sg11/1998-00/contrib/138e2.html. With respect to the threshold values used by DirecTV, we note that 5 dB is used for weaker transponders and 7.6 is used for stronger transponders. Also, in two cases DirecTV assumed a threshold value of 11 dB.

[192] These are the threshold values used in their example calculations for Washington, DC and Seattle, WA. *See* DirecTV Comments at Appendix I.

[193] For DirecTV, MITRE uses a VQ6 threshold of 7.3 dB which is approximately the same as DirecTV's 7.6 dB threshold and more stringent than their 5.5 dB threshold.

[194] MITRE chose the VQ6 threshold because it was mid-range in the span over which signal degradation could actually be observed repeatedly and reduced the amount of time in test execution. *See* MITRE Report at A-8.

acceptable picture to a DBS customer.[195] Finally, we agree with commenters who argue that the freeze-frame threshold is not an appropriate measure because when the signal level is reduced to this level, picture and audio performance are already degraded to levels where DBS customers will notice the degradation. Consequently, neither the VQ6 nor the freeze frame thresholds satisfy our objective to identify a level of interference that would be imperceptible to a DBS customer.

81. As stated earlier, the primary cause of degradation to DBS signals is due to heavy rain. Thus, any analysis is dependent on the method used to model rain effects in different geographic locations. To assist administrations, the ITU has developed a series of recommendations to model long-term rain statistics, ITU-R Rec. P.618.[196] Since the original recommendation, more data has been collected and modeling methods have improved. Taking advantage of this, the ITU has adopted several revisions, with the current version referenced as ITU-R Rec. P.618-7. We note that for the DBS/NGSO FSS sharing studies, DirecTV submitted representative links which specified ITU-R Rec. P.618-5 as the relevant rain model; there is no similar indication of which rain model EchoStar recommended. DirecTV provides examples using the same version of the rain model, ITU-R Rec. P.618-5, for their analysis of the effects of MVDDS on DBS service.[197] However, they state that ITU-R Rec. P.618-6 could also be used.[198] Northpoint argues that the more recent ITU-R Rec. P.618-6 should be used. We agree. The change from version 5 to 6 was a major revision of the model. In version 5, the earth was divided into rain regions with a value for rain rate attributed to each region. Version 6, in contrast, relies on more data and incorporates a multi-dimensional interpolation to calculate a rain rate for any geographical location. As a result of the additional data and increased sophistication of the version 6 model, we believe that it provides more accurate results than previous versions. Thus, we have used it in our analysis. Finally, we note in February 2001, the ITU adopted an update to the rain model, ITU-R Rec. P.618-7. We believe that the changes in the newer version are minor in nature and would not affect the outcome of our analysis.[199]

82. Another parameter central to the analysis of MVDDS/DBS sharing is the inclusion or exclusion of the various satellites in use. Currently, the United States has eight orbital slots for DBS service. Nominally, these are 61.5^{o}, 101^{o}, 110^{o}, 119^{o}, 148^{o}, 157^{o}, 166^{o}, and 175^{o} west longitude.[200] Of

[195] *See* MITRE Report at A-9.

[196] The ITU Recommendation P.618 is titled, "Propagation Data and Prediction Methods Required for the Design of Earth-Space Telecommunication Systems."

[197] DirecTV Comments at Appendix I, page 2.

[198] *Id*.

[199] These changes include the removal of a step-by-step procedure for calculating gaseous attenuation and a removal of some information included with the section on estimating total attenuation due to multiple sources of simultaneously occurring atmospheric attenuation. In both instances, the updated recommendation references the methods of ITU Rec. P.676.

[200] Actual transponder usage at each orbital location is shown in the table below:

(continued....)

these, only three provide full continental United States (CONUS) coverage - 101°, 110°, and 119° west longitude.[201] Taking advantage of the coverage afforded by the satellite at 101° west longitude, DirecTV uses it to provide service (core programming and local channels) to the majority of its customers. EchoStar has implemented its system differently. It generally provides core programming via its satellite at 119° west longitude and local channels via its satellite at 110° west longitude.[202] The remaining orbital locations are used for specialized programming or are not currently used at all. In considering orbital locations as part of our interference analysis, we developed as an initial step protection criterion that focused on the three CONUS slots because the vast majority of DBS programming originates from the three orbital slots and because we believed that our results would translate comparably to the other satellites. After deriving EPFD levels based on our analysis of the three satellites providing full CONUS coverage, we then applied these levels to satellites using other orbital slots and found that these EPFD levels provide a level of protection consistent with that specified for the CONUS slots. In particular, we modeled the satellites at 61.5° and 148° west longitude to ensure that the effect of our EPFD limits on outage time is generally consistent with the protection criterion from which we started. This modeling effort showed that these satellites will receive sufficient protection from MVDDS under our adopted EPFD limits.[203] Such protection is essential because Dominion operates solely from the satellite located at 61.5° west longitude and the other DBS licensees could shift programming to make heavier use of the satellites at the non-CONUS orbital locations in the future.

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Orbital Location (west longitude)	DirecTV (transponders)	EchoStar (transponders)	Dominion (transponders)	General Usage*
61.5°		30**	2***	International / Special/ Religious
101.0°	32			Basic / Premium / Sports / Local (29)
109.8°	3			Local (2)
110.0°		29		Local (34)
118.8°	11			Spanish / Local (10)
119.0°		21		Basic / Premium / Sports / National network feeds (4)
148.0°		24		International / Special
157.0°				
166.0°				
175.0°				

* This column only indicates general usage. In many cases additional types of programming are present.
** EchoStar uses 13 channels on a temporary basis pursuant to Special Temporary Authority only.
*** Dominion leases 8 transponders on the EchoStar's EchoStar III satellite and subleases 6 transponders back to EchoStar.
(x) x indicates the number of markets served. There are several channels (ABC, NBC, CBS, FOX, WB, UPN, etc.) per market.

Source:
Transponders – Satellite Broadcasting and Communications Association training materials.
Usage information – www.lyngsat.com

[201] The satellite at 61.5° has very low look angles in the northwestern U.S. and the satellites at 148°-175° are below the horizon in the eastern U.S.

[202] Under the various implementations, DirecTV subscribers can receive all programming from a single feed receive antenna while EchoStar subscribers require a dual feed receive antenna or a second single feed receive antenna to receive both core programming and local channels. *See* http://faq.dishnetwork.com/questions/85.asp?sc=%2F&cboSubCategory=0&cboCategory=0&txtSearch=local+broadcast&pg=1.

[203] *See* Appendix G.

83. Using the parameters and assumptions described above, we analyzed the top 32 television markets to determine the EPFD value for each market. As described in Appendix G, because these markets provide population, geographic, and climatic diversity, we believe they are representative of the U.S. as a whole. The results of our analysis revealed the presence of four distinct regions where calculated EPFD levels do not vary substantially and thus, the application of regional EPFD values to specific locations within each region result in acceptable variations in unavailability. These regions can be roughly described as the East, Midwest, Southwest, and Northwest and are shown in Figure 2 in Appendix G. Because of the consistent EPFD levels within each of these regions, we believe that it is appropriate to average the individual EPFDs for each market and adopt that average EPFD within each region. Specifically, we adopt the following EPFD limits for MVDDS to meet at any DBS subscriber location and for all U.S. satellites in view:[204] -168.4 dBW/m^2/4kHz in the East;[205] -169.8 dBW/m^2/4kHz in the Midwest[206]; -171.0 dBW/m^2/4kHz in the Southwest[207]; and -172.1 dBW/m^2/4kHz in the Northwest.[208] Because anomalous situations may arise at specific locations within such large regions—*e.g.*, rainfall at a location may deviate significantly from the rain model—we will consider requests by DBS providers to adjust the EPFD limit for a specific location within a region where they can demonstrate a tangible detrimental impact on DBS caused by MVDDS operations. This EPFD "safety valve" should ensure that DBS operations are fully protected throughout a region.

84. Although an approach based on averaging affects each market and satellite combination differently (*i.e.*, the effect on better performing satellites in a market is minimized, while the effect on poorer performing satellites is increased), these effects are relatively minor.[209] Using the average EPFD values for each region, the data show that the median increase in unavailability was 10.5% and the mean value was 11.9% for the total 32-city sample.[210] We find these results to be well within the range of ten

[204] The EPFD limits are incorporated into the rules in 47 C.F.R. § 101.105.

[205] The Eastern region consists of the following states: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Louisiana, and Florida.

[206] The Midwestern region consists of the following states: Ohio, Michigan, Indiana, Wisconsin, Illinois, Minnesota, Iowa, Missouri, Arkansas, South Dakota, Nebraska, Kansas, Oklahoma, and Texas.

[207] The Southwestern region consists of the following states: Wyoming, Colorado, New Mexico, Utah, Arizona, Nevada, and California (south of 37^o North Latitude).

[208] The Northwestern region consists of the following states: Washington, Oregon, California (north of 37^o North Latitude), Idaho, Montana, North Dakota, Alaska, and Hawaii.

[209] The calculated outage from an average EPFD will vary from ten percent. The amount of variance depends on the satellite EIRP, average rainfall in a specific location, and elevation angle of the DBS receive antenna. *See* Appendix G.

[210] *See* Appendix G. As a consequence of using an average EPFD value, many of the "difference in outage" values for the 32-city sample are above the starting basis of a 10% increase in unavailability. In many instances, this is only by a small nominal amount of a few percentages. In others, however, the differences are larger. For example, in a few instances, the increase in unavailability was on the order of 20-30%. However, the corresponding decrease in DBS service availability for these instances was only on the order of 0.05-0.08%. There are factors within DBS providers' control that affect the link budget and could result in similar increases in unavailability. These include the way available satellite power is apportioned among transponders and the amount of forward error correction being used. Less power allocated to a given transponder and less forward error correction results in a decrease in the margin and an increase in unavailability. Other factors such as actual seasonal and yearly precipitation conditions will cause much greater variations in the DBS service availability. Therefore, engineering judgment suggests that these differences are not significant and represent an acceptable range. Further, the instances where unavailability was on the order of 20-30% occurred only in the case of the satellite at 110º. This DBS satellite is scheduled to be replaced with a newer higher-powered satellite well in advance of MVDDS deployment. A higher-powered satellite will reduce service unavailability due to MVDDS. *See*, *e.g.*, footnote 211*, infra*. While these values are taken into account in the averaging to determine the regional EPFDs, as noted above, we conclude that they should not (continued....)

percent, and we conclude that they constitute permissible interference. We find further that many benefits are inherent in a regional approach that outweigh the drawbacks of separately calculating an EPFD for each market. By specifying an EPFD level in our rules, a separate calculation is not needed for each transmitting location, which provides a simple regulatory framework for our licensees. Thus, all parties know *apriori* the sharing environment that exists in each market. Further, by specifying EPFD levels in the rules, DBS licensees reap all the benefits of upgrading their system. For example, because the EPFD levels we are adopting are based on the current state of the DBS system, the performance of newer, more powerful satellites will decrease the potential outages to DBS customers. However, if a separate calculation were required for each transmitting antenna, the EPFD levels calculated in regions served by more powerful satellites would be higher than those we are specifying and allow MVDDS to operate with higher powers. Under our approach, therefore, the potential DBS outage minutes for each market would decrease as newer, higher powered satellites are implemented.[211] Finally, we note that this approach is similar to the approach adopted for NGSO FSS/DBS sharing which set specific EPFD levels that must be met.

85. In sum, we believe that the approach to technical sharing of MVDDS with DBS as outlined above strikes a reasonable balance between protecting incumbent licensees and their subscribers and providing sufficient flexibility for new service providers to deploy. These new services will provide opportunities for licensees to enhance the video and data services enjoyed by the public. Finally, in making these new services available, our analysis shows that under the parameters we specify, additional outages to DBS customers will be limited to levels which we believe will be imperceptible to the consumer in most cases, and in any event, at permissible levels. Nonetheless, as described above, if due to an anomalous situation, a DBS provider can demonstrate a tangible detrimental impact on DBS caused by MVDDS operations, we will consider adjustments to the EPFD limit for that specific location.

(...continued from previous page)
predominate in the determination of the EPFDs given the scheduled satellite upgrade and the fact that even a 20-30% increase in predicted unavailability (under our conservative model) should be considered permissible.

[211] For example, we calculated a baseline outage of 1331.7 minutes per year in Atlanta when viewing the satellite at 119° west longitude. On February 21, 2002, EchoStar launched a new satellite, EchoStar 7, to this orbital location. This satellite is more powerful than the previous satellite at 119° west longitude and will also use spot beams to many markets. In Atlanta, this translates to a reduction in baseline outage to 645.9 minutes per year for the general DBS signal and to 156.5 minutes per year for those channels that are transmitted using the spot beam. *See* Application of EchoStar Satellite Corporation for Minor Modification of DBS Authorization, Launch and Operating Authority for EchoStar 7, File Nos. SAT-MOD-20010810-00071 & SAT-A/O-20010810-00073, (August 10, 2001). As shown in the table below, a corresponding decrease in the outages caused by MVDDS would also be seen:

Atlanta, GA								
Satellite	Baseline Outage	Baseline Outage plus 10% Increase	EPFD For 10% Increase	FCC Adopted EPFD	Outage With FCC EPFD	Outage Increase		Difference Between Calculated And FCC EPFDs
	(minutes)	(minutes)	($dBW/m^2/4$ kHz)		(minutes)	%	(minutes)	DB
Previous	1331.7	1464.87	-169.4	-168.4	1510	13.4	178.3	0.96
Echo7 (General)	645.9	710.49	-166.5	-168.4	686.4	6.3	40.5	-1.9
Echo 7 (Spot)	156.5	172.15	-160.3	-168.4	158.7	1.4	2.2	-8.1

b. DBS Mitigation

86. Background. In the *Further Notice*, the Commission proposed to hold the MVDDS operator responsible for ensuring that DBS subscribers within the mitigation zone do not suffer an impermissible level of interference due to MVDDS operations.[212] Toward that end, the Commission proposed to require MVDDS licensees to correct any impermissible interference within the mitigation zone and proposed a general plan to accomplish the correction.[213] The Commission also requested comment on alternative procedures that could be used to expeditiously resolve interference disputes between the MVDDS and DBS licensees.[214]

87. Discussion. After careful consideration of the record, we reach the following conclusions. First, we disagree with the assertions of DBS entities' that MVDDS is a secondary service.[215] As we affirm in the *MO&O* portion of this document, the BSS and Fixed services have co-primary status in the 12.2-12.7 GHz band, but the Fixed Service is required by a footnote to the Table of Frequency Allocations not to cause harmful interference to DBS.[216] Co-primary services have an obligation to ensure that interference is not caused to existing operations. This obligation includes steps that go beyond antenna siting and design and thus we do not limit this obligation solely to MVDDS licensees.[217] Second, we agree with the MITRE Report findings that techniques exist, both for the MVDDS transmitting antenna and the DBS receive antenna locations that could be used when installing new DBS receive antennas to reduce the interference impact on DBS.[218] While the parties disagree on the effectiveness of some of these techniques under certain conditions,[219] we find that a wide variety of techniques are available. In many cases, DBS receive antennas can be installed such that they will be protected by "natural" shielding from, for example, buildings or topographical features. The MITRE Report discussed several techniques, such as proper siting of the DBS receive antenna to take advantage of natural shielding, using modest additional shielding on the DBS receive antenna (*e.g.*, clip on shields), and using

[212] *See Further Notice,* 16 FCC Rcd at 4198-99 ¶¶ 272-274.

[213] *Id.* at 4199 ¶ 273.

[214] *Id.* at 4199 ¶ 276.

[215] *See* DirecTV Comments at 14; EchoStar Comments at 20; DirecTV Reply Comments at 18. EchoStar and DirecTV argue that MVDDS operations have a secondary allocation status in the frequency band, and thus MVDDS has the burden of avoiding harmful interference to the primary DBS service. They also argue that mitigation at a DBS subscriber premise should not be allowed because it would effectively render DBS a secondary service in the band.

[216] *See* 47 C.F.R. § 2.105(c) (in the Table of Frequency Allocations, the names of primary services are listed in all capitals, whereas a mix of upper and lower case characters are used for secondary services). The Fixed Service in the 12.2-12.7 GHz band is listed in all capitals. Footnote S5.490 specifically states: "In Region 2, in the band 12.2-12.7 GHz, existing and future terrestrial radiocommunication services shall not cause harmful interference to space services operating in conformity with the broadcasting-satellite Plan for Region 2 contained in Appendix S30." Although the fixed and satellite services are co-primary in the Table of Allocations, the fixed services must not cause harmful interference to the DBS assignments that have been implemented in accordance with Appendix S30 as opposed to any DBS operations that are not consistent with the Plan. We note that, in general, the DBS satellites have characteristics that require modification to the Plan assignments. These assignment modifications have to be coordinated through the Appendix S30 process with other affected assignments and accepted into the Plan before they can be protected from the existing and future fixed services. Hence, it is more efficient to implement sharing and protection guidelines between the fixed service and these modified DBS assignments as outlined herein rather than wait for the outcome of the ITU coordination process, which is not guaranteed.

[217] *See* para. 92, *infra* which discusses the obligations of both MVDDS and DBS licensees.

[218] *See* MITRE Report at 6-3 to 6-4.

[219] *See*, *e.g.* EchoStar MITRE Report Comments at 4.

larger or better performing DBS receive antennas as reasonable measures to consider.[220] The acceptability of any given technique can be determined, by the installer, on a case-by-case basis.

88. When an MVDDS operator enters a market where there are existing DBS customers, the MVDDS operator must satisfy certain requirements that will provide protection to these customers. First, the MVDDS operator must site and design its transmitting system to avoid causing harmful interference to existing DBS subscribers. In this context, the MVDDS operator must site and design its transmitting system to ensure that an MVDDS signal does not seriously degrade, obstruct, or repeatedly interrupt the DBS signal under clear sky conditions. If harmful interference to an existing DBS subscriber occurs, the MVDDS operator must immediately take corrective action or cease operation until it corrects the problem. Second, the MVDDS transmitting system power must not exceed 14 dBm per 24 MHz EIRP. We believe that this power limit reduces the likelihood that MVDDS operations would significantly degrade DBS service to both existing and new DBS customers. We also believe that this power limit will not inhibit the introduction of new DBS customers in close proximity to the MVDDS transmitting system, *i.e.*, later-installed DBS receive antennas can be properly sited and shielded from the MVDDS signal.

89. Finally, with respect to the performance of mitigation, we decline to adopt rules that require an MVDDS licensee to perform mitigation at existing DBS locations within a mitigation zone. Instead, we adopt an approach in which MVDDS licensees must ensure that the adopted EPFD is not exceeded at any DBS customer of record[221] location. We believe that this approach offers a reasonable compromise between the positions of the parties and strikes a balance among several factors including the impact on DBS customers and the effect on DBS and MVDDS deployment. As detailed below, the procedures we adopt streamline the regulatory process and reduce the need for ongoing interactions between DBS and MVDDS providers.

90. We will require the MVDDS licensee to ensure that the EPFD at all existing DBS subscriber locations is at or below the values adopted herein or to turn off the transmitter(s) which are causing the excessive EPFD levels. MVDDS cannot resume until such time that the specified EPFD levels can be met. This approach addresses many of the concerns raised by DBS entities. First, it provides a strong incentive to the MVDDS licensee to site and design its system in such a way that existing DBS subscribers are not affected. Second, neither party would have a mandate under the rules to approach DBS customers to offer mitigation. However, we note that our rules do not preclude private parties (including MVDDS licensees and DBS subscribers) from entering into arrangements agreed to by both parties. Finally, because MVDDS licensees have total control of their system design (*e.g.*, through reduced power levels or re-siting of the MVDDS transmitting antenna) under this approach, they can predict system costs to meet the EPFD limits and factor such expenses into their bidding strategies during the auction process.

91. As mentioned above, MVDDS licensees will be required to ensure that the EPFD levels are met at all DBS customer of record locations.[222] Under the rules we adopt, MVDDS licensees must conduct a survey of the area around their proposed transmitting antenna site to determine the location of all DBS customers who may potentially be affected by the introduction of MVDDS service. The MVDDS licensee will assess whether the signal levels from its system, under its deployment plans, would exceed the adopted EPFD levels. To assist in making this determination, the MVDDS provider can use

[220] *See* MITRE Report at 6-4.

[221] DBS customers of record are those who had their DBS receive antennas installed prior to or within the 30 day period after notification to the DBS operator by the MVDDS licensee of the proposed MVDDS transmitting antenna site. *See* para. 92, *infra*. for a discussion of the notification requirement.

[222] We note that this is analogous to the approach we adopt for NGSO FSS/MVDDS sharing where we require that an MVDDS operator meet a PFD limit at all locations 3 km from its transmitting facility. *See* para. 112, *infra*.

the EPFD contour model developed by the Commission.[223] For example, the model can be used to develop a family of contours based on the planned height of the transmit antenna, a variety of DBS receive antenna models and heights, and each satellite in view at that location.[224] Using those contours along with knowledge of local terrain and building characteristics and the survey results, an MVDDS licensee could make a determination of whether its signal levels will exceed the EPFD limit at a specific DBS customer site.[225] For example, if a DBS receive antenna is within the zone predicted by the model where the EPFD level might be exceeded, but that antenna is mounted on the back of a structure facing away from the MVDDS transmitting antenna site such that the MVDDS signal would be blocked from the DBS antenna, the MVDDS licensee could make a determination that its signal level at that antenna would comply with the rules. If the MVDDS licensee determines that its signal level will exceed the EPFD limit at any existing DBS customer site, the licensee must take whatever steps are necessary, up to and including finding a new transmitting site, to ensure that the EPFD limit would not be exceeded at any existing DBS customer location.

92. We will require the MVDDS operator to provide to the DBS licensees at least 90 days prior to the planned date of commencement of operations of each transmitting antenna, the proposed location (including coordinates), maximum EIRP of each transmitting antenna system, antenna height above ground, antenna type along with main beam azimuth and altitude orientation and description of the antenna radiation pattern, and the survey results, including a description of how compliance with the appropriate EPFD level was determined at DBS customer of record locations. No later than forty-five days after receipt of the MVDDS system information, the DBS licensee(s) will provide the MVDDS licensee with a list of any new DBS customer locations that have been installed in the 30-day period following the MVDDS site notification. In addition, the DBS licensee(s) could indicate agreement with the MVDDS licensee's technical assessment, or identify DBS customer locations that the MVDDS licensee failed to consider or DBS customer locations where they believe the MVDDS licensee erred in its analysis and could exceed the prescribed EPFD limit. We believe that this 90-day period will provide sufficient time for the DBS licensees to adjust their installation guidelines for future DBS customers to account for the presence of the MVDDS transmitting antenna. After the DBS licensees are informed of a potential MVDDS site, the DBS licensee will have the responsibility of ensuring that all DBS receive antennas installed more than 30 days after such notification are located in such a way as to avoid interference from MVDDS. As noted above, the power limit we adopt here allows for the introduction of new DBS customers in close proximity to MVDDS transmitters. We believe that DBS licensees can take modest measures, *e.g.,* siting and shielding steps or use of a larger antenna, to account for the presence of an MVDDS signal. Because such steps are simple, effective, and consistent with existing DBS installation practices, we believe it is reasonable to expect DBS licensees to incorporate the presence of an MVDDS signal into their installation guidelines.[226] We conclude, therefore, that MVDDS licensees

[223] *See* Appendix J for a detailed model description.

[224] We note that the determination of MVDDS EPFD at a DBS subscriber location is dependent on many factors, including the location of the MVDDS transmitter, transmit and receive antenna gain patterns, MVDDS EIRP, and the relative height between the MVDDS transmitting antenna and the DBS receive antenna.

[225] While conducting its survey of the local area around a proposed transmit site, the MVDDS licensee may determine that its signal level would comply with the EPFD limit at all existing DBS customer locations; or it may determine that the EPFD limit would be exceeded at certain DBS customer locations.

[226] The Commission elsewhere requires primary users to incorporate protective measures, up to and including antenna replacement, to avoid receiving harmful interference. *See, e.g.,* 47 C.F.R. § 74.937(a) ("Should interference occur and it can be demonstrated that the existing [primary ITFS] receiving antenna is inadequate, a more suitable antenna should be installed. In such cases, installation of the new receiving antenna will be the responsibility of the [ITFS] system operator serving the receive site."); 47 C.F.R. § 101.115(d) ("The Commission shall require the replacement of any [primary Fixed microwave directional] antenna … that does not meet performance Standard A … at the expense of the licensee operating such antenna, upon a showing that said antenna [is likely to] receive interference from … any other authorized antenna or applied for station whereas a higher performance antenna is not (continued....)

will not cause harmful interference to new DBS receivers, consistent with the RLBSA.[227] MVDDS licensee will have to take into account the information provided by the DBS licensee. We encourage MVDDS operators to closely review the situation involving any DBS customers that the DBS licensee thinks may be in danger of receiving MVDDS signal levels in excess of the limit. However, we will not require the MVDDS licensee to take any specific action, provided its analysis shows the absence of a problem. The MVDDS licensee will be responsible once it commences service for ensuring that its signal level is not above the adopted limit at any DBS customer location. If the MVDDS licensee determines that it cannot meet the EPFD limit for DBS customers of record from its proposed site and finds a new site, a new 90 day coordination period will begin prior to the commencement of service. Finally, we will require that in the event of either an increase in the EPFD contour in any direction or a major modification to an MVDDS station, these procedures would apply anew. This does not include applications for renewal, assignment or transfer of control which are considered to be major filings.[228]

93. If a DBS provider or customer of record lodges a complaint regarding service within one year after MVDDS commences operation, the MVDDS licensees must correct interference to that customer or cease operation if it is demonstrated that the customer is receiving harmful interference from the MVDDS system or that the MVDDS signal exceeds the permitted EPFD level at the customer location. We believe that this procedure will minimize the potential for false claim reporting against the MVDDS licensee.

94. These procedures balance the positions of the various parties in this proceeding and will result in the ability of MVDDS to offer service in a timely fashion after licensing is completed. In addition, our adopted approach provides certainty to all parties involved and will allow them to develop their business plans accordingly.

2. MVDDS/NGSO FSS Sharing

95. Background. In the *Further Notice*, the Commission proposed basic technical operating standards to enable MVDDS and NGSO FSS sharing in the 12.2-12.7 GHz band.[229] At the same time, the Commission sought comment on whether different power limits would be appropriate for MVDDS transmitting systems and whether a database of MVDDS transmitting sites and NGSO FSS earth stations sites should be established so that licensees could determine problem areas prior to deployment of facilities.[230] The Commission also requested comment on whether various forms of coordination or information database sharing procedures should be established between NGSO FSS earth stations and MVDDS transmitting sites rather than specifying particular EPFD limits.[231]

96. The Commission proposed to limit the interference that MVDDS transmitting systems would cause to NGSO FSS receivers by restricting MVDDS transmitter power to 12.5 dBm in most areas.[232]

(...continued from previous page)
likely to involve such interference."); 47 C.F.R. § 90.361 (finding that primary multilateration LMS systems cannot claim harmful interference from parts 15 and 97 operations that operate under certain conditions).] Given the conservative MVDDS transmitting power level and the availability of simple protective measures, we find that DBS licensees can introduce new DBS receiver antennas without experiencing harmful interference from the MVDDS signal.

[227] *See* RLBSA, § 2002(B)(2).

[228] *See* 47 C.F.R. § 1.929.

[229] *See*, *generally*, *Further Notice,* 16 FCC Rcd at 4200-01 ¶¶ 277-281.

[230] *Id.* at 4201 ¶¶ 280, 281.

[231] *Id.*.

[232] *Id.*.

The Commission also proposed to protect MVDDS receivers from NGSO FSS interference by reducing the PFD limit for NGSO FSS satellites that transmit at angles of 5 degrees or less above the horizon.[233] The Commission declined to propose specific PFD or EPFD limits on MVDDS operations or to propose coordination procedures between MVDDS and NGSO FSS operators because such requirements might be overly burdensome on both parties.[234] Instead, the Commission proposed to limit the transmitter power of MVDDS operations to minimize any area of potential interference and rely upon the ability of NGSO FSS user terminals to work around static sources of interference in any environment in which they might be placed.[235]

97. After careful review of all the comments and based upon further extensive technical analysis, we are persuaded that further refinement of MVDDS/NGSO FSS operating criteria is required. We believe that the criteria we adopt herein will provide a technically sound and equitable framework for MVDDS and NGSO FSS sharing that is responsive to the concerns expressed by the commenters in this proceeding.

98. The majority of commenters disagree with the merits of the initial technical criteria the Commission proposed in the *Further Notice* for MVDDS/NGSO sharing, while others suggest fairly comprehensive alternative criteria for sharing. For example, SkyBridge comments that the Commission's initial proposals for MVDDS and NGSO FSS sharing are too simplistic and place too much of the burden of resolving interference upon the NGSO FSS operators. SkyBridge also argues that the Commission's general treatment of MVDDS sharing with NGSO FSS is inconsistent with its approach to NGSO sharing with BSS/DBS. SkyBridge contends that simply setting a limit of 12.5 dBm on MVDDS transmitting system output power would create sizable exclusion zones and is subject to too many uncertainties and variability in the real world to afford adequate interference protection to NGSO FSS operations. SkyBridge argues instead that focusing upon the EPFD seen by an NGSO receiver will provide a more workable and accurate gauge of interference to NGSO FSS receivers than a simple output power limitation for MVDDS transmitting systems.

99. The SkyBridge proposal describes a complex scheme involving multiple in-band PFD contours and EPFD defined zones and out-of-band emission limitations.[236] The three in-band limits proposed by SkyBridge are described as 1.) A PFD limit of –120 dBw/m^2/MHz 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 –120 dBw/m^2/4kHz 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/m^2/4kHz corresponding to a NGSO FSS receiver saturation threshold zone that would function as a limit that could not be exceeded into any operational NGSO FSS receiver.

100. SkyBridge argues that these multiple contours and zones are designed to avoid NGSO FSS receiver saturation and to prevent NGSO FSS receivers from making undue use, through frequency diversity techniques, of the lower 11.7-12.2 GHz band also authorized for NGSO FSS downlink operation.[237] In addition, SkyBridge suggests that low angle radiation limitations for NGSO FSS satellite

[233] *Id.* at 4200 ¶ 279. In particular, we proposed to require NGSO FSS downlinks in the 12.2-12.7 GHz band to meet a reduced PFD limit of –158 dB (W/m^2/4kHz) for angles of 0-2° above the horizon, and a reduced PFD limit of –158 + 3.33(δ-2) dB(W/m^2/4kHz) for angles of 2-5° above the horizon.

[234] *Id.* at 4201 ¶ 281.

[235] *Id.*

[236] *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).

[237] In the *First R&O*, we authorized NGSO FSS downlink operations in both the 11.7-12.2 and 12.2-12.7 GHz bands for a total 1,000 megahertz of spectrum. *See First R&O,* 16 FCC Rcd at 4159 ¶¶ 161, 165.

downlinks would be appropriate in order to afford protection into the boresight of MVDDS user terminals.

101. Northpoint argues from the contrary perspective that the proposed 12.5 dBm limit on MVDDS transmitter power is an inappropriate standard because it is too restrictive on MVDDS; that it would lead to a fifty percent increase in the number of MVDDS transmitters; that it would preclude improvements in antenna or other technology with no advantage to DBS or NGSO FSS; and that the increased number of MVDDS transmitters would result in excessive transmitter density that would actually disadvantage NGSO FSS.[238] Northpoint contends that a better approach would be to utilize the regional EPFD limits Northpoint suggests for DBS protection.[239] Northpoint claims that because these EFPD limits protect DBS operations they will lend inherent protection to NGSO FSS operations as well. Northpoint further argues that these EPFD levels would be exceeded in far less than 0.5% of the MVDDS service area in urban environments and that they are functionally equivalent to the 12.5 dBm limit proposed by the Commission. Thus, Northpoint concludes that these EPFD values are a practical limit on the interference power into NGSO FSS operations while affording MVDDS additional flexibility of using greater than 12.5 dBm power in certain circumstances.[240]

102. Northpoint also disagrees with SkyBridge's contention that multi-tiered, in-band PFD and EFPD limits are required to adequately protect NGSO FSS receivers from MVDDS interference. Northpoint maintains that NGSO FSS operators can avoid potential MVDDS interference because the NGSO's can easily use the lower 11.7-12.2 GHz band of frequencies allocated to the NGSO FSS for downlink operations. Northpoint also argues that SkyBridge is unable to cite any support in the record that NGSO FSS receivers might experience front-end saturation or be unable to utilize the lower 11.7-12.7 GHz band due to MVDDS operation. Any potential problem could be resolved, Northpoint argues, by NGSO FSS operators switching to LNB converters having a bandwidth of 500 MHz instead of 1000 MHz. Finally, Northpoint argues that the SkyBridge EPFD limit for ten percent of the MVDDS service area is arbitrary and unnecessary in light of the regional EPFD limits suggested by Northpoint.[241]

103. On the other hand, Northpoint concurs with SkyBridge and Boeing that some form of out-of-band limits are appropriate citing SkyBridge's letter of July 10, 2000.[242] However, Northpoint disagrees with the imposition of a 24 MHz bandwidth limit arguing that such a limit would have no benefit on NGSO FSS and might hamper future MVDDS operations.[243]

104. Boeing indicates that the specific EPFD limits offered by SkyBridge would not adequately protect many of Boeing's NGSO FSS receivers.[244] Nevertheless, Boeing agrees with SkyBridge that focusing on MVDDS EPFD limitations into NGSO FSS receivers would be far more useful than relying upon a single MVDDS transmitter power limit.[245] Boeing also argues for out-of-band

[238] Northpoint Comments at 26-28.

[239] *See, e.g.,* Northpoint Comments at 27. *See also*, para. 63, *supra* for a complete description of Northpoint's EPFD proposal.

[240] The exceptional conditions enumerated by Northpoint that would allow for an EIRP in excess of 12.5 dBm include, 1) locations near large unpopulated areas, 2) transmitters located at heights above average terrain (HAAT) greater than 300 feet, or 3) to accommodate improved transmit antenna technologies that might be developed in the future. *See* Northpoint Comments at 28.

[241] *See*, *generally*, Northpoint Comments at 12-21.

[242] Northpoint Reply Comments at 19.

[243] *Id.*

[244] Boeing Comments at 28.

[245] *Id.*

emission standards to ensure that NGSO FSS receivers can utilize the lower frequency bands below 12.2 GHz. Boeing also suggests that coordination rules and mitigation procedures must be put in place to facilitate NGSO FSS and MVDDS band sharing.

105. Virtual Geosatellite, LLC (Virtual Geo) generally agrees that sharing between MVDDS and NGSO FSS is feasible.[246] Virtual Geo also agrees, in part, with the low angle EPFD limitations the Commission proposed. However, they argue that requiring compliance with the low angle EPFD limits might unduly constrain the operating power of some NGSO FSS satellites under certain circumstances at higher angles. Virtual Geo urges that such a result could be avoided by allowing NGSO FSS operators to specify, in lieu of complying with the EPFD limits, that their satellites will not transmit at or below angles of 5 degrees.[247] In the latter situation, the NGSO licenses would be conditioned to prohibit transmission below 5 degrees, but would not have the low angle EPFD limits.[248] Virtual Geo argues that this would permit licensees of NGSO FSS systems to retain the maximum flexibility, while still providing MVDDS systems with the desired protection from NGSO FSS downlink emissions.[249] Pegasus generally supports sharing between NGSO FSS and MVDDS in the 12 GHz band and takes the position that the MVDDS limits to protect DBS that were proposed in the *Further Notice* are sufficient to offer protection to NGSO FSS.

106. In response to the Commission's requests for comment regarding coordination procedures, Boeing, among others, indicates that the Commission should adopt coordination rules and policies for NGSO FSS/MVDDS sharing.[250] Boeing also argues that MVDDS operators should be required to pay the entire cost of mitigating interference to NGSO FSS receivers. Boeing proposes a sliding scale approach whereby an MVDDS operator would be responsible for paying either all, half or one-quarter the mitigation expense depending upon various criteria within five and ten year time periods. Virtual Geo urges that a predicate to successful co-existence and coordination between NGSO FSS and MVDDS should include a well-maintained data base of MVDDS transmitter locations that is readily accessible to NFSO FSS operators. Virtual Geo also opines that MVDDS transmitting towers should be reasonably limited in number and power so as not to hinder the ability of NGSO FSS installers/operators from ascertaining the location of potentially interfering transmitters.[251] Pegasus supports coordination procedures that would require MVDDS operators to alert NGSO FSS operators of the commencement of MVDDS service so that mitigation procedures could begin.

107. Discussion. The rules the Commission adopted in the *First R&O* limit MVDDS operations to 500 megahertz in the 12.2-12.7 GHz band. In contrast, NGSO FSS service downlinks are authorized to use 1,000 megahertz of spectrum in both the 12.2-12.7 GHz band and the adjacent 11.7-12.2 GHz bands. As a result, NGSO FSS is authorized access to twice the available spectrum for downlinks as compared to MVDDS. We find that NGSO FSS receivers operating in the 12.2-12.7 GHz band could be designed with "frequency diversity" capability that enables 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. NGSO FSS operators could enhance the frequency diversity capabilities of subscriber receivers by using narrower bandwidth designs and through other refinements that would provide greater discrimination against undesired signals.

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[246] *See*, *generally,* Virtual Geo Comments at 1-4.

[247] *Id.*

[248] *Id.*

[249] *Id*.

[250] Boeing Comments at 30.

[251] *See*, *generally,* Virtual Geo Comments at 1-4.

108. Under the MVDDS/NGSO FSS sharing rules adopted herein, we believe that NGSO FSS receivers will not be precluded from operation in any significant area. First-in NGSO FSS receivers will be afforded full use of the entire 11.7-12.7 GHz band with significantly reduced need to rely upon frequency diversity as a result of the conservative spacing requirements we adopt between MVDDS transmitting antennas and pre-existing NGSO FSS receivers. NGSO FSS receivers that are later installed within an existing MVDDS service area, particularly those sited within 3 km of existing MVDDS transmitting antennas, may experience some degree of in-band interference that could encumber NGSO FSS operation in the 12.2-12.7 GHz band. However, NGSO FSS receivers would still have access to the remaining 500 megahertz of spectrum in the lower 11.7-12.2 GHz band for downlink service. As a result, later-in NGSO FSS receivers could utilize frequency diversity techniques so that they will not be precluded from operation even in areas where MVDDS operation has already been established.

109. We recognize that NGSO FSS receivers newly installed in close proximity to existing MVDDS transmitting antennas might be susceptible to receiver saturation from MVDDS signals in the 12.2-12.7 GHz band and might find it necessary to rely upon frequency diversity to make use of the lower 11.7- 12.2 GHz band. In 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-ends to enable operation in close proximity to pre-existing MVDDS transmitting antennas.

110. MVDDS transmitting antenna density limits (*i.e.*, limits on how closely multiple MVDDS transmitting antennas could be spaced and/or numerical limits within a given region) were suggested by some parties either in comments or in *ex parte* communications.[252] However, we find that insufficient information has been developed in the record for us to proceed any further with a quantitative analysis on this particular issue. Any possible limit that might be set would be entirely arbitrary and would have no means of evaluating the benefit to NGSO FSS. Therefore, we decline to adopt MVDDS transmitting antenna density limits.

111. Under our approach, first-in NGSO FSS receivers and first-in MVDDS transmitting systems will be afforded more and easier use of the shared 12.2-12.7 GHz portion of spectrum. We conclude that such a result is equitable and consistent with the co-primary status of NGSO FSS and MVDDS.

a. MVDDS Operating Requirements

112. In-band PFD limits. We adopt a requirement that the PFD of an MVDDS transmitting system not exceed –135 dBw/m^2/4kHz measured and/or calculated at the surface of the earth at distances greater than 3 km from the MVDDS transmitting site. The PFD of –135 dBw/m^2/4kHz corresponds to the limit proposed by SkyBridge for an NGSO FSS receiver saturation buffer zone. We recognize that the operating requirement we adopt is not as restrictive as that proposed by SkyBridge. However, we believe that setting the reference distance at 3 km for the specified PFD limit strikes a reasonable balance between limiting the potential for NGSO FSS receiver saturation or reliance on frequency diversity to relatively small and predictable areas while affording MVDDS operators benefit of the maximum 14 dBm EIRP adopted elsewhere herein[253] in most instances.[254] Limiting the distance to the specified PFD at

[252] *See, e.g.*, Boeing Comments at 14.

[253] *See* para. 198, *infra*.

[254] Some types of MVDDS transmitting antennas, such as the large and small sector horns proposed by Northpoint, may be restricted to EIRP values somewhat less than 14 dBm at some lower heights by the PFD limit at 3 km. However, we also note that use of other types of known antenna configurations, such as the cosecant-squared type, would allow for essentially the full 14 dBm EIRP for most antenna heights. Therefore, we find that the limit we (continued....)

3 km also serves to place a worst-case cap on the extent of MVDDS interference that might be caused to NGSO FSS receivers. As noted above, we acknowledge that NGSO FSS receivers that might be installed in close proximity to MVDDS transmitting antennas using 14 dBm EIRP, particularly within 3 km, could be susceptible to interference from MVDDS when the NGSO FSS receivers are operating in the 12.2-12.7 GHz band. However, in this situation, NGSO FSS receivers could also be designed to switch to the lower 11.7-12.2 GHz band and could be designed with narrower bandwidths to avoid such interference.

113. We find that adopting a single PFD limit that may not be exceeded at a specified distance has significant advantages over other proposed approaches. First, we believe that this approach is relatively uncomplicated and will not be burdensome for compliance by licensees. Second, the PFD limit is technology neutral 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. Third, by specifying a maximum PFD limit in terms of an absolute distance from the MVDDS transmitting site, we eliminate any dependence upon potentially equivocal determinations of percentages of MVDDS service area as suggested by SkyBridge. Finally, the approach we adopt fixes the worst-case maximum extent of possible NGSO FSS interference regardless of MVDDS transmitter or antenna design. As a result, we believe that both MVDDS and NGSO FSS licensees will benefit from the predictability of being able to anticipate and plan around the potential sharing and coordination issues that might arise.

114. In arriving at our decision to adopt the PFD limit of –135dBW/m^2/4kHz measured and/or calculated at the surface of the earth at 3 km, we believe that we have crafted an effective and reasonable compromise from among the available options. Boeing suggested the most stringent limits on MVDDS operation but indicated for its part that the SkyBridge proposal would be an acceptable compromise. We conclude, on balance, that the Boeing proposal is so restrictive that it could unduly undermine the ability to deploy MVDDS without a corresponding benefit to NGSO FSS operators. Therefore, our analysis focused on the merits of the multi-EPFD SkyBridge scheme as a possible solution. We also carefully considered Northpoint's proposal for higher permissible EIRPs and single-value EPFD limits.[255] To maintain uniformity for comparison purposes, we utilized a PFD value of –150.7 dBw/m^2/4kHz that corresponds to the value specified by Northpoint as point of reference for defining the MVDDS service area.

115. A key benefit of the PFD limit-at-a-distance standard we adopt is that it does not depend upon determinations of percentages of MVDDS service area as proposed by SkyBridge. Nonetheless, we did compare the worst case results obtained by the standard we adopt in terms of the limits proposed by SkyBridge. In making this comparison, we found that unless restrictions are placed on permissible MVDDS transmission modes, discrepancies exist between the protection limits proposed by SkyBridge

(...continued from previous page)
adopt will also serve to encourage the use and further development of alternative antenna forms that could provide improved service and protection characteristics.

[255]In an *ex parte* filing, Northpoint cautions that we should not determine MVDDS/NGSO FSS sharing criteria based upon NGSO FSS antennas that do not comply with the rules in 47 C.F.R. § 25.209 for GSO FSS antennas. *See* Northpoint *ex parte* filing of Feb. 6, 2002. However, as SkyBridge correctly points out in response, the Commission declined to adopt antenna standards for NGSO FSS user terminals in the *First R&O*. *See* SkyBridge *ex parte* filing of March 1, 2002. *See, also*, *First R&O,* 16 FCC Rcd at 4186 ¶ 240. In any event, notwithstanding Northpoint's concerns, we note that the PFD limits that we adopt herein do not depend upon the characteristics of the NGSO FSS receive antennas and instead are designed to limit the geographic extent of potential MVDDS interference to NGSO FSS regardless of the NGSO FSS antenna used.

and the MVDDS service area percentages associated with those protection limits.[256] We conclude, however, that placing polarization limits on MVDDS would only serve to undermine operational flexibility of MVDDS licensees and hinder efficient sharing of the 12 GHz band in exchange for a marginal benefit to NGSO FSS.

116. SkyBridge proposed that the extent of their so-called frequency diversity limit should not exceed ten percent of the MVDDS service area. Without considering MVDDS polarization constraints, we found that SkyBridge's frequency diversity zone will occupy, in the worst case, twenty percent of the MVDDS service area regardless of the EIRP or tower height. As a second example, SkyBridge proposed to limit the –135 dBw/m^2/4kHz saturation buffer zone to 0.2% of the MVDDS service area. We found that the –135 dBw/m^2/4kHz limit will, in the worst case, generally occupy between 1.8% [with MVDDS EIRPs restricted to levels as low as 4-6 dBm] and 2.5% [with MVDDS EIRPs unrestricted at 14 dBm] of the MVDDS service area for any reasonable combination of EIRP and transmitting antenna height. As in the first example, we achieved these figures without considering MVDDS polarization constraints. These results were obtained by fixing the distance to the –135 dBw/m^2/4kHz PFD limit between 1 km and 3.5 km from the MVDDS transmitting site.[257]

117. As noted above, virtually any EIRP and tower height combination will result in the same percentage of affected MVDDS service area. SkyBridge's stated criterion for selecting their proposed ten percent limit was to avoid use of frequency diversity "… over a large proportion of the MVDDS service area."[258] To the extent that we attempt to accommodate the stated goals of SkyBridge's proposal, we find that a worst case "frequency diversity" zone of twenty percent will afford significant protection to NGSO FSS in a large proportion (*i.e.*, eighty percent) of the MVDDS service area. As to the "saturation zone" limit of –135 dBW/m^2/4kHz, we observe that drastic reductions in MVDDS EIRP from the maximum 14 dBm to as low as 4 dBm have relatively little impact when viewed as a percentage of MVDDS service area as proposed by SkyBridge. The difference amounts to 2.5% at 14 dBm compared with 1.8% at 4 to 6 dBm – an improvement of only 0.7 percentage points. SkyBridge's stated criterion for selecting its proposed 0.2% limit was to honor assurances by MVDDS proponents that the area of NGSO saturation would be "small."[259] To the extent that we attempt to further accommodate that goal of SkyBridge's proposal, we find that a worst-case "saturation zone" of 2.5% of the MVDDS service area is sufficiently "small" to afford significant protection for NGSO FSS in the worst case.

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[256] SkyBridge explains in an *ex parte* communication that the percentage figures they proposed are achievable when MVDDS is limited to a single linear polarization mode of transmission or whenever MVDDS utilizes a single polarization mode dissimilar to that used by NGSO FSS. SkyBridge asserts that, under those constraints, NGSO FSS receivers would benefit from a 3 dB reduction in interference due to polarization discrimination. *See* SkyBridge *ex parte*, Letter from Jeffrey H. Ohlson, Paul, Weiss, Rifkind, *et al*. to Magalie Roman Salas, Secretary, FCC (filed Nov. 15, 2001). In response, Northpoint reiterates its position that MVDDS operation is not feasible under the SkyBridge proposed limits. *See* Northpoint *ex parte* Letter from Robert Combs of Broadwave USA, to Magalie Roman Salas, Secretary, Federal Communications Commission (filed Jan. 14, 2002).

[257] The significance of the 1 km distance is that it equates very nearly to the 0.2% of the MVDDS service area specified by SkyBridge as an acceptable "saturation zone" threshold when referenced to an EIRP of 14 dBm. When viewed in that context, the SkyBridge proposal implicitly accepts a worst-case "saturation buffer" EPFD limit of –135 dBW/m^2/4kHz that extends at least 1 km from the MVDDS transmitter for a worst-case 19.5 km service area radius at 14 dBm. We find, however, that EIRP constraints on MVDDS would be so extreme with the PFD limit established at 1 km - as low as 4 to 6 dBm EIRP with some common antenna type and height combinations - that MVDDS service quality could be significantly impaired. At the other end of the scale, fixing the distance at 3 km for the –135 dBW/m^2/4kHz saturation limit would allow for an unrestricted EIRP of 14 dBm with any antenna type and height.

[258] SkyBridge Comments at 33-34.

[259] *Id.* at 36.

118. In light of these findings, we decline to adopt the SkyBridge scheme that is based primarily upon multiple PFD/EPFD limits associated with percentages of MVDDS service. We believe that such a scheme is too complex on its face and would be inordinately burdensome in practical application. In addition, we believe that such a multi-level scheme would be susceptible to litigious dispute and manipulation among competing licensees. We conclude that we can achieve as much benefit as would be realizable from the either the Northpoint or SkyBridge proposals, but in a much more direct, predictable and practical fashion by specifying a fixed distance to the –135 dBW/m^2/4kHz PFD. Finally, because we conclude that MVDDS transmissions should not be restricted to a particular polarization mode, we believe that the standard we adopt will provide a more accurate depiction of the potential worst-case interference concerns while affording both significant protection for NGSO FSS and maximum flexibility for MVDDS.

119. MVDDS out-of-band emission limits. Northpoint agrees with the SkyBridge proposal that MVDDS should be required to adhere to some form of out-of-band limits.[260] SkyBridge asserts that the function of out-of-band limitations can be accomplished by specifying a maximum bandwidth of 24 megahertz for the emissions mask contained in Section 101.111(a)(2). We agree. Accordingly, we adopt elsewhere herein a change in the value of B to 24 MHz in the equation for determining the emissions mask as set forth in Section 101.111(a)(2) of our rules.[261]

b. NGSO FSS Operating Requirements

120. We adopt the low angle PFD limits on NGSO FSS downlinks in the 12.2-12.7 GHz band that the Commission proposed in the *Further Notice.* For angles of 0-2 degrees above the horizon, NGSO FSS downlinks must meet a reduced PFD of –158 dBW/m^2/4kHz, and for angles of 2-5 degrees above the horizon, a reduced PFD of –158 +3.33 (δ-2) dBW/m^2/4kHz.[262] We note that Northpoint and SkyBridge both agree that low angle NGSO FSS radiation should be limited. Some of the most restrictive limits proposed by each are the same and comport with the PFD values we adopt herein. However, Northpoint and SkyBridge disagree on the manner in which compliance with the limits should be demonstrated. Northpoint proposes that low angle NGSO FSS PFD limits that are tightened by 10 dB from the ITU Article S21 standards should be applied as hard limits that NGSO FSS must not exceed in any circumstances.[263] SkyBridge proposes that we should adopt the ITU Article S21 limits without the 10 dB tightening proposed by Northpoint. SkyBridge also proposes that those limits should be complied with in the same manner as the operational limits imposed on NGSO FSS systems for the protection of GSO FSS and BSS systems.[264]

121. For the same reasons described in the *First R&O, w*e conclude that the method of demonstrating compliance with the PFD limits we are adopting should follow the same approach as the operational EPFD down limits that the Commission adopted to protect GSO BSS operations.[265] We further believe that consistent requirements for DBS and MVDDS protection will be less burdensome for compliance by licensees. We do not believe that making any of the PFD limits dependent upon complaints or demonstration by MVDDS operators of violation with the limits would provide adequate or uniform protection. Therefore, we will require an NGSO FSS applicant to demonstrate, prior to becoming operational, that it meets the PFD limits we adopt herein to protect MVDDS. Each NGSO FSS

[260] *See* Northpoint Reply Comment (Technical Appendix) at 13; SkyBridge Comments at 38.

[261] *See* Transmitting Equipment Section at para. 206, *supra*.

[262] Where δ is defined as the angle of arrival above the horizontal plane.

[263] *See* Northpoint Reply Comments at 20-21.

[264] *See* SkyBridge Comments at 44-45.

[265] *See First R&O*, 16 FCC Rcd at 4170 ¶ 195.

licensee will be issued a conditional authorization and must submit, ninety days prior to operation, technical information demonstrating compliance with the PFD limits adopted herein to protect MVDDS.

c. MVDDS and NGSO FSS Spacing and Coordination Requirements

122. The interference mechanisms we considered in evaluating MVDDS impact on NGSO FSS are somewhat different than those we considered herein for MVDDS protection of DBS. In the DBS scenario, interference may occur primarily during heavy rain events due to DBS signal fading. All the parties generally agree with the presumption that MVDDS/DBS interference will not result during clear weather. By comparison, the MVDDS potential interference to NGSO FSS is not primarily related to rain or other inclement weather. Instead, interference is likely to occur when an NGSO FSS receiving antenna momentarily points directly at an MVDDS transmitting antenna as the receiving antenna tracks the NGSO satellite. In addition, interference may be caused through the back lobes of an NGSO FSS receiving antenna when in very close proximity to an MVDDS transmitting antenna. These interference events may occur regardless of weather conditions. We also note that the co-frequency interference that occurs when the NGSO FSS antenna points directly at an MVDDS transmitting antenna generally cannot be readily mitigated. Under these conditions, the NGSO FSS receiver essentially "sees" both the desired NGSO and undesired MVDDS transmitting antennas as a single source at the same point in the sky. As a result, we believe that standard mitigation techniques such as shielding and repositioning of the NGSO FSS antenna may be of little benefit and require NGSO FSS to make greater use of frequency diversity to utilize the lower 11.7-12.2 GHz band.

123. Because mitigation efforts might not be sufficiently feasible to address potential MVDDS interference to NGSO FSS receivers, we conclude instead that spacing and notification requirements should be employed to achieve optimal sharing conditions. Therefore, we decide that an MVDDS transmitting antenna may not be installed within 10 km of any pre-existing NGSO FSS receiver unless the affected licensees agree to a closer separation.[266] On the other hand, we also conclude that later-in NGSO FSS receivers must accept any interference resulting from pre-existing MVDDS transmitting antennas.

124. We conclude that NGSO FSS operators must maintain and share a database of existing NGSO FSS receiver locations. In addition, MVDDS operators must maintain and share with NGSO FSS operators a database of existing and proposed MVDDS transmitting locations, EIRP, tower height and related technical information. For each new MVDDS transmitting antenna, the MVDDS licensee must notify all NGSO FSS operators within the general service area of the proposed transmitting location and also disclose the related technical operating parameters. Within ten days of this notification, each NGSO FSS licensee must in turn advise the MVDDS licensee of the location of any NGSO FSS receiver within 10 km of the proposed MVDDS transmitting antenna site. If a qualifying NGSO FSS receiver, as defined by the rules adopted herein, is located within 10 km of the proposed MVDDS transmitting antenna site, then the parties are free to negotiate an agreement by which the NGSO FSS licensee would accept the MVDDS transmitting antenna at the closer-spaced site. In the absence of such an agreement, the MVDDS licensee may not construct the new transmitting antennas at the proposed site and must seek an alternative location that complies with the 10 km spacing criterion.

125. We believe that this approach preserves the relative rights and duties of both co-primary licensees without unduly hampering the expansion plans of either. We also conclude that the alternative approach of employing the existing coordination procedures in Parts 25 and 101 of our rules is not well-suited to the sharing situation in this band and, in any event, would not achieve any better results than the requirements we adopt herein.

[266] Our choice of 10 km is based upon the distance to the –144 dBW/m^2/4kHz PFD contour – which we equate to the "frequency diversity" zone limit proposed by SkyBridge – that extends approximately 9 to 10 km from the MVDDS transmitting site in the worst-case with an EIRP of 14 dBm per 24 megahertz.

B. Multichannel Video Distribution and Data Service Rules

1. Licensing Plan

126. We seek to implement a regulatory framework that will foster competition, promote innovation, and encourage the delivery of additional or improved services to consumers. Thus, as we developed the licensing and service rules for MVDDS, we considered the primary service offerings, the technical constraints in a shared environment, possible barriers that could impede the entry of small businesses into MVDDS, and the efficient deployment of these services to unserved and underserved areas of the nation.

127. We believe the licensing and service rules we adopt herein provide the framework to encourage robust competition in the MVPD marketplace, provide opportunities for small businesses to provide niche services across the nation, encourage innovation and advances in MVDDS technology that will not only complement other MVPD offerings, but will expand those offerings.

a. Service Areas

128. Background. Based on the record, we believe the initial services provided by MVDDS licensees will be multichannel video distribution of local television programs and high-speed Internet access. Such services require ubiquitous coverage to compete in the MVPD marketplace.[267] In the *Further Notice,* the Commission explained that a site-based regime would be resource intensive for a service that requires ubiquitous coverage.[268] Consequently, the Commission proposed to license MVDDS on the basis of geographic areas.[269]

129. In addition to proposing the use of geographic areas to license MVDDS, the Commission invited comment on the most appropriate geographic area licensing scheme for this service.[270] The Commission discussed several options for licensing MVDDS such as Nielsen's DMAs,[271] Metropolitan Statistical Areas and Rural Service Areas (MSAs and RSAs),[272] Economic Areas (EAs),[273] Regional

[267] *See, e.g.*, NCTA Comments at 5, (CSB Docket No. 01-129) (Aug. 2, 2001) (the presence of DBS affects the market power of the incumbent – cable - where it has the capacity to challenge the incumbent in almost 100% of the nation).

[268] *Further Notice*, 16 FCC Rcd at 4202 ¶ 284.

[269] *Id*.

[270] *Id.* at 4202 ¶ 285.

[271] Nielsen Media Research (Nielsen) has developed 211 county-based Designated Market Areas (DMAs) utilizing audience survey information from cable and non-cable households to determine the assignment of counties to local television markets. Nielsen determines what constitutes a separate market by applying a complex statistical formula based upon viewership and other factors.

[272] An MSA is a geographic area defined by the Office of Management and Budget. There are 306 MSAs including New England County Metropolitan Areas and the Gulf of Mexico Service Area (water area of the Gulf of Mexico, border is the coastline). An RSA consists of 428 areas, which when combined with the 306 MSAs, comprise the 734 Cellular Market Areas (CMAs). *See also* Implementation of Section 309(j) of the Communications Act – Competitive Bidding, PP Docket No. 93-253, *Fourth Report and Order*, 9 FCC Rcd 2330, 2333 ¶ 16 (1994).

[273] An EA is a geographic area established by the Bureau of Economic Analysis of the Department of Commerce. There are 172 EAs, plus three EA-like areas, encompassing the Northern Mariana Islands, Guam, American Samoa, the United States Virgin Islands and Puerto Rico. Each EA consists of one or more economic nodes – metropolitan areas or similar areas that serve as centers of economic activity – and the surrounding counties that are economically related to the nodes. *See Final Redefinition of the BEA Economic Areas*, 60 Fed. Reg. 13,114, 13,114-118 (Mar. 10, 1995).

Economic Area Groupings (REAGs),[274] and Major Economic Areas (MEAs).[275] The Commission specifically requested comment on whether DMAs or some other geographic area would be a better choice for this service.[276]

130. Discussion. Commenters generally support geographic licensing for MVDDS. We believe the initial services that will be provided by MVDDS licensees — multichannel distribution of local television programs and high-speed internet access — require ubiquitous coverage. Thus, deployment of this service will be more efficient by using a geographic licensing scheme that supports ubiquitous service. Accordingly, we will license MVDDS on the basis of geographic areas. We believe that site-based licensing would be resource intensive for both applicants/licensees and the Commission. In addition, we find no basis in the record for considering an approach to licensing the 12 GHz band other than geographic area licensing.

131. Commenters, however, were not in agreement with respect to the specific licensing scheme for MVDDS. In fact, commenters provided support for DMAs,[277] major trading areas (MTAs), basic trading areas (BTAs),[278] RSAs and CEAs.[279] AT&T did not name a geographic licensing scheme it supported. However, AT&T did provide distance characteristics that it found desirable for licensing MVDDS.[280]

132. We note that, in the *Further Notice*, the Commission considered the similarities between cable, non-cable and MVDDS services as it requested comment on using DMAs. After further consideration we do not believe DMAs are appropriate for MVDDS. We note that Nielsen is the copyright owner of the DMA listing. Nielsen has not given the Commission a blanket license to use its copyrighted DMA listing for MVDDS. By adopting DMAs, an MVDDS licensee who does not obtain a copyright license (either through a blanket license agreement or some other arrangement) from Nielsen for use of the copyrighted material may not rely on the grant of a Commission authorization as a defense to any claim of copyright infringement brought by Nielsen against such grantee.[281] We believe economic benefits will accrue to MVDDS licensees by establishing a designation that is in the public domain. We

[274] An REAG is a geographic area created by Commission staff. REAGs are based on groupings of 172 EAs and four EA-like areas (consisting of Guam and the Northern Mariana Islands, Puerto Rico and the United States Virgin Islands, American Samoa, and the Gulf of Mexico) which were developed by the Bureau of Economic Analysis of the Department of Commerce. Because REAGs are an aggregation of EAs, REAGs are substantially larger than EAs.

[275] An MEA is a geographic area created by Commission staff. An MEA is an aggregation of EAs which consists of 52 regions, including the Gulf of Mexico.

[276] *Further Notice*, 16 FCC Rcd at 4203 ¶ 286.

[277] Northpoint Comments at 32 (believes DMAs are well suited to the low-power character of its technology); SRL Comments at 3.

[278] Rand McNally & Company owns the copyright to the MTA/BTA Listings, which identify the BTAs contained in each MTA and the counties comprising each BTA. *See* Rand McNally, 1992 Commercial Atlas and Marketing Guide 36-39 (123rd ed. 1992).

[279] RTG Reply Comments at 2-3 (smaller license areas will facilitate opportunities for small and rural carriers to obtain spectrum for their customers and ensure that rural regions of the country benefit from MVDDS).

[280] AT&T Comments at 16 (AT&T opposes geographic service boundaries that are less than 20 miles across in any direction).

[281] *See, e.g.,* Revision of Part 22 and 90 of the Commission's Rules to Facilitate Future Development of Paging Systems, *Second Report and Order and Further Notice of Proposed Rulemaking*, 12 FCC Rcd 2732, 2735 n.3 (1997).

therefore will adopt a licensing system based on CEAs.[282] We believe adopting CEAs for MVDDS will provide similar benefits as DMAs. Specifically, we find that a CEA licensing scheme will better promote our objectives and address commenters' concerns. For example, fixed services are generally deployed on a localized basis, so the smaller CEA service areas better track actual deployment. Indeed with the exception of DBS, most MVPD service remains local or regional service.[283] CEAs are based on Economic Areas delineated by the United States Department of Commerce.[284] Each CEA consists of a single economic node and the surrounding counties that are economically related to the node. There are a total of 354 CEAs. We believe that CEAs will encourage rapid service deployment to less populated and rural regions of the nation because, as RTG points out, these service areas will permit additional opportunities for small businesses to provide MVDDS and thus, more varied groups of service providers.[285] We can encourage the meaningful participation of small businesses in this nascent service through the use of CEAs better than through the use of nationwide or regional service areas because the smaller service areas will likely require a lower minimum investment. For those who seek a regional or national footprint, we note that CEAs may be aggregated to create such larger networks.

b. Channel Plan

133. Background. MVDDS has a total of 500 megahertz of available spectrum per service area. In the *Further Notice*, the Commission indicated that 500 megahertz of spectrum would enable MVDDS licensees to effectively compete with other broadband video and data providers such as cable TV operators and DBS service operators who routinely provide hundreds of channels to subscribers.[286] The Commission indicated that MVDDS operators will require the full 500 megahertz to provide the type of variety that 100 channels offer.[287] Thus, the Commission invited comment on the amount of spectrum needed by MVDDS providers to facilitate competition between MVDDS, cable, DBS, and other broadband video data providers.[288] In addition, the Commission sought comment as to whether MVDDS, as a terrestrial operation, requires the same amount of spectrum as DBS operations, whether the capacity needs for both video and data applications require the full 500 megahertz in each license area and whether

[282] We adopt the service area requirement as the newly codified 47 C.F.R § 101.1401. *See* Appendix D.

[283] *See* Annual Assessment of the Status of Competition in the Marketplace for the Delivery of Video Programming, *Eight Annual Report*, CS Docket No. 01-129, 17 FCC Rcd 1244 (2002); Implementation of Cable Television Consumer Protection and Competition Act of 1992, *Notice of Proposed Rulemaking*, CS Docket No. 01-290, 16 FCC Rcd 19074 (2001).

[284] *See* Kenneth P. Johnson, *Redefinition of the BEA Economic Areas*, 2 Survey of Current Business (February 1995). *See also* Appendix H for CEA map. The 354 CEA service areas are based on the 348 Component Economic Areas delineated by the Regional Economic Analysis Division, Bureau of Economic Analysis, U.S. Department of Commerce February 1995, with the following six FCC-defined service area additions: American Samoa, Guam, Northern Mariana Islands, San Juan (Puerto Rico), Mayagüez/Aguadilla-Ponce (Puerto Rico), and the United States Virgin Islands. County definitions for the U.S. Department of Commerce delineated Component Economic Areas were obtained from the following file posted on the internet at http://www.fcc.gov/oet/info/maps/areas/. (This is a self-extracting, executable file that generates the text file EACODES.FIN - this file includes county, metro area, component economic area, and economic area codes for each county, and alphabetic names for all counties, component economic areas, and economic areas.)

[285] RTG Reply Comments at 2-5.

[286] *Further Notice*, 16 FCC Rcd at 4204 ¶ 288.

[287] *Id*.

[288] *Id*.

there are other feasible channel plans that satisfy the objectives of Section 309(j)(4)(C) and the public interest. [289]

134. Discussion. Although commenters were divided regarding the size of the MVDDS spectrum blocks, several commenters support the Commission's proposal to issue one spectrum block of 500 megahertz per service area.[290] We believe that licensing MVDDS in single blocks of 500 megahertz per service area[291] will provide licensees with the capacity to compete not only in the video broadband market with established MVPD providers that are capable of providing consumers with hundreds of channels of programming, but also to provide other wireless services. However, we note that Pegasus proposed an additional channel plan for MVDDS. Specifically, Pegasus asserts that licensing four 125 megahertz blocks to unaffiliated applicants in each service area would enhance competition.[292] Pegasus avers that this licensing scheme is sufficient to supplement DBS services and is adequate to initiate low-cost, basic, multichannel service.[293] EchoStar, on the other hand, asks for a set-aside of no less than 250 MHz of spectrum for interested DBS licensees.[294]

135. We do not believe the sub-division proposals are the best approaches for this particular service. Due to the complex sharing arrangement in the 12 GHz band between MVDDS, DBS and NGSO FSS, we believe that operations in this band may be more susceptible to interference from adjacent systems. We also do not believe that 125 megahertz spectrum blocks will place an MVDDS licensee in a position to compete with other MVPD providers. Rather, 125 MHz spectrum blocks will place MVDDS licensees in the second tier of MVPD providers at the outset. A single licensee operating on a 500 megahertz block of spectrum in each service area would reduce the number of transmitting antennas, and thus the aggregate power per area. This approach would mitigate the potential number of interference sources to DBS and NGSO FSS users and would also alleviate concerns regarding responsibility for interference. Thus, in this instance, the use of blocks less than 500 megahertz is not in the public interest. As discussed below, we also reject EchoStar's proposal with respect to a set-aside for DBS entities.[295] We believe that the schemes proposed by both Pegasus and EchoStar would make it more difficult for a terrestrial licensee to acquire enough bandwidth to effectively compete with the range of offerings that existing MVPD operators can provide.[296] Five-hundred megahertz spectrum blocks ensure sufficient

[289] "In prescribing regulations … the Commission shall … prescribe area designations and bandwidth assignments that promote (i) an equitable distribution of licenses and services among geographic areas, (ii) economic opportunity for a wide variety of applicants, including small businesses, rural telephone companies, and businesses owned by members of minority groups and women, and (iii) investment in and rapid deployment of new technologies and services." 47 U.S.C. § 309(j)(4)(C).

[290] AT&T Comments at 16 (states that the Commission's proposal would reduce the number of technical and interference problems that could develop between licensees); Northpoint Comments at 32 (a smaller block of spectrum would cripple any effort to effectively compete with local cable and DBS operators, who routinely provide hundreds of channels to subscribers and would not promote the objectives of 47 U.S.C. § 309(j)(4)(C)); SRL Comments at 4.

[291] The channeling plan for this service is codified at 47 C.F.R. § 101.1405. *See* Appendix D.

[292] Pegasus Comments at 15; Pegasus Reply Comments at 16 (by using advanced digital compression techniques, 50 digital video channels and one-way Internet services can be provided).

[293] Pegasus Comments at 15.

[294] EchoStar Comments at 29-30.

[295] EchoStar maintains that DBS licensees are entitled to use a significant portion of 12.2-12.7 GHz band for terrestrial services because its licenses were paid for at auction and its rights should extend to any use of the spectrum, whether satellite or terrestrial, that does not cause interference into any other DBS licensee. As explained in paras. 254-255, *infra*, we find this argument to be without merit.

[296] *See, e.g.*, Northpoint Reply Comments at 18.

capacity for the provision of a multichannel video distribution service that will enable the objectives for this service to be met.

c. Permissible Operations for MVDDS

136. Background. Based on the record, the Commission anticipates that the MVDDS licensees will use the 12 GHz band to deliver video services and one-way high speed data (non-video) services to consumers.[297] In the *Further Notice*, the Commission requested comment on whether to authorize MVDDS licensees to use spectrum in the 12 GHz band for fixed one-way direct-to-home/business video and data services.[298] To the extent that licensees wish to offer two-way services, the Commission indicated that spectrum in other bands, wirelines or other means could be used for a return path.[299] Although the Commission has a general policy of flexible spectrum use, the Commission proposed to prohibit mobile and aeronautical operations in the service.[300] The Commission was concerned that DBS would receive interference and the NGSO FSS allocation would be complicated by permitting mobile and aeronautical operations.[301] Additionally, the Commission sought comment on whether other technologies exist or can be designed to allow MVDDS to provide video channels with other capacity for use in other services such as the Internet.[302]

137. Discussion. Commenters uniformly agree that MVDDS licensees should have flexibility to determine the specific services to offer in the 12 GHz band as well as the flexibility to modify service offerings as customer demand evolves.[303] However, DirecTV believes that two-way service in the 12 GHz band should not be permitted because adding a return link in addition to the existing NGSO FSS allocation and the proposed MVDDS allocation would add extraordinary complications to an already "untenable" sharing scenario.[304] We agree that adding a return link in this scenario would unnecessarily complicate the sharing scenario. We believe that sufficient flexibility for two-way service may be afforded to MVDDS licensees whereby the 12 GHz band could be used for a "downstream" path,[305] and the "upstream" (or return) path[306] could be located outside of the 12 GHz band in other available spectrum or over a wireline return path. Sharing between the four types of services in the 12 GHz band will be challenging, and we believe that two-way services in the band without relocating the upstream path would significantly raise the potential for instances of interference among the operations. In this regard, any digital non-broadcast service, including fixed one-way service direct-to-home/business video and data services, will be among the permissible uses for MVDDS provided that such services comply with the technical standards and interference protection criteria set forth herein.

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[297] *See, e.g., First R&O*, 16 FCC Rcd at 4176-79 ¶¶ 212-217.

[298] *Further Notice*, 16 FCC Rcd at 4204 ¶ 289.

[299] *Id*.

[300] *Id*.

[301] *Id*.

[302] *Id*.

[303] AT&T Comments at 11-13 (two-way service could be provided within the band via spread-spectrum return paths that limit any interference with DBS to very small increases in the background noise floor experienced in satellite reception; or, in the alternative, licensees could use narrowband interstitial signals between DBS channels for return paths); AT&T Reply Comments at 6-7; MDS America Comments at 11; National Indian Telecommunications Institute (NITI) Comments at 3; RTG Reply Comments at 5; SRL Comments at 3-4; SkyTower Comments at 2 (permit MVDDS licensees to use stratospheric platforms to provide service).

[304] DirecTV Reply Comments at 24-25.

[305] A "downstream" path is the data information from the service provider to the customer.

[306] An "upstream" path is the data information from the customer to the service provider.

138. We note that the Commission does not license technologies. Service rules are developed prior to license rollout and interested parties may apply to operate in the service provided that they comply with the service rules. Based on the record in this proceeding, several entities claim to have access to technology they will utilize to deliver multichannel video and high speed data applications in MVDDS. Thus, we conclude that the permissible operational parameters as outlined will supply maximum flexibility with sufficient safeguards to decrease the likelihood of interference between the various types of operations in the 12 GHz band. We will, however, prohibit mobile and aeronautical operations due to the interference concerns noted above. We will modify Part 101 of our Rules accordingly.[307]

d. Broadcast Carriage Requirements

139. Background. Television stations have certain carriage rights on local market cable television systems.[308] Sections 614 and 615 of the Communications Act of 1934, as amended, contain the cable television "must carry" requirements for commercial and noncommercial television stations, respectively.[309] Section 325 contains retransmission consent requirements pursuant to which cable operators may be obligated to obtain the consent of commercial broadcasters before retransmitting their signals. Within local market areas, defined by DMAs, commercial television stations may elect cable carriage under either the mandatory carriage or retransmission consent requirements. Noncommercial television stations have a right to mandatory carriage under the Act, but do not have statutory retransmission consent rights.

140. The satellite carriage requirement is different from the cable carriage requirement. Under Section 614 of the Act, subject to market modification, local commercial television stations can demand carriage on all cable systems within their DMA.[310] Under Section 615 of the Act, a local noncommercial television station can demand carriage on a cable system if the cable system's principal "headend"[311] is within fifty miles of the television station's principal community reference point, or if the principal headend is within the Grade B service contour of the television station."[312] However, the satellite broadcast carriage requirements in Section 338 of the Act provides that only satellite carriers that use the statutory copyright license to transmit one or more stations to subscribers in the local markets must carry all stations in that market that request carriage. The carriage requirement does not apply in DMAs in which the satellite carrier does not deliver local into local or uses private copyright arrangements to deliver local stations.

141. In the *Further Notice*, we noted that MVDDS is in many ways comparable to, and could be a competitor to, MVPDs such as cable and DBS.[313] We noted that there was no explicit statutory

[307] Permissible operations for MVDDS are codified at 47 C.F.R § 101.1407. *See* Appendix D. We find that it is not necessary to modify 47 C.F.R. Part 21 to accommodate MVDDS.

[308] Implementation of the Cable Television Consumer Protection and Competition Act of 1992, Broadcast Signal Carriage Issues, *Report and Order*, 8 FCC Rcd 2965 (1993) (*Must Carry Order*). The Commission later clarified the broadcast signal carriage requirements. *See* Implementation of the Cable Television Consumer Protection and Competition Act of 1992, Broadcast Signal Carriage Issues, *Order*, 8 FCC Rcd 4142 (1993) (*Clarification Order*); Cable Television Consumer Protection and Competition Act of 1992, Pub. L. No. 102-385, 106 Stat. 1460 (1992).

[309] 47 U.S.C. §§ 534, 535; *see also* 47 C.F.R. § 76.56.

[310] 47 U.S.C. § 614.

[311] A headend is the originating point of a signal in cable TV systems. The principal headend is the headend, in the case of a cable system with a single headend. In the case of a cable system with more than one headend, the principal headend is designated by the cable operator. *See* 47 C.F.R. § 76.5.

[312] 47 U.S.C. § 615.

[313] *Further Notice*, 16 FCC Rcd at 4205 ¶ 292.

provision requiring mandatory carriage of all local broadcast signals by MVDDS providers and sought comment on whether the Commission should require MVDDS providers to provide all local television channels to every subscriber within each individual service area and whether any must-carry obligations should be imposed on MVDDS licensees.[314] We also asked whether requirements such as the Commission's network nonduplication, syndicated exclusivity, sports blackout, and leased access requirements should apply to MVDDS licensees.[315]

142. Discussion. We believe that the reasons that led Congress to impose mandatory carriage requirements on cable and DBS providers do not apply at this time to MVDDS. Congress identified three important governmental interests when it imposed must-carry obligations on cable systems: "(1) preserving the benefits of free, over-the-air local broadcast television, (2) promoting the widespread dissemination of information from a multiplicity of sources, and (3) promoting fair competition in the market for television programming."[316] With respect to DBS providers, Congress identified similar interests.[317] With respect to the first interest, Congress was concerned that absent mandatory carriage requirements, a substantial number of broadcast stations would either deteriorate or fail as a result of the increase in market penetration by cable systems.[318] Congress expressed concern that this shift in market share would give cable systems the incentive and ability to delete, reposition, or decline carriage of local broadcast stations on cable systems.[319] With respect to the government's interest in promoting the widespread dissemination of information from a multiplicity of sources, the record in this proceeding does not demonstrate that must-carry requirements are necessary to further that goal. Indeed, Northpoint and Pegasus are willing to assume must-carry obligations, which mean that they are willing to carry all television stations in a market.[320] Similarly, it has not been shown that imposing must-carry requirements on a new service would enhance competition. In light of the fact that MVDDS licensees could use their facilities to provide a variety of services, we are concerned that mandatory carriage requirements could deprive MVDDS licensees of the flexibility they need to execute their business plans and respond to market demands.[321] While certain must-carry regulations were mandated by statute to apply to cable systems and different broadcast carriage requirements to apply to satellite carriers, no such regulations were mandated for other MVPDs or for MVDDS. Given that MVDDS is not required to carry video programming, we choose not to impose such requirements. In short, the record does not provide us with a sufficient basis upon which to impose must-carry obligations at this time absent a directive from Congress. Nonetheless, MVDDS networks should not be utilized by DBS providers as a means of avoiding their carry-one-carry all responsibilities. Such bypass may prompt Commission action to enforce and/or revise the regulatory obligations of the bypassing provider.

[314] *Id.* at 4205-06 ¶ 292.

[315] *Id.* at 4205 ¶ 292.

[316] S.Rep. No. 102-92, p. 58 (1991). *See also Turner Broadcasting System v. FCC*, 512 U.S. 622, 662 (1994) *citing* S.Rep. No. 102-92, p. 58 (1991).

[317] *See Satellite Broadcasting & Communications Association v. FCC*, 146 F.Supp.2d 803, 822-823 (E.D. Va. 2001).

[318] *See Turner Broadcasting System v. FCC*, 520 U.S. 180, 191-192 (1997).

[319] *Id*.

[320] Northpoint Comments at 32; Pegasus Comments at 16. We note that APTS argues that mandatory carriage obligations are consistent with the intent of promoting localism and providing service to unserved and underserved areas. APTS Comments at 5-6. At this time, however, we do not agree that it is necessary to require mandatory carriage in the new MVDDS service.

[321] *See* SRL Comments at 5.

143. If an MVDDS licensee meets the statutory definition of an MVPD, we conclude that the retransmission consent requirement of Section 325(b)(1) of the Act[322] shall apply to that MVDDS licensee. The Act defines an MVPD as any person "who makes available for purchase, by subscribers or customers, multiple channels of video programming …"[323] Section 325(b)(1) of the Act[324] states that, with certain exceptions, no MVPD may retransmit the signal of a broadcast station, or any part thereof, without the express authority of the originating station, except pursuant to Sections 614 and 338 of the Act.[325] Since the general retransmission consent provisions apply to all MVPDs, we conclude that any MVDDS licensee that is an MVPD must obtain the prior express authority of a broadcast station before retransmitting the station's signal, subject to the exceptions contained in Section 325(b)(2) of the Act.[326]

144. Additionally, we decline at this time to impose network nonduplication, syndicated exclusivity, sports blackout, and leased access rules on MVDDS licensees who provide MVPD service. Pegasus and NAB support applying these requirements to MVDDS licensees.[327] In applying these requirements to satellite carriers, the Commission stated, "We believe that Congress's purpose in applying the network nonduplication, syndicated exclusivity, and sports blackout rules to these satellite retransmissions reflects a balance between providing access to national programming carried by the superstation and a recognition that, in the absence of retransmission consent requirements, broadcasters and rights holders will have no opportunity to protect their contractual rights."[328] While we are sensitive to the need to protect contractual rights, given the fact that MVDDS is a new service and the uncertainties concerning the types of services MVDDS will provide, we believe it is premature to impose these regulatory requirements at this time. It is unclear whether MVDDS will even be used to transmit superstations or other distant television stations to subscribers. We also note that the existing obligations do not apply to cable systems with fewer than 1,000 subscribers[329] or to a satellite carrier if it has fewer than 1,000 subscribers within the relevant protected zone who subscribe to the nationally distributed superstation or network station. In addition, private contractual arrangements and the necessity for retransmission consent, as discussed above, may be sufficient to protect rights holders. Under these circumstances, we believe we will be in a better position to ascertain the appropriateness of applying these requirements after MVDDS licensees construct their systems and begin serving customers. Accordingly, we decline to impose these requirements at this time. However, we may revisit this issue at a later date if MVDDS licensees provide MVPD service.

e. Treatment of Incumbent Licensees[330]

145. Background. In addition to incumbent DBS operations, the Commission has authorized over 200 incumbent non-public safety and public safety POFS licensees[331] to operate in the 12 GHz band.

[322] 47 U.S.C. § 325(b)(1).

[323] 47 U.S.C. § 522(13).

[324] 47 U.S.C. § 325(b)(1).

[325] 47 U.S.C. § 534.

[326] 47 U.S.C. § 325(b)(2).

[327] Pegasus Comments at 17 (it is "reasonable" to apply these requirements to MVDDS licensees because they are designed to protect local television stations); NAB Reply Comments at 10-12 (strongly urges the application of program exclusivity rules such as network nonduplication, syndicated exclusivity, and sports blackout rules).

[328] Implementation of the Satellite Home Viewer Improvement Act of 1999: Application of Network Nonduplication, Syndicated Exclusivity, and Sports Blackout Rules to Satellite Retransmissions, *Notice of Proposed Rulemaking*, CS Docket No. 00-2, 15 FCC Rcd at 438-39 ¶ 9.

[329] 47 C.F.R. §§ 76.95(a), 76.106, 76.111(f).

[330] The newly codified 47 C.F.R. § 101.1409 governs the treatment of incumbent licensees. *See* Appendix D.

The Commission recognized the potential for interference between POFS and DBS systems at the onset of DBS' entrance into the band[332] and instructed the incumbent POFS licensees to either operate on a secondary basis to DBS or to relocate their facilities.[333]

146. As stated earlier, the Commission permitted the entry of MVDDS into the 12 GHz band on a co-primary, but non-harmful interference basis to incumbent DBS operations and on a co-primary basis to NGSO FSS.[334] In addition, the Commission explained its obligation under the Rural Local Broadcast Signal Act to ensure that no facility licensed or authorized to deliver local broadcast television signals as set forth in the Act, causes harmful interference to the primary and incumbent public safety POFS service providers.[335] Thus, the Commission proposed that only incumbent commercial POFS licensees should be required to protect new MVDDS and NGSO FSS licensees in the 12 GHz band from harmful interference.[336] However, MVDDS and NGSO FSS licensees would be required to protect incumbent public safety POFS licensees in that band.[337]

147. Discussion. We shall require incumbent non-public safety licensees in the 12 GHz band to protect new MVDDS and NGSO FSS licensees from harmful interference. Pegasus states that the Commission should require MVDDS and NGSO FSS licensees to protect all incumbent POFS licensees.[338] We are in agreement with Pegasus to the extent that it supports the protection of incumbent public safety POFS licensees. However, we believe that our distinction between the obligations of incumbent POFS non-public safety licensees and incumbent public safety POFS licensees is critical to our compliance with the RLBSA. In this regard, MVDDS and NGSO FSS will satisfy the requirements of this statutory language by protecting incumbent public safety POFS licensees. We note that an incumbent public safety POFS licensee must continue to utilize the license area to provide public safety services in order to retain its protected status.[339] Because MVDDS licensees will be awarded licenses for a 500 megahertz channel block,[340] we believe that the requirement to protect these public safety incumbents will involve only a modest amount of spectrum and thus, will not significantly impact the MVDDS service. We emphasize that our decision as set forth herein does not relieve any NGSO FSS, POFS and MVDDS licensees of their obligation to protect DBS operations in the 12 GHz band.

(...continued from previous page)

[331] Low-power limited coverage systems are a type of POFS licensee.

[332] *See* Inquiry into the Development of Regulatory Policy in Regard to Direct Broadcast Satellites for the Period Following the 1983 Regional Administrative Radio Conference, Gen. Docket No. 80-603, *Report and Order*, 90 FCC 2d 676 (1982).

[333] *Id.*; *see also* Initiation of Direct Broadcast Satellite Service – Effect on 12 GHz Terrestrial Point-to-Point Licensees in the Private Operational Fixed Radio Service, *Public Notice*, 10 FCC Rcd 1211 (1994). The Commission indicated that in the event that DBS service experiences interference from terrestrial point-to-point operations, it is the sole responsibility of terrestrial licensees to eliminate such interference immediately.

[334] *See* para. 11, *supra*.

[335] *See Further Notice*, 16 FCC Rcd at 4206 ¶ 293; *see also* RLBSA, Pub. L. 106-113, 113 Stat. 1501, 1537 (1999).

[336] *Further Notice*, 16 FCC Rcd at 4206 ¶ 294.

[337] *Id*.

[338] Pegasus Comments at 17.

[339] A transfer and/or assignment of a license by a public safety entity to a non-public safety entity will result in a loss of protected status such that neither MVDDS nor NGSO FSS licensees will be required to protect the non-public safety license areas.

[340] *See* paras. 134-135, *supra*.

Hierarchy of Protection for 12 GHz Band Licensees

1. DBS	MVDDS/NGSO operators are subject to technical requirements to protect DBS.
2. Public Safety POFS	MVDDS/NGSO are required to protect incumbent public safety POFS operators.
3. MVDDS/NGSO	MVDDS/NGSO are designated to operate on a co-primary basis with each other.
4. Non-Public Safety POFS	MVDDS/NGSO are not required to protect incumbent non-public safety POFS operators.

148. In light of our actions described above, and effective as of the date of the release of this *Second R&O*, we will no longer accept any POFS applications for new licenses (including public safety POFS), amendments to applications for new licenses, or major modifications for the 12 GHz band received on or after the release date of this *Second R&O*. All such POFS applications received after that date will be returned as unacceptable for filing. We believe that this action is consistent with our approach in other services utilizing geographic area licensing and competitive bidding procedures to issue licenses.[341]

149. We will, however, continue to process POFS applications for minor modifications[342] or for license assignment or transfer of control.[343] This exception will also apply to amendments to applications for minor modifications. Thus, we will accept applications for minor modifications, amendments to applications for minor modifications, license assignments, and transfers of control under existing procedures. Moreover, we will continue to process POFS applications for new licenses, amendments to the applications for new licenses, and major modifications that are pending as of the release date of this *Second R&O* on a first-come, first-served basis.[344]

f. Incremental Licensing

150. Background. Some parties ask that we institute an incremental licensing approach in order to evaluate harmful interference.[345] Specifically, DirecTV, EchoStar and SBCA believe that if the Commission licenses the MVDDS service, then it should start by licensing a single local market – not one of the nation's fifty largest markets – as it did with LMDS, in order to allow the Commission to evaluate

[341] *See, e.g.,* Amendment of the Commission's Rules Regarding Multiple Address Systems, WT Docket No. 97-81, *Report and Order*, 15 FCC Rcd 11956, 12002-12005 ¶¶ 109-115 (2000) (*MAS Report and Order*) *citing* Revision of Part 22 and Part 90 of the Commission's Rules to Facilitate Future Development of Paging Systems, Implementation of Section 309(j) of the Communications Act – Competitive Bidding, WT Docket No. 96-18, *Notice of Proposed Rule Making*, 11 FCC Rcd 3108, 3136 & n.270 (1996).

[342] *See* 47 C.F.R. § 1.929 for a description of major and minor filings.

[343] We will require the assignees and transferees of such transactions and their successors to comply with the revised service rules with respect to the treatment of incumbents as set forth herein.

[344] *See* Appendix I for a list of POFS licensees.

[345] *See, e.g.*, DirecTV Reply Comments at 22-23; EchoStar Comments at 20.

the viability of MVDDS.[346] The MITRE Report recommended a different form of incremental licensing such that the Commission could grant all of the licenses in a stepwise fashion based on satisfaction of certain milestones.[347]

151. Discussion. Incremental licensing could be useful for a service in which additional testing is required to determine the nature of interference. In such a situation, the Commission could introduce a service on a limited basis to assess "the real world impact of signal interference" prior to the full deployment of service nationwide.[348] In this proceeding, however, we examined the test data provided by applicants, DBS providers, and the MITRE Report and conclude that the intermediate step of incremental licensing is not required. The MITRE Report has essentially already provided the data that would be gained from additional testing.[349] The MITRE Report indicates that sharing of the 12 GHz band is feasible and provides suggested mechanisms to mitigate potential interference to DBS operations.[350] We have, in the MITRE Report, a "real world assessment of signal interference." We have also determined that our technical criteria will provide the necessary protection to DBS customers no matter what technology or system is used.

152. Thus, we decline to adopt an incremental licensing plan in the 12 GHz band. We find that this approach does not give sufficient certainty concerning the future scope of the service and therefore could result in ineffectual deployment and adversely affect funding opportunities in the capital markets. In addition, this approach removes the economic market incentives and economies of scale generally associated with licensing several systems across the United States for this new service offering. For example, greater numbers of service areas may be needed to support the development of equipment and the purchase of programming. Limiting the scope of deployment may adversely affect the entry of new sources of effective competition to DBS and cable. Moreover, the present record is not sufficient to determine the initial markets that should be selected or the terms for subsequent roll-out of other markets. We also believe that an initial incremental licensing approach in which only rural unserved and underserved areas are selected initially for licensing would make MVDDS less appealing to some parties due to the lack of economic market incentives and economies of scale that could be enjoyed in a broader-based licensing approach. Further, to the extent that this approach is viewed as helpful in identifying terrestrial NGSO interference issues, it does not provide an immediately useful method for evaluating terrestrial interference to NGSO systems because NGSO FSS systems will likely be deployed after MVDDS systems.

2. Application, Licensing and Processing Rules

153. Background. In the *Further Notice*, the Commission sought comment on an appropriate licensing framework for implementing MVDDS in the 12 GHz band.[351] Northpoint, the only entity to comment on this issue, maintains that all pertinent application, licensing and processing rules are already

[346] DirecTV Reply Comments at 22-23; EchoStar Comments at 20; SBCA Comments at 7-8; SBCA Reply Comments at 7-8.

[347] MITRE Report, Policy Issues and Recommendations at 6-5 to 6-8.

[348] Creation of Low Power Radio Service, *Report and Order*, MM Docket 99-25, 15 FCC Rcd 2205 (2000) (statement of Commissioner Michael K. Powell, Dissenting in Part).

[349] We note that the MITRE Report is based on test results utilizing equipment supplied by Northpoint, EchoStar and DTV and technical specifications provided by Pegasus. We are confident that the technical operating parameters we adopt in light of the MITRE Report provide for the necessary protection against harmful interference.

[350] *See* MITRE Report at 6.1 to 6.2.

[351] *Further Notice*, 16 FCC Rcd at 4206-07 ¶ 295. *See* para. 210, *infra* for a separate discussion concerning pending applications.

in place for MVDDS, and that the Commission needs only to grant its waiver petition to permit what is currently prohibited: point-to-point video broadcasts in the Fixed Wireless allocation.[352]

154. Discussion. As indicated in further detail herein, we believe that a rule making proceeding is the proper forum to address spectrum management decisions for the 12 GHz band.[353] Hence, in this *Second R&O*, we are providing a licensing framework for MVDDS that we believe will promote competition in the multichannel video programming and broadband data markets and thus best serve the public interest.

a. Frequency Availability and Regulatory Status

155. Background. Currently, the Frequency Availability Table (Table) in Section 101.101 of our Rules designates the POFS and the DBS as available services in the 12 GHz band.[354] With the assignment of MVDDS to the 12 GHz band, the Commission sought comment on whether to modify the Table to designate MVDDS as an additional radio service in the 12 GHz band.[355] Similarly, the Commission invited comment on whether to amend the frequency assignments in Section 101.147 of our Rules to designate MVDDS as an additional radio service in the 12 GHz band.[356] In the *First R&O*, the Commission explained that MVDDS can operate in this band under the existing primary allocation, but also established that we would maintain that fixed operations would be on a non-harmful interference basis to DBS.[357]

156. In the *Further Notice*, the Commission also requested comment on whether to permit an MVDDS licensee to use the 12 GHz band for distribution of video programming and data services.[358] The Commission did not envision MVDDS as a common carrier service,[359] nor did the Commission envision that MVDDS licensees will provide switched voice and/or data services.[360] However, the

[352] Northpoint Comments at 31.

[353] *See* paras. 215-228, *infra.*

[354] 47 C.F.R. § 101.101.

[355] *Further Notice*, 16 FCC Rcd at 4203, 4205 ¶¶ 287, 291.

[356] 47 C.F.R. § 101.147.

[357] *See First R&O*, 16 FCC Rcd at 4177-80 ¶¶ 213-218.

[358] *Further Notice*, 16 FCC Rcd at 4206-07 ¶ 295.

[359] *See* 47 U.S.C. § 153(10) which provides that a common carrier is "any person engaged as a common carrier for hire, in interstate or foreign communication by wire or radio or in interstate or foreign radio transmission of energy, except where reference is made to common carriers not subject to this Act; but a person engaged in radio broadcasting shall not, insofar as such person is so engaged, be deemed a common carrier." *See* also 47 C.F.R. § 32.9000.

[360] Video programming service will be treated as a non-common carrier service. *See* Rule Making to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services, CC Docket No. 92-297, *Second Report and Order*, *Order on Reconsideration and Fifth Notice of Proposed Rule Making*, 12 FCC Rcd 12545, 12639-41, ¶¶ 213-15 (1997) (*LMDS Second R&O*). Thus, any applicant intending to provide a video programming service would appropriately indicate a choice of non-common carrier regulatory status. We note that in other services we adopted a more flexible approach wherein an applicant may elect common carrier status and/or non-common carrier status under its authorization. For instance, in the LMDS proceeding, we permitted licensees to operate exclusively as a common carrier or non-common carrier or to provide services on both bases. *See LMDS Second R&O*, 12 FCC Rcd 12545, ¶¶ 245-251. Similarly, in the 39 GHz proceeding, we adopted a flexible approach where we permitted licensees to serve as either a common carrier or a private licensee, permitting licensees that selected to provide common carrier service to private service as well. *See* Amendment of the Commission's Rules (continued....)

Commission noted that local cable companies and DBS operators provide their services on a non-common carrier basis.[361] Therefore, the Commission sought comment on whether to limit the scope of MVDDS operations to the provision of service on a non-common carrier basis.

157. Discussion. Pegasus, the only entity commenting on the issues of frequency availability and regulatory status, supports the Commission's proposal to amend its Frequency Table and Part 101 of its rules and agreed with the Commission's initial proposal to provide service on a non-common carrier basis.[362] We will amend the Table and the frequency assignments in Part 101 to designate MVDDS as an available service in the 12 GHz band.[363] We note that existing point-to-point users are located in this portion of the allocation table. Although the Commission determined that MVDDS services can be provided on a non-common carrier basis,[364] after further consideration, we do not believe elimination or prohibition of common carrier use of this spectrum is in the public interest. We believe that permitting MVDDS licensees to provide service on a common carrier basis is consistent with our objective of fostering flexibility in wireless services where feasible.[365] For example, if an entity provides two-way service utilizing a switched network return path, the entity would not be classified as a common carrier service. However, if both the send and receive paths are connected to the public switched network, the service offered could be construed as a common carrier service. In this regard, we believe that providing MVDDS applicants with the option of choosing either common carrier and/or non-common carrier status will provide maximum flexibility and restrict unnecessary regulatory burden for this service.[366]

158. An MVDDS licensee will be considered a common carrier if the licensee is providing voice and data services through the public switched telephone network. To the extent that an applicant chooses to use MVDDS spectrum to provide common-carrier service, compliance with the requirements of Title II of the Communications Act, in addition to all applicable Commission Rules is warranted.[367] In addition, we will require MVDDS licensees to notify the Commission within thirty days of a change in the service(s) offered if such change would result in a change to its regulatory status.[368] Therefore, we

(...continued from previous page)
Regarding the 37.0-38.6 GHz and 38.6-40.0 GHz Bands, ET Docket No. 95-183, *Report and Order and Second Notice of Proposed Rule Making*, 12 FCC Rcd 18600, 18636 (1997) (*39 GHz R&O*).

[361] *Further Notice*, 16 FCC Rcd at 4206-07 ¶ 295.

[362] Pegasus Comments at 20.

[363] *See* Appendix D. Accordingly, we will not amend 47 C.F.R. Part 21.

[364] *See Further Notice*, 16 FCC Rcd at 4206-07 ¶ 295.

[365] *See, e.g.*, *LMDS Second R&O*, 12 FCC Rcd 12545 ¶¶ 245-251; *24 GHz Report and Order*, 15 FCC Rcd at 16946-48 ¶¶ 26-29.

[366] Pegasus Comments at 18. No commenter recommended limiting the scope to non-common carrier status, however, Pegasus recommended permitting MVDDS licensees to provide services on a non-common carrier basis.

[367] We note that we are currently exploring our forbearance authority in the context of Title II with respect to the Part 101 Services in an outstanding proceeding. *See* Reorganization and Revision of Parts 1, 2, 21, and 94 of the Rules to Establish a New Part 101 Governing Terrestrial Microwave Fixed Radio Services, WT Docket No. 94-148, *Memorandum Opinion and Order and Notice of Proposed Rule Making*, 15 FCC Rcd 3129 ¶ 83 (2000) (*Part 101 MO&O and NPRM*).

[368] *See* 47 C.F.R. § 1.947(b). However, if the change results in discontinuance, reduction, or impairment of the existing service, the licensee may be subject to a different time period. Also, to the extent that a licensee's decision to change its regulatory status raises issues with respect to that licensee exceeding the benchmark contained in 47 U.S.C. § 310(b)(4), our Rules require the Commission's prior approval before the licensee can make this change. Rules and Policies on Foreign Participation in the U.S. Telecommunications Market and Market Entry and Regulation of Foreign-Affiliated Entities, IB Docket Nos. 97-182 and 95-22, *Report and Order and Order on* (continued....)

will amend Sections 101.101[369] and 101.147(p)[370] of our Rules to reflect that both common carrier and/or non-common carrier uses are permitted in this band.

b. License Eligibility

159. Background. In the *Further Notice*, the Commission outlined the source of our authority to regulate eligibility for MVDDS licenses. Specifically, the Commission explained that Section 309(j) of the Act, acknowledged our authority "to [specify] eligibility and other characteristics of such licenses" and directs that we exercise that authority so as to "promot[e] … economic opportunity and competition … by avoiding excessive concentration of licenses and by disseminating licenses among a wide variety of applicants."[371] As the *Further Notice* indicates, in assessing the need to restrict the opportunity of any class of service provider to obtain and use spectrum to provide communications services, we must determine whether the restriction is necessary to ensure that consumers receive high-quality communications at reasonable prices.[372] Toward this end, the Commission created a standard for determining whether an eligibility restriction is warranted. The Commission will impose a restriction if open eligibility raises a significant likelihood of substantial harm to competition in specific markets and if the restriction will be effective in eliminating such harm.[373] The Commission stated that this test would be appropriate for assessing eligibility requirements for MVDDS, and it sought comment on whether there is a significant likelihood that incumbent cable operators and DBS firms may substantially harm competition by acquiring MVDDS licenses.[374]

160. Based on a preliminary analysis, the Commission determined that incumbent local cable operators and existing DBS service providers may have both the ability and incentive to acquire MVDDS licenses in order to anti-competitively foreclose entry by a new MVPD competitor.[375] The Commission invited comment on its initial analysis. Additionally, the Commission requested comment on whether to restrict cable service operators from acquiring an attributable interest in an MVPD provider within their franchised cable service area, unless such area has been found by the Commission to be characterized by effective competition.[376] The Commission also sought comment on whether to restrict DBS carriers or distributors from obtaining or investing in an MVDDS license.[377]

(...continued from previous page)
Reconsideration, 12 FCC Rcd 23,891, 23,940-41 ¶¶ 111-118 (1997) (*Foreign Participation Order*). *See, e.g.,* 47 C.F.R. § 101.305.

[369] 47 C.F.R. § 101.101.

[370] 47 C.F.R. § 101.147(p).

[371] *See Further Notice*, 16 FCC Rcd at 4207-08 ¶ 297. *See also* 47 U.S.C. § 309(j)(3); *Cincinnati Bell Tel. Co. v. FCC*, 69 F.3d 752, 761-762 (6th Cir. 1995) (*Cincinnati Bell*). Our use of that authority to "place restrictions on the bidding process in order to ensure that a wide variety of applicants are able to meaningfully participate" in the market for the service being auctioned has been upheld by the courts.

[372] *See Further Notice*, 16 FCC Rcd at 4207 ¶ 296; *See also*, 47 U.S.C. § 151.

[373] *See, e.g., 39 GHz R&O*, 12 FCC Rcd 18600, 18619; Rule Making to Amend Parts 1, 2, 21 and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and policies for Local Multipoint Distribution Service and for Fixed Satellite Services, CC Docket 92-297*, Third Report and Order and Memorandum Opinion and Order*, 15 FCC Rcd 11857 (2000).

[374] *Further Notice*, 16 FCC Rcd at 4208-10 ¶¶ 298-299.

[375] *Id.* at 4208-09 ¶ 298.

[376] *Id*. at 4209-10 ¶ 299.

[377] *Id*.

161. Discussion. Upon review of the record, we find that the issue of whether to impose an eligibility restriction in this instance is multifaceted and warrants careful consideration of the perspectives of all affected parties. On the one hand, most MVPD markets are highly concentrated and many exhibit only limited competition.[378] Cable operators hold a dominant market share in most MVPD markets, serving approximately seventy-seven percent of the MVPD households nationwide.[379] In addition, there is little prospect of competitive entry other than via MVDDS in the foreseeable future. Thus, it is reasonable to argue that the dominant incumbent operators may have an incentive to anti-competitively acquire MVDDS licenses in the areas of their current operations in order to foreclose competition from MVDDS licensees. Several commenters have argued that utilizing eligibility restrictions to prohibit certain incumbent cable operators from obtaining MVDDS licenses is in the public interest.[380] In contrast, no commenters have argued that smaller incumbent MVPD providers, using other technologies, would have the incentive and ability to acquire MVDDS licenses anti-competitively, and there appears no reason to exclude these entities from acquiring MVDDS licenses. Finally, it also appears that the imposition of an eligibility restriction here would be an effective remedy for the harms identified (*i.e.*, potential anti-competitive behavior)[381] by preventing those harms without introducing other problems. We believe workable attribution rules and geographic overlap rules can be specified, as they were in the case of the LMDS eligibility restriction. On the other hand, there are reasonable arguments that the acquisition of MVDDS licenses by in-region[382] cable operators or the current DBS providers[383] would be efficient and pro-competitive, and thus that open eligibility for MVDDS licenses should be maintained. The current DBS providers may find acquiring MVDDS licenses attractive for several reasons.[384] First, DBS providers have limited capacity relative to the demand for provision of local television channels, and thus they could use MVDDS spectrum to develop complementary non-interfering terrestrial operations.[385] MVDDS may provide a data path for DBS that will enhance capacity. Second, combined

[378] *See*, *e.g.*, *Seventh Annual Report*, 16 FCC Rcd 6005, 6008 ¶¶ 5, 8 (cable television is still the dominant technology for the delivery of video programming to consumers in the MVPD marketplace), (growth of non-cable MVPD subscribers continues to be primarily attributable to the growth of DBS).

[379] *See* NCTA Comments (CSB Docket No. 01-129) at 7 (filed Aug. 2, 2001).

[380] Pegasus Comments at 18 (preclude incumbent cable operators from acquiring an attributable interest in an MVDDS license that is located within a franchised cable service area, unless deemed characterized by effective competition); EchoStar Comments at 26-28 (cable systems should be barred from applying for the new service because they have been found to possess market power in a relevant market); EchoStar Reply Comments at 19-21 (bar all companies found to possess market power in a relevant market, including incumbent cable systems); SBCA Comments at 8-9 (bar only cable systems found to possess market power in a relevant market).

[381] *See, e.g.*, Pegasus Comments at 18; EchoStar Comments at 26; SBCA Comments at 8-9.

[382] Generally, "in-region" describes those MVPDs with service areas that have significant overlap with MVDDS service areas. *See* para. 165 *supra*.

[383] Two Commission DBS licensees, EchoStar and DirecTV, have agreed to a merger and have submitted an application to the Commission for consent to transfer control of Commission licenses and authorization to a newly created entity, EchoStar Communications Corporation (New EchoStar). *See Application of EchoStar Communications Corporation, General Motors Corporation, Hughes Electronics Corporation, Transferors, and EchoStar Communications Corporation, Transferee, for Authority to Transfer Control*, (filed December 3, 2001) CS Docket No. 01-348 (EchoStar/DirecTV Application). The application was placed on public notice on December 21, 2001, DA 01-3005. According to the merger applicants, EchoStar, through its DISH Network brand, currently provides DBS service to more than 6 million subscribers in the United States (EchoStar/DirecTV Application, p. 10) and DirecTV currently provides DBS service to approximately 10.3 million subscribers in the United States (EchoStar/DirecTV Application p.13).

[384] In the event that the EchoStar-DirecTV merger is approved, we may re-examine the imposition of eligibility restrictions with regards to DBS.

[385] DirecTV Reply Comments at 32. We note that EchoStar and DirecTV assert that consent to their merger would also enhance their capacity to provide local signals.

satellite-terrestrial operations could make the DBS providers stronger competitors to cable, and thus enhance competition in MVPD markets. Third, allowing DBS providers to acquire MVDDS licenses essentially would allow DBS providers to provide MVDDS service in the way that best responds to the interference concerns of DBS.

162. Likewise, for several reasons, in-region cable operators may find acquiring MVDDS licenses appealing although dominant cable operators will be barred from acquiring an attributable interest in an MVDDS license for a service area where significant overlap is present. First, exclusion from acquiring in-region MVDDS licenses would prevent them from using MVDDS to serve customers they are presently unable to serve economically in their current franchise areas. Exclusion would also prevent them from increasing MVPD competition by using MVDDS to expand into the territories of other cable operators. Second, a cable restriction might also deny operators the opportunity to efficiently provide non-cable services, such as broadband video and data services, either within its own or neighboring service areas.[386] Finally, an eligibility restriction could have the effect of excluding incumbent companies that are developing innovative technologies for the band. Precluding such innovation could ultimately harm the public interest.[387]

163. In balancing these arguments, and in particular, weighing the probabilities of the various motives the dominant, in-region MVPDs may have for acquiring MVDDS licenses, we conclude that open eligibility for DBS service providers and distributors will not result in substantial competitive harm. The fact that DBS acquisition of MVDDS licenses could provide important public benefits lends support to our determination that DBS does not satisfy the criteria set forth in the "substantial harm" test, and that its exclusion is not warranted. These benefits include in particular the possibility that DBS service providers may use MVDDS as a complementary terrestrial application capable of providing the extra capacity to accommodate demand for local television channels. As noted previously, MVDDS networks should not be utilized by DBS providers as a means of avoiding their carry-one-carry all responsibilities.[388]

164. Conversely, we find that open eligibility for in-region cable operators poses a significant likelihood of substantial competitive harm. With their large current market shares, cable operators have a strong incentive to prevent entry by new MVPD providers.[389] In making this determination, we are influenced by the strong interest of applicants to primarily use MVDDS to distribute local television programming. Hence, we deem a restriction premised on harm in the MVPD market is appropriate. In addition, we have given considerable weight to the fact that MVPD markets are characterized by a limited number of current providers and a small likelihood of increased competition. Prospects for entry in the form of cable over-building or other types of MVPD service appear unlikely. Moreover, we believe a fourth provider in the MVPD marketplace would provide significant public interest benefits through lower prices, improved service quality and increased innovation.[390] In this regard, we view

[386] AT&T Comments at 18; AT&T Reply Comments at 7-8.

[387] MDSA Comments at 16; MDSA Reply Comments at 10-14.

[388] *See* para. 139, *supra*.

[389] *See, e.g.,* NCTA Comments (CSB Docket No. 01-129) at 5 (filed August, 2, 2001 (cable still has the largest share of multichannel video customers); *Seventh Annual Report*, 16 FCC Rcd at 6008, 6010, 6015-25 (cable television still is the dominant technology for the delivery of video programming to consumers in the MVPD marketplace; the cable industry has continued to grow in homes passed, basic cable subscribership, premium service subscriptions, basic cable viewership, basic cable penetration and channel capacity).

[390] One commenter asserts that the launch of a fourth competitor to compete with the two DBS operators and the cable operators would result in a decrease in cable rates of five per cent and an annual savings of $2 billion for U.S. households. Northpoint Comments, Hazlett Declaration at 17.

implementation of this restriction as consistent with our continuous policy efforts to stimulate competition in the telecommunications industry.[391]

165. Because cable operators' service areas will typically be smaller than CEAs and because cable service areas often cross CEA boundaries, operators will sometimes be partly in-region and partly out-of-region. In addition, even if entirely in-region, operators' service areas may cover only a limited part of a CEA. We will impose the cable eligibility restriction only when there is a "significant overlap" of an operator's service area and an MVDDS license area. Thus, we adopt a definition for significant overlap intended to identify only those cable operators whose overlap would create a strong incentive for them to acquire MVDDS licenses for the purpose of foreclosing entry and protecting current market position. Specifically, cable operators whose subscribers make up at least thirty-five percent of the MVPD households will be precluded from obtaining an attributable interest[392] in an MVDDS license for that CEA.

166. The *Horizontal Merger Guidelines* identify thirty-five percent as the critical market share above which "merged firms may find it profitable to raise price and reduce joint output" when competitors are distinguished primarily by their capacities.[393] Although MVDDS operators are distinguished by factors other than capacity, the logic that underlies the thirty-five percent threshold is germane here. With a sufficiently large share (*i.e.*, thirty-five percent or more) of the relevant market, a firm will have pronounced incentive to ensure that the price for its service is not reduced, since any price reduction will apply to a large customer base. One strategy a cable operator with a large market share might pursue to prevent price declines is to preclude entry by a new MVDDS operator via acquiring the license it requires to operate. When it has a large market share, a cable firm may find this strategy to be profitable even though some of the benefits of the strategy accrue to rival firms. Such undesirable preclusion of entry can be eliminated by restricting the eligibility of cable operators to those whose subscribers constitute fewer than thirty-five percent of the MVPD households in the MVDDS license area.

167. Previously, when establishing rules limiting cellular incumbents' eligibility to acquire the soon-to-be auctioned broadband PCS licenses, the Commission concluded that an overlap of ten percent or more should be considered significant. We found that "an overlap of less than ten percent of the population is sufficiently small and that the potential for exercise of undue market power by the cellular operator is slight."[394] Subsequently, we reaffirmed the choice of a ten percent threshold as appropriate for

[391] *See, e.g.*, Amendment of the Commission's Rules to Establish New Personal Communications Services, GEN Docket No. 90-314, *Second Report and Order*, 8 FCC Rcd 7700, 7744-45 ¶¶ 105-106 (1993) (PCS *Second Report and Order*) (Commission's earlier policies did not allow cellular incumbents to acquire the broadband Personal Communications Services (PCS) licenses in the areas of their current operations).

[392] The attributable interest percentage in this instance will parallel that employed for purposes of applying the eligibility restriction in other wireless services, such as LMDS and the Commission's CMRS spectrum cap. *See* Amendment of Parts 1,2, 21, and 25 of the Commission's Rules – To Establish Rules and Policies for Local Multipoint Distribution Service, CC Docket No. 92-297, *Second Report and Order, Order on Reconsideration , and Fifth Notice of Proposed Rulemaking*, 12 FCC Rcd 12545, 12628-29 ¶¶ 186-188 (*LMDS Second Report and Order*); Amendment of Parts 20 and 24 of the Commission's Rules – Broadband PCS Competitive Bidding and the Commercial Mobile Radio Service Spectrum Cap, WT Docket No. 96-59, *Report and Order*, 11 FCC Rcd 7824, 7876 ¶ 107 (1996) (*CMRS Spectrum Cap Report and Order*). This restriction generally provides that an entity owning 20% or more of an MVDDS license would have ownership of that license attributed to it.

[393] Department of Justice, Federal Trade Commission, *Notice,* 1992 Horizontal Merger Guidelines, § 2.22, 57 FR 41552, 41560 (1992) (*Horizontal Merger Guidelines*).

[394] *See PCS Second Report and Order,* 8 FCC Rcd at 7744-45 ¶ 105.

the closely related CMRS Spectrum Cap.[395] For purposes of the MVDDS restriction, however, we believe that a ten percent overlap threshold is too low. While cellular and PCS licenses are very close substitutes that can provide similar types of telephony services, it seems premature to try to assess the extent to which MVDDS will be a good substitute for existing cable service. Thus, incumbent cable operators may be less likely to behave anti-competitively in acquiring the new licenses because their service and technology are not as easily interchangeable with that of MVDDS. Whereas a ten percent overlap may not give rise to strong anticompetitive incentives to acquire MVDDS licenses, substantially higher overlaps are likely to do so. For the reasons identified above, we believe those cable operators with overlapping service areas by a percentage slightly greater than ten percent are likely to have limited anti-competitive incentive to acquire MVDDS licenses. A more substantial overlap seems necessary to give rise to a serious threat of anti-competitive behavior. For the reasons identified above, we believe that thirty-five percent (overlap) is an appropriate threshold for determining the applicability of the cable eligibility restriction for MVDDS.[396]

168. We conclude that a cable operator whose current subscribers make up fewer than thirty-five percent of the MVPD households in an MVDDS license area is unlikely to attempt to acquire MVDDS licenses for anticompetitive purposes. Since their potential for anticompetitive abuse is limited, such firms should not be subject to the eligibility restriction.

169. Our examination of the MVPD marketplace, and our evaluation of the record in this proceeding, leads us to conclude that reasonable attribution rules, tailored to minimize any intrusive consequences with regard to the operations of MVDDS licensees, will serve as an important factor in promoting competition. In the absence of such attribution rules, there is a risk that our efforts to foster a competitive marketplace will be undermined. In order to ensure that the MVPD marketplace is competitive, thus fostering economic growth, and promoting a variety of service providers, we believe that attribution rules are necessary.

170. Accordingly, concurrently with the adoption of a thirty-five percent eligibility restriction, we are establishing a twenty percent attribution threshold for MVDDS licensees. We have previously found that this percentage is appropriate in a number of markets when the policy concern was, as here, introducing new competition via auction of new spectrum licenses. In the case of the *LMDS Second Report and Order* and the *CMRS Spectrum Cap Order*, we adopted a twenty percent attribution threshold for a number of reasons. Specifically, we found that given the changing technology, increased flexibility will enable providers to adapt their services to meet customer demand.[397] Additionally, we believe that a twenty percent threshold will encourage capital investment.[398] Consequently, controlling interests are attributable.[399] Non-controlling ownership interests of twenty percent or more, including general and limited partnership interests, voting and non-voting stock interests, or any other equity interest, also are attributable.[400] Officers and directors are attributed with their company's holdings, as are persons who

[395] *See CMRS Spectrum Cap Report and Order*, 11 FCC Rcd at 7876 ¶ 107; 49 C.F.R. § 20.6 (the CMRS spectrum cap rule). *See also LMDS Second Report and Order*, 12 FCC Rcd at 12628-29 ¶¶ 186-188 (the Commission found that use of a ten percent threshold for geographic overlap was appropriate for the purposes of the temporary LMDS eligibility restriction, basing this in part on a desire to conform to the CMRS spectrum cap overlap rule).

[396] We codify the MVDDS eligibility restrictions for cable companies at 47 C.F.R. § 101.1412. *See* Appendix D.

[397] *See, e.g.*, *LMDS Second Report and Order*, 12 FCC Rcd at 12630 ¶¶ 190-192; 2000 Biennial Regulatory Review Spectrum Aggregation Limits for Commercial Mobile Radio Services, *Report and Order*, 16 FCC Rcd 22,668, 22672 ¶ 10 (2001) (*CMRS Spectrum Cap Report and Orde*r); .

[398] *See, e.g. LMDS Second Report and* Order, 12 FCC Rcd at 12630-31 ¶¶ 190-192.

[399] *Id.*

[400] *Id.*

manage certain operations of licensees, and licensees that enter into certain joint marketing arrangements with other licensees.[401] Debt does not constitute an attributable interest for purposes of the spectrum cap, and securities conferring potential future equity interests (such as warrants, options, or convertible debentures) are not considered attributable until they are converted or exercised.[402]

c. Foreign Ownership Restrictions

171. Background. Sections 310(a) and 310(b) of the Communications Act contain certain foreign ownership and citizenship provisions that may restrict the issuance of licenses to certain applicants.[403] These statutory provisions are implemented in Section 101.7 of our Rules.[404] Specifically, Section 101.7(a) prohibits the grant of any license to a foreign government or its representative, and Section 101.7(b) prohibits the grant of any common carrier license to individuals or entities that do not meet the foreign ownership or citizenship provisions specified in the rule.[405] In the *Further Notice*, the Commission proposed to apply Section 101.7 of our rules, the *Foreign Participation Order* and other relevant Commission precedent to MVDDS licenses.[406] Additionally, the Commission proposed to require MVDDS licensees to use the Universal Licensing System (ULS) forms and procedures.[407]

172. Discussion. Based on our review of the record in this proceeding,[408] we will apply Section 101.7 of our rules, the foreign ownership precedent set forth in the *Foreign Participation Order* and other relevant Commission foreign ownership precedent.[409] As indicated earlier in this *Second R&O*,[410] we will permit MVDDS licensees to operate on either a common carrier or non-common carrier basis.[411] Thus, consistent with our approach in other services, such as the Multipoint Distribution Service (MDS), LMDS and 24 GHz,[412] we will require the MVDDS applicant that seeks to provide non-common carrier service to submit the same information that common carrier applicants submit to address the alien ownership restrictions under Section 310(b) of the Act. This requirement will enable us to ascertain

[401] *Id.*

[402] *Id.*

[403] *See* 47 U.S.C. § 310(a)-(b).

[404] *See* 47 C.F.R. § 101.7(a)-(b).

[405] *Id*.

[406] *Further Notice*, 16 FCC Rcd at 4210 ¶ 300.

[407] *Id.* at 4210 ¶ 301.

[408] Pegasus Comments at 20 (supports foreign ownership restrictions).

[409] *See Foreign Participation Order*, 12 FCC Rcd at 23935-47 ¶¶ 97-132; Rules and Policies on Foreign Participation in the U.S. Telecommunications Market, IB Docket No. 97-142, *Order on Reconsideration*, 15 FCC Rcd 18158 (2000). *See also, e.g.*, Application of VoiceStream Wireless Corporation, Powertel, Inc., Transferors, and Deutsche Telekom AG, Transferee, for Consent to Transfer Control of Licenses and Authorizations Pursuant to Sections 214 and 310(d) of the Communications Act and for Declaratory Ruling Pursuant to Section 310 of the Communications Act, *Memorandum Opinion and Order*, 16 FCC Rcd 9779 (2001); DiGiPH PCS, Inc. and Eliska Wireless Ventures License Subsidiary I, L.L.C., *Memorandum Opinion and Order*, 15 FCC Rcd 24501, (2000); Global Crossing Ltd. and Frontier Corporation, *Memorandum Opinion and Order*, 14 FCC Rcd 15911 (1999).

[410] *See* para. 156, *supra*.

[411] The newly codified 47 C.F.R. § 101.1411 governs the regulatory status of and eligibility for MVDDS. *See* Appendix D.

[412] *See* Revisions to Part 21 of the Commission's Rules Regarding the Multipoint Distribution Service*, CC Docket No. 86-179, Report and Order*, 2 FCC Rcd 4251, 4253 ¶ 16 (1987); *LMDS Second Report and Order*, 12 FCC Rcd at 12651 ¶ 243; *24 GHz Report and Order*, 15 FCC Rcd at 16958 ¶ 54.

whether all MVDDS applicants are in compliance with the criteria set forth in Section 101.7 of our Rules.[413] Moreover, this requirement will minimize the regulatory burdens to which MVDDS licensees will be subject and will encourage administrative efficiency. We expect that, in many instances, an MVDDS licensee will be able to change its regulatory status without filing supplemental information concerning foreign ownership.[414] We further note that we will not disqualify an applicant requesting authorization to provide non-common carrier service from obtaining a license solely on the basis that its foreign ownership information would disqualify it from receiving a common carrier license.

173. Based on the discussion as set forth herein, we will require both common carrier and non-common carrier MVDDS licensees to provide the foreign ownership information requested by FCC Forms 601 and 602. Furthermore, we expect the licensees to inform the Commission of any changes in their foreign ownership information. Hence, common carrier and non-common carrier MVDDS licensees will be responsible for amending the FCC Form 602 to reflect any changes with respect to their foreign ownership status.

d. License Term and Renewal Expectancy

174. Background. In the *Further Notice*, the Commission solicited comment on the license term and renewal expectancy requirements for MVDDS.[415] The Commission indicated that a ten-year authorization is consistent with license terms in other wireless services and would offer sufficient time and flexibility for licensees to establish systems and deploy services.[416] Additionally, the Commission sought comment on whether to offer licensees a renewal expectancy based on a showing that the licensee is providing substantial service.[417] Moreover, the Commission proposed to require the application of an MVDDS licensee to include certain showings, at a minimum, in order to request a renewal expectancy and sought comment as to whether alternate showings may serve as a more effective guide to the Commission with respect to license renewal.[418]

175. Discussion. We believe that ten-year licenses, beginning on the date of the initial authorization grant, would allow the flexibility needed to deploy systems in the MVDDS service.[419] In this connection, we will adopt our proposal to permit a licensee to receive a renewal expectancy if certain buildout criteria are met by the conclusion of the license term. Accordingly, upon license renewal, the application of an MVDDS licensee must include the following showings, at a minimum, in order to claim a renewal expectancy: (1) a coverage map depicting the served and unserved areas; (2) a corresponding description of current service in terms of geographic coverage and general and/or household population served or transmitting antenna sites installed in the served areas, including a description of how the licensee has complied with the substantial service requirement; and (3) copies of any Commission Orders finding the licensee to have violated the Communications Act or any Commission rule or policy and a list of any pending proceedings that relate to any matter described by the requirements for the renewal

[413] *See* 47 C.F.R. § 101.7(a)-(b).

[414] We note, however, that to the extent a licensee's decision to change its regulatory status raises issues with respect to that licensee exceeding the 25% indirect foreign ownership benchmark contained in 47 C.F.R. § 310(b)(4), the licensee must seek prior Commission approval before it can make this change. *See Foreign Participation Order*, 12 FCC Rcd at 23940-41 ¶¶ 111-118.

[415] *Further Notice*, 16 FCC Rcd at 4210-11 ¶¶ 302-304.

[416] *Id*. at 4211 ¶ 302.

[417] *Id*. at 4211 ¶ 303.

[418] *Id*.

[419] The license term and renewal expectancy for MVDDS are codified at 47 C.F.R. § 101.1413. *See* Appendix D.

expectancy.[420] We believe this approach to be in the public interest as it will ensure that MVDDS licensees use this spectrum efficiently and operate in compliance with our Rules.

176. We are cognizant of Congressional interest in quickly deploying local broadcast programming service to unserved and underserved areas.[421] In our effort to devise buildout requirements for MVDDS, we must consider Congress's objectives while recognizing the challenges that deploying various types of services in the 12 GHz band may pose. The spectrum is designated for use by four types of users. Although Pegasus supports aggressive buildout requirements, it also believes that the service rules should be crafted with an eye toward the difficulty of actual deployment of this service – with small cell sizes as the norm and difficult zoning restrictions.[422] We agree. Because MVDDS providers will be subject to various operating restrictions and will be required to engage in extensive coordination efforts with the other 12 GHz band users, we believe that a ten-year buildout requirement is a sound approach. Pegasus notes that an initial five-year buildout requirement with a demonstration of service to a significant portion of the population or land area of the licensed area is reasonable.[423] However, given the complexity and contention surrounding the issues involving band sharing, we conclude that a ten-year buildout is more appropriate for MVDDS. A ten-year buildout period will provide ample time and flexibility for the MVDDS licensees to work with other service providers in the 12 GHz band as they determine the best method to deploy valuable services to the public.

177. Accordingly, we will apply a ten-year buildout with a demonstration of substantial service to MVDDS as the basis for a license renewal expectancy. We define substantial service as "a service that is sound, favorable, and substantially above a level of mediocre service which might minimally warrant renewal."[424] Due to the significant flexibility that this standard affords, we will provide a safe harbor example to serve as a guide to licensees in satisfying the substantial service requirement. Thus, for an MVDDS licensee that chooses to offer point-to-multipoint service, a demonstration of substantial service would consist of actual delivery of service to customers via four separate transmitting locations per million population.[425] We recognize that rural areas may experience some difficulty in meeting this safe harbor, therefore we provide the following additional factors that we will take into consideration in determining whether the substantial service standard is satisfied: a)

[420] *Cf*. 47 C.F.R. §§ 22.940(a)(2)(i)-(iv).

[421] *See, e.g.,* RLBSA, Pub. L. 106-113, 113 Stat. 1501, 1537. *See also* Letter from The Honorable Mary L. Landrieu, *et al*., U.S. Senate to Chairman Michael K. Powell, FCC (dated July 20, 2001); Letter from The Honorable William Frist, U.S. Senate to Chairman Michael K. Powell, FCC (July 16, 2001); Letter from The Honorable Trent Lott , U.S. Senate to Chairman Michael K. Powell, FCC (dated June 29, 2001); Letter from The Honorable Ed Bryant, House of Representatives to Chairman Michael K. Powell, FCC (dated July 27, 2001).

[422] Pegasus Comments at 19.

[423] *Id*.

[424] *See* 47 C.F.R. § 22.940(a)(1)(i). *See also LMDS Second Report and Order*, 12 FCC Rcd at 12660; Amendment of the Commission's Rules to Establish Part 27, the Wireless Communications Service, GN Docket No. 96-228, *Report and Order*, 12 FCC Rcd 10785, 10843-10844 (1997) (*WCS Report and Order*); Amendment of Part 95 of the Commission's Rules to Provide Regulatory Flexibility in the 218-219 MHz Service, WT Docket No. 98-169, *Report and Order and Memorandum Opinion and Order*, 15 FCC Rcd 1497, 1537-38 (1999); *MAS Report and Order*, 15 FCC Rcd 11956.

[425] In other fixed wireless services such as the 39 GHz Service, the Commission provides a safe harbor example consisting of "four links per million population within a service area." *See 39 GHz R&O*, 12 FCC Rcd at 18625 ¶ 46. We believe that the nature of this service requires us to provide a different example from that suggested in other fixed wireless services such as the 39 GHz Service. We anticipate that an MVDDS license will more likely be used to provide a wireless service as opposed to being used to provide backbone support for other networks by way of independent point-to-point links as in the 39 GHz Service. Therefore, we believe that describing the safe harbor example in terms of transmitter location sites is more appropriate for the MVDDS service.

whether the MVDDS licensee is offering a specialized or technologically sophisticated service that does not require a high level of coverage to be of benefit to customers; b) whether the licensee's operations serve niche markets or focus on serving populations outside of areas served by other licensees and MVPDs, including rural areas or those areas that are traditionally deemed unserved and/or underserved; c) whether the licensee's operations serve populations with limited access to communications services; and d) a demonstration of service to a significant portion of the population or land area of the license area.[426] We emphasize that the safe harbor example provided herein is not exhaustive and that the substantial service standard can be met in other ways. In this connection, we will review the showings on a case-by-case basis.

e. Partitioning and Disaggregation

178. Background. In the *Further Notice,* the Commission proposed to allow MVDDS operators to partition their geographic service areas.[427] Partitioning is the assignment of geographic portions of a license along geopolitical or other boundaries. The Commission indicated that partitioning encourages spectrum efficiency and will enable additional licensees to respond to market demands for services and/or spectrum in unserved and underserved areas.[428] Additionally, the Commission sought comment on what additional information it should require parties to file in conjunction with the partitioning process.[429]

179. Although the Commission proposed to permit partitioning, the Commission realized that disaggregation[430] could potentially cause complications involving interference.[431] Thus, the Commission proposed to hold all terrestrial parties that could be a possible source for interference responsible for rectifying the problem should complications arise.[432] In addition, the Commission sought comment on possible market incentives for disaggregating spectrum in the 12 GHz band. The Commission also sought comment on whether the implementation of alternative policies would be more appropriate for this service.[433]

180. Discussion. To further ensure protection of DBS from MVDDS deployment, we have allotted one 500 megahertz spectrum block per service area.[434] When balancing our concerns regarding interference to DBS with our concerns regarding promoting spectrum efficiency and deploying service rapidly, we find that this regulatory framework will ease protection and coordination between MVDDS DBS and NGSO FSS entities. We believe that partitioning fosters rapid delivery of service to rural areas

[426] *See, e.g., 24 GHz Report and Order*, 15 FCC Rcd at 16934.

[427] *Further Notice*, 16 FCC Rcd at 4212 ¶ 305.

[428] *Id*.

[429] *Id*.

[430] *Id*. "Disaggregation" is the assignment of discrete portions or "blocks" of spectrum within one license area. Disaggregation allows for multiple transmitters in the same area operated by different companies (thus the possibility of harmful interference from MVDDS to DBS increases). *See, e.g.*, Geographic Partitioning and Spectrum Disaggregation by Commercial Mobile Radio Services Licensees and Implementation of Section 257 of the Communications Act - Elimination's of Market Barriers, WT Docket No.96-148, *Report and Order and Further Notice of Proposed Rulemaking*, 11 FCC Rcd 21831, 21833 n.2 (1996) (*Partitioning and Disaggregation Report and Order*).

[431] *Further Notice*, 16 FCC Rcd at 4212 ¶ 306.

[432] *Id.*

[433] *Id.* at 4212 ¶ 306.

[434] *See* para. 134, *supra*.

and encourages the participation of smaller entities at auction, consistent with our mandate to ensure that licenses are disseminated among a wide array of applicants.[435] Moreover, smaller entities may form a bidding consortium in order to level the playing field at auction, and thereafter, partition the license among the consortium members in order to form smaller service areas.[436] Thus, we believe that flexible partitioning rules will provide an effective mechanism by which smaller or newly formed entities can gain access to the broadband wireless market.[437] Because we believe that the flexibility provided by this approach will accommodate license transferability and provide a mechanism by which new entrants and small businesses are afforded additional opportunities to become service providers in the 12 GHz band,[438] we will adopt our proposal. Thus, we will permit MVDDS licensees to partition their service areas, but only along county lines, in order to be consistent with cable franchise areas which are usually defined by county lines.[439]

181. Most services that are licensed on a geographic area basis are governed by service rules that permit flexible partitioning. However, in this instance, as discussed previously, three ubiquitous services will share the spectrum, in addition to existing point-to-point facilities that require protection. We are concerned that allowing the MVDDS licensees to define partitioned services areas in any manner could lead to serious concerns of responsibility with respect to adjacent area interference problems, and eligibility. Thus, we believe that a more disciplined and structured approach towards partitioning is warranted in this case. County lines are also very useful in helping to determine the eligibility requirements for cable systems because they are usually franchised by county, and thus it is more reliable to determine which areas they can serve. We believe the public interest is served by implementing a simple regulatory structure that uses well-established boundaries.

182. In the event that an MVDDS license is partitioned, any partitionee is authorized to hold its license for the remainder of the original licensee's license term and a demonstration must be made that the applicable construction requirements have been met for the partitioned area at the time of renewal. However, we will permit participants to a partitioning agreement to negotiate whether one party or both will be responsible for compliance with these requirements. In addition to being consistent with provisions in other services, we conclude that this approach is appropriate because it will "ensure that licensees have the flexibility to structure their business plans while ensuring that partitioning will not be used as a vehicle to circumvent the applicable construction requirements."[440] Thus, parties will have two options to satisfy the substantial service construction requirement. Under the first option the parties to the partitioning agreement would certify that they would each separately satisfy the substantial service requirement for their portion of the service area.[441] If either party fails to meet the substantial service requirement by the end of the license term, then the non-performing licensee's authorization would be subject to cancellation at the end of the initial license term.[442] Under the second option, the original licensee or partitionor certifies that it has met or will meet the substantial service requirement for the entire service area during the license term. If the original licensee fails to make the required showing,

[435] 47 U.S.C. §§ 309(j)(3)(B), 309(j)(4)(C).

[436] 47 C.F.R. § 1.2105.

[437] *See, e.g., Partitioning and Disaggregation Report and Order*, 11 FCC Rcd at 21843-44 ¶¶ 13-17.

[438] Teligent Comments at 25-26.

[439] We codify this understanding at 47 C.F.R. § 101.1415. *See* Appendix D. We find that partitioning along county lines best comports with one of the underlying considerations for crafting CEAs, namely, that each CEA consists of a single economic node and the surrounding counties that are economically related to the node. *See* Kenneth P. Johnson, *Redefinition of the BEA Economic Areas*, 2 Survey of Current Business (February 1995).

[440] *See, e.g., LMDS Fourth Report and Order*, 13 FCC Rcd at 11664-65 ¶ 16.

[441] *See, e.g., PCS Order*, 11 FCC Rcd at 21855; *LMDS Report and Order*, 13 FCC Rcd at 11665 ¶ 16.

[442] *See, e.g., LMDS Report and Order,* 13 FCC Rcd at 11665 ¶ 16.

then this licensee's authorization will be subject to cancellation, but the partitionee's license will not be affected by this cancellation.[443]

183. We consider partitioning to be a form of license assignment that will require prior Commission approval, unless the assignment is pro-forma in nature.[444] Therefore, an MVDDS licensee will be required to file a standard application for approval of assignment on an FCC Form 603.[445] We note that if a licensee has negotiated a frequency coordination agreement with another licensee, such agreement shall remain in effect on all parties regardless of an assignment or partitioning arrangement unless a new agreement is reached. In effect, the frequency coordination agreement will convey with the license. Finally, MVDDS licensees who receive bidding credits at auction and subsequently seek to partition their geographic area(s) will be subject to the unjust enrichment provisions contained in Section 1.2111(e) of our rules.[446]

184. Although commenters provided alternatives to allow disaggregation,[447] we find the increase in possible interference to be too great and decline to permit disaggregation at this time. We are also concerned that permitting disaggregation would make it difficult to determine which licensee is causing the interference problem and therefore which would be responsible for correcting it. We are severely limiting the output power of MVDDS transmissions solely to enhance the protection of consumer earth station antennas which receive faint signals from the DBS satellites. In order to minimize the number of transmitting locations in any given area and thereby reduce the total number of transmitters, as well as retain complete control and understanding of who is responsible for any interference that might occur, we sought to keep the entire 500 megahertz band under the purview of only one licensee per area. For example, if we were to allow disaggregation of the spectrum into two separate pieces of 250 MHz in an area, we could expect the resultant number of transmitters required to serve that same area to double, thereby doubling the total potential interfering power. Each further disaggregation could give rise to an equal number of additional transmitters. We believe that the complexity and problems associated with effectively engineering and solving the potential interference problems in each zone warrant keeping the number of licensees responsible and the number of total transmitters low. We find that this approach best comports with our overall goal of promoting shared use of the band and protecting DBS operations.

f. Reporting Requirement

185. Background. The Commission can require applicants and licensees to submit information in order to assess such factors as market trends, competition and interference.[448] Believing such a report would be useful for MVDDS, the Commission proposed to require MVDDS licensees to submit such information each year.[449]

186. Discussion. Consistent with other MVPDs, we will require each MVDDS licensee who is providing MVPD-type services to file with the Commission two copies of a report no later than March 1 of each year for the preceding calendar year, which must include the following: (a) name and address of licensee; (b) station(s) call letters and primary geographic service area(s); and (c) the following

[443] *Id.*

[444] *See, e.g., 39 GHz Report and Order*, 12 FCC Rcd at 18635 ¶ 73.

[445] *See* 47 C.F.R. § 1.948.

[446] 47 C.F.R. § 1.2111(e).

[447] *See, e.g.,* SkyBridge Comments at 12; Boeing Comments at 38.

[448] *See, e.g.*, 47 C.F.R. § 21.911 ("Annual Reports" for MDS).

[449] *Further Notice*, 16 FCC Rcd at 4212 ¶ 307.

statistical information for the licensee's station (and each channel thereof): (i) the total number of separate subscribers served during the calendar year; (ii) the total hours of transmission service rendered during the calendar year to all subscribers; (iii) the total hours of transmission service rendered during the calendar year involving the transmission of local broadcast signals; and (iv) a list of each period of time during the calendar year in which the station rendered no service as authorized, if the time period was a consecutive period longer than forty-eight hours.[450] We believe that the information compiled in this report will assist us in analyzing trends and competition in the marketplace.

g. Licensing and Coordination of MVDDS Stations

187. Background. In the *Further Notice,* the Commission explained that universal sharing criteria cannot be developed between adjacent licensees because of the decision to allow licensees to have flexibility in selecting and deploying equipment. Due to the varying MVDDS systems and climate and terrain, the Commission proposed to require adjacent licensees to develop their own sharing and protection agreements.[451]

188. Discussion. We will require adjacent licensees to develop their own sharing and protection agreements based on the design and architecture of their systems, in order to avoid interference occurrences between adjacent service areas. Specifically, we will require MVDDS licensees to (1) engineer systems to be reasonably compatible with adjacent and co-channel operations in the adjacent areas on all frequencies; and (2) cooperate fully and in good faith to resolve whatever potential interference and transmission security problems may be present in adjacent areas and co-channel operations. This approach is similar to the approach we adopted in the 24 GHz proceeding.[452]

189. Because harmful interference to co-channel and adjacent channel users in adjacent geographical areas is prohibited, we expect all MVDDS licensees to make a good faith effort at resolving interference problems prior to notifying the Commission. Additionally, we conclude that incumbent public safety POFS licensees will retain exclusive rights to their channel(s) within the relevant geographical areas. In this connection, we will require MVDDS and NGSO FSS licensees to protect public safety POFS licensees.[453] We clarify that if a public safety POFS licensee transfers its license(s) to a non-public safety POFS entity, MVDDS licensees will not be required to protect the non-public safety POFS license area. Moreover, we reiterate that effective as of the date of the release of this *Second R&O*, we will no longer accept any POFS applications for new licenses (including public safety POFS), amendments to applications for new licenses, or major modifications for the 12 GHz band received on or after the release date of this *Second R&O*. All such POFS applications received after that date will be returned as unacceptable for filing.

190. We have also determined that MVDDS licensees must protect incumbent POFS systems licensed for traditional public safety uses.[454] Accordingly, we will publish a list of existing public safety licensees that need to be protected. MVDDS licensees must coordinate with these incumbent POFS licensees to avoid harmful interference, in accordance with the procedures in Section 101.103 of our rules.[455] MVDDS licensees may also protect these incumbents by not using the same channel(s), thus giving up a relatively small portion of the available 500 megahertz block of spectrum.

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[450] *See, e.g.,* 47 C.F.R. § 21.911 ("Annual Reports" for MDS).

[451] *Further Notice*, 16 FCC Rcd at 4213 ¶ 308.

[452] *24 GHz Report and Order*, 15 FCC Rcd at 16963-64 ¶¶ 65-67.

[453] *See* para. 147, *supra*.

[454] *Id.*

[455] 47 C.F.R. § 101.103.

h. MVDDS and Adjacent CARS/BAS Band Considerations

191. Background. CARS and BAS facilities operate on a primary basis in the upper adjacent 12.7-13.25 GHz band and satellite earth stations operate on a primary basis in the lower adjacent band 11.7-12.2 GHz. In order to ensure that the addition of MVDDS does not interfere with these adjacent channel operations, the Commission sought comment on necessary coordination and interference resolution procedures for MVDDS stations to and from CARS and BAS facilities.[456]

192. Discussion. Generally, our standard emission limitations in Sections 101.111(a)(2)(i) and (a)(2)(iii) were developed to suppress out-of-band emission levels to protect adjacent channel licensees from harmful interference.[457] We recognize, however, that some CARS and BAS operations in the upper adjacent band and some satellite earth stations in the lower adjacent band may be using equipment that could be affected by the operation of new MVDDS terrestrial services in this band – especially in the 12.7-13.25 GHz portion of the band. The satellite earth stations would be less affected because they point skyward. The CARS and BAS facilities point more horizontal as would MVDDS systems would and thus are more of a concern. However, SkyBridge has expressed a concern about out of band emissions in the lower adjacent band to MVDDS below 12.2 GHz.[458] Although we understand this problem could normally arise when microwave point-to-point systems use high powers, we believe that one step we have already taken will ensure that adjacent band facilities are not adversely affected. That step was to limit the isotropic effective radiated output power of MVDDS systems to 14 dBm per 24 megahertz. This low output power has the secondary effect of automatically limiting the out of band emissions to incumbent adjacent band users. Consequently, we believe it is unlikely that the MVDDS out-of band signals will be strong enough to cause harmful interference to adjacent band operations. We are more concerned that MVDDS operations may be the subject of out-of-band harmful interference from adjacent band operations, particularly in the upper adjacent band. An MVDDS licensee will need to consider the adjacent band licensees in its system design. We will not require incumbent adjacent band licensees to modify their equipment to protect MVDDS operations, only that they meet the out-of-band emission limits of their relevant rule parts.

i. Canadian and Mexican Coordination

193. Background. Section 2.301 of our rules requires stations using radio frequencies to identify their transmissions with a view to eliminating harmful interference and generally enforcing applicable radio treaties, conventions, regulations, arrangements, and agreements.[459] At this time, international coordination between and among the United States, Mexico and Canada concerning the 12 GHz band is not complete. The Commission sought comment on interim requirements for terrestrial licenses along these borders, and indicated that MVDDS licensees would be subject to the provisions of future agreements between and among the subject countries.[460] The Commission also proposed to grant conditional licenses to United States MVDDS systems within fifty-six km (thirty-five miles) of the Canadian and Mexican borders, until final international agreements are signed.

194. Discussion. Northpoint believes that we should issue conditional MVDDS licenses within fifty-six km of the U.S. Border with Canada.[461] However, Telesat Canada (Telesat)[462] believes that

[456] *Further Notice*, 16 FCC Rcd at 4201-02 ¶ 282.

[457] 47 C.F.R. §§ 101.111(a)(2)(i), (a)(2)(iii).

[458] SkyBridge Comments at 28-29.

[459] *See* 47 C.F.R. § 2.301.

[460] *Further Notice*, 16 FCC Rcd at 4213 ¶¶ 309-310.

[461] Northpoint Reply Comments at 11-12.

we should withhold licensing of MVDDS systems – conditional or otherwise – within fifty-six km of the U.S. border with Canada and Mexico until there is conclusive evidence that MVDDS transmitting antennas will not cause interference with any radio frequency systems licensed and operating within these neighboring countries. Telesat requests maintaining this "status quo" until the United States, Canada, and Mexico have concluded final international coordination agreements for services in this band.[463] Although we recognize Telesat's concerns, we agree with Pegasus and Northpoint that conditioning these licenses on future agreements addressing interference concerns between the affected countries[464] will adequately protect Canadian licensees.

195. Although we received no comments on specific methods or parameters for licensing MVDDS systems near the borders, we will rely on our existing procedures outlined under Sections 101.147(p) and Sections 1.928(f)(1) and (2) of our rules until final international agreements concerning MVDDS are signed.[465] Section 101.147(p) of our rules states that terrestrial stations in the 12 GHz frequency band cannot cause any interference to broadcasting satellite stations of other countries operating in accordance with the Region 2 plan established at the 1983 WARC.[466] Section 1.928(f) of our rules states that transmit antennas can be located as near as five miles (eight kilometers) of the border if they point within a sector of 160 degrees away from the border, and as near as thirty-five miles (fifty-six kilometers) of the border if they point within a sector of 200 degrees toward the border without coordination with Canada.[467] Our analysis of MVDDS transmitting systems indicates that most systems will only provide service up to twelve miles (about 19 kilometers). Thus we believe that the distances provided in Section 1.928 of our rules will provide the necessary interim protection for Canadian receivers. Section 1.928 of our rules has heretofore only applied to Canada, however we will apply this same standard at the United States border with Mexico for reasons of parity. Therefore, we will issue conditional licenses for MVDDS systems located within thirty-five miles (fifty-six kilometers) of the Canadian and Mexican borders. These systems may not cause interference to receive stations in Canada or Mexico, and as such, will be required to operate at the given distances from these borders with the appropriate direction of the antenna. Consequently, some areas of the country will not be served until after we reach agreements with Canada and Mexico.[468] We note that further modification of MVDDS licenses may be necessary in order to comply with these future agreements.

3. Technical Rules

a. Transmitting Power

196. Background. In 1999, Northpoint demonstrated that it could provide service in the 12 GHz band using an EIRP of 12.5 dBm at its test sites in Rosslyn, Virginia and Washington, D.C. With a view toward simplifying coordination and reducing potential interference, in the *Further Notice*, the Commission proposed to limit urban area EIRP to 12.5 dBm, with two exceptions: (1) those MVDDS systems with service areas containing mountain ridges that are over one kilometer from populated subscriber areas may use higher output power, provided that the increase will not cause the system to

(...continued from previous page)

[462] Telesat Canada is a Canadian-licensed FSS provider.

[463] Telesat Comments at 2.

[464] Pegasus Reply Comments at 19; Northpoint Reply Comments at 12 (Telesat's concerns are unfounded; the same measures that will protect U.S. DBS systems will likewise protect Canadian satellite operators).

[465] 47 C.F.R. §§ 101.147(p), 1.928(f)(1), (2).

[466] 47 C.F.R. § 101.147(p).

[467] 47 C.F.R. § 1.928(f).

[468] *Id.*

exceed the "unavailability criteria" to be established in this proceeding; and (2) those MVDDS systems located on tall manmade structures and natural formations that are adjacent to bodies of water or other significant and clearly unpopulated areas, may use higher output power, provided that the increase will not cause the system to exceed the same "unavailability criteria."[469]

197. In the process of establishing an acceptable national standard for transmitting power in the band, the Commission determined that the appropriate values for the desired carrier signal to the undesired interfering signal (C/I) (such as, for example, 25 dB at each DBS subscriber unit) and power flux density (an amount not to be exceeded at any DBS subscriber unit) fluctuate too much from area to area to be used as acceptable standards mainly due to differences in rainfall.[470] Therefore, the Commission sought comment on other protection criteria options for determining the acceptable amount of yearly increased outage for each DBS system.[471] SRL generally supports the Commission's proposals for transmitting power.[472] In contrast, Northpoint asserts that the Commission should not adopt any EIRP limit, claiming that the Commission should instead adopt EPFD limits. They claim that their recommended EPFD limits to protect DBS also provide sufficient protection to NGSO FSS systems.[473] MDS America espoused a different view in which MVDDS EPFD would be determined by C/I ratios. Specifically, MDS America proposes that MVDDS be permitted to transmit so long as a C/I ratio of 23 dB is maintained in urban areas and a C/I of 9 dB or lower is maintained in rural areas.[474] Further, MDS America proposes that, because there could be instances where the EPFD limit cannot be met, that a compensation mechanism be adopted to compensate providers for outages in excess of what the Commission's rules would allow.[475] Finally, we note that the MITRE Report recommended a maximum EIRP value of 14 dBm for all MVDDS transmitting systems without requiring a study of the impact of rain scatter.[476]

198. Discussion. Based on the comments we received, we believe that we will be able to ensure adequate protection to DBS subscribers by establishing a four-region EPFD value which should limit the outage at DBS subscriber locations due to MVDDS to negligible amounts. In addition, we will adopt the power limit of 14 dBm per 24 megahertz as recommended by MITRE and indirectly supported by other commenters who merely requested the Commission to keep the EIRP low.[477] This power limit is a compromise between our proposed limit of 12.5 dBm generally and higher power allowed under certain

[469] *Further Notice*, 16 FCC Rcd at 4213 ¶ 311.

[470] *Id.* at 4213-14 ¶ 312.

[471] *Id*.

[472] *See* SRL Comments at 5.

[473] *See* Northpoint Comments at Technical Annex at 27-28.

[474] *See* MDS America *ex parte* (filed Feb. 12, 2002). In this filing, MDS America defines an urban area as one of the 50 largest markets as determined by population density.

[475] *Id*. at 5.

[476] *See* MITRE Report at 6-5. Rain scatter interference occurs when energy that is transmitted from the MVDDS terrestrial terminal into a rain cell is scattered by the rain cell and the scattered energy is received by the DBS earth station. The necessary conditions for this interference to occur are that the main beams of the terrestrial terminal and the DBS earth station antenna patterns must create a common volume in which there is rain. *Id.* at 2-8. Because such interference is dependent on the location of the rain cell and the location and pointing direction of the transmitting and receive antennas, it is difficult to predict (*e.g.*, it could occur in a shielded south pointing receive antenna even when the MVDDS transmitting antenna is also pointing south) and at high power levels could occur at significant distances away from the offending MVDDS transmitter; possibly in another MVDDS licensee's service area.

[477] *See, e.g.*, Pegasus Comments at 4 (recommends 12.5 dBm EIRP).

circumstances. The 14 dBm limit provides MVDDS with higher operating power to address their coverage concerns, but eliminates the proposed higher power exceptions to ameliorate the concerns of DBS and NGSO FSS entities that higher power would increase the size of the interference zone.[478] Furthermore, placing a limit on MVDDS EIRP will ensure that DBS entities are not unduly hindered in their ability to acquire customers in areas in close proximity to MVDDS transmit facilities. Thus, we are not permitting higher powers over areas containing mountain ridges or over presently unpopulated regions because the higher power may cause too great of an exclusion zone for future DBS and NGSO FSS subscribers. We recognize that a higher power benefit for MVDDS providers would not offset the potential constraints placed on other service subscribers in the 12 GHz band.

b. RF Safety

199. In the *Further Notice*, the Commission proposed to limit power in the terrestrial use of the 12 GHz band in urban areas, but did not propose to set limits for the excepted areas on tall manmade structures and natural formations adjacent to bodies of water or unpopulated areas.[479] The Commission proposed that those stations with output powers that equal or exceed 1640 watts EIRP would be subject to the environmental evaluation rules for radiation hazards, as set forth in Section 1.1307 of our rules.[480] However, in this proceeding we have limited the EIRP for MVDDS transmitting systems to 14 dBm per 24 megahertz, which is far below 1640 watts, and thus MVDDS transmitting stations will not be subject to routine environmental evaluation under Section 1.1307 of our rules.[481]

c. Quiet Zone Protection

200. The Commission tentatively concluded in the *Further Notice* to require MVDDS operators to comply with the radio quiet zone criteria set forth in Section 1.924 of our rules.[482] As such, the Commission proposed that stations authorized by competitive bidding must receive approvals from the relevant quiet zone before commencing operations.[483] The requirement to comply with radio quiet zone clearances is a long-standing practice at the Commission and the incumbent POFS operators were also required to meet this standard. The record supports the Commission's proposal for quiet zone protection.[484] Thus, we will adopt the quiet zone criteria set forth in Section 1.924 of our rules for MVDDS.[485]

d. Antennas

201. Background. In the *Further Notice*, the Commission proposed to require antennas deployed to receive MVDDS services to be technically similar to home DBS receive antennas and to have a minimum unidirectional gain of 34 dBi.[486] Additionally, the Commission proposed to require MVDDS

[478] *See, e.g.*, EchoStar Comments to MITRE Report at Technical Appendix, Page 1.

[479] *Further Notice*, 16 FCC Rcd at 4214 ¶ 313.

[480] *Id.*; *see* 47 C.F.R. § 1.1307.

[481] *Id.*

[482] *Further Notice,* 16 FCC Rcd at 4214 ¶ 314; *See* 47 C.F.R. § 1.924.

[483] *Id*.

[484] SRL Comments at 5.

[485] 47 C.F.R. § 1.924. We note, however, that the Commission is currently considering changes to this rule in a separate proceeding. In the Matter of Review of Quiet Zones Application Procedures, WT Docket No. 01-319, FCC 01-333, *Notice of Proposed Rulemaking* (Rel. Nov. 21, 2001).

[486] *Further Notice*, 16 FCC Rcd at 4214 ¶ 315.

transmitting antennas to (1) meet the marking and lighting requirements under Part 17 of our rules[487] and (2) generally point southward.[488] The Commission also proposed that the terrestrial licensee of each service area must take into consideration that the DBS satellite receive antennas in the United States generally point southward. In that discussion, the Commission explained that in order to minimize interference to DBS receive antennas, MVDDS licensees must determine for each area of the country the "look angles" of all DBS receive antennas to determine appropriate angles for its transmit antennas that do not place high concentrations of interfering power into DBS receive antennas.[489] The Commission also proposed to require MVDDS licensees to mitigate any interference caused by its transmitters into the DBS receive antennas, beyond that which the Commission deems to be permissible.[490]

202. Discussion. We find that it is better to allow the MVDDS provider to design its own system, than to promulgate rules limiting design options. The MITRE Report concludes that MVDDS antennas do not need to point south.[491] MITRE confirms the observations about backlobe characteristics of DBS receive antennas and cautions against transmitting past the edges of the antenna into the feed horn.[492] MITRE suggests that larger receive antennas could alleviate this problem.[493] MITRE also reports that look angles for MVDDS other than south, including north, create 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.[494] In fact, based upon the findings of the MITRE Report, we believe that the direction of MVDDS antennas is not important. Interference protection is what is important, and we do not see any reason to limit the general pointing direction of MVDDS antennas. Thus, we agree with MDSA that we should shift our focus from proposals that transmit antennas "generally point southward" and that receive antennas have a "minimum unidirectional gain of 34 dBi," to the objective of protecting DBS so as not to limit technical innovation and competition in technical rules generally, and antenna configurations specifically.[495]

203. We also believe that the requirement to keep the EIRP low obviates the need to specify a minimum receive antenna gain.[496] As such, we are placing the emphasis on allowing MVDDS operators to meet certain EPFD limits to protect existing DBS subscribers, instead of trying to define and limit their systems. Thus, we are not requiring pointing angles for MVDDS, nor are we requiring receive antenna standards as originally proposed.

e. Over-the-Air Reception Devices (OTARD) Rule

204. Background. The Over-the-Air Reception Devices rule preempts governmental and nongovernmental rules that impair installation, maintenance or use of certain antennas that receive, for example, broadcast television, DBS, and other video programming services.[497] The Commission

[487] *Id. citing* 47 C.F.R. Part 17, Subpart C.

[488] *Id.* at 4214 ¶ 315.

[489] A "look angle" is the elevation angle and azimuth of the antenna pointing at the satellite.

[490] *See Further Notice,* 16 FCC Rcd at 4199 ¶ 273.

[491] MITRE Report at 6-2.

[492] *Id*. at 6-3.

[493] *Id*. at 6-4

[494] *Id*. at 6-2 to 6-4.

[495] MDSA Comments at 11-12; MDSA Reply Comments at 13-14.

[496] *See* MDSA Comments at 12; Northpoint Comments, Technical Index at 25.

[497] *See* 47 C.F.R. § 1.4000. *See also* Promotion of Competitive Networks in Local Telecommunications Markets, Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, *First Report and* (continued....)

previously opined that the OTARD rule would probably apply to MVDDS antennas at subscribers' homes or offices because MVDDS proposed to provide wireless services.[498] The Commission received no comments on this issue.

205. Discussion. The OTARD rule applies to LMDS, MDS and MMDS.[499] The OTARD rule was recently expanded to apply to antennas that transmit or receive non-video fixed wireless services when the antenna is otherwise within the scope of OTARD.[500] We clarify that our OTARD rule under Section 1.4000[501] includes MVDDS customer-end antennas measuring one meter or less in diameter or diagonally that will receive radio signals. It is not necessary to amend the OTARD rule to include MVDDS antennas as they already fit within the definition in the rule.[502]

f. Transmitting Equipment

206. Background. In the *Further Notice*, the Commission made a number of proposals with regards to MVDDS transmitting equipment. Specifically, the Commission proposed to amend either Section 101.139[503] or Section 21.120[504] of our rules to require verification of all MVDDS transmitters in the 12 GHz band.[505] The Commission also proposed to require MVDDS transmitters to use digital modulation, operate with a bandwidth of 500 megahertz, and provide as many video and data channels as possible.[506] In addition, the Commission proposed to require all MVDDS stations to meet the digital emissions mask set forth in Section 101.111(a)(2) of our rules.[507] Further, the Commission proposed to retain the frequency tolerance standard of 0.005% in Section 101.107 of our rules,[508] and to change the maximum bandwidth in Section 101.109 of our Rules to reflect a value of 500 megahertz for MVDDS systems.[509] The Commission also indicated that MVDDS transmitters should not be required to meet the efficiency standards in Section 101.141 of our rules.[510]

207. Discussion. SkyBridge supports requiring all MVDDS transmitters to meet the emissions mask set forth in Section 101.111(a)(2), but opposes expanding the maximum authorized bandwidth of

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Order and Further Notice of Proposed Rule Making, WT Docket No. 99-217*, Fifth Report and Order and Memorandum Opinion and Order, CC* Docket No. 96-98*, and Fourth Report and Order and Memorandum Opinion and Order,* CC Docket No. 88-57, 15 FCC Rcd 22983 (2000) (*Competitive Networks R&O*).

[498] *Further Notice,* 16 FCC Rcd at 4214 ¶ 316.

[499] *See* Implementation of Section 207 of the Telecommunications Act of 1996*, Report and Order,* 11 FCC Rcd 19276 (1996).

[500] *See Competitive Networks R&O,* 15 FCC Rcd at 23,027-28, and 23,031 ¶¶ 97-100, 106.

[501] 47 C.F.R § 1.4000.

[502] *See* 47 C.F.R. § 1.4000(a).

[503] 47 C.F.R. § 101.139.

[504] 47 C.F.R. § 21.120.

[505] *Further Notice*, 16 FCC Rcd at 4215 ¶ 317.

[506] *Id.*

[507] *Id.*

[508] *Id.*

[509] *Id*.

[510] *Id*.

fixed microwave service carriers from 20 megahertz to 500 megahertz.[511] SkyBridge believes that employing this value in the equation will significantly relax the emissions mask, resulting in no limitation on interference levels as far as 250 megahertz below 12.2 GHz (*i.e.* 11.95 GHz). SkyBridge believes that this situation can be remedied by expanding the maximum authorized bandwidth to no more than 24 megahertz, the bandwidth cited by Northpoint for its system.[512] SkyBridge proposes an out-of-band requirement for MVDDS systems in accordance with the emissions mask applicable to CARS systems in the Ku-Band,[513] but believes that the Commission's proposal to apply the tighter emissions mask contained in Section 101.111 of our rules[514] will serve the same purpose, so long as the maximum authorized bandwidth is expanded to no more than 24 megahertz.[515] SkyBridge contends that if the Commission adopts its proposal, an EPFD limit on MVDDS out-of-band emissions would not be necessary.[516]

208. We believe terrestrial licensees will, by necessity, utilize the most efficient technology available in conjunction with their business plans. We also agree with SkyBridge that the emissions mask for MVDDS will be more suitable with 24 megahertz for the value for B in the equation in Section 101.111 of our Rules.[517] Accordingly, we will change the value of B to 24 megahertz in the equation for determining the emissions mask as set forth in Section 101.111(a)(2) of our rules.[518] We believe that optimum efficiency will be achieved in the use of spectrum by MVDDS licensees. Thus, we do not believe we should require MVDDS transmitters to meet the efficiency standards in Section 101.141 of our rules.[519] This action is consistent with the Commission's approach in other Part 101 services.[520]

209. We received no other comments on technical parameters including the limit on digital emissions. Therefore, where we have not adopted specific rules herein, we will require MVDDS licensees to conform to existing standards in Part 101. MVDDS licensees will also be required to adhere to any additional requirements specified in this *Second Report and Order*, including the requirement to operate with digital emissions and to meet the digital emission mask.

4. Pending Applications

210. Background. As previously discussed, on January 8, 1999, April 18, 2000 and August 25, 2000, Northpoint, Pegasus and SRL, respectively, filed applications and waiver requests for terrestrial use of the 12 GHz band with the Commission.[521] In the *Further Notice,* the Commission sought comment on the disposition of Northpoint's waiver request and application.[522] Specifically, the Commission asked

[511] SkyBridge Comments at 38-39.

[512] *Id*. at 39.

[513] 47 C.F.R. § 78.103.

[514] 47 C.F.R. § 101.111.

[515] SkyBridge Comments at 39.

[516] *Id.* at 40.

[517] *See* 47.C.F.R. § 101.111.

[518] *See* 47.C.F.R. § 101.111(a)(2).

[519] *See* 47 C.F.R. § 101.141.

[520] *See*, *e.g.*, *LMDS Second Report and Order*, 12 FCC Rcd at 12672 ¶ 301; *24 GHz Report and Order*, 15 FCC Rcd at 16962 ¶ 62.

[521] *See* paras. *7, 9*, *supra*.

[522] *Further Notice*, 16 FCC Rcd at 4217 ¶ 325.

(a) whether the *Ku-Band Cut-Off Notice*[523] and the November 24, 1998 *NPRM*[524] gave adequate notice to all parties interested in filing applications for terrestrial use of the 12 GHz band, (b) whether Northpoint's applications should be accepted for filing, and (c) whether Northpoint's applications are mutually exclusive with the applications submitted by Pegasus and SRL.[525] Subsequent to the release of the *First R&O and Further Notice,* Congress passed a law on December 21, 2000, requiring the Commission to provide for independent testing of "any terrestrial service technology proposed by any entity that has filed an application to provide terrestrial service" in the 12 GHz band.[526]

211. Application Analysis. The standard for determining adequate notice is whether the *Ku-Band Cut-Off Notice* was "reasonably comprehensible to people of good faith."[527] That is, would a fair reading of the subject *Notice* have put the reader on notice that the Commission had in fact established dates certain for filing terrestrial applications for use of the 12 GHz band? Northpoint and others argue that the *Notice* provided adequate notice.[528] First, according to these commenters, the *Ku-Band Cut-Off Notice* provided notice to all interested 12 GHz applicants, by establishing a licensing window for the 10.7-12.7 GHz band.[529] Second, these commenters argue that the *November 24, 1998 NPRM* established that the rulemaking would address Northpoint's Petition for Rulemaking for terrestrial service sharing.[530] Thus, these commenters, along with NITI and Paxson contend that the Commission should dismiss all other pending applications as late-filed and complete the processing of Northpoint's application in accordance with the Commission's satellite licensing procedures.[531]

212. EchoStar, SkyTower, AT&T, DirectTV, SBCA, MDS America and Boeing argue that the *Ku-Band Cut-Off Notice* did not provide adequate notice to terrestrial applicants interested in the proceeding. These commenters explain that the subject *Notice* merely established the cut-off date for additional NGSO FSS systems and was silent with regard to terrestrial use of the Ku-band.[532] Accordingly, these commenters argue that notice to terrestrial services was not "reasonably comprehensible to people of good faith" and may not be made by implication, as court cases have pointed out.[533]

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[523] *See Ku-Band Cut-Off Notice.*

[524] *See November 24, 1998 NPRM*, 14 FCC Rcd at 1138 ¶¶ 8-9.

[525] *Further Notice*, 16 FCC Rcd at 4219 ¶¶ 328-329.

[526] *See* para. 13, *supra*; *see* also Prevention of Interference to Direct Broadcast Satellite Services, Pub. L. No. 106-553, App. B. Tit. X, § 1012(a), 114 Stat. 2762, 2762A-128, 2762A-141 (codified at 47 U.S.C. § 1110) (2000), discussed in detail at para. 229, *infra*.

[527] *Radio Athens, Inc. v. FCC*, 401 F.2d 398, 404 (D.C. Cir. 1968).

[528] Northpoint Comments at 17-18, 22-25; Northpoint Reply Comments at 4-6; Joint Broadcasters Comments at 4-6; Consumers Union, Consumer Federation of America, Leadership Conference on Civil Rights, Center for Media Education, League of United Latin American Citizens, the Media Access Project (CU *et al.*) at 2.

[529] Northpoint Comments at 17; Northpoint Reply Comments at 5; Joint Broadcasters Comments at 5.

[530] *See November 24, 1998 NPRM*, 14 FCC Rcd at 1138 ¶¶ 8-9.

[531] Northpoint Comments at 31; Joint Broadcasters at 2; NITI Comments at 3; Paxson Comments at 1-2; Northpoint Reply Comments at 3; CU *et al*. Reply Comments at 6.

[532] AT&T Comments at 4-10; Boeing Comments at 38-40; DirectTV Comments at 33-34; EchoStar Comments at 22-24, 29; MDS America *Ex Parte* Presentation (filed Oct. 26, 2000); MDS America *Ex Parte* submission at 1-2 (filed March 18, 2002); SBCA Comments at 9-12; SkyTower Comments at 3-4.

[533] AT&T Comments at 4 *citing McElroy Electronics Corp. v. FCC*, 86 F.3d 248, 257 (D.C. Cir. 1996); DirectTV Comments at 33 *citing Ridge Radio Corp. v. FCC*, 292 F.2d 770, 773 (D.C. Cir. 1961); EchoStar Comments at 23-24 *citing Maxcell Telecom Plus, Inc. v. FCC*, 815 F.2d 1551 (D.C. Cir. 1987).

213. We agree and find that the *Ku-Band Cut-Off Notice* did not provide adequate notice for all interested terrestrial entities to file applications for licenses in the subject band. The *Notice* was completely silent with regard to terrestrial use of the Ku-band. The *Notice* specifically "establishes the cut-off date for additional NGSO FSS systems seeking to operate" in those frequencies. Moreover, the *Notice* twice specifically invites entities wishing to implement NGSO FSS systems and those wishing to file competing NGSO FSS applications to do so before rules for NGSO FSS systems were set in place in these bands.[534] To receive consideration concurrently with SkyBridge's applications, requests were to take one of three forms (with accompanying fees): (a) application for a space station license; (b) application for an earth station license that will communicate with a non-licensed satellite; or (c) letter of intent to use a non-United States licensed satellite to provide service in the United States.[535] Clearly, the International Bureau did not request applications from entities seeking to provide terrestrial service irrespective of the notice on allocation in the band. Simply because Northpoint participated in a rulemaking that was generally considering the allocation of spectrum involving the 12 GHz band, does not provide a reasonable basis to believe the Commission was inviting applications for terrestrial service in the 12 GHz band through a satellite cut-off public notice.

214. We find that notice to file applications for terrestrial services was not "reasonably comprehensible" to interested parties and may not be made by implication.[536] Moreover, if the Commission imposes cut-off dates by implication, then every service interested in spectrum subject to a cut-off notice would be required to file by the deadline (notwithstanding the service that is the subject of the cut-off notice) or risk exclusion from an application processing round. Such a result would unnecessarily result in expanding the scope of cut-off notices, delays, and additional burdens on applicants and the Commission. Thus, Northpoint's application for terrestrial service in the band was not properly filed and is dismissed without prejudice to refile in a subsequent window for terrestrial applications. In that we find that the *Ku-Band Cut-Off Notice* did not provide adequate notice to all interested terrestrial entities interested in filing applications for licenses in the 12 GHz band, we also dismiss without prejudice the applications filed by Pegasus and SRL for terrestrial use of the 12 GHz band as prematurely filed. We establish this new service and will provide adequate notice to allow MVDDS applicants to apply to provide this service. In light of our finding that adequate notice did not exist, these entities may reapply under the new licensing rules established in this proceeding. We believe this action will maximize the public interest by promoting fair and efficient licensing practices.

215. Waivers. For the reasons provided below, granting of the waivers filed to date for terrestrial service in the 12.2-12.7 GHz band is not warranted here. Northpoint seeks a waiver of Sections 101.105, 101.107, 101.109, 101.111, 101.115, 101.139, 101.603 and any other Commission rules that otherwise would preclude processing of its applications.[537] Northpoint may obtain a waiver of our rules by demonstrating that (i) the underlying purpose of the rule(s) would not be served or would be frustrated by application to the instant case, and that a grant of the requested waiver would be in the public interest; or (ii) in view of unique or unusual factual circumstances of the instant case, application of the rule(s)

[534] *See Ku-Band Cut-Off Notice*.

[535] *Id*.

[536] *McElroy Electronics Corp. v. FCC*, 86 F.3d at 257; *Ridge Radio Corp. v. FCC*, 292 F.2d at 773; *Maxcell Telecom Plus, Inc. v. FCC*, 815 F.2d at 1551.

[537] *See* Broadwave Network, LLC Application for License to Provide a New Terrestrial Transport Service in the 12.2-12.7 GHz Band (filed Jan. 8, 1999), Exhibit 3 (Broadwave application); 47 C.F.R. §§ 101.105, 101.107, 101.109, 101.111, 101.115, 101.139, 101.603. We note that the waiver requests of Pegasus and SRL raise similar issues and are resolved herein as well.

would be inequitable, unduly burdensome, or contrary to the public interest, or the applicant has no reasonable alternative.[538]

216. Northpoint asserts that the technical rules[539] of which it seeks a waiver are designed to govern typical two-way, private or common carrier point-to-point microwave systems.[540] Further, Northpoint asserts that the underlying purpose of these rules is to "prevent harmful interference from occurring among the services operating under Part 101."[541] Northpoint argues that its proposed service can reuse the 12 GHz band to deliver local television programming, without causing harmful interference to the other services in the band.[542] We find that the information submitted in Northpoint's initial waiver request is insufficient to support such relief. We agree that, under certain parameters, terrestrial entities can reuse the 12 GHz band to deliver local television programming, without causing harmful interference to other services in the band. However, those parameters are not readily apparent without detailed analysis. Northpoint's sweeping request for waiver of our technical rules assumes that insertion of its system into the 12.2-12.7 GHz band will be without technical concerns. We disagree because we do not believe that a waiver of our rules would resolve all of the sharing issues involved in introducing such a new service into the band.

217. Based upon engineering data[543] assembled through independent testing, comments in the record, and our independent analysis, we believe that without licensing and service rules establishing explicit parameters for the operation of this new service, harmful interference could result to the primary users and public safety spectrum operations. We have no Part 101 technical rules for the 12 GHz band that are designed to ensure that systems deploying such a service operate efficiently and without interference to other 12.2-12.7 GHz band systems. Additionally, we believe Northpoint's request to use the 12 GHz band for point-to-multipoint unidirectional operations is a request for re-licensing of the spectrum. In similar situations,[544] when our rules did not permit the type of use of the frequencies that the requester sought, the Commission resolved the policy concerns in a rulemaking. We believe that authorizing point-to-multipoint omnidirectional operations is a complex undertaking best accomplished as a result of a rulemaking whereby there is ample opportunity to develop the record, and not an ad hoc waiver proceeding.[545]

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[538] *See* 47 C.F.R. § 1.925(b)(1).

[539] 47 C.F.R. §§ 101.105, 101.107, 101.109, 101.111, 101.115.

[540] Broadwave Application Exhibit 3, page 3.

[541] Northpoint Reply Comments to Northpoint Waiver at 5.

[542] *Id*.

[543] *See*, *e.g.* MITRE Report.

[544] For example, in the *35 MHz MO&O*, the Commission determined that a change of policy with respect to the use of certain frequencies should take place within the context of a rule making rather than a series of waivers. Amendment of Section 22.501(a) of the Rules to Allow the 35 MHz Frequency Band to be used for One-way Signaling on an Exclusive Basis in the Domestic Public Land Mobile Radio Service, *Memorandum Opinion and Order and Notice of Proposed Rule Making*, 78 FCC2d 438 (1980) (*35 MHz MO&O*). In addition, the Commission declined to grant waivers that raised policy questions involving the best use of the spectrum, and opted for a rulemaking proceeding to address additional rules that would be needed to govern new uses of the band. Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services, *Report and Order*, 12 FCC Rcd 12,545 (1997). The Commission's decision to allow all interested parties the opportunity to comment and provide an opportunity to proceed in a thorough manner in that proceeding was affirmed in *Melcher v. FCC*, 134 F.3d 1143 (D.C.Cir. 1998).

[545] *See Stockholders of Renaissance Communications Corp. and Tribune Co.*, 12 FCC Rcd 11866, 11887-88 ¶ 50 (1997) *citing Community Television of Southern California v. Gottfried*, 459 U.S. at 511 (1983).

218. Moreover, we believe that a rulemaking proceeding is generally, a better, fairer and more effective method of implementing a new industry-wide policy than is the ad hoc and potentially uneven application of conditions in isolated, proceedings affecting or favoring a single party.[546] We find that establishing service rules by waiver may lead to varying and arbitrary differences among like licenses and may place an excessive administrative burden on the agency. We further believe that supplementing a rulemaking or other open proceeding would be a "better, fairer, and more effective method" of implementing a new policy than would the granting of individual waivers.[547] We believe issues such as these have far-reaching implications and should be addressed in a rulemaking proceeding in the first instance instead of in an adjudication or waiver proceeding. The Commission has broad discretion in deciding to proceed by rulemaking or adjudication.[548] The rulemaking approach is accorded judicial preference when an agency develops new policies.[549] This preference is based on the principle that a rulemaking under the Administrative Procedure Act's provisions for notice and broad public participation assures fairness, the opportunity to develop the record and mature consideration.[550]

219. We note that Northpoint originally believed that a rulemaking proceeding was the best procedure to authorize the 12 GHz band for the provision of multichannel distribution of local television programs and broadband digital data.[551] In addition to seeking comment on the Petition for Rulemaking via a public notice, the Commission incorporated the petition into the *November 24, 1998 NPRM* for resolution. Accordingly, the Commission exercised its broad discretion and instituted a rulemaking proceeding to resolve these complex issues. Moreover, by resolving the waiver in this proceeding we ensured the development of a full record upon which to address the interference issues and address the sharing concerns of the relevant services.

220. Northpoint asserts that its proposal is unique because it serves "compelling public interests."[552] Additionally, Northpoint maintains that its proposal creates competition to cable and promotes spectrum efficiency.[553] We do not believe that Northpoint's proposal to reuse spectrum shared with satellite services to transmit signals using terrestrial systems is a unique or unusual circumstance such that application of the broadly defined rules through a rulemaking proceeding would be inequitable, unduly burdensome or contrary to the public interest or leave Northpoint with no reasonable alternative. We note that private cable operators may reuse spectrum shared with satellite services in the 18 GHz band

[546] *See Stockholders of Renaissance Communications Corp. and Tribune Co.*, 12 FCC Rcd at 11887-88 ¶ 50 *citing Community Television of Southern California v. Gottfried*, 459 U.S. at 511.

[547] *See id.*

[548] *FCC v. National Citizens Com. For Broadcasting*, 98 S.Ct. 2096, 2119 n.29 (1978); *SEC v. Chernery Corp*. 332 U.S. 194, 202-203 (1947).

[549] *See* Fresno Mobile Radio, Inc. *et. al*., *Order on Reconsideration*, (rel. May 13, 1986) (*Fresno Mobile*) *citing National Petroleum Refiners Assoc. v. FTC*, 482 F.2d 672, 681-683 (D.C. Cir. 1973), *cert. Denied*, 415 U.S. 951 (1974).

[550] *NLRB v. Wyman Gordon Co*., 394 U.S. 759, 764 (1969).

[551] *See* para. 6; We also note that Northpoint's Petition sought to modify our Rules to authorize DBS licensees and their affiliates to provide this new service. Northpoint Petition. Although the Petition is different from the waiver in that Northpoint sought the authorizations for itself, we do not believe this change in the ultimate licensee negates the global interference concerns or the far-reaching impact of permitting this new service in the 12.2-12.7 GHz band. The Northpoint Petition was filed on March 6, 1998. The Commission invited comment on the petition on March 23, 1998.

[552] Northpoint Reply Comments to the Northpoint Waiver at 12.

[553] *Id*.

to transmit signals using their terrestrial systems.[554] Additionally, several parties have indicated that they have the ability to reuse spectrum in the 12.2-2.7 GHz band and seek the opportunity to do so as well.[555]

221. By adopting a family of technical, licensing and service rules, we are establishing rules for all parties who seek to provide MVDDS. Consequently, we believe we are providing an opportunity for further competition in the MVPD market, and promoting spectrum efficiency by establishing rules to permit this new service that will apply to all parties without the risk of harmful interference to the existing users of the 12.2-12.7 GHz band.

222. Northpoint, however, seeks to operate a separate service that has no existing technical, operational or service rules through an extensive waiver of a variety of rules. In the MVDDS proceeding, we have addressed not only the operation of the Northpoint technology, but the interference impact and potential with regards to the other users of the 12 GHz band—specifically, DBS, NGSO FSS and incumbent public safety licensees. Northpoint seeks to be a licensee of 500 MHz of spectrum, which would make it a competitor to DBS and cable.

223. Finally, we do not believe that Northpoint satisfies the final prong of our waiver standard. Specifically, we do not believe that the underlying purpose of the technical and licensing rules of which Northpoint seeks a waiver could be served, if one were granted. Specifically, these technical and licensing rules are designed to protect Part 101 licensees, including public safety incumbents, from harmful interference. Moreover, DBS licensees must be protected from harmful interference caused by any facility licensed or authorized to deliver local broadcast television signals. As discussed above, there are significant interference concerns associated with the decision to permit terrestrial entities to reuse the 12 GHz band as proposed by Northpoint. We believe that a rulemaking proceeding is a better tool than a waiver grant to resolve such concerns and to set technical parameters allowing MVDDS to share the spectrum on a co-primary basis.

224. This approach is also consistent with the *Boeing Two-Way Order* and *Boeing Receive-Only Order,* which found that Boeing's requests for authority to operate mobile earth stations aboard aircraft could be granted by rule waiver, and that a rulemaking proceeding was unnecessary because the proposed secondary use of the spectrum did not involve any significant technical concerns.[556] In these two orders, the International Bureau and Office of Engineering and Technology (OET), acting on delegated authority, waived Section 2.106 of the Commission's rules, which contains the U.S. Table of Frequency Allocations, to allow Boeing to use the 11.7-12.2 GHz and 14.0-14.5 GHz bands for aeronautical mobile satellite service (AMSS) downlinks and uplinks.

225. In these bands, the Table includes a primary allocation for FSS, as well as other primary and secondary allocations, but no allocation for AMSS.[557] It is notable that Boeing's request for waiver of Section 2.106 was granted as a non-conforming use and subject to certain significant restrictions.

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[554] Redesignation of the 17.9-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use*, Report and Order*, 15 FCC Rcd. 13,430, 13,443-13,462 (2000).

[555] *See, e.g.,* SRL Application Exhibit 1 page 3; Pegasus Application Exhibit 1 page 1; MDS America Comments at 10-11.

[556] *See* The Boeing Company Application for Blanket Authority to Operate Up to Eight Hundred Technically Identical Transmit and Receive Mobile Earth Stations Aboard Aircraft in the 14.0-14.5 GHz and 11.7-12.2 GHz Frequency Bands, *Order and Authorization*, 16 FCC Rcd 22,645, at 22652, 22653 ¶¶ 16, 18 (2001*)(Boeing Two-Way Order*); The Boeing Company, *Order and Authorization*, 16 FCC Rcd 5864 ¶ 9 (Int'l Bur./OET 2001) (*Boeing Receive-Only Order*).

[557] 47 C.F.R. § 2.106.

Thus, Boeing is required to accept interference from all authorized primary and secondary services in the affected bands and is not permitted to cause harmful interference to any such services.[558] In addition, the *Boeing Two-Way Order,* which addressed Boeing's request for the authorization of uplinks in the 14.0-14.5 GHz band, granted a joint request filed by Lockheed Martin Corporation, Intelsat, and PanAmSat to condition Boeing's license on the latter's compliance with the ITU Radiocommunication Sector Working Party 4A's draft new recommendation regarding AMSS operations in that band.[559] The *Boeing Two-Way Order* also took into account Boeing's various measures to protect other services (*e.g.,* a coordination agreement with the National Science Foundation to ensure the protection of radio astronomy stations).[560]

226. Given these measures, the fact that all parties to the proceeding had reached consensus on the appropriate measures to protect primary FSS operations, and the fact that other operators had been authorized to provide secondary or non-conforming services in the frequencies at issue without any adverse effects or complaints, the International Bureau and OET appropriately concluded in the *Boeing Two-Way Order* that there were no outstanding technical issues and that a rulemaking proceeding was unnecessary.[561] As the International Bureau and OET noted, the Commission has granted waivers in the past "when there is little potential for interference into any service authorized under the Table of Frequency Allocations and when the non-conforming operator accepts any interference from authorized users."[562] We note also that in the *Boeing Receive-Only Order* the Bureau and OET found that a waiver of 47 C.F.R. § 25.134 was unnecessary to authorize Boeing's downlink operations because these operations would be consistent with the policies underlying the rule.[563]

227. The circumstances presented in the Boeing case and the situation presented here are very different. Boeing was licensed to use leased transponder capacity on existing satellites operating within applicable coordination agreements,[564] whereas Northpoint seeks to establish a new service for which there are no applicable rules. In the Boeing case there was agreement among all interested parties as to the conditions under which Boeing must operate and thus there were no unresolved interference issues at the time the waiver was granted; here, however, neither DBS operators nor NGSO FSS providers have reached an agreement with Northpoint as to the technical parameters of its proposed operation. Finally, Boeing must accept interference from all authorized users in the bands in which it will operate, a condition which will not pertain to MVDDS. In light of these important considerations, we reject Northpoint's assertion that the *Boeing Two-Way Order* demonstrates that the Commission's licensing procedures have been biased against Northpoint and in favor of satellite operators.[565]

228. As noted above, the Commission must ensure that public safety incumbents and DBS operators do not receive harmful interference from this new service. Thus, the Commission must ensure that its decision is supported by information and data in the record. Such record support was best attained

[558] *Boeing Two-Way Order,* 16 FCC Rcd at 22652 ¶ 16; *Boeing Receive-Only Order*, 16 FCC Rcd at 5866-7 ¶ 9.

[559] *Boeing Two-Way Order*, 16 FCC Rcd at 22,653 ¶ 18.

[560] *Boeing Two-Way Order*, 16 FCC Rcd at 22,647-9 ¶¶ 5-8.

[561] *Boeing Two-Way Order*, 16 FCC Rcd at 22,653 ¶ 18. For example, we note that the Commission already permitted mobile communications with satellite on a waiver basis in this band for Omnitracs. Therefore, the feasibility of these operations had been demonstrated and was not highly contested.

[562] *Boeing Receive-Only Order*, 16 FCC Rcd at 5866-7 ¶ 9; *Boeing Two-Way Order*, 16 FCC Rcd at 22650-1¶ 12.

[563] *Boeing Receive-Only Order*, 16 FCC Rcd at 5867 ¶ 10.

[564] *See Boeing Two-Way Order*, 16 FCC Rcd at 22652 ¶ 16; *Boeing Receive-Only Order*, 16 FCC Rcd at 5866-7 ¶ 9).

[565] *See* Ex Parte Letter to Mr. William Caton, Acting Secretary, FCC, from J.C. Rozendaal, Counsel for Northpoint Technology, Ltd., dated Feb. 22, 2002.

through the rulemaking process. Accordingly, we believe that exercising our discretion to implement this new service through a rulemaking proceeding was appropriate and in the public interest. The filing of waiver requests by Northpoint, Pegasus and SRL did not obviate the consideration of the issues in our rulemaking proceeding. In light of our determination that a waiver is not justified in this situation, we will deny the waiver requests as moot. In conjunction with this denial, we will dismiss the pending applications of Northpoint, Pegasus and SRL.

229. Independent Testing. As set forth previously,[566] Congress passed a law on December 21, 2000, requiring the Commission to provide for independent testing of "any terrestrial service technology proposed by any entity that has filed an application to provide terrestrial service" in the 12 GHz band.[567] Northpoint contends that it is the only entity that satisfied the provisions of the subject legislation by providing equipment and technology to MITRE for testing.[568]

230. Given its focus on interference, the purpose of Section 1012 is to require a determination of whether any proposed terrestrial service would cause harmful interference to any DBS service. We find that Section 1012(a)'s requirement that the Commission 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 entities that seek to provide terrestrial service in the DBS band. In contrast, Section 1012(b), which lays out certain 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.

231. Our interpretation is grounded in the internal structure of Section 1012. Section 1012(a) covers "any entity that has filed an application," while Section 1012(b) provides instruction for satisfying "the requirement of subsection (a) for any pending application" and sets a timeframe tied to the date of enactment within which the testing was to occur. 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).[569] Moreover, if the entities covered

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[566] *See* paras. 13, 210, *supra*.

[567] Prevention of Interference to Direct Broadcast Satellite Services, Pub. L. No. 106-553, App. B. Tit. X, § 1012(a), 114 Stat. 2762, 2762A-128, 2762A-141 (2000) (LOCAL TV Act). This legislation reads as follows:

> (a) Testing for Harmful Interference.-The Federal Communications Commission shall provide for an independent technical demonstration of any terrestrial service technology proposed by any entity that has filed an application to provide terrestrial service in the direct broadcast satellite frequency band to determine whether the terrestrial service technology proposed to be provided by that entity will cause harmful interference to any direct broadcast satellite service.
>
> (b) Technical Demonstration.-In order to satisfy the requirement of subsection (a) for any pending application, the Commission shall select an engineering firm or other qualified entity independent of any interested party based on a recommendation made by the Institute of Electrical and Electronics Engineers (IEEE), or a similar independent professional organization, to perform the technical demonstration or analysis. The demonstration shall be concluded within 60 days after the date of enactment of this Act and shall be subject to public notice and comment for not more than 30 days thereafter.
>
> (c) Definitions.-As used in this section:
>
> (1) Direct broadcast satellite frequency band.-The term "direct broadcast satellite frequency band" means the band of frequencies at 12.2 to 12.7 gigahertz.
>
> (2) Direct broadcast satellite service.-The term "direct broadcast satellite service" means any direct broadcast satellite system operating in the direct broadcast satellite frequency band.

[568] Northpoint Reply Comments at 9.

[569] As a general matter, the use of different words within the same statutory context strongly suggests that different meanings were intended. "Where Congress has chosen different language in proximate subsections of the same (continued....)

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.[570] As a result, we conclude that future applications are subject to Section 1012(a).[571] We also conclude that the specific requirements imposed in Section 1012(b) do not necessarily apply to the requirement of Section 1012(a).

232. We note that pursuant to Section 1012(b), the MITRE Corporation issued a report embodying the results of a technical demonstration and analysis of technology proposed to be used in the DBS band. The report concluded, *inter alia*, that while MVDDS "poses a significant interference threat to DBS operations in many realistic operational situations," it also concludes that "MVDDS/DBS band sharing appears feasible if and only if suitable mitigation measures are applied."[572] The Commission subsequently sought comment on the MITRE Report and incorporated the report and the comments into this rulemaking proceeding.

233. The Commission today creates technical rules based on the valuable input provided by the MITRE Report to effectuate the underlying purpose of the statute – to provide assurance that terrestrial operations in the DBS band will not disrupt DBS service. MVDDS providers thus will be subject to technical rules aimed at preventing harmful interference to DBS services.[573]

234. Prospective application of Section 1012(a) requires an "independent technical demonstration" of any "terrestrial service technology" proposed by any MVDDS applicant.[574] Such statutory language requires the Commission to determine, as an initial step, when new "terrestrial service technology" is proposed. The statute, however, does not define the term "technology." The word "technology" could refer to an individual company's operations or more generally to a set of technical specifications.[575] In this case, after weighing the statutory objectives at issue and the ability of the Commission's rules to vindicate Congress' goals here, we conclude that the operating parameters for MVDDS licensees, developed through the MITRE testing and codified by this Order, define the

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statute, courts are obligated to give that choice effect." *See Cable Huntington Hospital, Inc. v. Shalala*, 101 F.3d 984, 988 (4th Cir. 1996) (quotation omitted); *see also* 2A N. Singer, Sutherland on Statutory Construction § 46.07 (5th ed.1992 and Supp.1996) ("[W]hen the legislature uses certain language in one part of the statute and different language in another, the court assumes different meanings were intended.").

[570] As a matter of statutory interpretation, we are obligated to interpret statutory language in a manner that gives meaning to each word -- if at all possible -- over an interpretation that renders certain words superfluous. *See, e.g., Hoffman v. Connecticut Dept. of Income Maintenance*, 429 U.S. 96, 103 (1989) (statute should be construed to "give effect, if possible, to every clause and word"*); Northwest Forest Resource Council v. Glickman*, 82 F.3d 825, 833-34 (9th Cir. 1996) ("statute must be interpreted to give significance to all of its parts … statutes should not be construed to make surplusage of any provision."). *See also Office of Consumer's Counsel v. FERC*, 783 F.2d 206, 220 (D.C. Cir. 1986) (same).

[571] MDS America *Ex Parte* submission at 2-3 (filed March 18, 2002), concurring.

[572] *See* MITRE Report at Executive Summary xvi, xvii.

[573] Any request for waiver of these rules would likewise have to show that the waiver would not cause harmful interference to DBS services. *See* para. 235, *supra*.

[574] LOCAL TV Act § 1012(a).

[575] For example, the American Heritage Dictionary of the English Language contains a definition of technology as "the scientific method and material used to achieve a commercial or industry objective." *See* http://www.bartleby.com/61/91/T0079100.html. The Merriam-Webster's Collegiate Dictionary includes a definition of technology that is "the specialized aspects of a particular field of endeavor." *See* http://www.m-w.com.

"terrestrial service technology" already tested and deemed capable of sharing with direct broadcast satellite service without causing harmful interference.[576]

235. The congressional policy set out in Section 1012 was to ensure that terrestrial services operated in the DBS band would not cause harmful interference. Our technical rules, adopted in accordance with the findings of the MITRE Report, are intended to ensure that harmful interference would not occur as a result of MVDDS operation. We have adopted EPFD limits and other requirements to prevent harmful interference to DBS. These rules ensure that terrestrial services would operate below the level at which harmful interference as defined by our Part 2 rules would result. As a result, we find that the MITRE Report satisfies the independent technical demonstration requirement for applicants that seek to provide terrestrial service in this band subject to the technical rules adopted here. Alternatively, if the Commission were to construe Section 1012(a) to require separate testing for each individual application whose proposed operations will operate within the technical rules adopted here, such a requirement would be superfluous given these technical rules. We do not believe Congress intended such a result.

236. We clarify that MVDSS applicants are not limited to using technology that complies with the operating parameters adopted here. However, any entity seeking to employ a terrestrial service technology that does not comply with our technical rules must file a waiver petition, on which public comment will be sought. As part of the waiver process, the entity must submit an independent technical demonstration of its equipment and technology. We find that this process is in furtherance of the Communications Act and consistent with the requirements of the LOCAL TV Act's Section 1012(a), as discussed above. While we are mindful of the need to protect current and future entities from harmful interference within the band, we seek to allow flexible use of the spectrum and, as such, do not wish to limit current and future technological innovations. We find that the independent testing requirement will balance these competing interests for terrestrial wireless technologies that do not comply with the technical rules.

5. Competitive Bidding Procedures

a. Statutory Requirements

237. Background. The Balanced Budget Act of 1997 amended Section 309(j) of the Act to require the Commission to award mutually exclusive applications for initial licenses or permits using competitive bidding procedures, with very limited exceptions.[577] In the *Further Notice,* we stated that if

[576] To illustrate this relationship, we note that MITRE recommended that power levels above 14 dBm could be problematic due to rain scatter, and the rules we adopt here limit maximum MVDDS power to 14 dBm. MITRE provided measurements and test results which form the basis of the antenna pattern used here to evaluate the EPFD contours. Although MITRE recommended that the interference-mitigation region be based on an increase in DBS baseline unavailability of ten percent and used a receiver threshold of video quality 6 or VQ6 (equivalent to less than 1 uncorrected error per 15 seconds, but more than 1 per minute), we adopt the ten percent baseline but use a more conservative threshold for acceptable interference to a consumer, QEF (equivalent to 1 uncorrected error per hour). For purposes of clarification, we note further that although MITRE recommends defining an interference-mitigation region based on a carrier-to-interference ratio (C/I), our rules use equivalent power flux density (EPFD), which is a logical outgrowth of C/I that is related by a straightforward conversion. C/I is a comparison measurement in clear air of the undesired MVDDS transmitter signal and desired satellite signal received at any given point, while EPFD is a measurement taken after the DBS receiver and considers many other factors such as obstructions and the receive antenna characteristics.

[577] *See* 47 U.S.C. § 309(j)(1), (2). Section 309(j)(2) exempts from auctions licenses and construction permits for public safety radio services, digital television service licenses and permits given to existing terrestrial broadcast licensees to replace their analog television service licenses, and licenses and construction permits for noncommercial educational broadcast stations and public broadcast stations under 47 U.S.C. § 397(6).

we find that it would serve the public interest to implement a geographic area licensing scheme, under which mutual exclusivity is possible, mutually exclusive applications for initial MVDDS licenses must be resolved through competitive bidding.[578] In so doing, the Commission also found that the Open-Market Reorganization for the Betterment of International Telecommunications Act (ORBIT Act) does not bar the use of competitive bidding to award licenses to provide terrestrial services merely because those terrestrial services operate on the same frequencies as satellite services.[579]

238. Discussion. In light of our decision to adopt a geographic area licensing scheme that permits the filing of mutually exclusive applications[580] and consistent with our statutory mandate to resolve such applications through the use of auctions, any mutually exclusive initial applications for the MVDDS service will be resolved by competitive bidding.

239. Northpoint argues that licensing MVDDS through competitive bidding would be inappropriate because the Commission may conduct an auction only if it accepts "mutually exclusive applications" for any "initial license or construction permit."[581] Northpoint argues that the Commission's threshold decision to accept applications must be exercised in a manner consistent with 47 U.S.C. § 309(j)(6)(E), which imposes an obligation to use various means in order to avoid mutual exclusivity.[582] Northpoint states that the Commission recently has interpreted its obligation in Section 309(j)(6)(E) as an obligation to further the public interest goals of Section 309(j)(3).[583] Northpoint questions whether such interpretation is consistent with the plain meaning of the statute but maintains that even if the Commission's interpretation is correct, under Section 309(j)(3)(A)-(E) of the statute the Commission must avoid accepting applications that would be mutually exclusive with Northpoint's because the use of Northpoint's technology in this band promotes the public interest objectives of Section 309(j)(3).[584] Certain commenters oppose Northpoint's contention, arguing that neither the Communications Act nor the public interest requires the Commission to avoid accepting mutually exclusive applications as suggested by Northpoint. Moreover, these commenters argue that awarding Northpoint a single, nationwide license without the use of competitive bidding would be tantamount to reestablishing the Pioneer's Preference program that Congress expressly abolished.[585]

240. The Commission has previously established a framework for the exercise of its auction authority, as amended by the Balanced Budget Act of 1997.[586] In the *BBA Report and Order,* the Commission affirmed that it was required to pursue the public interest objectives set forth in Section

[578] *Further Notice,* 16 FCC Rcd at 4221 ¶ 334.

[579] *Id.* at 4218 ¶ 326. *See also* ORBIT Act, Pub. L. 106-180, 114 Stat. 48 § 647 (codified at 47 U.S.C. § 647).

[580] *See* para.130, *supra*.

[581] Northpoint Comments at 22 *citing* 47 U.S.C. § 309(j)(1).

[582] Northpoint Comments at 23.

[583] *Id.*

[584] *Id*. at 23-31. CU *et al*. and NABOB also support Northpoint's contention that the grant of Northpoint's application would promote the public interest objectives of Section 309(j)(3). *See* CU *et al.* Reply Comments at 9-10, 17-18; NABOB Reply Comments at 3-7. *See also* NAB Reply Comments at 3 (urging the Commission to grant Northpoint's waiver request).

[585] AT&T Comments at 3, 6, 8; AT&T Reply Comment at 3-4; NRTC Comments at 13; Boeing Comments at 39-40; Boeing Reply Comments at 13-14; EchoStar Comments at 29; EchoStar Reply Comments at 7; SBCA Reply Comments at 6; SkyBridge Reply Comments at 18. *See also* 47 U.S.C. § 309(j)(13)(F).

[586] *See* Implementation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended, WT Docket No. 99-87, *Report and Order and Further Notice of Proposed Rule Making*, 15 FCC Rcd 22709 (2000) (*BBA Report and Order)*.

309(j)(3) of the Act in identifying which classes of licenses would be subject to competitive bidding.[587] The *BBA Report and Order* also affirmed that, as part of this public interest analysis, the Commission must continue to consider alternative procedures that avoid or reduce the likelihood of mutual exclusivity.[588] The Commission concluded, however, that its obligation to avoid mutual exclusivity does not preclude it from adopting licensing processes that result in the filing of mutually exclusive applications where it determines that such an approach would serve the public interest.[589]

241. Northpoint nonetheless contends that it is not in the public interest to permit the filing of applications for MVDDS that would be mutually exclusive with an application filed by Northpoint. We disagree. As we discuss above, we believe that a geographic area licensing scheme, which permits the filing of mutually exclusive applications, promotes the public interest objectives of Section 309(j)(3) by creating economic opportunities for a number of potential service providers and by disseminating licenses among a wide variety of applicants. While a geographic area licensing scheme promotes efficient licensing and administrative ease, it also facilitates the ubiquitous use of services and provides licensees with flexibility to quickly adjust and coordinate spectrum usage, within their license areas, based on changing market conditions.[590] Assigning MVDDS licenses through competitive bidding also promotes efficient and intensive use of the spectrum and recovery for the public of a portion of the value of this scarce resource. As a general matter, we conclude that awarding licenses to the entities that value them most highly fosters Congress's policy objectives because those bidders are more likely to rapidly introduce new and valuable services and deploy those services quickly.[591] Moreover, because we are providing MVDDS licensees with flexibility to use any technology that complies with our rules, accepting mutually exclusive applications to provide MVDDS service and assigning licenses through competitive bidding will result in the most competitive provider being licensed and facilitate entry of a viable competitor into the MVPD marketplace. Further, we agree with those commenters who argue that we do not have statutory authority to award an entity a license for a non-auction-exempt service without the use of competitive bidding solely based on its innovative technology, and such action would be inconsistent with Congress's intent in abolishing the Pioneer's Preference program.[592] Rather, consistent with our statutory mandate, we will resolve any mutually exclusive initial applications for licenses for MVDDS through competitive bidding.

242. We also reject Northpoint's argument that the ORBIT Act bars the assignment of licenses for MVDDS in the 12.2-12.7 GHz band by competitive bidding because the terrestrial licenses will be operating on the same frequencies as a satellite service.[593] The ORBIT Act restricts the Commission from

[587] *Id.* at 22718-23 ¶¶ 20-27.

[588] *Id.*

[589] *Id.* Consistent with this conclusion, the U.S. Court of Appeals for the D.C. Circuit has concluded that the Section 309(j)(6)(E) obligation does not foreclose new licensing schemes that are likely to result in mutual exclusivity. The court stated that if the Commission finds such schemes to be in the public interest, it may implement them "without regard to [S]ection 309(j)(6)(E) which imposes an obligation only to minimize mutual exclusivity 'in the public interest,' … and 'within the framework of existing policies' …" *See Benkelman Telephone Co., et al. v. FCC*, 220 F.3d 601, 606 (D.C. Cir. 2000) (*petition for rehearing on other grounds pending*).

[590] Site-based licensing does not provide licensees with the same flexibility and, as discussed above, it is also resource intensive for applicants and licensees. *See* paras. 130-132, *supra*, where we also decline to adopt a nationwide license area. The auction of a single nationwide license would disadvantage small businesses seeking to participate in MVDDS.

[591] *See* Implementation of Section 309(j) of the Communications Act – Competitive Bidding, *Second Report and Order,* 9 FCC Rcd 2348, 2352 ¶¶ 3-7 (1994).

[592] *See* 47 U.S.C. § 309(j)(13)(F).

[593] Northpoint Comments at 16.

using competitive bidding procedures to award licenses for "spectrum used for the provision of international or global satellite communications services."[594] Northpoint contends that the ORBIT Act's ban on competitive bidding should attach here because MVDDS will ubiquitously share the exact frequencies in the 12.2-12.7 GHz band with NGSO FSS, an international or global satellite service.[595] Northpoint further contends that the recent decision of the U.S. Court of Appeals for the D.C. Circuit in *National Public Radio, Inc. v. FCC*[596] supports its reading of the ORBIT Act.[597]

243. As to Northpoint's first argument, namely, that the ORBIT Act bars the assignment of licenses for MVDDS in the 12.2-12.7 GHz band by competitive bidding because the terrestrial licenses will be operating on the same frequencies as a satellite service, we note that the Commission has previously rejected this argument.[598] All other commenters who addressed this issue agree with the Commission's conclusion.[599]

244. We are not persuaded by Northpoint's argument regarding Section 647 of the ORBIT Act, especially when the legislative history is taken into account. The language of the statutory prohibition, while not entirely clear, does appear to focus on whether the particular spectrum being "assigned" is "used for" international or global satellite communications services. The legislative history makes clear that licensing this spectrum for domestic terrestrial purposes is not prohibited by Section 647. In particular, the legislative history demonstrates that Congress's concern was with "… the viability and availability of global and international satellite services …" which could be threatened by concurrent or successive spectrum auctions in numerous countries.[600] Thus, the legislative history states that the

[594] Section 647 provides: "Notwithstanding any other provision of law, the Commission shall not have the authority to assign by competitive bidding … spectrum used for the provision of international or global satellite communications services." ORBIT Act, Pub. L. No. 106-180, 114 Stat. 48 § 647 (enacted Mar. 12, 2000).

[595] Northpoint Comments at 16; Northpoint Reply Comments at 6.

[596] *National Public Radio, Inc. v. FCC*, 254 F.3d 226 (D.C. Cir. 2001) (*NPR*).

[597] Northpoint Ex Parte filing on Sept. 19, 2001.

[598] In the *Further Notice* we rejected Northpoint's interpretation of the ORBIT Act and stated that where we establish a domestic terrestrial service, as we proposed to do here, the ORBIT Act does not bar auctioning licenses to provide that service. *See Further Notice,* 16 FCC Rcd at 4218 ¶ 326. *See also* Amendment of the Commission's Rules With Regard to the 3650-3700 MHz Government Transfer Band, ET Docket No. 98-237; The 4.9 GHz Band Transferred from Federal Government Use, WT Docket No. 00-32, *First Report and Order and Second Notice of Proposed Rule Making,* 15 FCC Rcd 20488 at ¶ 20 n.64 (2000) (stating that the assignment of licenses for terrestrial services by competitive bidding is not prohibited by the ORBIT Act); *24 GHz Report and Order*, 15 FCC Rcd 16934 (adopting rules to award licenses for terrestrial fixed service by competitive bidding in the 24 GHz band, which is also allocated to satellite services); *39 GHz R&O*, 12 FCC Rcd 18600; 39 GHz Band Auction Closes, *Public Notice,* DA 00-1035, Report No. AUC-30-E (rel. May 10, 2000) (assigning terrestrial fixed service licenses by auction in the 39 GHz band, which is also allocated to satellite services). *See also* TRW INC., Request for Waiver of the Commission's Rules to Provide Fixed Satellite Service in the 39 GHz Band, *Memorandum Opinion and Order*, DA 01-371, File No. 0000137436 (rel. March 12, 2001). *But cf.* Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Band, IB Docket No. 01-185*, Notice of Proposed Rule Making,* 16 FCC Rcd 15532 (2001).

[599] *See* EchoStar Comments at 29; EchoStar Reply Comments at 14-15; Boeing Comments at 39-40; AT&T Comments at 3; AT&T Reply Comments at 2; DTV Reply Comments at 31; NRTC Comments at 13; NRTC Reply Comments at 6-7; SBCA Reply Comments at 8-9; SkyBridge Reply Comments at ii, 19-20 and 22.

[600] The legislative history explains the purpose of the section as follows:

> New section 649 [section 647] prevents the Commission from using competitive bidding procedures (*i.e.*, auctions) to award licenses for spectrum or orbital locations used for providing international satellite services.

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provision "prevents the Commission from using competitive bidding … to award licenses for spectrum or orbital locations used for providing international satellite services."[601] There is no indication that Congress was concerned with auctioning spectrum licenses to terrestrial licensees or that auctioning licenses for this spectrum to licensees who use it solely for terrestrial use would have any financial or other impact on any international satellite licensees that may share this spectrum. Because of this, we believe that Section 647 does not prohibit the auction of spectrum licenses for terrestrial uses where the same spectrum may also be used for global or international satellite communications purposes by other licensees. The spectrum licenses at issue here would be "assigned" to licensees and auctioned only for domestic terrestrial use.

245. We further reject the argument that the recent *NPR* case supports Northpoint's argument that we may not auction the spectrum at issue. Northpoint asserts that the ORBIT Act represents the converse of *NPR*, claiming that the ORBIT Act's denial of auction authority is based on the part of the spectrum in which the applicant seeks to operate, and not on the nature of the applicant that ultimately receives the license. In *NPR*, the court determined that the statutory prohibition is grounded in "the nature of the station" rather than "the part of the spectrum in which the station operates."[602] In this instance, we are dealing with a shared spectrum band used both for "international or global satellite communications services" and, as envisioned, domestic terrestrial services. Because the international or global satellite communications service uses, and the domestic terrestrial uses, can be assigned separately and share the spectrum, there is no reason to read the ORBIT Act to constrain the terrestrial spectrum license assignments.

246. Northpoint further argues that it is the sole entity eligible to apply for the MVDDS licenses because only Northpoint completed equipment testing within the 60-day timeframe established by Section 1012(b) of the LOCAL TV Act.[603] As discussed in Section V.B.4., *supra*, Northpoint misconstrues the LOCAL TV Act. Section 1012(b) requires that for "any pending application," equipment testing be completed "within 60 days after the date of enactment of this [LOCAL TV] Act."[604]

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> In addition, it requires the Administration to oppose the adoption of auctions to award licenses for orbital locations or satellite services in the ITU and other fora.
>
> The Committee believes that auctions of spectrum or orbital locations could threaten the viability and availability of global and international satellite services, particularly because concurrent or successive spectrum auctions in the numerous countries in which U.S.-owned global satellite service providers seek downlink or service provision licenses could place significant financial burdens on providers of such services. This problem would be compounded by the fact that the multi-year period required for design, construction and launch of global and international satellite systems usually requires service providers to invest substantial resources well before they obtain all needed worldwide licenses and spectrum assignments. The uncertainty created by spectrum auctions could disrupt the availability of capital for such projects, and significantly reduce the available benefits offered by global and international satellite systems.

Report of Committee on Commerce, Communications Satellite Competition and Privatization Act of 1998, H.R. Rep. No.494, 105 Cong., 2nd Sess. 64-65 (1998). *See also* Report on the Activity of the Committee on Commerce for the 106th Congress. H.R. Rep. 106-1047 at 38. (Jan. 2, 2001) (stating that the bill prohibits the Commission from auctioning orbital slots or spectrum assignments for global satellite systems).

[601] *Id*.

[602] *NPR,* 254 F. 3d at 228-29.

[603] Letter from J.C. Rozendaal, counsel for Northpoint Technology, Ltd., to Magalie Roman-Salas, Secretary, FCC (filed Sept. 19, 2001) at 2.

[604] LOCAL TV Act, § 1012(b).

By its plain language, Section 1012(b) applies retrospectively. That is, the testing requirement applies only to applications "pending" at the time the LOCAL TV Act was adopted. Northpoint, moreover, construes Section 1012(b) as a cut-off precluding mutually exclusive applications for MVDDS licenses. There is no evidence, however, of such a Congressional intent in this case. Indeed, if Congress had intended to establish a 60-day cut-off for terrestrial wireless applications in the 12 GHz band, it could have done so explicitly.[605]

247. Additionally, Northpoint argues that the Commission cannot justify an auction for MVDSS – a terrestrial wireless service – because the agency does not assign all licenses to provide terrestrial wireless services through competitive bidding.[606] Specifically Northpoint argues that in the year 2001 alone, 93 percent of wireless licenses for both mobile and fixed microwave services were assigned without competitive bidding.[607] We note that the number of licenses assigned without competitive bidding is irrelevant to the question of whether the Commission should adopt a licensing regime (such as geographic area licensing) for a particular service that is likely to result in the filing of mutually exclusive license applications, which would have to be resolved by auction. The Commission has broad discretion to establish licensing rules in the public interest.[608] We have before us a record that suggests an interest in utilizing the 12.2-12.7 GHz band for ubiquitous terrestrial service. Northpoint is only one of several parties interested in this spectrum. Based on our experience and the requested use of this band, a geographic area licensing regime is both the most effective and efficient means of deploying licenses here.

248. Finally, Northpoint claims that the Commission unjustly discriminates in favor of satellite services because the agency has adopted mechanisms for assigning satellite licenses that avoid mutual exclusivity and, hence, auctions.[609] We note that the Commission has conducted auctions to assign domestic satellite licenses in both the Direct Broadcast Satellite Service and the Digital Audio Radio Service.[610] Section 309(j), however, requires the Commission to consider procedures that avoid or reduce

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[605] *See* SBCA *Ex Parte* (filed Dec. 21, 2001) at 11 ("If Congress had meant to establish a deadline, it would have done so directly. Indeed, in other parts of the LOCAL TV Act, Congress specifically directed the Commission not to accept particular filings. *See, e.g.,* section 1007(a)(2), 47 U.S.C. § 1106(a)(2) (precluding petitions to deny major modifications of cellular applications). The fact that explicit language precluding the submission of certain documents is set forth in section 1007 but not in section 1012 undermines Northpoint's argument that such a limitation should be read into section 1012. *See, e.g., Moshe Gozlon-Peretz v. United States*, 498 U.S. 395, 404 (1990) (when Congress includes language in one section of a statutory scheme but omits it in another, the exclusion is presumed "intentional and purposeful"); *Russello v. United States,* 463 U.S. 16, 23, 78 (1983) (same)).

[606] Ex-Parte Letter to The Honorable Michael K. Powell, Chairman, FCC, from Sophia Collier, President, BroadwaveUSA, dated Nov. 28, 2001.

[607] *Id*. Notably, Northpoint does not distinguish between site-based and geographic area licenses. Site-based licenses authorize one or more individual transmitters in a city, or a set of microwave paths. In contrast, the auctioned licenses authorize service in an entire geographic area, *e.g.*, nationwide, MTA, EA, etc. The proffered calculation inaccurately suggests that award of a large number of licenses is tantamount to award of a large amount of spectrum when, in fact, a single geographic area license may confer the right to use more spectrum than many site-based licenses. A comparison of license grants is only indicative of the number of physical license records that we retain.

[608] *See Bachow Commmunications, Inc. v. FCC*, 237 F.3d 683, 691-692 (D.C. Cir. 2001); *Benkelman Telephone Co. v. FCC*, 220 F.3d at 606.

[609] Ex-Parte Letter to The Honorable Michael K. Powell, Chairman, FCC, from Sophia Collier, President, BroadwaveUSA, dated Nov. 28, 2001. SkyBridge disputes Northpoint's contention and states that Northpoint mischaracterizes many relevant facts and regulatory practices. *See* SkyBridge *Ex-Parte* filed on Dec. 21, 2001.

[610] *See* MCI Telecommunications Corporation bids $682,500,000 for last available nationwide DBS slot, *FCC News* (rel. Jan. 25, 1996); EchoStar DBS Corporation wins 24 DBS channels at the 148 degree orbital location with a high bid of $52,295,000, *FCC News* (rel. Jan. 26, 1996); Wireless Telecommunications Bureau announces auction (continued....)

the likelihood of mutually exclusive license applications where such procedures serve the public interest,[611] and pursuant to this provision the Commission has concluded that licensing mechanisms for international satellite services that avoid mutual exclusivity serve the public interest. The Commission has reached this conclusion because, *inter alia*, licensing such services requires international coordination; the inability of U.S. auctions to confer global licenses might prevent market entry by satellite providers interested in global service; and coordinated, multilateral-transnational auctions are not feasible.[612] We also note that Congress shared these concerns and stated its reservations about assigning licenses for orbit locations and international satellite services by competitive bidding when it expanded the Commission's auction authority in 1997.[613] As explained above, the ORBIT Act now prevents the Commission from assigning licenses for international or global satellite services by competitive bidding.[614] Thus, the differences in the Commission's licensing approaches to international satellite and terrestrial services have arisen from public interest considerations associated with the particular characteristics of the services and now are based as well on the different treatment of these services by Congress.

b. Incorporation by Reference of the Part 1 Standardized Competitive Bidding Rules

249. Background. In the *Further Notice* we proposed to conduct any auction of MVDDS licenses in the 12.2-12.7 GHz band in conformity with the general competitive bidding rules set forth in Part 1, Subpart Q, of the Commission's Rules, and substantially consistent with the bidding procedures that have been employed in previous auctions.[615] Specifically, we proposed to employ the Part 1 rules governing competitive bidding design, designated entities, application and payment procedures, reporting requirements, collusion issues, and unjust enrichment.[616]

250. Discussion. We adopt our proposal to auction MVDDS licenses in the 12.2-12.7 GHz band in conformity with the general competitive bidding rules set forth in Part 1, Subpart Q, of the Commission's Rules. This decision is consistent with our ongoing effort to streamline our general competitive bidding rules for all auctionable services, increase the efficiency of the competitive bidding process, and provide more guidance to auction participants.[617] Moreover, all commenters that addressed

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winners of DBS auction, *Public Notice* (rel. Jan. 29, 1996); and FCC Announces Auction Winners for Digital Audio Radio Service, *Public Notice*, DA 97-656 (rel. Apr. 2, 1997).

[611] 47 U.S.C. § 309(j)(3), (6).

[612] *See BBA NPRM*, 14 FCC Rcd 5206, ¶ 65 (1999).

[613] *See* H.R. Conf. Rep. No. 105-217, 105th Cong., 1st Sess., at 572 (stating that the Balanced Budget Act's omission of an auction exemption for licenses to provide global satellite services should not be construed as a Congressional endorsement of auctions for such licenses and stating that the treatment of global satellite systems raises numerous public policy questions which are better handled in the context of substantive legislation rather than budget legislation).

[614] *See* para. 242, *supra*.

[615] *Further Notice,* 16 FCC Rcd at 4221-4222 ¶ 335.

[616] *Id.*

[617] *See*, *e.g.,* Amendment of Part 1 of the Commission's Rules – Competitive Bidding Procedures, WT Docket No. 97-82, *Order, Memorandum Opinion and Order and Notice of Proposed Rule Making,* 12 FCC Rcd 5686 (1997); Amendment of Part 1 of the Commission's Rules – Competitive Bidding Procedures, Allocation of Spectrum Below 5 GHz Transferred from Federal Government Use, *Third Report and Order and Second Further Notice of Proposed Rule Making*, 13 FCC Rcd 374 (1997) (modified by Erratum, DA 98-419 (rel. Mar. 2, 1998)) (*Part 1 Third Report and Order)*; Amendment of Part 1 of the Commission's Rules – Competitive Bidding Procedures, *Order on Reconsideration of the Third Report and Order, Fifth Report and Order, and Fourth Further Notice of Proposed*
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the issue support the use of the general competitive bidding rules set forth in Part 1, Subpart Q, of the Commission's Rules.[618] Our application of the Part 1 rules to MVDDS will include any amendments that may be adopted in the ongoing Part 1 proceeding.[619]

c. Provisions for Designated Entities

251. Background. In the *Further Notice* we proposed small business size standards and bidding credits that would afford licensees substantial flexibility and that would also be appropriate for the provision of services with varying capital costs.[620] Specifically, we proposed to define a very small business as an entity with average annual gross revenues not exceeding $3 million for the preceding three years; a small business as an entity with average annual gross revenues not exceeding $15 million for the preceding three years; and an entrepreneur as an entity with average annual gross revenues not exceeding $40 million for the preceding three years. We further proposed to provide very small businesses with a bidding credit of 35 percent, small businesses with a bidding credit of 25 percent, and entrepreneurs with a bidding credit of 15 percent.[621]

252. Discussion. We will adopt our proposed three small business definitions and three levels of bidding credits. We believe that this approach provides a variety of businesses, including local businesses, with opportunities to participate in the auction of licenses for this spectrum, and will also promote opportunities for the provision of services with varying capital costs. Moreover, we have not received any opposition to our proposed small business definitions or three levels of bidding credits. Accordingly, we define a very small business as an entity with average annual gross revenues not exceeding $3 million for the preceding three years; a small business as an entity with average annual gross revenues not exceeding $15 million for the preceding three years; and an entrepreneur as an entity with average annual gross revenues not exceeding $40 million for the preceding three years. We will also adopt our proposed bidding credits, which are the same as those set forth in the standardized schedule in Part 1 of our rules.[622] Thus, very small businesses will receive a bidding credit of 35 percent, small businesses will receive a bidding credit of 25 percent, and entrepreneurs will receive a bidding credit of 15 percent.[623]

d. EchoStar's Proposals

(i) Spectrum Set-Aside and Special Bidding Credits for DBS Licensees

253. Background. EchoStar argues that DBS licensees should be exempt from competitive bidding for MVDDS licenses. Pointing out that it has already paid for its DBS licenses, by participating

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Rule Making, 15 FCC Rcd 15293 (2000) (*Part 1 Recon Order and Part 1 Fifth Report and Order)*; Amendment of Part 1 of the Commission's Rules – Competitive Bidding Procedures, *Seventh Report and Order*, 16 FCC Rcd 17546 (2001); Amendment of Part 1 of the Commission's Rules – Competitive Bidding Procedures, *Eighth Report and Order*, FCC 02-34 (rel. Feb. 13, 2002).

[618] *See* Pegasus Comments at 19.

[619] *See Part 1 Recon Order and Part 1 Fifth Report and Order*, 15 FCC Rcd 15293 (recons. pending).

[620] *Further Notice,* 16 FCC Rcd at 4222-4223 ¶¶ 336-339.

[621] *Id.*

[622] In the *Part 1 Third Report and Order*, we adopted a standard schedule of bidding credits, the levels of which were developed based on the Commission's auction experience. *Part 1 Third Report and* Order, 13 FCC Rcd at 403-04 ¶ 47. *See also* 47 C.F.R. § 1.2110(f)(2).

[623] 47 C.F.R. § 1.2110(f)(2).

in an FCC auction and by purchasing a license acquired through an FCC auction, EchoStar further contends that allowing terrestrial use of the 12.2-12.7 GHz band by DBS licensees would be consistent with the Commission's spectrum flexibility policy.[624] Thus, EchoStar argues that DBS licensees are entitled to use at least a significant portion of the 12.2-12.7 GHz band for terrestrial services without having to participate in a terrestrial license auction, and that the Commission should set aside no less than 250 MHz of this spectrum for interested DBS licensees. EchoStar further contends that if the Commission accepts mutually exclusive applications from other interested parties for terrestrial use of the remaining portion of the 12.2-12.7 GHz band, DBS licensees should receive a special bidding credit in the auction of MVDDS licenses.[625] EchoStar claims that such a set-aside and bidding credits are justified because any payment for spectrum to which a licensee has already "purchased the rights" would be an "overpayment."[626] Pegasus opposes EchoStar's request.[627]

254. Discussion. We decline to adopt a set-aside of MVDDS spectrum or special bidding credits for DBS licensees. DBS licenses do not include an authorization to use the 12.2-12.7 GHz band for terrestrial services.[628] EchoStar in effect argues that it should be assigned additional flexibility in its authorization because it acquired its DBS licenses through auction. In adopting Section 309(j) of the Act, Congress expressly provided that the Commission's use of competitive bidding should not be construed to limit or otherwise affect its authority to regulate spectrum licenses.[629] Accordingly, the previous assignment of DBS licenses through competitive bidding does not limit our authority to assign MVDDS licenses through competitive bidding once we determine that it will serve the public interest to do so. In choosing a license assignment mechanism we are required to consider the public interest objectives of Section 309(j). We find that the public interest would not be served by providing terrestrial rights to existing DBS authorizations solely because DBS licensees acquired their existing licenses by auction. Such a licensing mechanism would not ensure that the new terrestrial licenses are assigned to those that value them the most, which may or may not be the current DBS licensees. Further, as discussed above, we have determined that assigning licenses for MVDDS spectrum as one single block per geographic service area promotes the public interest objectives of Section 309(j)(3), an approach that precludes a set-aside of a portion of the spectrum for DBS licensees.[630] Moreover, EchoStar has not shown that either a set-aside or bidding credits for DBS licensees would promote the public interest objectives of Section 309(j). With respect to the promotion of competition in particular, we note that third parties can share the 12 GHz band without causing significant harm to existing services and that assigning MVDDS licenses

[624] EchoStar Comments at 29-30.

[625] *Id.* at 30.

[626] *Id*.

[627] Pegasus Reply Comments at 21.

[628] *See, e.g*., Inquiry into the Development of Regulatory Policy in Regard to Direct Broadcast Satellite or the Period Following the 1983 Regional Administrative Radio Conference, *Report and Order,* 90 FCC2d 676 (1982); Revisions of Rules and Policies for the Direct Broadcast Satellite Service, *Report and Order*, 11 FCC Rcd 9712 (1995); Amendment to Commission's Regulatory Policies Governing Domestic Fixed Satellite and Separate International Satellite Systems, *Report and Order,* 11 FCC Rcd 2429 (1996); Policy and Rules for the Direct Broadcast Satellite Service, 13 FCC Rcd 6907 (1998); Amendment to Commission's Regulatory Policies Governing Domestic Fixed Satellite and Separate International Satellite Systems, *Order on Reconsideration*, 16 FCC Rcd 15579 (2001); and 47 C.F.R. Part 100. *See also* 47 U.S.C. § 301. Section 301 expressly states that a license does not convey the ownership of the channels and no license shall be construed to create any rights beyond the terms, conditions, and periods of the license.

[629] 47 U.S.C. § 309(j)(6)(B)(C). *See also* 47 U.S.C. § 309(j)(6)(D) for the fact that a license obtained in an auction will not convey any additional rights beyond its terms and conditions.

[630] *See* paras.134-135, *supra*.

only to incumbent DBS licensees or granting them special bidding credits would limit the opportunity for entry of new competitive service to both cable and DBS.[631]

255. EchoStar also states that the Commission should grant its request because it is consistent with the Commission's Spectrum Policy Statement supporting flexible use of spectrum.[632] We note that our Spectrum Policy Statement outlines in general terms a series of initiatives that the Commission intends to undertake.[633] This Policy Statement does not, by itself, provide a basis upon which to increase the spectrum usage rights of a particular licensee. The Commission weighs competing policy goals in each rulemaking proceeding and, as discussed above, it has not been shown that flexibility of the kind EchoStar envisions is in the public interest under these circumstances.[634]

(ii) Use of Auction Proceeds to Mitigate Interference

256. Background. EchoStar suggests that part of the auction proceeds for MVDDS should be used to compensate incumbents for disruption of their operations. [635] EchoStar also contends that such compensation would be analogous to other Commission provisions (*e.g.*, provisions to encourage early clearing of the 700 MHz band) for payment to incumbents to cover the cost of relocating or disrupting their operations.[636]

257. Discussion. We decline to adopt EchoStar's suggestion. Section 309(j)(8) of the Communications Act requires the Commission to deposit all proceeds from a competitive bidding system in the United States Treasury, except for expenditures made for the purposes of conducting competitive bidding.[637] In light of this statutory requirement, the Commission has no authority to use auction proceeds for the purpose of offsetting costs incurred by DBS from MVDDS licensees.

(iii) Transfer of MVDDS Licenses

258. Background. EchoStar argues that in order to prevent speculative auction participation and unjust enrichment the Commission should prohibit any transfer of a license or transfer of control of a

[631] *See* 47 U.S.C. § 309(j)(3)(B).

[632] EchoStar Comments at 30 (citing Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, Notice of Proposed Rulemaking,* 15 FCC Rcd 24203 (2000) (*Secondary Markets NPRM*)).

[633] *See Policy Statement on Principles for Reallocation of Spectrum to Encourage the Development of Telecommunications Technologies for the New Millennium*, 14 FCC Rcd 19868 (1999) (*Spectrum Policy Statement*). *See also* Principles for Promoting the Efficient Use of Spectrum by Encouraging the Development of Secondary Markets, *Policy Statement,* 15 FCC Rcd 24178 (2000) (*Secondary Markets Policy Statement)*.

[634] We note that the Commission has sought comment, in a pending rulemaking proceeding, on its DBS "non-conforming use" policy. Specifically, the Commission has asked whether it should eliminate, relax, or maintain time or other restrictions on non-DBS uses of DBS spectrum, and whether permitting "flexible use" of DBS spectrum will enhance or impede competition in the multichannel video programming distribution market. The Commission's request for comment, however, is limited to the issue of DBS providers' satellite uses of DBS spectrum and does not contemplate flexible use that would extend to DBS licensees' use of their authorizations to provide terrestrial service. *See Public Notice*, "The Commission Requests Further Comment in Part 100 Rulemaking Proceeding on Non-Conforming Use of Direct Broadcast Satellite Service Spectrum," IB Docket No. 98-21, FCC 00-426 (rel. Dec. 8, 2000).

[635] EchoStar Comments at 30-31.

[636] *Id.* Pegasus disagrees, noting that EchoStar provides no appropriate precedent. *See* Pegasus Reply Comments at 21-22.

[637] 47 U.S.C. § 309(j)(8).

license until all of the licensee's facilities in all of its license areas are fully constructed and operational.[638]

259. Discussion. We decline to adopt a prohibition of transfer of MVDDS licenses. We believe that our Part 1 rules are sufficient to deter speculative auction participation because these rules, including rules on procedures and payment issues, bidder and licensee qualifications, and penalties in the event of default or disqualification, ensure that the competitive bidding process is limited to serious, qualified applicants.[639] Our Part 1 rules also provide safeguards, including anti-collusion and unjust enrichment provisions, that will deter possible abuses of the bidding and licensing processes.[640] Moreover, the public interest favors giving licensees flexibility to assign, transfer, or partition their MVDDS licenses; such flexibility will advance the more efficient and innovative use of spectrum.[641] We also believe that partitioning fosters rapid delivery of service to rural areas and encourages the participation of smaller entities at auction, consistent with our mandate to ensure that licenses are disseminated among a wide array of applicants.[642] Thus, we find that it is not necessary to prohibit any transfer of license until all of the licensee's facilities are fully operational, and that the benefits of allowing transfers outweigh any risk of unjust enrichment. We also believe that adopting such a prohibition would needlessly penalize licensees that may wish to implement changes to their business plans based on subsequent market conditions.

VI. PROCEDURAL INFORMATION

A. Final Regulatory Flexibility Analysis

Final Regulatory Flexibility Analysis. The analysis regarding the *Second Report and Order*, pursuant to the Regulatory Flexibility Act of 1980, 5 U.S.C. § 603, is contained in Appendix E.

B. Paperwork Reduction Analysis

This *Memorandum Opinion and Order and Second Report and Order* contains either a new or modified information collection. As part of the Commission's continuing effort to reduce paperwork burdens, we invite the general public and the Office of Management and Budget (OMB) to take this opportunity to comment on revision to the information collections contained in the *Report and Order* as required by the Paperwork Reduction Act of 1995.[643] Public and agency comments are due ***[60 days after date of publication in the Federal Register].*** Comments should address:

- 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.
- The accuracy of the Commission's burden estimates.
- Ways to enhance the quality, utility, and clarity of the information collected.

[638] EchoStar Comments at 31.

[639] *See* 47 C.F.R. § 1.2101 *et. seq*.

[640] *Id.*

[641] *See* para.180, *supra*. *See also Secondary Markets Policy Statement,* 15 FCC Rcd 24178, and *Secondary Markets NPRM,* 15 FCC Rcd 24203.

[642] 47 U.S.C. §§ 309(j)(3)(B), 309(j)(4)(C).

[643] *See* Pub. L. No. 104-13.

- 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.

260. Written comments by the public on the proposed and/or modified information collections are due 60 days after the date of publication in the Federal Register. Written comments must be submitted by the OMB on the proposed and/or modified information collections on or before 120 days after the date of publication in the Federal Register. In addition to filing comments with the Secretary, a copy of any comments on the information collections contained herein should be submitted to Judith B. Herman, Federal Communications Commission, Room 1-C804, 445 12th Street, SW, Washington, DC 20554, or via the Internet to jboley@fcc.gov, and to Jeanette Thornton, OMB Desk Officer, Room 10236 New Executive Office Building, 725 Seventeenth Street, N. W., Washington, D.C. 20503, or via the Internet to JThorto@omb.eop.gov. For additional information concerning the information collection(s) contained in this document, contact Judith B. Herman at 202-418-0214, or via the Internet at jboley@fcc.gov.

C. Further Information

261. For further information contact the following: for MVDDS/DBS and MVDDS/NGSO FSS sharing issues, Office of Engineering and Technology – Thomas Derenge at (202) 418-2451, Gary Thayer at (202) 418-2290 or Ira Keltz at (202) 418-0616. For MVDDS service rules, Wireless Telecommunications Bureau – Michael Pollak, Jennifer Burton, or Brian Wondrack at (202) 418-0680, TTY (202) 418-7233.

262. Alternative formats (computer diskette, large print, audio cassette, and Braille) are available to persons with disabilities by contacting Brian Millin at (202) 418-7426, TTY (202) 418-7365, or via e-mail to bmillin@fcc.gov. This *Memorandum Opinion and Order and Second Report and Order* can be downloaded at http://www.fcc.gov.

VII. ORDERING CLAUSES

263. Authority. Accordingly, IT IS ORDERED that pursuant to the authority contained in Sections 4(i), 7(a), 301, 303(c), 303(f), 303(g), 303(r), 308, and 309(j) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 157(a), 301, 303(c), 303(f), 303(g), 303(r), 308, 309(j), this *Memorandum Opinion and Order and Second Report and Order* IS ADOPTED.

264. IT IS FURTHER ORDERED that, effective as of the date of the release of this *Memorandum Opinion and Order and Second Report and Order*, revised rules 101.147(p) and (q), 47 C.F.R. § 101.47(p), (q) are in effect. 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).

265. IT IS FURTHER ORDERED that, Parts 25 and 101 of the Commission's Rules ARE AMENDED as specified in Appendix D, effective 60 days after publication in the Federal Register, except as specified. 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).

266. IT IS FURTHER 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), 303(r) and 405, the petitions for reconsideration filed by SkyBridge, DirecTV, Inc., EchoStar Satellite Corporation, Satellite Broadcasting and Communications Association, the Boeing Company, and SkyTower, Inc. as they relate to our decision to allocate MVDDS in the 12 GHz band ARE DENIED.

267. IT IS FURTHER 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), 303(r) and 405, the DBS Petition for Consolidation and Declaration filed by DirecTV and EchoStar IS DISMISSED.

268. IT IS FURTHER ORDERED that pursuant to Sections 4(i), 302, 303(e), 303(f), 303(g) and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 302, 303 (e), 303(f), 303(g) and 303(r), the May 9, 2001 letter filed by Michael K. Kellogg, counsel to Northpoint Technology, Ltd. to Jane Mago, General Counsel, Federal Communications Commission IS DISMISSED.

269. IT IS FURTHER ORDERED that pursuant to Sections 4(i), 303(r) and 309(j) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 303(r), 309(j), and Section 1.934(d) of the Commission's Rules, 47 C.F.R. § 1.934(d), the Broadwave Network, LLC Applications for Licenses to Provide a New Terrestrial Transport Service in the 12 GHz band, Various DMAs, filed on January 8, 1999, ARE DISMISSED.

270. IT IS FURTHER ORDERED that pursuant to Sections 4(i), 303(r) and 309(j) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 303(r), 309(j), and Section 1.934(d) of the Commission's Rules, 47 C.F.R. § 1.934(d), the PDC Broadband Corporation Applications for Licenses to Provide Terrestrial Service in the 12 GHz Band in All DMAs, filed on April 18, 2000, ARE DISMISSED.

271. IT IS FURTHER ORDERED that pursuant to Sections 4(i), 303(r) and 309(j) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 303(r), 309(j), and Section 1.934(d) of the Commission's Rules, 47 C.F.R. § 1.934(d), the Satellite Receivers, Ltd. Applications for Licenses to Provide Terrestrial Television Broadcast and Data Services in the 12.2-12.7 GHz Band in Illinois, Indiana, Iowa, Michigan, Minnesota and Wisconsin, filed on August 25, 2000, ARE DISMISSED.

272. IT IS FURTHER ORDERED that, effective as of the date of the release of this *Memorandum Opinion and Order and Second Report and Order*, NO NEW APPLICATIONS WILL BE ACCEPTED FOR FILING in the 12.2-12.7 GHz band for private operational fixed service, except for applications for minor modifications or for license assignment or transfer of control.

273. IT IS FURTHER ORDERED that pending applications, as of the release date of this *Memorandum Opinion and Order and Second Report and Order*, for Private Operational Fixed Service licenses in the 12.2-12.7 GHz band WILL BE PROCESSED on a first-come, first-served basis.

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

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A: PETITIONS FOR RECONSIDERATION, REPLIES AND OPPOSITIONS

Petitions for Reconsideration Filed March 12, 2001
SkyTower, Inc. (SkyTower)

Petitions for Reconsideration Filed March 19, 2001
The Boeing Company (Boeing)
DirecTV, Inc. (DirecTV)
EchoStar Satellite Corporation (EchoStar)
Hughes Communications, Inc., *et. al.* (Joint Petition.) (Hughes)
PanAmSat Corporation (PanAmSat)
Satellite Broadcasting and Communications Association (SBCA)
SkyBridge, L.L.C. (SkyBridge)

Oppositions to Petitions for Reconsideration Filed March 29, 2001
Satellite Receivers Ltd., (SRL)

Oppositions to Petitions for Reconsideration Filed April 24, 2001
The Boeing Company (Boeing)
MDS America, Incorporated (MDSA)
Northpoint Technology, Ltd. (Northpoint)
PanAmSat Corporation (PanAmSat)
SkyBridge, L.L.C. (SkyBridge)

Replies to Oppositions to Petitions for Reconsideration Filed May 4, 2001
SkyBridge L.L.C. (SkyBridge)
SkyTower, Inc. (SkyTower)

Replies to Oppositions to Petitions for Reconsideration Filed May 9, 2001
PanAmSat Corporation (PanAmSat)
Satellite Broadcasting and Communications Association (SBCA)
DirecTV, Inc. (DirecTV)
EchoStar Satellite Corporation (EchoStar)
The Boeing Company (Boeing)

APPENDIX B: COMMENTING PARTIES TO FNPRM

COMMENTS (Due on March 12, 2001)
Association of America's Public Television Stations (APTS)
AT&T Corp. (AT&T)
The Boeing Company (Boeing)
DirecTV, Inc. (DirecTV)
EchoStar Satellite Corporation (EchoStar)
Gray Communications (Gray)
Joint Broadcasters
(Benedek Broadcasting Corporation, Corridor Television, L.L.P., Eagle III Broadcasting, L.L.C., Granite Broadcasting Corporation, LIN Television Corporation)
MDS America, Incorporated (MDSA)
Minority Media and Telecommunications Council (MMTC)
Minority Media and Telecommunications Council – Supplement (MMTC Supplement)
National Rural Telecommunications Cooperative (NRTC)
National Indian Telecommunications Institute (NITI)
Northpoint Technology, Ltd. and Broadwave USA, Inc. (Northpoint)
Paxson Communications (Paxson)
Pegasus Broadband Corporation (Pegasus)
Pegasus Broadband Corporation - Technical Supplement (Pegasus Technical Supplement)
Satellite Broadcasting and Communications Association (SBCA)
Satellite Receivers, Ltd. (SRL)
Second Generation of Iowa (SGI)
SkyBridge, L.L.C. (SkyBridge)
SkyTower, Inc. (SkyTower)
Society of Broadcast Engineers (SBE)
Telesat Canada (Telesat)
Virtual Geosatellite

REPLY COMMENTS (Originally due on March 26; date extended to April 5, 2001)
Association of America's Public Television Stations (APTS)
AT&T Corp. (AT&T)
The Boeing Company (Boeing)
Consumers Union, Consumer Federation of America, Leadership Conference on Civil Rights, Center for Media Education, League of United Latin American Citizens, the Media Access Project (CU *et al*.)
DirecTV, Inc. (DirecTV)
EchoStar Satellite Corporation (EchoStar)
MDS America, Incorporated (MDSA)
National Association of Black Owned Broadcasters (NABOB)
National Association of Broadcasters (NAB)
National Rural Telecommunications Cooperative (NRTC)
Northpoint Technology, Ltd. and Broadwave USA, Inc. (Northpoint)
Pegasus Broadband Corporation (Pegasus)
Rural Telecommunications Group (RTG)
Satellite Broadcasting and Communications Association (SBCA)
Satellite Receivers, Ltd. (Satellite Receivers)
SkyBridge, L.L.C. (SkyBridge)

APPENDIX C: COMMENTING PARTIES TO MITRE REPORT

COMMENTS: (Due on May 15, 2001)
Boeing Company
Conus Communications
DirecTV, Inc.
EchoStar Satellite Corporation
Northpoint Technology and Broadwave USA, Inc.
Pegasus Broadband Corporation
Satellite Broadcasting and Communications Association

REPLY COMMENTS: (Due on May 23, 2001)
AT&T Corporation
DirecTV, Inc.
EchoStar Satellite Corporation
MDS America
Northpoint Technology and Broadwave USA, Inc.
Pegasus Broadband Corporation
Satellite Broadcasting and Communications Association
Satellite Receivers, Ltd.

APPENDIX D: FINAL RULES

For the reasons discussed in the preamble, the FCC amends 47 C.F.R. Parts 25 and 101 as follows:

PART 25 – SATELLITE COMMUNICATIONS

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

AUTHORITY: 47 U.S.C. 701-744. Interprets or applies sec. 303. 47 U.S.C. sections 154, 301, 302, 303, 307, 309, and 332, unless otherwise noted.

2. Section 25.208 is amended by adding new paragraph (k) to read as follows:

§ 25.208 Power flux density limits.

* * * * *

(k) In the band 12.2-12.7 GHz, for NGSO FSS space stations, the low-angle power flux-density at the Earth's surface produced by emissions from a space station for all conditions and for all methods of modulation shall not exceed the lower of the following values:

–158 dB(W/m^2) in any 4 kHz band for angles of arrival between 0 and 2 degrees above the horizontal plane; and

-158+ 3.33(δ-2) dB(W/m^2) in any 4 kHz band for angles of arrival (δ) (in degrees) between 2 and 5 degrees above the horizontal plane.

Note to paragraph (k): These limits relate to the power flux density, which would be obtained under assumed free-space propagation conditions.

* * * * *

3. Section 25.139 is added to read as follows:

§ 25.139 NGSO FSS coordination and information sharing between MVDDS licensees in the 12.2 GHz to 12.7 GHz band.

(a) NGSO FSS licensees shall maintain a subscriber database in a format that can be readily shared with MVDDS licensees for the purpose of determining compliance with the MVDDS transmitting antenna spacing requirement relating to qualifying existing NGSO FSS subscriber receivers set forth in §101.129 of this chapter.

(b) Within ten business days of receiving notification of the location of a proposed MVDDS transmitting antenna, the NGSO FSS licensee shall provide sufficient information from the database to enable the MVDDS licensee to determine whether the proposed MVDDS transmitting site meets the minimum spacing requirement.

(c) If the location of the proposed MVDDS transmitting antenna site does not meet the separation requirements of §101.129 of this chapter, then the NGSO FSS licensee shall also indicate to the MVDDS licensee within the same ten day period specified above whether the proposed MVDDS transmitting site is acceptable at the proposed location.

(d) Nothing in this section shall preclude NGSO FSS and MVDDS licensees from entering into an agreement to accept MVDDS transmitting antenna locations that are shorter-spaced from

existing NGSO FSS subscriber receivers than the distance set forth in §101.129 of this chapter.

PART 101 - FIXED MICROWAVE SERVICES

4. The authority citation for Part 101 continues to read as follows:

AUTHORITY: 47 U.S.C. 154, 303.

5. Section 101.3 is amended by adding a definition for MVDDS in alphabetical order to read as follows:

§ 101.3 Definitions.

* * * * *

Multichannel Video Distribution and Data Service (MVDDS). A fixed microwave service licensed in the 12.2-12.7 GHz band that provides various wireless services. Mobile and aeronautical operations are prohibited.

* * * * *

6. Section 101.101 is amended by revising the entry for 12,200-12,700 MHz in the table to read as follows:

§ 101.101 Frequency availability.

Frequency band (MHz)	Radio Service				
	Common carrier (Part 101)	Private radio (Part 101)	Broadcast auxiliary (Part 74)	Other (Parts 15, 21, 24, 25, 74, 78 & 100)	Notes
* * * * * * *					
12,200-12,700	MVDDS	MVDDS, POFS		DBS, NGSO FSS	
* * * * * * *					

* * * * *

7. Section 101.103 is amended by revising paragraph (f) to read as follows:

§101.103 Frequency coordination procedures.

* * * * *

(f) *Coordination and information sharing between MVDDS and NGSO FSS licensees in the 12.2 GHz to 12.7 GHz band*. Prior to the construction or addition of an MVDDS transmitting antenna in this frequency band, the MVDDS licensee shall provide notice of intent to construct the proposed antenna site to NGSO FSS licensees operating in the 12.2-12.7 GHz frequency band and maintain an Internet web site of all existing transmitting sites and transmitting antennas that are scheduled for operation within one year including the "in service" dates. In addition to the location of a proposed new transmitting antenna, MVDDS licensees shall provide to the NGSO FSS licensees a technical description of the operating characteristics of the proposed transmission facility. At a minimum, the following information must be included in each notification:

- Name of MVDDS licensee
- Geographic location (including NAD83 coordinates) of proposed MVDDS transmitting antenna
- Maximum EIRP per 24 MHz
- Height above average terrain of the transmitting antenna
- Type of antenna to be utilized
- Main beam azimuth and altitude orientation for the proposed transmitting antenna
- Theoretically modeled antenna radiation pattern
- Type(s) of emissions
- Description of the proposed service area.

If the proposed MVDDS antenna site does not meet the minimum spacing requirements on the date of original notification or on subsequent annual anniversary dates of non-operation as set forth in §101.129 of this part, then the MVDDS licensee shall not construct the proposed transmission facility unless all NGSO FSS licensees having active subscribers within the minimum separation distance agree to a shorter spacing. Nothing in this section shall preclude MVDDS and NGSO FSS licensees from agreeing to accept the siting of new MVDDS transmitting antennas that do no meet the minimum distance set forth in §101.129 of this part. Incumbent point-to-point licensees (those not licensed as MVDDS) facilities are to be operated in the band 12,200-12,700 MHz following the procedures, technical standards, and requirements of § 101.105 of this part in order to protect stations providing Direct Broadcast Satellite Service.

8. Section 101.105 is amended by adding paragraphs (a)(4) and (a)(5) and revising paragraph (d) by adding the phrase "for incumbent non-MVDDS stations" after the words "12,200-12,700 MHz band" to read as follows:

§101.105 Interference protection criteria.

(a) * * *

(4) 12.2-12.7 GHz band.

(i) To accommodate co-primary NGSO FSS earth stations in the 12.2-12.7 GHz band, the PFD of an MVDDS transmitting system must not exceed –135 dBW/m^2 in any 4 kHz band at a reference point at the surface of the earth at a distance greater than 3 kilometers from the MVDDS transmitting antenna.

(ii) To accommodate co-primary Direct Broadcast Satellite Service earth stations, an MVDDS transmitting system must not exceed the EPFD levels specified in paragraph (a)(4)(ii)(B) of this section at any DBS subscriber location in accordance with the procedures listed in § 101.1440 of this part.

(A) Definition of equivalent power flux density: The equivalent power flux density (EPFD) is the power flux density produced at a direct broadcast service (DBS) receive earth station, taking into account shielding effects and the off-axis discrimination of the receiving antenna assumed to be pointing at the appropriate DBS satellite(s) from the transmitting antenna of a multichannel video distribution and data service (MVDDS) transmit station. The EPFD in dBW/m^2 in the reference bandwidth is calculated using the following formula:

$$EPFD = 10 * \log_{10}\left[\frac{P_{out} * G_m(\theta_m, \phi_m) * G_e(\theta_e, \phi_e) * I}{G_{e,\max} * 4 * \pi * d^2}\right]$$

Where:

P_{out} = Total output power of the MVDDS transmitter (watts) into antenna

$G_m(\theta_m,\phi_m)$ = Gain of the MVDDS antenna in the direction of the DBS earth station

$G_e(\theta_e,\phi_e)$ = Gain of the earth station in the direction of the MVDDS antenna

I = Interference scaling factor for the earth station (1 dB for MVDDS transmitters employing the modulation discussed in Section 3.1.5 of the MITRE Report (*i.e.*, a QPSK modulated signal passed through a square-root raised cosine filter). For other modulation and filtering schemes, the interference scaling factor can be measured using the procedures described in Appendix A of the MITRE Report available at http://www.fcc.gov/oet/info/mitrereport/mitrereport_4_01.pdf).

$G_{e,max}$ = Maximum gain of the DBS earth station

d = the distance between the MVDDS transmitting antenna and the DBS earth station (meters)

(B) Regional equivalent power flux density levels:

(1) -168.4 dBW/m^2/4kHz in the Eastern region consisting of the District of Columbia and the following states: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Louisiana, and Florida.

(2) -169.8 dBW/m^2/4kHz in the Midwestern region consisting of the following states: Ohio, Michigan, Indiana, Wisconsin, Illinois, Minnesota, Iowa, Missouri, Arkansas, South Dakota, Nebraska, Kansas, Oklahoma, and Texas

(3) -171.0 dBW/m^2/4kHz in the Southwestern region consisting of the following states: Wyoming, Colorado, New Mexico, Utah, Arizona, Nevada, and California (south of 37^o North Latitude).

(4) -172.1 dBW/m^2/4kHz in the Northwestern region consisting of the following states: Washington, Oregon, California (north of 37^o North Latitude), Idaho, Montana, North Dakota, Alaska, and Hawaii.

(iii) Except for public safety entities, harmful interference protection from MVDDS stations to incumbent point-to-point 12 GHz fixed stations is not required. Incumbent point-to-point private operational fixed 12 GHz stations, except for public safety entities, are required to protect MVDDS stations under the process described in § 101.103(d) of this part.

(5) All stations operating under this part must protect the radio quiet zones as required by § 1.924 of this chapter. Stations authorized by competitive bidding are cautioned that they must receive the appropriate approvals directly from the relevant quiet zone entity prior to operating.

* * * * *

9. Section 101.107 is amended by revising footnote 6 to the Table in paragraph (a) to read as follows:

§ 101.107 Frequency tolerance.

(a) * * *

(6) Applicable to private operations fixed point-to-point microwave stations and stations providing MVDDS service.

* * * * *

10. Section 101.109 is amended by revising the entry for 12,200-12,700 MHz and by adding footnote 8 in the Table at the end of the section to read as follows:

§101.109 Bandwidth.

* * * * *

(c) * * *

Frequency band (MHz)	Maximum authorized bandwidth
* * * * * * *	
12,200 to 12,700 [8]	500 megahertz
* * * * * * *	

* * *

[8] For incumbent private operational fixed point-to-point stations in this band (those not licensed as MVDDS), the maximum bandwidth shall be 20 MHz.

* * * * *

11. Section 101.111 is amended by adding a footnote immediately after the definition of "B" in paragraph (a)(2)(i) to read as follows:

§101.111 Emission limitations.

* * * * *

(a) * * *

(2) * * *

(i) * * *

MVDDS operations in the 12.2-12.7 GHz band shall use 24 megahertz for the value of B in the emission mask equation set forth in this section.

12. Section 101.113 is amended by revising the entry for 12,200-12,700 MHz in the table and adding a new footnote 10 to the table in paragraph (a) to read as follows:

§ 101.113 Transmitter power limitations.

(a) * * *

Frequency Band (MHz)	Maximum allowable EIRP [1, 2]	
	Fixed (dBW)	Mobile (dBW)
* * * * * * *		
12,200 to 12,700 [10]…….	+50	……

Frequency Band (MHz)	Maximum allowable EIRP [1, 2]	
	Fixed (dBW)	Mobile (dBW)
* * * * * * *		

* * *

[10] The EIRP for MVDDS stations is limited to 14.0 dBm per 24 MHz (-16.0 dBW per 24 MHz). Incumbent point-to-point stations may use up to +50 dBW except for low power systems which were licensed under Section 101.147(q) of this part.

* * * * *

13. Section 101.115 is amended by revising footnote 9 to the table in paragraph (c) to read as follows:

§101.115 Directional antennas.

* * * * *

(c) * * *

(9) Except for Temporary-fixed operations in the band 13200-13250 MHz with output powers less than 250 mW and as provided in Section 101.147(q) of this part, and except for antennas in the MVDDS service in the band 12.2-12.7 GHz.

* * * * *

14. Section 101.129 is revised by amending paragraph (b) to read as follows:

§101.129 Transmitter location.

* * * * *

(b) In the 12.2-12.7 GHz band, licensees must not locate MVDDS transmitting antennas within 10 km of any qualifying NGSO FSS receiver unless mutual agreement is obtained between the MVDDS and NGSO FSS licensees. Such agreements must be retained by the licensees and made available for inspection by interested parties upon request.

(1) A qualifying NGSO FSS receiver, for the purposes of this section, is deemed to be one that is in regular use by an NGSO FSS subscriber for normal reception purposes in the 12.2-12.7 GHz band and not one for monitoring or testing purposes. In addition, qualifying receivers must either be in operation on the date or already be under construction and then operating within thirty days of the date that the MVDDS licensee notifies the NGSO FSS licensee of its intent to construct a new MVDDS transmitting antenna at a specified location.

(2) Except as provided in section (b)(3) below, the 10 kilometer spacing requirement for each MVDDS transmitting antenna site shall not apply with respect to NGSO FSS receivers that might be installed or become operational (except for those under construction and operating within thirty days as specified in paragraph (b)(1) of this section) subsequent to the original date that the MVDDS licensee provided notice of its intention to construct a given transmission facility.

(3) In the event that a proposed MVDDS transmitting antenna for which notice has been duly given to the NGSO FSS licensees has not been placed in normal operation within one calendar year of the date of notice, then the MVDDS licensee loses the benefit of the original notice. Upon such anniversary, the MVDDS licensees must re-determine compliance with the minimum 10 kilometer spacing requirement based upon locations of qualifying NGSO FSS receivers on that anniversary date. A new determination of compliance with the spacing requirement shall be made for each succeeding anniversary of non-operation for each proposed MVDDS transmission site or additional antenna. This provision contemplates that failure to commence normal operation at a given MVDDS transmitting antenna site within one year of the date of NGSO FSS notification may require successive relocations of the proposed transmitter site in order to meet the minimum spacing distance as determined on each anniversary of non-operation.

15. Section 101.139 is amended by revising the last sentence of paragraph (a) to read as follows:

§ 101.139 Authorization of transmitters.

(a) * * * Transmitters designed for use in the 31.0-31.3 GHz band and transmitters designed for MVDDS use in the 12,200-12,700 MHz band will be authorized under the verification procedure.

* * * * *

16. Section 101.141 is amended by revising the first sentence of paragraph (a) to read as follows:

§ 101.141 Microwave modulation.

(a) Microwave transmitters employing digital modulation techniques and operating below 19.7 GHz (except for MVDDS stations in the 12,200-12,700 MHz band) must, with appropriate multiplex equipment, comply with the following additional requirements:

* * * * *

17. Section 101.147 is amended by removing the entries for 12,200-12,500 megahertz and 12,500-12,700 MHz, adding a new entry for 12,200-12,700 MHz, and adding a new footnote 31 in the frequency assignment table in paragraph (a), and revising paragraphs (p) and (q) to read as follows:

§ 101.147 Frequency assignments.

(a) * * *

12,200-12,700 MHz (31)

* * *

(31) This frequency band can be used for Multichannel Video Distribution and Data Service (MVDDS) shared with Direct Broadcast Satellite (DBS) Services on a co-primary non-harmful interference basis and on a co-primary basis with NGSO FSS satellite earth stations. Incumbent private operational fixed point-to-point licensees can also use these frequencies on a site by site basis.

* * * * *

(p) 12,000-12700 MHz. The Commission has allocated the 12.2-12.7 GHz band for use by the Direct Broadcast Satellite Service (DBS), the Multichannel Video Distribution and Data Service (MVDDS), and the Non-Geostationary Satellite Orbit Fixed Satellite Service (NGSO FSS). MVDDS shall be licensed on

a non-harmful interference co-primary basis to existing DBS operations and on a co-primary basis with NGSO FSS stations in this band. MVDDS use can be on a common carrier and/or non-common carrier basis and can use channels of any desired bandwidth up to the maximum of 500 MHz provided the EIRP does not exceed 14 dBm per 24 megahertz. Private operational fixed point-to-point microwave stations authorized after September 9, 1983, are licensed on a non-harmful interference basis to DBS and are required to make any and all adjustments necessary to prevent harmful interference to operating domestic DBS receivers. Incumbent public safety licensees shall be afforded protection from MVDDS and NGSO FSS licensees, however all other private operational fixed licensees shall be secondary to DBS, MVDDS and NGSO FSS licensees. As of May 23, 2002, the Commission no longer accepts applications for new licenses for point-to-point private operational fixed stations in this band, however, incumbent licensees and previously filed applicants may file applications for minor modifications and amendments (as defined in § 1.929 of this chapter) thereto, renewals, transfer of control, or assignment of license. Notwithstanding any other provisions, no private operational fixed point-to-point microwave stations are permitted to cause harmful interference to broadcasting-satellite stations of other countries operating in accordance with the Region 2 plan for the Broadcasting-Satellite Service established at the 1983 WARC.

(q) Special provisions for incumbent low power, limited coverage systems in the band segments 12.2-12.7 GHz.

(1) As of May 23, 2002, the Commission no longer accepts applications for new stations in this service and incumbent stations may remain in service provided they do not cause harmful interference to any other primary services licensed in this band as described in paragraph (p) of this section. However, incumbent licensees and previously filed applicants may file applications for minor modifications and amendments (as defined in § 1.929 of this chapter) thereto, renewals, transfer of control, or assignment of license.

(2) Prior to December 8, 2000, notwithstanding any contrary provisions in this part, the frequency pairs 12.220/12.460 GHz, 12.260/12.500 GHz, 12.300/12.540 GHz and 12.340/12.580 GHz, were authorized for low power, limited coverage systems subject to the following provisions:

(1) Maximum equivalent isotropically radiated power (EIRP) shall be 55 dBm;
(2) The rated transmitter output power shall not exceed 0.5 watts;
(3) Frequency tolerance shall be maintained to within 0.01 percent of the assigned frequency;
(4) Maximum beamwidth shall not exceed 4 degrees. However, the sidelobe suppression criteria contained in § 101.115 of this part shall not apply, except that a minimum front-to-back ratio of 38 dB shall apply;
(5) Upon showing of need, a maximum bandwidth of 12 MHz may be authorized per frequency assigned;
(6) Radio systems authorized under the provisions of this section shall have no more than three hops in tandem, except upon showing of need, but in any event the maximum tandem length shall not exceed 40 km (25 miles);
(7) Interfering signals at the receiver antenna terminals of stations authorized under this section shall not exceed -90 dBm and -70 dBm respectively, for co-channel and adjacent channel interfering signals, and
(8) Stations authorized under the provisions of this section shall provide the protection from interference specified in § 101.105 of the part to stations operating in accordance with the provisions of this part.

18. Section 101.601 is amended by adding a sentence at the end of the introductory paragraph to read as follows:

§ 101.601 Eligibility.

* * * This subpart shall not apply to stations offering MVDDS in the 12.2-12.7 GHz band.

* * * * *

19. A new subpart P is added to read as follows:

Subpart P - Multichannel Video Distribution and Data Service Rules for the 12.2-12.7 GHz Band

§ 101.1401 Service areas.

Multichannel Video Distribution and Data Service (MVDDS) is licensed on the basis of Component Economic Areas (CEAs). The 354 CEA service areas are based on the 348 Component Economic Areas delineated by the U.S. Department of Commerce, with the following six FCC-defined service area additions: American Samoa, Guam, Northern Mariana Islands, San Juan (Puerto Rico), Mayagüez/Aguadilla-Ponce (Puerto Rico), and the United States Virgin Islands. Each CEA shall be licensed by auction to one licensee.

§ 101.1403 Broadcast Carriage Requirements.

MVDDS licensees are not required to provide all local television channels to subscribers within its area and thus are not required to comply with the must-carry rules, nor the local signal carriage requirements of the *Rural Local Broadcast Signal Act*. *See* Multichannel Video and Cable Television Service Rules, Subpart D (Carriage of Television Broadcast Signals), 47 C.F.R. §§ 76.51-76.70. If an MVDDS licensee meets the statutory definition of Multiple Video Programming Distributor (MVPD), the retransmission consent requirement of § 325(b)(1) of the Communications Act of 1934, as amended (47 U.S.C. § 325(b)(1)) shall apply to that MVDDS licensee. Any MVDDS licensee that is an MVPD must obtain the prior express authority of a broadcast station before retransmitting that station's signal, subject to the exceptions contained in § 325(b)(2) of the Communications Act of 1934, as amended (47 U.S.C. § 325(b)(2)). Network nonduplication, syndicated exclusivity, sports blackout, and leased access rules shall not be imposed on MVDDS licensees.

§ 101.1405 Channeling plan.

Each license shall have one spectrum block of 500 megahertz per geographic area that can be divided into any size channels. Disaggregation is not allowed.

§ 101.1407 Permissible operations for MVDDS.

MVDDS licensees must use spectrum in the 12.2-12.7 GHz band for any digital fixed non-broadcast service (broadcast services are intended for reception of the general public and not on a subscribership basis) including one-way direct-to-home/office wireless service. Mobile and aeronautical services are not authorized. Two-way services may be provided by using other spectrum or media for the return or upstream path.

§ 101.1409 Treatment of incumbent licensees.

Terrestrial private operational fixed point-to-point licensees in the 12.2-12.7 GHz band which were licensed prior to MVDDS or NGSO FSS satellite stations are incumbent point-to-point stations and are not entitled to protection from harmful interference caused by later MVDDS or NGSO FSS entrants in the 12.2-12.7 GHz band, except for public safety stations which must be protected. MVDDS and NGSO FSS operators have the responsibility of resolving any harmful interference problems that their operations may cause to these public safety incumbent point-to-point operations in the 12.2-12.7 GHz band. Incumbent public safety terrestrial point-to-point licensees may only make minor changes to their stations without losing this protection. This does not relieve current point-to-point licensees of their obligation to protect BSS operations in the subject frequency band. All point-to-point applications, including low-power operations, for new licenses, major amendments to pending applications, or major modifications to existing licenses for the 12.2-12.7 GHz band are no longer accepted except for renewals and changes in ownership. See § 1.929 of this chapter for definitions of major and minor changes.

§ 101.1411 Regulatory status and eligibility.

(a) MVDDS licensees are permitted to provide one-way video programming and data services on a non-common carrier and/or on a common carrier basis. MVDDS is not required to be treated as a common carrier service unless it is providing non-Internet voice and data services through the public switched network.

(b) MVDDS licensees in the 12.2-12.7 GHz band are subject to the requirements set forth in § 101.7 of this part.

(c) Any entity, other than one precluded by § 101.7 and by § 101.1412 of this part, is eligible for authorization to provide MVDDS under this part. Authorization will be granted upon proper application filing in accordance with the Commission's Rules.

§ 101.1412 MVDDS eligibility restrictions for cable operators.

(a) Eligibility for MVDDS license. No cable operator, nor any entity owning an attributable interest in a cable operator, shall have an attributable interest in an MVDDS license if such cable operator's service area significantly overlaps the MVDDS license area, as "signficantly overlaps" is defined in paragraph (e) of this section.

(b) Definition of cable operator. For the purposes of paragraph (a) of this section, the term "cable operator" means a company that is franchised to provide cable service, as defined in 47 C.F.R. § 76.5(ff) of the Commission's rules, in all or part of the MVDDS license area.

(c) For the purpose of this section, the term "MVPD household" refers to a household that subscribes to one or more Multichannel Video Program Distributors (MVPDs), as defined in 47 C.F.R. § 76.1000(e) of the Commission's rules.

(d) Waiver of restriction. Upon completion of the initial award of an MVDDS license, a cable operator may petition for a waiver of the restriction on eligibility based upon a showing that changed circumstances or new evidence indicate that no significant likelihood of substantial competitive harm will result from the operator retaining an attributable interest in the MVDDS license.

(e) Significant overlap with service area. For purposes of paragraph (a) of this section, significant overlap occurs when a cable operator's subscribers in the MVDDS license area make up thirty-five percent or more of the MVPD households in that MVDDS license area.

(f) Definition of attributable interest. For purposes of paragraph (a) of this section, an entity shall be considered to have an attributable interest in a cable operator or MVDDS licensee pursuant to the following criteria:

(1) A controlling interest shall constitute an attributable interest. Controlling interest means majority voting equity ownership, any general partnership interest, or any means of actual working control (including negative control) over the operation of the entity, in whatever manner exercised.

(2) Any general partnership interest in a partnership;

(3) Partnership and similar ownership interests (including limited partnership interests) amounting to 20 percent or more of the total partnership interests, calculated according to both the percentage of equity paid in and the percentage of distribution of profits and losses;

(4) Any stock interest amounting to 20 percent or more of the outstanding voting stock of an entity;

(5) Any voting or non-voting stock interest, amounting to 20 percent or more of the total outstanding stock of an entity;

(6) Stock interests held in trust that exceed the limit set forth in paragraph (f) of this section shall constitute an attributable interest of any person who holds or shares the power to vote such stock, of any person who has the sole power to sell such stock, and, in the case of stock held in trust, of any person who has the right to revoke the trust at will or to replace the trustee at will. If the trustee has a familial, personal, or extra-trust business relationship to the grantor or the beneficiary, the stock interests held in trust shall constitute an attributable interest of such grantor or beneficiary, as appropriate.

(7) Debt and interests such as warrants and convertible debentures, options, or other interests (except non-voting stock) with rights of conversion to voting interests shall not constitute attributable interests unless and until conversion is effected.

(8) An interest in a Limited Liability Company (LLC) or Registered Limited Liability Partnership (RLLP) amounting to 20 percent or more, shall constitute an attributable interest of each such limited partner.

(9) Officers and directors of a cable operator, an MVDDS licensee, or an entity that controls such cable operator or MVDDS licensee, shall be considered to have an attributable interest in such cable operator or MVDDS licensee.

(10) Ownership interests that are held indirectly by any party through one or more intervening corporations or other entities shall be determined by successive multiplication of the ownership percentages for each link in the vertical ownership chain and application of the relevant attribution benchmark to the resulting product, except that, if the ownership for any interest in any link in the chain exceeds 50 percent or represents actual control, it shall be treated as if it were a 100 percent interest.

(11) Any person who manages the operations of a cable operator or an MVDDS licensee pursuant to a management agreement shall be considered to have an attributable interest in such cable operator or MVDDS licensee, if such person or its affiliate has authority to make decisions or otherwise engage in practices or activities that determine, or significantly influence:

(i) The nature or types of services offered by such entity;

(ii) The terms upon which such services are offered; or

(iii) The prices charged for such services.

(12) Any person or its affiliate who enters into a joint marketing arrangement with a cable operator, an MVDDS licensee, or an affiliate of such entity, shall be considered to have an attributable interest in such cable operator, MVDDS licensee, or affiliate, if such person or its affiliate has authority to make decisions or otherwise engage in practices or activities that determine:

(i) The nature or types of services offered by such entity;

(ii) The terms upon which such services are offered; or

(iii) The prices charged for such services.

(g) Divestiture. Any cable operator, or any entity owning an attributable interest in a cable operator, that would otherwise be barred from acquiring an attributable interest in an MVDDS license by the eligibility restriction in paragraph (a) of this section, may be a party to an MVDDS application (*i.e.*, have an attributable interest in the applicant), and such applicant will be eligible for an MVDDS license, pursuant to the divestiture procedures set forth in paragraphs (g)(1) through (g)(6) of this section.

(1) Divestiture shall be limited to the following prescribed means:

(i) An MVDDS applicant holding an attributable interest in a cable operator may divest such interest in the cable company.

(ii) Other MVDDS applicants disqualified under paragraph (a), will be permitted to:

(A) Partition and divest that portion of the existing service area that causes it to exceed the overlap restriction in paragraph (a) of this section, subject to applicable regulations of state and local governments; or

(B) Partition and divest that portion of the MVDDS geographic service area that exceeds the overlap restriction in paragraph (a) of this section.

(iii) Divestiture may be to an interim trustee if a buyer has not been secured in the required period of time, as long as the MVDDS applicant has no interest in or control of the trustee and the trustee may dispose of the license as it sees fit.

(2) The MVDDS applicant shall certify as an exhibit to its short form application that it and all parties to the application will come into compliance with paragraph (a).

(3) If such MVDDS applicant is a successful bidder in an auction, it must submit with its long-form application a signed statement describing its efforts to date and future plans to come into compliance with the eligibility restrictions in paragraph (a) of this section.

(4) If such an MVDDS applicant is otherwise qualified, its application will be granted subject to a condition that the applicant shall come into compliance with the eligibility restrictions in paragraph (a), within ninety (90) days of final grant of such MVDDS license.

(5) An MVDDS applicant will be considered to have come into compliance with paragraph (a) of this section if:

(i) In the case of the divestiture of a portion of an MVDDS license service area, it has successfully completed the assignment or transfer of control of the requisite portion of the MVDDS geographic service area.

(ii) In all other cases, it has submitted to the Commission a signed certification that it has come into compliance with paragraph (a) of this section by the following means, identified in such certification:

(A) By divestiture of a disqualifying interest in a cable operator, identified in terms of the interest owned, the owner of such interest (and, if such owner is not the applicant itself, the relationship of the owner to the applicant), the name of the party to whom such interest has been divested, and the date such divestiture was executed; or

(B) By divestiture of the requisite portion of the cable operator's existing service area, identified in terms of the name of the party to whom such interest has been divested, the date such divestiture was executed, the name of any regulatory agency that must approve such divestiture, and the date on which an application was filed for this purpose with the regulatory agency.

(6) If no such certification or application is tendered to the Commission within ninety (90) days of final grant of the initial license, the Commission may cancel or rescind the license automatically, shall retain all monies paid to the Commission, and, based on the facts presented, shall take any other action it may deem appropriate.

Note 1 to paragraph (f)(6): Waivers of § 101.1014(f)(6) may be granted upon an affirmative showing:

(1) That the interest holder has less than a fifty percent voting interest in the licensee and there is an unaffiliated single holder of a fifty percent or greater voting interest;

(2) That the interest holder is not likely to affect the local market in an anticompetitive manner;

(3) That the interest holder is not involved in the operations of the licensee and does not have the ability to influence the licensee on a regular basis; and

(4) That grant of a waiver is in the public interest because the benefits to the public of common ownership outweigh any potential anticompetitive harm to the market.

§ 101.1413 License term and renewal expectancy.

(a) The MVDDS license term is ten years, beginning on the date of the initial authorization grant.

(b) Application of a renewal expectancy is based on the substantial service requirement which is defined as a service that is sound, favorable, and substantially above a level of mediocre service which might minimally warrant renewal. At the end of the license term, the Commission will consider factors such as:

(1) whether the licensee's operations service niche markets or focus on serving populations outside of areas serviced by other MVDDS licensees;

(2) whether the licensee's operations serve populations with limited access to telecommunications services; and

(3) a demonstration of service to a significant portion of the population or land area of the licensed area.

(c) The renewal application of an MVDDS licensee must include the following showings in order to claim a renewal expectancy:

(1) a coverage map depicting the served and unserved areas;

(2) a corresponding description of current service in terms of geographic coverage and population served or transmitter locations in the served areas; and

(3) copies of any Commission Orders finding the licensee to have violated the Communications Act or any
Commission rule or policy and a list of any pending proceedings that relate to any matter described by the requirements for the renewal expectancy.

§ 101.1415 Partitioning and Disaggregation.

(a) MVDDS licensees are permitted to partition licensed geographic areas along county borders (Parishes in Louisiana or Territories in Alaska). Disaggregation will not be permitted by MVDDS licensees in the 12.2-12.7 GHz band. "Partitioning" is the assignment of geographic portions of a license along geopolitical or other boundaries. "Disaggregation" is the assignment of discrete portions or "blocks" of spectrum licensed to a geographic licensee or qualifying entity.

(b) *Eligibility*.

(1) Parties seeking approval for partitioning shall request from the Commission an authorization for partial assignment of a license pursuant to § 1.948 of this chapter.

(2) MVDDS licensees may apply to the Commission to partition their licensed geographic service areas to eligible entities and are free to partition their licensed spectrum at any time following the grant of a license.

(3) Any existing frequency coordination agreements shall convey with the assignment of the geographic area or spectrum, and shall remain in effect for the term of the agreement unless new agreements are reached.

(c) *Technical standards*.

(1) Partitioning. In the case of partitioning, applicants and licensees must file FCC Form 603 pursuant to § 1.948 of this chapter and list the partitioned service area on a schedule to the application.

(2) The geographic coordinates must be specified in degrees, minutes, and seconds to the nearest second of latitude and longitude and must be based upon the 1983 North American Datum (NAD83).

(d) *Unjust enrichment*. 12 GHz licensees that received a bidding credit and partition their licenses to entities not meeting the eligibility standards for such a bidding credit, will be subject to the provisions concerning unjust enrichment as set forth in § 1.2111 of this chapter.

(e) *License term*. The MVDDS license term is ten years, beginning on the date of the initial authorization grant. The license term for a partitioned license area shall be the remainder of the original licensee's license term as provided for in § 101.1413 of this part.

(f) *Construction requirements*. Applications requesting approval for partitioning must include a certification by each party stating that one or both parties will satisfy the construction requirement set forth in § 101.1413 of this part. Failure by a party to meet its respective construction requirement will result in the automatic cancellation of its license without further Commission action.

§ 101.1417 Annual report.

Each MVDDS licensee shall file with the Public Safety & Private Wireless Division of the Wireless Telecommunications Bureau of the Commission two copies of a report by March 1 of each year for the preceding calendar year. This report must include the following:

(1) name and address of licensee;

(2) station(s) call letters and primary geographic service area(s); and

(3) the following statistical information for the licensee's station (and each channel thereof):

(i) the total number of separate subscribers served during the calendar year;

(ii) the total hours of transmission service rendered during the calendar year to all subscribers;

(iii) the total hours of transmission service rendered during the calendar year involving the transmission of local broadcast signals; and

(iv) a list of each period of time during the calendar year in which the station rendered no service as authorized, if the time period was a consecutive period longer than 48 hours, and

§ 101.1421 Coordination of adjacent area MVDDS stations and incumbent public safety POFS stations.

(a) MVDDS licensees in the 12.2-12.7 GHz band are required to develop sharing and protection agreements based on the design and architecture of their systems, in order to ensure that no harmful interference occurs between adjacent geographical area licensees. MVDDS licensees shall:

(1) Engineer systems to be reasonably compatible with adjacent and co-channel operations in the adjacent areas on all its frequencies; and

(2) Cooperate fully and in good faith to resolve interference and transmission problems that are present on adjacent and co-channel operations in adjacent areas.

(b) Harmful interference to public safety stations, co-channel MVDDS stations operating in adjacent geographic areas, and stations operating on adjacent channels to MVDDS stations is prohibited. In areas where the CEAs are in close proximity, careful consideration should be given to power requirements and to the location, height, and radiation pattern of the transmitting and receiving antennas. Licensees are expected to cooperate fully in attempting to resolve problems of potential interference before bringing the matter to the attention of the Commission.

(c) Licensees shall coordinate their facilities whenever the facilities have optical line-of-sight into other licensees' areas or are within the same geographic area. Licensees are encouraged to develop operational

agreements with relevant licensees in the adjacent geographic areas. Incumbent public safety POFS licensee(s) shall retain exclusive rights to its channel(s) within the relevant geographical areas and must be protected in accordance with the procedures in § 101.103 of this part. A list of public safety incumbents is attached as Appendix I to the Memorandum Opinion and Order and Second Report and Order, Docket 98-206 released May 23, 2002. Please check with the Commission for any updates to that list.

§ 101.1423 Canadian and Mexican coordination.

Pursuant to § 2.301 of this chapter, MVDDS systems in the United States within 56 km (35 miles) of the Canadian and Mexican border will be granted conditional licenses, until final international agreements are approved. These systems may not cause harmful interference to stations in Canada or Mexico. MVDDS stations must comply with the procedures outlined under § 101.147(p) of this part and §§ 1.928(f)(1) and (2) of this chapter until final international agreements concerning MVDDS are signed. Section 1.928(f) of this chapter states that transmitting antennas can be located as close as five miles (eight kilometers) of the border if they point within a sector of 160 degrees away from the border, and as close as thirty-five miles (fifty-six kilometers) of the border if they point within a sector of 200 degrees toward the border without coordination with Canada. MVDDS licensees shall apply this method near the Canadian and Mexican borders. No stations are allowed within 5 miles of the borders.

§ 101.1425 RF safety.

MVDDS stations in the 12.2-12.7 GHz frequency band do not operate with output powers that equal or exceed 1640 watts EIRP and therefore will not be subject to the routine environmental evaluation rules for radiation hazards, as set forth in § 1.1307 of this chapter.

§ 101.1427 MVDDS licenses subject to competitive bidding.

Mutually exclusive initial applications for MVDDS licenses in the 12.2-12.7 GHz band are subject to competitive bidding. The general competitive bidding procedures set forth in Part 1, Subpart Q of this chapter will apply unless otherwise provided in this subpart.

§ 101.1429 Designated entities.

(a*) Eligibility for small business provisions.*

(1) A very small business is an entity that, together with its controlling interests and affiliates, has average annual gross revenues not exceeding $3 million for the preceding three years.

(2) A small business is an entity that, together with its controlling interests and affiliates, has average annual gross revenues not exceeding $15 million for the preceding three years.

(3) An entrepreneur is an entity that, together with its controlling interests and affiliates, has average annual gross revenues not exceeding $40 million for the preceding three years.

(4) A consortium of very small businesses is a conglomerate organization formed as a joint venture between or among mutually independent business firms, each of which individually satisfies the definition in paragraph (a)(1) of this section. A consortium of small businesses is a conglomerate organization formed as a joint venture between or among mutually independent business firms, each of which individually satisfies the definition in paragraph (a)(2) of this section. A consortium of entrepreneurs is a conglomerate organization formed as a joint venture between or among mutually independent business firms, each of which individually satisfies the definition in paragraph (a)(3) of this section.

(5) For purposes of determining whether an entity meets any of the definitions set forth in paragraphs (a)(1), (a)(2), (a)(3), or (a)(4) of this section, the gross revenues of the entity, its controlling interests and affiliates shall be considered in the manner set forth in §§ 1.2110(b) and (c) of this chapter.

(b) *Bidding credits*. A winning bidder that qualifies as a very small business or a consortium of very small businesses as defined in this section may use the bidding credit specified in § 1.2110(f)(2)(i) of this chapter. A winning bidder that qualifies as a small business or a consortium of small businesses as defined in this section may use the bidding credit specified in § 1.2110(f)(2)(ii) of this chapter. A winning bidder that qualifies as an entrepreneur or a consortium of entrepreneurs as defined in this section may use the bidding credit specified in § 1.2110(f)(2)(iii) of this chapter.

§ 101.1440 MVDDS protection of DBS.

(a) An MVDDS licensee shall not begin operation unless it can ensure that the EPFD from its transmitting antenna at all DBS customers of record locations is below the values listed for the appropriate region in Section 101.105(a)(4)(ii)(B) of this part. Alternatively, MVDDS licensees may obtain a signed written agreement from DBS customers of record stating that they are aware of and agree to their DBS system receiving MVDDS signal levels in excess of the appropriate EFPD limits specified in § 101.105(a)(4)(ii)(B) of this part. DBS customers of record are those who had their DBS receive antennas installed prior to or within the 30 day period after notification to the DBS operator by the MVDDS licensee of the proposed MVDDS transmitting antenna site.

(b) MVDDS licensees are required to conduct a survey of the area around its proposed transmitting antenna site to determine the location of all DBS customers of record that may potentially be affected by the introduction of its MVDDS service. The MVDDS licensee must assess whether the signal levels from its system, under its deployment plans, would exceed the appropriate EPFD levels in § 101.105(a)(4)(ii)(B) of this part at any DBS customer of record location. Using EPFD calculations, terrain and building structure characteristics, and the survey results, an MVDDS licensee must make a determination of whether its signal level(s) will exceed the EPFD limit at any DBS customer of record sites. To assist in making this determination, the MVDDS provider can use the EPFD contour model developed by the Commission and described in Appendix J of the *Memorandum Opinion and Order and Second Report and Order,* ET Docket 98-206 or on the OET website at http://www.fcc.gov/oet/dockets/et98-206.

(c) If the MVDDS licensee determines that its signal level will exceed the EPFD limit at any DBS customer site, it shall take whatever steps are necessary, up to and including finding a new transmit site, to ensure that the EPFD limit will not be exceeded at any DBS customer location.

(d) Coordination between MVDDS and DBS licensees.

(1) At least 90 days prior to the planned date of MVDDS commencement of operations, the MVDDS licensee shall provide the following information to the DBS licensee(s):

(i) Geographic location (including NAD 83 coordinates) of its proposed station location;

(ii) Maximum EIRP of each transmitting antenna system;

(iii) Height above ground level for each transmitting antenna;

(iv) Antenna type along with main beam azimuth and altitude orientation information, and description of the antenna radiation pattern;

(v) Description of the proposed service area; and

(v) Survey results along with a technical description of how it determined compliance with the appropriate EPFD level at all DBS subscriber locations.

(2) No later than forty-five days after receipt of the MVDDS system information in (d)(1), the DBS licensee(s) shall provide the MVDDS licensee with a list of any new DBS customer locations that have been installed in the 30-day period following the MVDDS notification. In addition, the DBS licensee(s) could indicate agreement with the MVDDS licensee's technical assessment, or identify DBS customer locations that the MVDDS licensee failed to consider or DBS customer locations where they believe the MVDDS licensee erred in its analysis and could exceed the prescribed EPFD limit.

(3) Prior to commencement of operation, the MVDDS licensee must take into account any new DBS customers or other relevant information provided by DBS licensees in response to the notification in (d)(1).

(e) Beginning thirty days after the DBS licensees are notified of a potential MVDDS site under (d)(1), the DBS licensees have the responsibility of ensuring that all future installed DBS receive antennas on its system are located in such a way as to avoid the MVDDS signal. These later installed receive antennas shall have no further rights of complaint against the notified MVDDS transmitting antenna(s).

(f) In the event of either an increase in the EPFD contour in any direction or a major modification as defined in § 1.929 of this chapter, such as the addition of an antenna, to an MVDDS station, the procedures of paragraphs (d) and (e) of this section and rights of complaint begin anew. Exceptions to this are renewal, transfer of control, and assignment of license applications.

(g) Interference complaints. The MVDDS licensee must satisfy all complaints of interference to DBS customers of record which are received during a one year period after commencement of operation of the transmitting facility. Specifically, the MVDDS licensee must correct interference caused to a DBS customer of record or cease operation if it is demonstrated that the DBS customer is receiving harmful interference from the MVDDS system or that the MVDSS signal exceeds the permitted EPFD level at the DBS customer location.

APPENDIX E: FINAL REGULATORY FLEXIBILITY ANALYSIS

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),[644] an Initial Regulatory Flexibility Analysis (IRFA) was incorporated in the 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, *First Report and Order and Further Notice of Proposed Rule Making*.[645] The Commission sought written public comment on the proposals in the *Further Notice* including comment on the IRFA. This Final Regulatory Flexibility Analysis (FRFA) examines the possible significant economic impact of our actions on small entities and conforms to the RFA.[646]

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

2. By this action, Multichannel Video Distribution and Data Service (MVDDS) providers will share the 12.2-12.7 GHz band with new NGSO FSS operators on a co-primary basis and on a non-harmful interference basis with incumbent direct broadcast satellite (DBS) providers. The objective of this *Second Report and Order* is to adopt licensing, service and technical rules for the MVDDS. Specifically, we seek: (1) to accommodate the introduction of innovative services; and (2) to facilitate the sharing and efficient use of spectrum. Furthermore, the rules adopted in this *Second Report and Order* are designed to implement Congress's goal of giving small businesses the opportunity to participate in the provision of spectrum-based services in accordance with Section 309(j) of the Communications Act of 1934, as amended.[647] Thus, we believe that this service will facilitate the delivery of communications services, such as video and broadband services, to various populations including those that are deemed to be unserved and/or underserved.

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

3. Although we did not receive any comments in direct response to the IRFA, commenters suggested approaches that would foster participation in the MVDDS service by smaller entities. For instance, several commenters favored allowing MVDDS licensees to partition their geographic service areas into smaller areas.[648] In addition, the Rural Telecommunications Group (RTG) suggested the use of smaller service areas – Metropolitan Statistical Areas (MSAs), Rural Service Areas (RSAs) or Component Economic Areas (CEAs) – to facilitate opportunities for small and rural carriers to obtain MVDDS licenses and to ensure that rural regions benefit from the 12.2-12.7 GHz band.[649] Likewise,

[644] *See* 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. § 601 *et. seq*., 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).

[645] *First R&O and Further Notice*, 16 FCC Rcd at 4269 (2001).

[646] *See* 5 U.S.C. § 604.

[647] 47 U.S.C. §§ 257, 309(j)(Communications Act).

[648] *See, e.g.*, MDS America Reply Comments at 14; Northpoint Comments at 33; Pegasus Comments at 19; Satellite Receivers Ltd. Comments at 4.

[649] *See* RTG Reply Comments at 2-3.

Pegasus supported licensing MVDDS on the basis of basic trading areas (BTAs) and major trading areas (MTAs) because the population served would be smaller and the cost of licenses likely lower, thus providing greater economic opportunity for a wider variety of applicants.[650] Thus, the need to establish opportunities for smaller entities to have access to MVDDS spectrum was a sentiment expressed by various commenters in the MVDDS rule making proceeding.

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

4. The RFA directs agencies to provide a description of, and, where feasible an estimate of, the number of small entities that may be affected by the rules adopted herein.[651] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[652] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[653] A small business concern is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA).[654]

5. *Small Multichannel Video Programming Distributors (MVPDs)*. SBA has developed a definition of small entities for cable, which includes all such companies generating $11 million or less in annual receipts.[655] This definition includes cable system operators and DBS services. According to the Census Bureau data from 1992, there were 1,758 total cable and other pay television services and 1,423 had less than $11 million in revenue.[656] We address below each service individually to provide a more precise estimate of small entities.

Cable Services. The Commission has developed, with SBA's approval, our own definition of a small cable system operator for the purposes of rate regulation. Under the Commission's rules, a "small cable company" is one serving 400,000 or fewer subscribers nationwide.[657] We last estimated that there were 1439 cable operators that qualified as small cable companies.[658] Since then, some of those companies may have grown to serve over 400,000 subscribers, and others may have been involved in transactions that caused them to be combined with other cable operators. Consequently, using this definition, we estimate that there are fewer than 1439 small

[650] *See* Pegasus Comments at 14-15; Pegasus Reply Comments at 15.

[651] 5 U.S.C. § 603(b)(3).

[652] 5 U.S.C. § 601(6).

[653] 5 U.S.C. § 601(3) (incorporating by reference the definition of "small business concern" in 15 U.S.C. § 632). Pursuant to the RFA, the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register." 5 U.S.C. § 601(3).

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

[655] 13 C.F.R. § 121.201 (Cable Networks (NAICS 513210) Cable and Other Program Distribution (NAICS 513220)).

[656] *Id.* (U.S. Department of Commerce, Bureau of the Census, Industry and Enterprise Receipts Size Report, Table) (Bureau of the Census data under contract to the Office of Advocacy of the SBA).

[657] 47 C.F.R. § 76.901(e). The Commission developed this definition based on its determinations that a small cable system operator is one with annual revenues of $100 million or less. *Sixth Report and Order and Eleventh Order on Reconsideration*, MM Docket Nos. 92-266 and 93-215, 10 FCC Rcd 7393 (1995).

[658] Paul Kagan Associates, Inc., Cable TV Investor, Feb. 29, 1996 (based on figures for Dec. 30, 1995).

entity cable system operators that may be affected by the decisions and rules adopted in this *Second Report and Order*.

The Communications Act defines a small cable system operator as "a cable operator that, directly or through an affiliate, serves in the aggregate fewer than one percent of all subscribers in the United States and is not affiliated with any entity or entities whose gross annual revenues in the aggregate exceed $250,000,000."[659] The Commission has determined that there are 61,700,000 subscribers in the United States. Therefore, an operator serving fewer than 617,000 subscribers shall be deemed a small operator under the Communications Act definition, if its annual revenues, when combined with the total annual revenues of all of its affiliates, do not exceed $250 million in the aggregate. Based on available data, we find that the number of cable operators serving 617,000 subscribers or less totals approximately 1450.[660] Although it seems certain that some of these cable system operators are affiliated with entities whose gross annual revenues exceed $250,000,000, we are unable at this time to estimate with greater precision the number of cable system operators that would qualify as small cable operators under the definition in the Communications Act.

DBS Service. Because DBS provides subscription services, DBS falls within the SBA definition of Cable Networks (NAIC 513210) and Cable and Other Program Distribution (NAIC 513220). This definition provides that a small entity is expressed as one with $11 million or less in annual receipts. The operational licensees of DBS services in the United States are governed by Part 100 of the Commission's Rules. The Commission, however, does not collect annual revenue data for DBS and, therefore, is unable to ascertain the number of small DBS licensees meeting this definition that could be impacted by these rules. DBS service requires a great investment of capital for operation, and we acknowledge that there are entrants in this field that may not yet have generated $11 million in annual receipts, and therefore may be categorized as a small business by the SBA, if independently owned and operated.

6. *Auxiliary, Special Broadcast and other program distribution services*. This service involves a variety of transmitters, generally used to relay broadcast programming to the public (through translator and booster stations) or within the program distribution chain (from a remote news gathering unit back to the station). The Commission has not developed a definition of small entities applicable to broadcast auxiliary licensees. Therefore, the applicable definition of small entity is the definition under the SBA rules applicable to radio networks (NAICS 513111), radio stations (NAICS 513112), and television broadcasting (NAICS 513120). These definitions provide, respectively, that a small entity is one with either $5 million or less in annual receipts or $10.5 million in annual receipts. The numbers of these stations are very small. The Commission does not collect financial information on these auxiliary broadcast facilities. We believe, however, that most, if not all, of these auxiliary facilities could be classified as small businesses by themselves. We also recognize that most of these types of services are owned by a parent station which, in some cases, would be covered by the revenue definition of small business entity discussed above. These stations would likely have annual revenues that exceed the SBA maximum to be designated as a small business (as noted, either $5 million for a radio station or $10.5 million for a TV station). Furthermore, they do not meet the SBA's definition of a "small business concern" because they are not independently owned and operated.

7. *Private Operational Fixed Service*. Incumbent microwave services in the 12.2-12.7 GHz bands include common carrier, private operational fixed (POF), and BAS services. Presently, there are approximately 22,015 common carrier licensees, and approximately 61,670 POF licensees and broadcast auxiliary radio licensees in the microwave service. Inasmuch as the Commission has not yet defined a small business with respect to these incumbent microwave services, we will utilize the

[659] 47 U.S.C. § 543(m)(2).

[660] Paul Kagan Associates, Inc., Cable TV Investor, Feb. 29, 1996 (based on figures for Dec. 30, 1995).

SBA's definition applicable to cellular and other wireless telecommunications companies (NAICS 513322); *i.e.*, an entity with no more than 1500 persons. We estimate, for this purpose, that all of the Fixed Microwave licensees (excluding broadcast auxiliary licensees) would qualify as small entities under the SBA definition for radiotelephone companies.

8. The rules set forth in this *Second Report and Order* will affect all entities that intend to provide terrestrial MVDDS operations in the 12.2-12.7 GHz band. In this *Second Report and Order*, we state that licensees are permitted to use MVDDS spectrum for, among other things, fixed one-way direct-to-home/business video and data services.

9. Additionally, in the *Second Report and Order*, we adopt definitions for three tiers of small businesses for the purpose of providing bidding credits to small entities. Specifically, we define the three tiers of small businesses as follows: an "entrepreneur" is an entity with average annual gross revenues not exceeding $40 million for the preceding three years; a "small business" is an entity with average annual gross revenues not exceeding $15 million for the preceding three years; and a "very small business" is an entity with average annual gross revenues not exceeding $3 million for the preceding three years.[661] We will not know how many auction participants or licensees will qualify under these definitions as entrepreneurs, small businesses, or very small businesses until an auction is held. However upon reviewing the record in the MVDDS proceeding, we assume that, for purposes of our evaluations and conclusions in the FRFA, a number of the prospective licensees will be entrepreneurs, small businesses, or very small businesses under our adopted definitions.

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

10. Applicants for MVDDS licenses are required to submit an FCC Form 175 short-form application prior to the auction, and auction winners will be required to file an FCC Form 601 license application. Additionally, we will apply the Part 101 rules governing reporting requirements to MVDDS systems. Specifically, each MVDDS licensee is required to file with the Commission two copies of a report no later than March 1 of each year for the preceding calendar year, which must include the following: (a) name and address of licensee; (b) station(s) call letters and primary geographic service area(s); and (c) the following statistical information for the licensee's station (and each channel thereof): (i) the total number of separate subscribers served during the calendar year; (ii) the total hours of transmission service rendered during the calendar year to all subscribers; (iii) the total hours of transmission service rendered during the calendar year involving the transmission of local broadcast signals; and (iv) a list of each period of time during the calendar year in which the station rendered no service as authorized, if the time period was a consecutive period longer than forty-eight hours. In addition, we require each MVDDS licensee to file actual data on cases of harmful interference to DBS operations and measures taken to alleviate such interference. We believe that the information compiled in this report will assist us in analyzing trends and competition in the marketplace.

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

[661] These definitions have been approved by the U.S. Small Business Administration. *See* Letter to Margaret W. Weiner, Deputy Chief, Auctions and Industry Analysis Division, Wireless Telecommunications Bureau, from Aida Alvarez, Administrator, U.S. Small Business Administration (Sept. 14, 2000).

11. The RFA requires an agency to describe any significant alternatives that it has considered in reaching its approach, which may include the following four alternatives: (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.

12. We have taken significant steps to reduce burdens on small entities wherever possible. To provide opportunities for small entities to participate in any auction that is held, we provide bidding credits for entrepreneurs, small businesses, and very small businesses as defined in Section C of this FRFA. The bidding credits adopted are 15 percent for entrepreneurs, 25 percent for small businesses, and 35 percent for very small businesses. Our decision to adopt CEAs as service areas for MVDDS and to permit the partitioning of these service areas is also intended to provide small entities an opportunity to acquire licenses. There are currently 354 CEAs and we believe that the use of these service areas will encourage smaller business entities to participate in the MVDDS auction. Participation in the MVDDS auction by smaller business entities would foster the buildout of services to local and/or rural areas which are traditionally deemed underserved or unserved. The regulatory burdens we have retained are necessary in order to ensure that the public receives the benefits of innovative new services in a prompt and efficient manner. We will continue to examine alternatives in the future with the objectives of eliminating unnecessary regulations and minimizing any significant economic impact on small entities.

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

13. None.

Report to Congress. The Commission will send a copy of the *Second Report and Order*, including this FRFA, in a report to be sent to Congress pursuant to the Congressional Review Act.[662] In addition, the Commission will send a copy of the *Second Report and Order*, including this FRFA, to the Chief Counsel for Advocacy of the Small Business Administration. A copy of the *Second Report and Order* and FRFA (or summaries thereof) will also be published in the Federal Register.[663]

[662] *See* 5 U.S.C. § 801(a)(1)(A).

[663] *See* 5 U.S.C. § 604(b).

APPENDIX F: A METHOD OF CONVERTING PERCENTAGE OF UNAVAILABLE TIME INTO A CORREPSONDING EQUIVALENT POWER FLUX DENSITY

This appendix presents a method for calculating the equivalent power flux density (EPFD) that an MVDDS terrestrial station must meet at a DBS subscriber location to limit DBS outage time to a specified amount.

The availability of a satellite space-to-Earth link is defined as the total amount of time that the satellite service is available to the user without disruption. Conversely, the unavailability of that same link is the total time during which the user is without service (outage). Generally, availability and unavailability are expressed in terms of percentage of time of an average year (8766 hours) or the worst month in an average year.[664] These two variables are complementary and always sum to 100%. For example if a satellite system has an availability of 99.7%, its unavailability is 0.3% which equates to total outage time of 26.3 hours averaged over a year.

In a shared environment (satellite and terrestrial service), the total unavailability can be attributed to two sources: natural propagation phenomenon such as precipitation (*e.g.*, rain) in the space-to-earth path and external radio interference. In the frequency bands used by DBS for downlink (12.2-12.7 GHz), the predominant propagation impairment is rain attenuation in the space-to-earth slant path.[665] The amount of service outage caused by rain can be estimated using the prediction procedures of ITU-R Recommendation P.618-6.[666] This rain attenuation model predicts, for a given geographic area, the average service outage time over an average year for a specific level of precipitation attenuation along the space-to-earth slant path.

To determine the EPFD that an MVDDS system must meet, we first establish the amount of outage time of the DBS space-to-earth link that is caused by precipitation only. The outage time is directly dependent on the link margin of the space-to-earth link, which is calculated from the system's link power budget. Link margin is the amount of power received at the earth station receiver above its operating threshold that is designed into the satellite link to overcome the effects of rain and other impediments. During rain, the satellite link is affected in two ways: the carrier signal strength is attenuated due to rain and the rain causes an increase in the system's noise temperature. If the rain attenuation and earth station G/T (gain / system noise temperature) degradation cause a reduction to the carrier-to-noise (C/N) power that exceeds the available link margin, the satellite link will experience an outage. The amount of attenuation due to rain that causes an outage is referred to as the rain margin.

Once the link margin is known, one can proceed to determine the rain margin. This is accomplished by adding a rain attenuation term to the equation used to find the clear-sky carrier-to-noise ratio to instead find a rainy-sky carrier-to-noise ratio. Additionally, the G/T must be recalculated to account for the increase in atmospheric noise due to the rain. Thus, the G/T will be reduced during a rain event and the rain margin will be less than the link margin.

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[664] A method for converting annual statistics to worst-month statistics is contained in Recommendation ITU-R P.841-1, *Conversion Of Annual Statistics To Worst-Month Statistics*.

[665] In this analysis, we omitted the uplink (earth-to-space) outage contribution.

[666] ITU-R Recommendation P.618-6 "Propagation Data and Prediction Method required for the Design of Earth-Space Telecommunication Systems" provides a procedure to estimate the long-term statistics of the space-to-earth path precipitation attenuation and the associated percentage of outage time.

Once the rain margin is determined, the expected outage time of a satellite link in an average year or in the worst month can be computed using the prediction method contained in ITU-R Recommendation P.618-6.

Now that the percentage of outage time due solely to rain is known, we can reverse the procedure to determine the minimum C/I that a terrestrial system must maintain to effect a specific amount of additional outage time on the satellite system. First, the additional outage time must be determined, either as a percentage of additional outage time or a number of minutes per time period. This additional outage time can then be added to the outage time due to rain only to find the 'equivalent unavailability.' For example, if a satellite space-to-earth link has an unavailability of 0.3% and the minimum C/I for the terrestrial system to cause no more than an additional ten percent outage is to be determined, the equivalent unavailability would be 0.33% (0.3 * 1.1). Using the equivalent unavailability, the ITU rain model can be used to find the corresponding 'equivalent rain margin.' That is, the ITU model can be used to find the amount of attenuation associated with the increased outage time. This change in attenuation is attributed to interference from the terrestrial system.

The C/I for the terrestrial system can now be found by modifying the methodology used to determine the satellite link budget. The terrestrial system is factored into the link budget by adding a term representing its C/I. By using the equivalent rain margin in the link budget, we find an 'equivalent link margin.' We can then find the C/I of the terrestrial system that causes the reduction of the equivalent link margin to be zero. This is the minimum C/I that the terrestrial system must maintain to cause no more than the amount of additional outage time chosen.

The minimum C/I for the terrestrial system is then used to determine the EPFD level that must be met. This is accomplished by first determining the power flux density (PFD) received at the DBS earth station from the satellite. From the PFD, the C/I is subtracted and the gain of the DBS earth station antenna in the direction of the terrestrial station is added. This results in the EPFD. Because the EPFD is dependent on the DBS earth station gain in the direction of the terrestrial transmitting antenna, the EPFD varies with both relative distance and orientation of the terrestrial transmitting antenna and the DBS earth station. A method for plotting EPFDs is presented in Appendix J.

It is important to note that the above methodology results in the rainy-sky C/I for the terrestrial service interference, which would produce the additional outage time at the DBS earth station. This represents the worst case scenario in which the space-to-earth signal from the satellite is attenuated due to rain, but the terrestrial system is not. In many cases, however, the DBS signal and the terrestrial system will both be attenuated due to rain. Thus, less DBS outage will occur than predicted by this model.

An example of our model implementing the process described is shown below. This example, using MathCAD, calculates the EPFD that would be associated with an MVDDS transmitting antenna when a DBS receive dish is pointing towards the satellite 119^{o} west longitude.

Calculation of EPFD for Washington,

Functions

$dB(x) := 10 \cdot \log(x)$ $real(x) := 10^{\left(\frac{x}{10}\right)}$ $rain\_temp(loss) := 280\left[1 - 10^{\left(\frac{-loss}{10}\right)}\right]$

Some necessary constants

radians-to-degrees $r2d := \frac{180}{\pi}$ degrees-to-radians $d2r := \frac{\pi}{180}$

suggested value for effective radius of the earth for RF calculations $R_e := 8500$

Earth physical radius (km) $erad := 6378.145$

GSO physical radius (km) $gsorad := 42164.2$

BSS System Inputs:

$f := 12.45$: Frequency (GHz)

$satlon := -119$: BSS satellite longitude (deg) (E=+, W=-)

$contour := 0.0$: Relative eirp contour line (dB) at earth

$\tau := 45$: Polarization tilt angle of signal relative to horizontal, in degrees. For circular polarization τ is 45 degrees (typical of BSS systems), τ = 0 for linear horizontal and 90 for linear polarization. This term is used in ITU-R Rec. P.838-1

$cnup := 27.7$: C/N BSS uplink carrier-to-noise ratio (dB)

$ciadj := 20.7$: C/I BSS adjacent satellite interference (dB)

$xpol\_iso := 22.9$: Cross polarization isolation (dB)

$citerr := 90.0$: C/I for other terrestrial interference

$bw := 24.0\,10^6$: BSS emission bandwidth (Hz)

$br := 24.0\,10^6$: BSS Information bit rate (bps)

$thresh := 8.1$: QEF operating threshold (dB)

$antg := 34$: BSS earth station antenna gain (dBi)

$temp := 125$: BSS earth station temp (dB)

$mispt := 0.5$: BSS earth station antenna mispointing (dB)

$atmos := 0.2$: Atmospheric gaseous loss (dB)

Earth Location Input Parameters

$eirp := 53.0$: Satellite down-link peak EIRP (dBW)

$elat := 38.898$: DBS earth station (ES) latitude (deg) (N=+, S=-)

$elon := -77.009$: ES longitude (deg) (E=+, W=-)

$h_s := 0.01$: ES height above mean sea level (km)

$R_{0.01} := 48.15$: Rainfall rate exceeded for 0.01% of an average year with an integration time of 1 minute. See ITU-R P.837 for estimates.

$Q1 := 2.85$

$B := 0.13$

: Factors used to convert annual percentage outage statistics to worst month outage statistics. Q1 and B are obtained from ITU-R Rec. P.841-1. } Not used in model

Calculate range and elevation angle from ES to satellite:

$glonr := satlon \cdot d2r$ $elatr := elat \cdot d2r$ $erad := erad + h_s$

$glatr := 0.$ $elonr := elon \cdot d2r$

$gx := gsorad \cdot \cos(glonr) \cdot \cos(glatr)$ $ex := erad \cdot \cos(elonr) \cdot \cos(elatr)$

$gy := gsorad \cdot \sin(glonr) \cdot \cos(glatr)$ $ey := erad \cdot \sin(elonr) \cdot \cos(elatr)$

$gz := gsorad \cdot \sin(glatr)$ $ez := erad \cdot \sin(elatr)$

$egx := ex - gx$ $egy := ey - gy$ $egz := ez - gz$

$disteg := \sqrt{(egx^2 + egy^2 + egz^2)}$ range from earth station to BSS sat (km)...:

$disteg = 3.8825 \times 10^4$

$ele := acos\left(\frac{erad^2 + disteg^2 - gsorad^2}{2 \cdot erad \cdot disteg}\right) \cdot r2d - 90.$ elevation angle (deg)

$ele = 27.64$

Perform the calculations specified in ITU Rec. P.618-6 to obtain a curve of the attenuation exceeded vs. probability

Relabel some variable names to the terminology used in P.618-6

$\theta := ele$ elevation angle from ES to the satellite (deg)

$\phi := elat$ latitude of the Earth Station (deg)

Step 1 - Calculate rain height h_R. (Based upon "ho" in ITU-R P.839) A function of the earth station latitude.

$$h_R := \begin{cases} 5 - 0.075(\phi - 23) & \text{if } \phi > 23 \\ 5 & \text{if } 0 \le \phi \le 23 \\ 5 & \text{if } 0 \ge \phi \ge -21 \\ 5 + 0.1\cdot(\phi + 21) & \text{if } -71 \le \phi < -21 \\ 0 & \text{if } \phi < -71 \end{cases}$$

Latitude = $\phi = 38.898$

$h_R := \text{if}[\phi \ge 35, \text{if}[\phi \le 70, 3.2 - 0.075(\phi - 35), h_R], h_R]$ For Northern Europe west of 60 deg long. and North America, see ITU-R P.839-2

Step 2: Compute the slant path length Ls below the rain

$h_R = 2.908$ km

$$L_s := \begin{cases} \dfrac{h_R - h_s}{\sin(\theta\cdot d2r)} & \text{if } \theta \ge 5 \\ \dfrac{2\cdot(h_R - h_s)}{\left[\sin(\theta\cdot d2r)^2 + \dfrac{2\cdot(h_R - h_s)}{R_e}\right]^{0.5} + \sin(\theta\cdot d2r)} & \text{if } \theta < 5 \end{cases}$$

km

$L_s = 6.246$ km

Step 3: Calculate the horizontal projection, LG, of the slant-

$L_G := L_s\cdot\cos(\theta\cdot d2r)$ km

$L_G = 5.533$ km

Step 4: Obtain the rainfall rate, R0.01, exceeded for 0.01% of an average year. Estimates be obtained from ITU-R P.837 of

$R_{0.01} = 48.15$ From input section

Step 5; Obtain the specific attenuation, γR, from the frequency dependent coefficients in ITU-R Rec. ITU-R P.838 and R0.01 as follows:

$$V\_tab := \begin{pmatrix} [\text{freq} & \text{kh} & \text{kv} & \alpha h & \alpha v\ ] \\ 1 & 0.0000387 & 0.0000352 & 0.912 & 0.880 \\ 2 & 0.000154 & 0.000138 & 0.963 & 0.923 \\ 4 & 0.00065 & 0.000591 & 1.121 & 1.075 \\ 6 & 0.00175 & 0.00155 & 1.308 & 1.265 \\ 7 & 0.00301 & 0.00265 & 1.332 & 1.312 \\ 8 & 0.00454 & 0.00395 & 1.327 & 1.310 \\ 10 & 0.0101 & 0.00887 & 1.276 & 0.264 \\ 12 & 0.0188 & 0.0168 & 1.217 & 1.200 \\ 15 & 0.0367 & 0.0335 & 1.154 & 1.128 \\ 20 & 0.0751 & 0.0691 & 1.099 & 1.065 \\ 25 & 0.124 & 0.113 & 1.061 & 1.030 \\ 30 & 0.187 & 0.167 & 1.021 & 1.000 \\ 35 & 0.263 & 0.233 & 0.979 & 0.963 \\ 40 & 0.350 & 0.310 & 0.939 & 0.929 \\ 45 & 0.442 & 0.393 & 0.903 & 0.897 \\ 50 & 0.536 & 0.479 & 0.873 & 0.868 \\ 60 & 0.707 & 0.642 & 0.826 & 0.824 \end{pmatrix}$$

Rec. P.838-1 indicates logarithmic interpolation for frequency and k and linear for alpha. Rec. P.838-1 goes to 400 GHz, however, P.618-6 is only good to 55 GHz. Therefore, the table is truncated at 60 GHz. A Mathcad internal function spline interpolation is used.

Define separate vectors to aid in interpolation; define the working vector "vs" and use Mathcad's "interp" spline interpolation function

$i := 0..16$

$\text{freq}_i := \ln(V\_tab_{i,0})$ $\quad \text{freq}_{in} := \ln(f)$ $\quad f = 12.45$

$k_{H_i} := \ln(V\_tab_{i,1})$

$vs := \text{cspline}(\text{freq}, k_H)$

$k_h := \exp(\text{interp}(vs, \text{freq}, k_H, \text{freq}_{in}))$ $\quad k_h = 0.021$

$k_{V_i} := \ln(V\_tab_{i,2})$

$vs := \text{cspline}(\text{freq}, k_V)$

$k_v := \exp(\text{interp}(vs, \text{freq}, k_V, \text{freq}_{in}))$ $\quad k_v = 0.019$

$\alpha_{H_i} := V\_tab_{i,3}$

$vs := \text{cspline}(\text{freq}, \alpha_H)$

$\alpha_h := \text{interp}(vs, freq, \alpha_H, freq_{in})$ $\alpha_h = 1.205$

$\alpha_{V_i} := V\_tab_{i,4}$

$vs := \text{cspline}(freq, \alpha_V)$

$\alpha_v := \text{interp}(vs, freq, \alpha_V, freq_{in})$ $\alpha_v = 1.311$

Polarization tilt angle relative to horizontal (deg) $\tau = 45$ from input section

$$k := \frac{k_h + k_v + (k_h - k_v)\cdot\cos(\theta\cdot d2r)^2\cdot\cos(2\cdot\tau\cdot d2r)}{2} \qquad k = 0.02$$

$$\alpha := \frac{k_h\cdot\alpha_h + k_v\cdot\alpha_v + (k_h\cdot\alpha_h - k_v\cdot\alpha_v)\cdot\cos(\theta\cdot d2r)^2\cdot\cos(2\cdot\tau\cdot d2r)}{2\cdot k} \qquad \alpha = 1.256$$

Returning to ITU-R P.618-6

$\gamma_R := k\cdot R_{0.01}^{\alpha}$ $\gamma_R = 2.598$ Specific attenuation dB/km

Step 6: Calculate the horizontal reduction factor for 0.01% of the time

$$r_{0.01} := \frac{1}{1 + 0.78\sqrt{\frac{L_G\cdot\gamma_R}{f}} - 0.38\left(1 - e^{-2\cdot L_G}\right)} \qquad r_{0.01} = 0.686$$

Step 7: Calculate the vertical adjustment factor for 0.01% of the time

$$\zeta := \text{atan}\left(\frac{h_R - h_s}{L_G\cdot r_{0.01}}\right)\cdot r2d \qquad \zeta = 37.366$$

$$L_R := \begin{cases} \dfrac{L_G\cdot r_{0.01}}{\cos(\theta\cdot d2r)} & \text{if } \zeta > \theta \\ \left(\dfrac{h_R - h_s}{\sin(\theta\cdot d2r)}\right) & \text{otherwise} \end{cases} \qquad L_R = 4.283$$

$$\chi := \begin{cases} 36 - |\phi| & \text{if } |\phi| < 36 \\ 0 & \text{otherwise} \end{cases} \qquad \chi = 0$$

$\phi = 38.898$

$$\upsilon_{0.01} := \frac{1}{1 + \sqrt{\sin(\theta\cdot d2r)}\cdot\left[31\cdot\left(1 - e^{-\frac{\theta}{1+\chi}}\right)\cdot\frac{\sqrt{L_R\cdot\gamma_R}}{f^2} - 0.45\right]} \qquad \upsilon_{0.01} = 0.871$$

Step 8: The effective path length is calculated as:

$L_E := L_R \cdot \upsilon_{0.01}$ km $L_E = 3.731$

Step 9: The predicted attenuation exceeded for 0.01% of an average year is

$A_{0.01} := \gamma_R \cdot L_E$ dB $A_{0.01} = 9.695$

Step 10: The estimated attenuation to be exceeded for other percentages of an average year, in the range 0.001% to 5%, is calculated by defining "p", the wanted probability by an array going from 0.001% to 5.0%, i.e., the "prob" array.

Set up arrays for p, β and A. P should go from 0.001% to 5%. Values outside of this range are invalid, see ITU-R P.618-6

$Npts := 37$ number of points in probability array

$j := 0 .. Npts$ index for probability array

$arg_j := 0.7 - \frac{j}{10}$ Yields probability from about 5 to 0.001

$p_j := 10^{arg_j}$ wanted probability of an average year

$\beta_j := -0.005(|\phi| - 36) + 1.8 - 4.25 \cdot \sin(\theta \cdot d2r)$

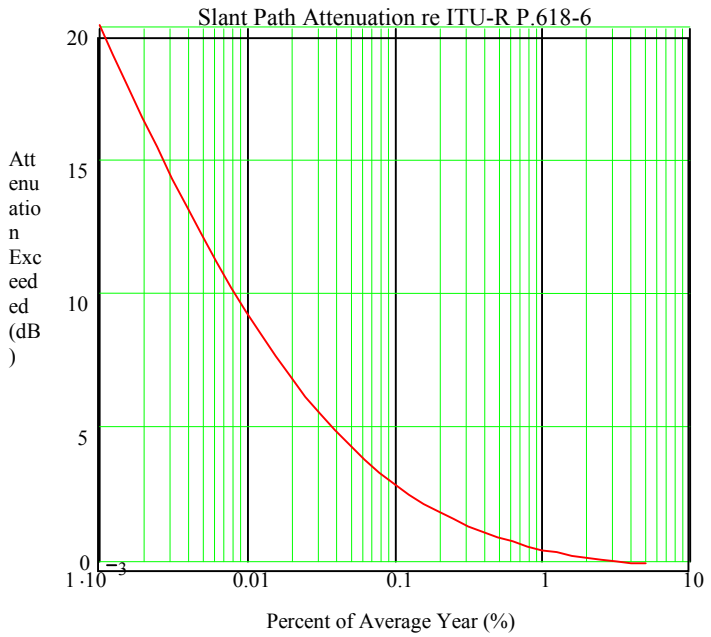
$\beta_j := if[p_j < 1, if[|\phi| < 36, if[\theta \geq 25, -0.005(|\phi| - 36), \beta_j], \beta_j], \beta_j]$

$$\beta_j := \begin{cases} 0 & \text{if } |\phi| \geq 36 \\ \beta_j & \text{otherwise} \end{cases}$$

$$\beta_j := \begin{cases} 0 & \text{if } p_j \geq 1 \\ \beta_j & \text{otherwise} \end{cases}$$

$$A_{p_j} := A_{0.01} \cdot \left(\frac{p_j}{0.01} \right)^{-\left[0.655 + 0.033 \cdot \ln(p_j) - 0.045 \cdot \ln(A_{0.01}) - \beta_j \cdot (1 - p_j) \cdot \sin(\theta \cdot d2r)\right]}$$

And finally: For p % of an average year shown graphically



Input Parameters

$f = 12.45$	Frequency (GHz)
$elat = 38.898$	ES Latitude (deg.)
$elon = -77.01$	ES Longitude (deg)
$h_s = 0.01$	ES altitude AMSL (km)
$\theta = 27.64$	ES elevation (deg)
$\tau = 45$	e-wave tilt angle (deg)
$R_{0.01} = 48.15$	rain rate exceeded 0.01%

Now returning to the link budget for the BSS link

$l := 0 .. 1500$

$rain\_loss_l := \frac{l}{100}$ Rain attenuation (dB) from 0 to 15 dB in steps of 0.01 dB

btl = Basic Transmission Loss in (dB)

$btl := 32.44 + 20 \cdot \log(f \cdot 1000) + 20 \cdot \log(disteg)$ $btl = 206.126$

Earth station antenna noise temperature and G/T computation

$tant_l := rain\_temp(rain\_loss_l)$

$tsys_l := temp + tant_l$

Antenna noise temp under rain conditionds array (kelvin)

$tsys_0 = 125$

$gt_l := antg - 10 \cdot \log(tsys_l)$ G/T

$gt_0 = 13.031$

Carrier-to-noise ratio

$cn_l := eirp + contour - btl - mispt + gt_l + 228.6 - 10 \cdot \log(bw) - rain\_loss_l - atmos$

Carrier-to-noise plus interference ratio

$cnt_l := -10 \cdot \log\left(10^{-0.1 \cdot cn_l} + 10^{-0.1 \cdot cnup} + 10^{-0.1 \cdot ciadj} + 10^{-0.1 \cdot citerr} + 10^{-0.1 \cdot xpol\_iso}\right)$

Link margin

$link\_marg_l := cnt_l - thresh$

Clear sky Link Parameters

$cn_0 = 14.003$

$cnt_0 = 12.587$

$link\_marg_0 = 4.487$ Clear Sky Link margin

The rain margin is the value of rain loss that drives the link margin to 0 dB. The following loop is exited at the point the link margin crosses zero

```
pos := | k ← 0
       | while link_marg_k ≥ 0
       |   k ← k + 1
       | k
```

$pos = 249$

The calculated rain margin is:

$Rain\_margin := rain\_loss_{pos-1}$

$Rain\_margin = 2.48$ rain loss required to drive margin to zero

Note: A smaller increment for rain loss could be used if higher fidelity is required.

$cn_{pos-1} = 8.569$ Faded C/N

Faded Total C/N

$cnt_{pos-1} = 8.114$

$link\_marg_{pos-1} = 0.014$ should be near zero

Returning to the attenuation vs. probability curve. interpolating to find the percentage of an average year associated with the rain margin

Find the Percent of time associated with the rain margin by interpolating the attn. vs. probability curve

Using Mathcad's built in spline interpolation

$vs := cspline(A_p, p)$ required for spline interpolation

$Rain\_outage := interp(vs, A_p, p, Rain\_margin)$

$Rain\_outage = 0.1596$

$Avail0 := 100 - Rain\_outage$

$Avail0 = 99.84043$

$dB\left(\frac{rain\_temp(Rain\_margin) + temp}{temp}\right) = 2.955$ Increase in noise temp due to rain

Calculate the number of minutes of outage represented by the available margin

$Min\_per\_year := 60 \cdot 24 \cdot 365.24$ %

$Min\_per\_year = 5.259456 \times 10^5$ minutes

$Outage\_per\_yr := Min\_per\_year \cdot \frac{Rain\_outage}{100}$ %

$Outage\_per\_yr = 839.242$ minutes

EPFD calculation for 5% increase in DBS outage

$Allow\_FS\_min5 := Outage\_per\_yr \cdot 0.05$ Rounded $Allow\_FS\_min5 = 41.962$ minutes

The total outage and associated percent of average year, including interference from the MVDDS, is:

$Total\_min5 := Outage\_per\_yr + Allow\_FS\_min5$ $Total\_min5 = 881.204$

$Total\_per5 := \frac{Total\_min5}{Min\_per\_year} \cdot 100$ $Total\_per5 = 0.168$

To interpolate probability vs. loss curve for a loss given the probability, the indices must be reversed because the spline function in Mathcad requires the "y" values to be increasing.

$jk_j := Npts - j$

$prob_j := p_{(jk_j)}$

$Atn_j := A_{p_{(jk_j)}}$

$vs := cspline(prob, Atn)$ required for spline interpolation $Avail1 := 100 - Total\_per5$

$Attn\_out1 := interp(vs, prob, Atn, Total\_per5)$

$Total\_per5 = 0.168$

$Attn\_out1 = 2.41$ dB

Recalculate the faded downlink channel with the new parameters

$tant\_out := rain\_temp(Attn\_out1)$

$tsys\_out := temp + tant\_out$

Carrier-to-noise ratio and other; link parameters

$Attn\_out1 = 2.4101$

$dB\left(\frac{rain\_temp(Attn\_out1) + temp}{temp}\right) = 2.909$ Increase in noise temp due to rain

$$cn\_out := eirp + contour - btl - mispt + gt_0 + 228.6 - 10\cdot\log(bw) - atmos \ldots + -Attn\_out1 - dB\left(\frac{rain\_temp(Attn\_out1) + temp}{temp}\right)$$

$$cn\_out = 8.684$$

$$cnt\_out := -10\cdot\log\left(10^{-0.1\cdot cn\_out} + 10^{-0.1\cdot cnup} + 10^{-0.1\cdot ciadj} + 10^{-0.1\cdot citerr} + 10^{-0.1\cdot xpol\_iso}\right)$$

$$cnt\_out = 8.218$$

Calculate the Allowable C/I from MVDSS to drive the C/(N+I) to the threshold value

$$C2I15 := -dB(real(-thresh) - real(-cnt\_out))$$

Calculate the PFD from the MVDDS at the DBS antenna

MVDDS minimum C/I' $C2I15 = 23.829$

$$PFD24 := eirp + contour - mispt - atmos - dB\left[4\cdot\pi\cdot(disteg\cdot 1000)^2\right]$$

PFD into a zero gain antenna

$PFD24 = -110.474$ dB(W/m^2 in 24 MHz)

$Local\_gain := 0$

$PFD24 := PFD24 - C2I15 + (antg - Local\_gain)$ $PFD24 = -100.303$ dB(W/m^2 in 24 MHz)

$$PFD40k := PFD24 + dB\left(\frac{40}{24000}\right)$$ $PFD40k = -128.085$ dB(W/m^2 in 40 kHz)

$$PFD4k5 := PFD40k + dB\left(\frac{4}{40}\right)$$ $PFD4k5 = -138.085$ dB(W/m^2 in 4 kHz)

EPFD calculation for 10% increase in DBS outage

Allow_FS_min10 := Outage_per_yr · 0.10 Rounded Allow_FS_min10 = 83.924

The total outage and associated percent of average year, including interference from the MVDDS, is:

Total_min10 := Outage_per_yr + Allow_FS_min10 Total_min10 = 923.167

$$Total\_per10 := \frac{Total\_min10}{Min\_per\_year} \cdot 100 \qquad Total\_per10 = 0.176$$ minutes

To interpolate probability vs. loss curve for a loss given the probability, the indices must be reversed because the spline function in Mathcad requires the "y" values to be increasing.

$jk_j := Npts - j$

$prob_j := p_{(jk_j)}$

$Atn_j := A_{p(jk_j)}$

vs := cspline(prob, Atn) required for spline interpolation

Attn_out1 := interp(vs, prob, Atn, Total_per10)

Avail1 := 100 − Total_per10

Total_per10 = 0.176

Attn_out1 = 2.345 dB

Recalculate the faded downlink channel with the new parameters

tant_out := rain_temp(Attn_out1)

tsys_out := temp + tant_out

Carrier-to-noise ratio and other; link parameters

Attn_out1 = 2.345

$$dB\left(\frac{rain\_temp(Attn\_out1) + temp}{temp}\right) = 2.866$$ Increase in noise temp due to rain

$$cn\_out := eirp + contour - btl - mispt + gt_0 + 228.6 - 10 \cdot \log(bw) - atmos \ldots + -Attn\_out1 - dB\left(\frac{rain\_temp(Attn\_out1) + temp}{temp}\right)$$

cn_out = 8.792

$$cnt\_out := -10 \cdot \log\left(10^{-0.1 \cdot cn\_out} + 10^{-0.1 \cdot cnup} + 10^{-0.1 \cdot ciadj} + 10^{-0.1 \cdot citerr} + 10^{-0.1 \cdot xpol\_iso}\right)$$

cnt_out = 8.315

Calculate the Allowable C/I from MVDSS to drive the C/(N+I) to the threshold value

$C2I110 := -dB(real(-thresh) - real(-cnt\_out))$

Calculate the PFD from the MVDDS at the DBS antenna

MVDDS minimum C/I' $C2I110 = 21.259$

$PFD24 := eirp + contour - mispt - atmos - dB\left[4\cdot\pi\cdot(disteg\cdot 1000)^2\right]$ PFD into a zero gain antenna

$PFD24 = -110.474$ dB(W/m^2 in 24 MHz)

$Local\_gain := 0$

$PFD24 := PFD24 - C2I110 + (antg - Local\_gain)$ $PFD24 = -97.733$ dB(W/m^2 in 24 MHz)

$PFD40k := PFD24 + dB\left(\frac{40}{24000}\right)$ $PFD40k = -125.515$ dB(W/m^2 in 40 kHz)

$PFD4k10 := PFD40k + dB\left(\frac{4}{40}\right)$ $PFD4k10 = -135.515$ dB(W/m^2 in 4 kHz)

EPFD calculation for 2.86% increase in DBS outage

$Allow\_FS\_min := Outage\_per\_yr \cdot 0.0286$ Rounded $Allow\_FS\_min = 24.002$ minutes

The total outage and associated percent of average year, including interference from the MVDDS, is:

$Total\_min := Outage\_per\_yr + Allow\_FS\_min$ $Total\_min = 863.245$

$Total\_per := \frac{Total\_min}{Min\_per\_year}\cdot 100$ $Total\_per = 0.164$

To interpolate probability vs. loss curve for a loss given the probability, the indices must be reversed because the spline function in Mathcad requires the "y" values to be increasing.

$jk_j := Npts - j$

$prob_j := p_{(jk_j)}$

$Atn_j := A_{p(jk_j)}$

$vs := cspline(prob, Atn)$ required for spline interpolation $Avail1 := 100 - Total\_per$

$Attn\_out1 := interp(vs, prob, Atn, Total\_per)$

$Total\_per = 0.164$

$Attn\_out1 = 2.439$ dB

Recalculate the faded downlink channel with the new parameters

$$tant\_out := rain\_temp(Attn\_out1)$$

$$tsys\_out := temp + tant\_out$$

Carrier-to-noise ratio and other; link parameters

$$Attn\_out1 = 2.4394$$

$$dB\left(\frac{rain\_temp(Attn\_out1) + temp}{temp}\right) = 2.928$$ Increase in noise temp due to rain

$$cn\_out := eirp + contour - btl - mispt + gt_0 + 228.6 - 10\cdot\log(bw) - atmos \ldots$$
$$+ -Attn\_out1 - dB\left(\frac{rain\_temp(Attn\_out1) + temp}{temp}\right)$$

$$cn\_out = 8.635$$

$$cnt\_out := -10\cdot\log\left(10^{-0.1\cdot cn\_out} + 10^{-0.1\cdot cnup} + 10^{-0.1\cdot ciadj} + 10^{-0.1\cdot citerr} + 10^{-0.1\cdot xpol\_iso}\right)$$

$$cnt\_out = 8.174$$

Calculate the Allowable C/I from MVDSS to drive the C/(N+I) to the threshold value

$$C2I1 := -dB(real(-thresh) - real(-cnt\_out))$$

Calculate the PFD from the MVDDS at the DBS antenna

MVDDS minimum C/I' $C2I1 = 25.815$

$$PFD24 := eirp + contour - mispt - atmos - dB\left[4\cdot\pi\cdot(disteg\cdot 1000)^2\right]$$ PFD into a zero gain antenna

$PFD24 = -110.474$ dB(W/m^2 in 24 MHz)

$Local\_gain := 0$

$PFD24 := PFD24 - C2I1 + (antg - Local\_gain)$ $PFD24 = -102.289$ dB(W/m^2 in 24 MHz)

$$PFD40k := PFD24 + dB\left(\frac{40}{24000}\right)$$ $PFD40k = -130.07$ dB(W/m^2 in 40 kHz)

$$PFD4k := PFD40k + dB\left(\frac{4}{40}\right)$$

EPFD calculation for 30 minutes per year increase in DBS outage

$Allow\_FS\_min := 30$ Rounded $Allow\_FS\_min = 30$

The total outage and associated percent of average year, including interference from the MVDDS, is:

$Total\_min := Outage\_per\_yr + Allow\_FS\_min$ $Total\_min = 869.242$

$Total\_per := \frac{Total\_min}{Min\_per\_year} \cdot 100$ $Total\_per = 0.165$

minutes

To interpolate probability vs. loss curve for a loss given the probability, the indices must be reversed because the spline function in Mathcad requires the "y" values to be increasing.

$jk_j := Npts - j$

$prob_j := p_{(jk_j)}$

$Atn_j := A_{p_{(jk_j)}}$

$vs := cspline(prob, Atn)$ required for spline interpolation $Avail1 := 100 - Total\_per$

$Attn\_out1 := interp(vs, prob, Atn, Total\_per)$

$Total\_per = 0.165$

$Attn\_out1 = 2.43$ dB

Recalculate the faded downlink channel with the new parameters

$tant\_out := rain\_temp(Attn\_out1)$

$tsys\_out := temp + tant\_out$

Carrier-to-noise ratio and other; link parameters

$Attn\_out1 = 2.4296$

$dB\left(\frac{rain\_temp(Attn\_out1) + temp}{temp}\right) = 2.922$ Increase in noise temp due to rain

$cn\_out := eirp + contour - btl - mispt + gt_0 + 228.6 - 10 \cdot \log(bw) - atmos \ldots$
$+ -Attn\_out1 - dB\left(\frac{rain\_temp(Attn\_out1) + temp}{temp}\right)$

$cn\_out = 8.652$

$cnt\_out := -10 \cdot \log\left(10^{-0.1 \cdot cn\_out} + 10^{-0.1 \cdot cnup} + 10^{-0.1 \cdot ciadj} + 10^{-0.1 \cdot citerr} + 10^{-0.1 \cdot xpol\_iso}\right)$

$cnt\_out = 8.189$

Calculate the Allowable C/I from MVDSS to drive the C/(N+I) to the threshold value

$C2I130min := -dB(real(-thresh) - real(-cnt\_out))$

Calculate the PFD from the MVDDS at the DBS antenna

MVDDS minimum C/I' $C2I130min = 25.037$

$PFD2430min := eirp + contour - mispt - atmos - dB\left[4\cdot\pi\cdot(disteg\cdot 1000)^2\right]$ PFD into a zero gain antenna

$PFD2430min = -110.474$ dB(W/m^2 in 24 MHz)

$Local\_gain := 0$

$PFD2430min := PFD2430min - C2I130min + (antg - Local\_gain)$ dB(W/m^2 in 24 MHz)

$PFD40k30min := PFD2430min + dB\left(\frac{40}{24000}\right)$ $PFD40k30min = -129.293$ dB(W/m^2 in 40 kHz)

$PFD4k30min := PFD40k30min + dB\left(\frac{4}{40}\right)$

Summary of Results

$Outage\_per\_yr = 839.242$

PFD and C/I for 2.86%

$PFD4k = -140.07$ dB(W/m^2 in 4 kHz) $EPFD4k := PFD4k - 34$

$EPFD4k = -174.07$ $C2I1 = 25.815$

PFD and C/I for 10%

$PFD4k10 = -135.515$ dB(W/m^2 in 4 kHz) $EPFD4k10 := PFD4k10 - 34$

$EPFD4k10 = -169.515$ $C2I110 = 21.259$

PFD and C/I for 5%

$PFD4k5 = -138.085$ dB(W/m^2 in 4 kHz) $EPFD4k5 := PFD4k5 - 34$

$EPFD4k5 = -172.085$ $C2I15 = 23.829$

PFD and C/I for 30 minutes

$PFD4k30min = -139.293$ dB(W/m^2 in 4 kHz) $EPFD4k30min := PFD4k30min - 34$

$EPFD4k30min = -173.293$ $C2I130min = 25.037$

I = Interference scaling factor for the earth station.[667] A detailed explanation of this term can be found in Section 3.3.2 of the MITRE Report (http://www.fcc.gov/oet/info/mitrereport/mitrereport_4_01.pdf)

[667] The interference scaling factor is 1 dB for MVDDS transmitters employing the modulation discussed in Section 3.1.5 of the MITRE Report (*i.e.*, a QPSK modulated signal passed through a square-root raised cosine filter). For other modulation and filtering schemes, the interference scaling factor can be measured using the procedures described in Appendix A of the MITRE Report.

APPENDIX G:

DESCRIPTION OF MODEL USED FOR DETERMINING REGIONAL EPFD LEVELS

AND

SATELLITE OUTAGE ANALYSIS RESULTS

DESCRIPTION OF MODEL USED FOR DETERMINING REGIONAL EPFD LEVELS

Introduction

The 12.2 to 12.7 GHz band is allocated to the Fixed, Broadcasting-Satellite services and Non-Geostationary Satellite Orbit Fixed Satellite Service. In the United States, this band is used predominately at this time for the provision of DBS service. This Appendix describes the technical approach adopted by the Commission for the sharing of this spectrum by DBS and a new MVDDS service.

General Description of the Model

Modeling the potential for interference between two radio services, such as DBS and MVDDS, is a relatively straightforward process, although the details can be quite technically complex. First, the performance of the DBS system must be described and quantified. This entails determining the characteristics of the DBS satellite such as orbital position, power, and the antenna gain pattern. Second, the performance characteristics of the DBS customer receiver system must be determined.[668] This includes, for example, receiver elevation angle, antenna size, gain and pattern. Third, an appropriate propagation and rain model must be chosen. The primary propagation characteristic of interest is the effect of rain on the DBS satellite signal. This is because DBS signals become more susceptible to MVDDS interference when it is raining and the DBS signals are attenuated. All of this information is then used in interference analyses to determine appropriate technical requirements for MVDDS to ensure protection of DBS operations.

Establishment of EPFD Limits

This section describes the methodology used for establishing EPFD limits for MVDDS. These EPFD limits were determined taking into account the technical parameters of DBS service, including satellite power, receiver performance, and internationally recognized rain and propagation models. Specifically, four regional EPFD limits were developed to ensure that any degradation would result in only a small increase in the outage or "unavailability" of DBS service that now occurs due to rain and other factors.

EPFD is a direct measure of the MVDDS power that can cause interference. It is administratively simple to apply and enforce. It is similar to the approach adopted internationally for sharing between DBS and NGSO service.

The technical parameters used in the computations are based on extensive and exhaustive technical studies and analysis performed by the DBS satellite and MVDDS proponents, MITRE Corporation (an independent technical consultant), and FCC technical staff from the Office of Engineering and Technology, the International Bureau and the Wireless Telecommunications Bureau.

In practice, as described below, most DBS customers, including those close to a MVDDS transmitter, are expected to experience *much less* interference than calculated since the calculations do not take into account a number of factors that would reduce the impact of MVDDS signals. For example, the analysis

[668] MITRE, for example, simulated DBS receiver susceptibilities for all combinations of code rate, interleaver length, and Reed-Solomon error correction used by DBS vendors and compared those results with its field and laboratory measurements.

does not take into account natural and man-made shielding or other propagation losses that would minimize the impact of MVDDS to the DBS customer.

Increase in Unavailability Criterion. Some metric of acceptable DBS system performance must be quantified in order to determine appropriate technical requirements for MVDDS to ensure protection of DBS operations. Using a 10% increase in DBS service unavailability criterion as an initial benchmark to establish EPFD limits for MVDDS strikes a reasonable balance between protecting DBS from interference and deploying new MVDDS services. It should be noted that this 10% criterion is not used as a strict limit but rather a guideline in developing the actual regional EPFD requirements, described below. In specific cases, calculated outages may be above or below this 10% value. In light of the conservative nature of this overall approach, sound engineering judgment suggests that using the 10% average unavailability criterion as a strict limit is unnecessary and inappropriate especially given the wide variability in the provision of DBS services noted below.[669]

DBS service availability, and conversely unavailability, varies depending on the DBS satellite providing the service, the location of the receiver and other factors. This is because DBS licensees apportion their satellite resources to different customer locations based on variety of factors, such as population density and differences in average rainfall. In any regard, DBS satellites are designed to provide very reliable service with typical service availabilities on the order of 99.8-99.9%.[670]

As indicated above, the regional EPFD requirements are based on permitting a small percentage increase in the unavailability or outage of DBS service. In general, DBS service unavailability or outage currently occurs only during periods of heavy rain or precipitation. The EPFD requirements would ensure that the effect of an MVDDS signal would be only a small increase in the DBS service outages that occur during this heavy precipitation, *e.g.*, the onset of the rain outage may begin sooner or the rain outage may last somewhat longer.

Using an increase in unavailability as an index or measure of permissible impact by MVDDS does result in a variation of impact from place to place. This is due to the fact that a small percentage change in unavailability can result in relatively large differences in the actual minutes of outage permitted (even where there are relatively small percentage changes in actual availability). For example, a service availability of 99.9% is equivalent to an outage of about 500 minutes/year and a service availability of 99.8% is equivalent to an outage of about 1000 minutes/year. There is, therefore, a 0.1% change in availability but a 100% change in unavailability in this case. In addition, using this approach, the magnitude of the permitted change is directly related to the "baseline" outage. This means where DBS service is very reliable the permitted change would be very small and where DBS service is poorer the permitted change would be larger. For example, if the current unavailability is 100 minutes and the permitted percent increase is 10%, the resulting unavailability would be a total of 110 minutes. On the other hand, if the current unavailability were 1000 minutes, the permitted increase would be 100 minutes or an unavailability of 1100 minutes.

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[669] In a few instances, the increase in unavailability was on the order of 20-30%. This occurred, for example, in some locations served by the satellite at 110º. This DBS satellite is scheduled to be replaced with a newer higher-powered satellite. As discussed below, it was not felt that the relatively poorer performance of this satellite should dominate the determination of the EPFDs. It should also be noted that these cases where the "difference in outage" or increase in unavailability was above 20% did not include the "worst case" (*i.e.*, the situation with the largest minutes of unavailability). The analysis also shows that in these cases the new total calculated outages will still be less than the current outages in a few of the cities served by that satellite. More generally, as discussed elsewhere, the increase in unavailability due to an MVDDS signal – even beyond 10% -- do not rise to the level of harmful interference.

[670] *See, for example,* column labeled Baseline Outage, Percent Availability in Satellite Outage Analysis Results below.

While this approach does result in different impacts on DBS service across the country, the impacts in any regard are small. Based on the wide deviation already present in the provision of DBS service, an increase in unavailability of about 10% is a relatively minor change and should not be perceptible to DBS customers.[671] In this regard, the outage increases due to MVDDS are significantly less than the seasonal and yearly variability in actual rain fall rates, and therefore, the variability in outage already experienced by many DBS customers. The item provides some examples showing the variability of rainfall from year-to-year and month-to-month for Reno, NV and Allentown, PA.[672]

In addition, the outage differences between DBS providers in many cases vary by a significant order of magnitude due to propagation effects, rain, and differences in the way DBS providers have deployed their systems (*e.g.*, satellite power). For example, the outages from different DBS satellites providing service to New York currently vary dramatically: 200.1 minutes from the satellite at 101º, 1323.6 minutes from the satellite at 110º and 822.1 minutes from the satellite at 119º.[673] The variability in outage across the country from any one DBS satellite is also significant. For example, DBS customers receiving service from the 101º satellite position will experience outages totaling 82.2 minutes in Los Angeles and 653.9 minutes in San Francisco and 1720.3 minutes in Miami. This represents increases of over 800% for San Francisco and 2000% for Miami as compared to DBS service for Los Angeles.

Consideration of DBS Satellites. The current orbital positions that may be used to provide DBS service to the United States are nominally located at 61.5º, 101º, 110º, 119º, 148º, 157º, 166º and 175º west longitude. The orbital positions at 101º, 110º and 119º are available for DBS service for the entire continental United States (CONUS). These positions generally provide the best combination of elevation angle of the DBS receiver and eclipse protection of the DBS satellite.[674] The small 45 cm parabolic receive antennas commonly employed for DBS are generally intended for use at elevation angles of greater than 20 degrees. With the exception of a small portion of the northern most portion of the eastern United States from the 119º position, the orbital positions at 101º, 110º and 119º provide for elevation angles greater than 20 degrees.

The remaining orbital positions are generally limited to providing regional or specialized DBS services due to elevation angle limitations. For example, the 61.5 º position is best suited to serving the eastern United States. The 148º, 157º, 166º and 175º positions are best for serving the western portions of the United States and Alaska and Hawaii. In this regard, for example, DBS operations from the 61.5 º position would provide 20 degree elevations for the eastern half of the United States but the elevation angles to the northwestern United States would be very low and may require much larger receive antennas for acceptable service availability.

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[671] We note that, for the same reasons, even higher percentage increases in unavailability in the range of 30% or higher would still constitute a relatively minor change. Since we have used a 10% starting point as a basis for calculating a small set of easily administered power limits (*i.e.*, the four regional EPFD limits), however, we have ensured that the likely real world unavailability increases that occur under these limits will generally not range this high.

[672] *See* footnote 179, *supra*.

[673] *See*, Satellite Outage Analysis Results below.

[674] The angle at which the DBS receiver looks at the satellite is called the elevation angle of the receiver. For example, a receiver located at the equator looking at a satellite directly overhead has the maximum elevation angle of 90 degrees and a receiver located at the same longitude as the satellite and about 80º North latitude would have the minimum elevation angle of zero degrees. DBS system performance is directly related to the elevation angle, as trees, buildings and other obstacles can prevent optimum reception of the satellite transmission. Elevation angles of 20 degrees or greater are generally considered acceptable for DBS reception using small antennas. *See*, for example, *Staff Report on Policies for Regulation of Direct Broadcast Satellites,* September 1980.

The regional EPFD values are calculated based on the technical parameters of the current CONUS DBS satellites operating at 101º, 110º and 119º, which provide the overwhelming majority of service to DBS subscribers today. There are two other orbital slots that provide DBS service to portions of the U.S. (*i.e.*, 61.5º and 148º west longitudes). The footprint of the full CONUS satellites encompass the footprint of the partial CONUS satellites, and the operating characteristics (*i.e.*, power) are similar. Therefore, the EPFDs calculated based on the CONUS slots result in comparable increases in unavailability to DBS subscribers who receive programming from the other slots. To validate this approach, limited sample calculations were performed on the satellites at 61.5º and 148º west longitudes. These calculations confirm that impact of the adopted EPFD limits is acceptable in locations where reliable DBS service could be expected.[675]

Calculations were not performed for the remaining satellite positions at 157º, 166º and 175º, which do not provide full CONUS service, because no service is currently offered from these positions. As a threshold matter, it would be inappropriate to perform an analysis of potential interference to these orbital positions for the eastern parts of the United States where reliable service would not be expected due to low antenna elevation angles and other factors. In addition, any analysis of these positions would be purely speculative because the characteristics of the satellites are unknown.

Use of Representative Links. Thirty-two cities in the top 32 television markets cities were chosen as representative DBS links and used to determine an appropriate EPFD for MVDDS. Choosing a limited number of representative satellite links for analysis purposes to determine an appropriate EPFD or similar value is an acceptable engineering and scientific approach.

These markets constitute a reasonable sample that accounts for the differences in satellite signal strength and climate patterns that occur across the country. In addition, they include a large number of television viewers in diverse geographic locations throughout the United States. For example, Seattle, Washington and Portland, Oregon in the northwest; Los Angeles and San Francisco California and Phoenix, Arizona in the southwest; Miami and Orlando, Florida and Atlanta, Georgia in the southeast; Boston, Massachusetts, New York, New York, and Philadelphia, Pennsylvania in the northeast; and, Chicago, Illinois; Minneapolis, Minnesota; St. Louis, Missouri and Denver, Colorado in the mid-west. The additional precision that would be provided by analyzing additional or other locations is unnecessary and unlikely to be significant given other factors, such as, the large variability that already exist in rainfall patterns from season to season and year to year.

While the analysis is based on DBS links in each of the top 32 markets, the results in fact apply to much larger areas beyond these cities or markets extending into rural areas as well. [676] This is because satellite signal strength and rainfall patterns tend to change only gradually over great distances.[677] In addition, to

[675] *See infra* Satellite Outage Results Analysis for the Satellites at 61.5º and 148º. As the MITRE Report suggested, it does not make sense to tailor the MVDDS interference criterion to protect DBS operations where reliable service is not now expected. *See* MITRE Report at 6-7 (suggesting that locations with more than 100 hours of baseline outage should not be protected). In this regard, the two sample calculations for Seattle from both the satellite at 61.5º and at 148º had baseline outages in excess of 100 hours indicating that calculations should take into account the use of larger DBS receive antennas. Excluding the values for Seattle, the data for the satellites at 61.5º and 148º show "outage increases" from 4.4% to 28.5% with a median value of 7.3% and a mean of 10.8%. These values compare favorably with the values for the CONUS satellites in our 32-city sample.

[676] For example, if one were to look at the values for the DBS satellite at 101º, one would see that the outage increases are 9.8% for Seattle, 9.9% for Portland, 10.5% for San Francisco and 9.3% in Sacramento. These values indicate that the overall impact throughout the Pacific Northwest/Northern California region including for those DBS customers in rural areas of this region will be between about 9 and 10%.

[677] For example, EchoStar submitted an application that shows an EIRP of 53 dBW for the entire eastern half of the United States. Similarly, this application generally shows an EIRP of 51 dBW for the rest of the continental United States. *See*, Application for Minor Modifications of DBS Authorizations, Launch and Operation Authority, File No. (continued....)

ensure accuracy in the outage calculations for each area, the actual elevation above mean sea level (AMSL) for that area was used in the model. However, as described below, to model the increased outage that would be attributable to MVDDS, free space path loss over a flat earth was assumed (*i.e.*, effects of blocking by terrain or buildings was not considered).[678] Therefore, the modeling approach ensures that the test results from urban centers apply equally to rural settings with similar rainfall patterns. For example, the results for New York and Philadelphia reasonably apply for the areas between those cities. The same would be true for Chicago and Cincinnati, Los Angeles and San Diego, Seattle and Portland, etc. A sufficient number of data points have been analyzed to ensure that the results are properly representative of the entire country.

Other parties have taken a similar approach for evaluating the potential for interference to DBS associated with particular models. For example, the ITU analyzed the potential for NGSO interference to DBS in 14 U.S. cities.[679]

Other Factors. Several simplifying assumptions were made in conducting this analysis. These factors, as explained below, lead to a conservative assessment and will generally result in outage predictions that are greater than DBS subscribers will experience in reality.

First, free space path loss over a flat earth was assumed for all calculations of additional DBS outage attributable to MVDDS.680 Natural shielding by terrain, foliage, and buildings were not considered. Such an assumption is necessitated by the lack of prior knowledge of where an MVDDS licensee will actually site its transmitting antennas. As MITRE points out, such an assumption "…undoubtedly exaggerates the sizes of the interference contours shown on the plots. If natural shielding were considered, those contours would certainly enclose smaller areas."[681]

Second, the analysis assumed a rain faded DBS signal and a full strength MVDDS signal. Most DBS outages occur during periods of heavy rain. However, periods of heavy rain tend to be localized events and would also attenuate local MVDDS signals. Therefore, the model overstates the number of DBS subscribers that may potentially be affected. This is corroborated by MITRE, which states, "[h]ad it been feasible to consider this factor [rain attenuation of the MVDDS signal], the interference contours would probably have shrunk further …"[682]

Third, the computations are based on a quasi-error free (QEF) DBS receiver threshold value. This is a conservative approach and represents an audio/video signal that appears essentially error-free to the DBS

(...continued from previous page)
DBS-88-01/68-SAT-ML-96/70, File No. DBS-88-02/6-SAT-ML-97/71, File No. DBS-74-SAT-P/L-96/72, Filed Dec. 30, 1997. Long term climatology data show the mean annual precipitation in inches does not fluctuate significantly over large areas throughout the United States. *See* climatography of the U.S. No. 81 - Supplement # 3, Maps of Annual 1961-1990 Normal Temperature, Precipitation and Degree Days. This supplement is available at http://lwf.ncdc.noaa.gov/oa/documentlibrary/clim81supp3/clim81.html.

[678] That is, the DBS receive antenna and the MVDDS transmitter were assumed to be at the same elevation AMSL and the MVDDS transmitter had a clear line-of-sight to the DBS receive antenna.

[679] *See* Recommendation ITU-R BO.1444, *Protection of the BSS in the 12 GHz Band and Associated Feeder Links in the 17 GHz Band from Interference Caused by Non-GSO FSS Systems.* The cities are: Seattle, WA; Tampa, FL; Minneapolis, MN; Juneau, AL; Anchorage, AL; Honolulu, HI; Chicago, IL; Dallas, TX; Houston; TX; San Antonio, TX; Los Angeles, CA; Miami, FL; Salt Lake City, UT.

[680] The elevation above mean sea level, however, was used in the model to determine the baseline DBS outage and the outage that would be present with MVDDS.

[681] *Id*. at 5-6.

[682] *Id*.

customer. In many cases, a DBS customer may not perceive a degradation in picture quality when the DBS signal level crosses the QEF threshold. Thus, the amount of outage actually experienced by a DBS customer may be less than the outages predicted by the model.

Finally, the improved performance of new satellites was not considered in our analysis. It should be noted that DirecTV recently began transmitting from a new satellite. This satellite transmits with more power than the one used for the analysis. In addition, this satellite is also capable of transmitting spot beams which are used to concentrate the power in small areas as needed. Similarly, EchoStar is planning to launch a new satellite in June, 2002 to the 110° W.L. orbital position. This satellite is also more powerful than the one used in our analysis. The practical effect of more powerful satellites will be to reduce the amount of DBS outage predicted under this analysis.

Computation of EPFD Limits and Choice of Regions. Using the appropriate technical parameters and assumptions described above, the EPFD that would yield a 10% increase in unavailability was calculated for each of the 32 sample cities and for each of the DBS satellites at 101º, 110º, and 119º; and the results plotted. The EPFD values for each location were then averaged, sorted by average EPFD value and plotted from highest to lowest. The data is shown in Figure 1 below:

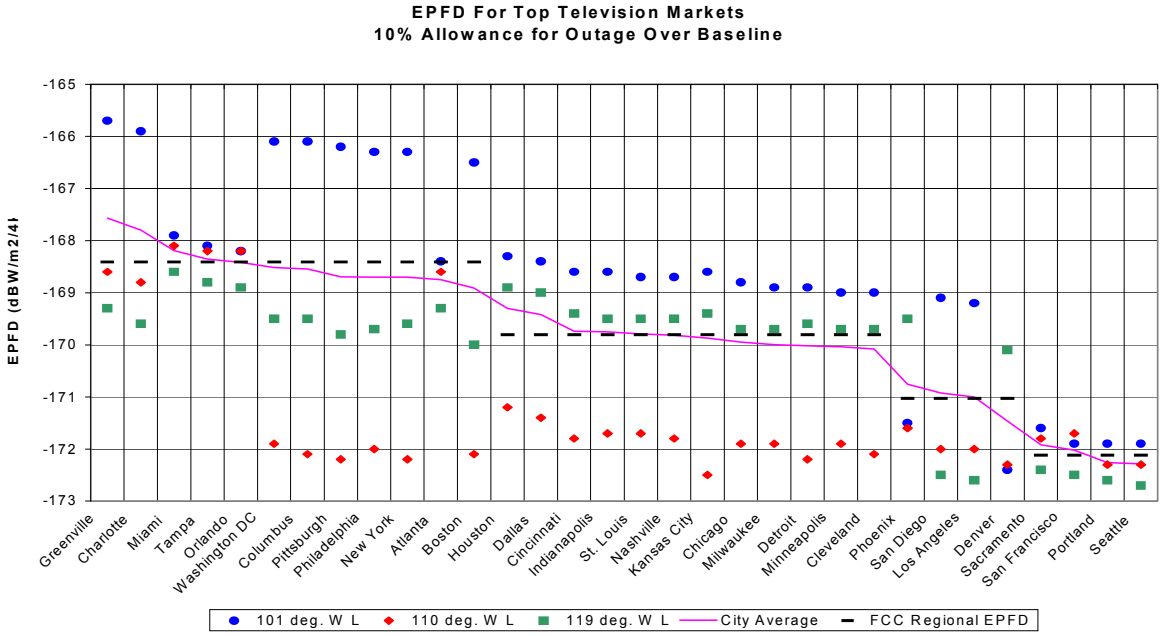


Figure 1

Using the average EPFD values, it can be seen that the above data can be organized into distinct groupings where the average and calculated EPFD levels do not vary substantially. That is, where the calculated EPFD levels in general vary by no more than 3 dB from the average value. One can also observe that the groupings occur along geographic lines. That is, the average EPFD levels from the above data can be used to form four geographic regions, taking into account DBS satellite characteristics and climatic conditions. These regions can be roughly described as the Eastern, Midwestern, Southwestern, and Northwestern regions. Because the EPFD levels are relatively consistent within each of these regions, the individual EPFDs for the markets within each region are averaged. Averaging ensures that the EPFD for neither the "worst case" nor the "best case" satellite predominates.

Using the average EPFD values for each region, the increase in unavailability or "difference in outage" was calculated for each city and satellite. This data is present in the Satellite Outage Analysis Results section of this Appendix. The data show a median increase in outage value of 10.5% and a mean value of 11.9% for the total 32-city sample.

As a consequence of using an average EPFD value, many of the "difference in outage" values for the 32-city sample are above the starting basis of a 10% increase in unavailability.[683] In many instances, this is only by a small nominal amount of a few percentages. In others, however, the differences are larger. For example, in a few instances, the increase in unavailability was on the order of 20-30%. However, the corresponding decrease in DBS service *availability* for these instances was only on the order of 0.05-0.08%. Other factors such as actual seasonal and yearly precipitation conditions will cause much greater variations in the DBS service availability. Therefore, engineering judgement would suggest that these differences are not significant and represent an acceptable range.

Further, the majority of instances where unavailability was on the order of 20-30% occurred in the case of the satellite at 110º. This DBS satellite is scheduled to be replaced with a newer higher-powered satellite in advance of the anticipated market introduction of MVDDS. While these values are taken into account in the averaging to determine the regional EPFDs, as noted above, it was not felt that they should predominate the determination of the EPFDs.

The average EPFD for each of the regions are: -168.4 dBW/m^2/4kHz for the Eastern region;[684] -169.8 dBW/m^2/4kHz for the Midwestern region;[685] -171.0 dBW/m^2/4kHz for the Southwestern;[686] and, -172.1 dBW/m^2/4kHz in the Northwestern region.[687] The regions and average EPFD levels are shown in Figure 2 below.

[683] *See* Satellite Outage Analysis Results below.

[684] The Eastern region consists of the District of Columbia and the following states: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Louisiana, and Florida.

[685] The Midwestern region consists of the following states: Ohio, Michigan, Indiana, Wisconsin, Illinois, Minnesota, Iowa, Missouri, Arkansas, South Dakota, Nebraska, Kansas, Oklahoma, and Texas.

[686] The Southwestern region consists of the following states: Wyoming, Colorado, New Mexico, Utah, Arizona, Nevada, and California (south of 37^o North Latitude).

[687] The Northwestern region consists of the following states: Washington, Oregon, California (north of 37^o North Latitude), Idaho, Montana, North Dakota, Alaska, and Hawaii.

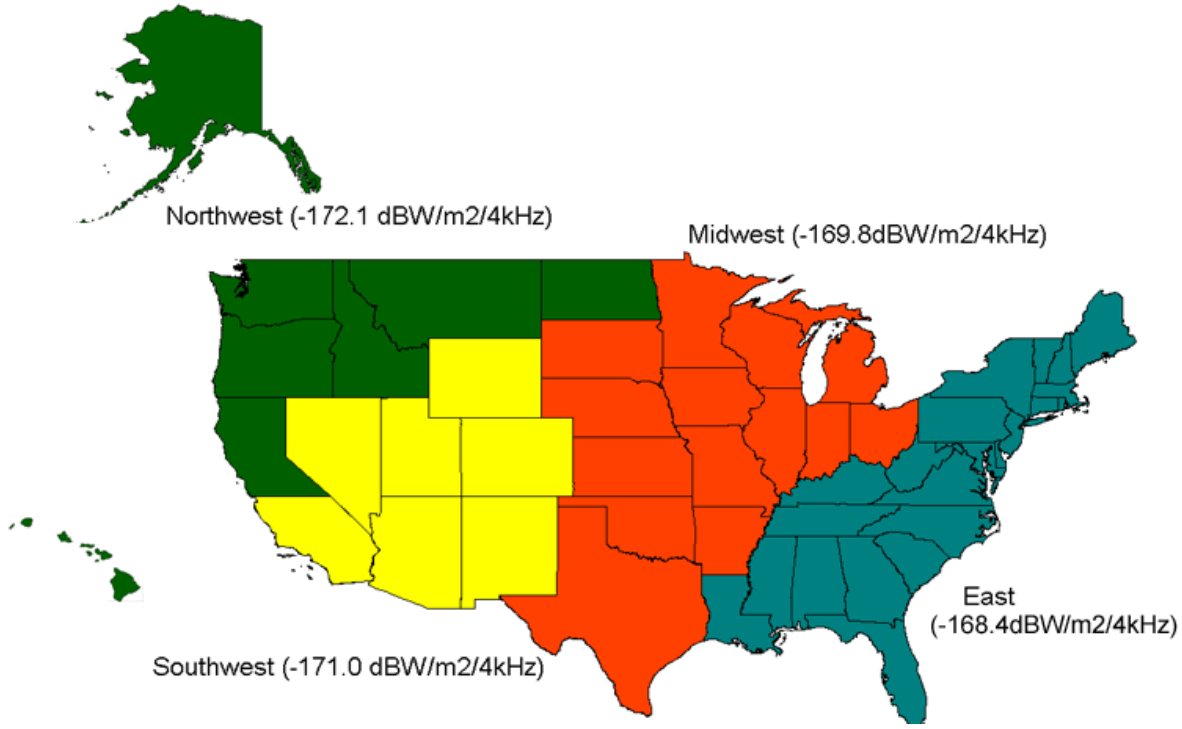


Figure 2

Additional Computations for Validation of the Model. Additional sample computations were conducted to validate the model and ensure that the EPFD values and the choice of regions were appropriate. That is, the EPFD for the region would generally ensure that for locations within the region any increase in DBS outage would be consistent with our 10% approximate increase in unavailability guideline. Sample calculations were conducted for Baton Rouge, New Orleans, and Shreveport, Louisiana; Billings, Montana; Fargo, North Dakota; Salt Lake City, Utah; Omaha, Nebraska; Oklahoma City, Oklahoma; Boise, Idaho; and Jackson, Mississippi. The results of these sample computations show outage increases generally consistent with our guideline and the results from our 32 city sample. In addition, as the data for three locations within Louisiana demonstrate, the outage increases across smaller geographic areas (*e.g.*, state boundary) show very little variation. Further, the data for all locations show outage increases for locations throughout the U.S. are consistent with our 10% approximate increase in unavailability guideline. The sample data is shown below.

The additional sample data show "outage increases" from 9.4% to 19.4%, with a median value of 11.1% and a mean value of 11.8%. These sample calculations demonstrate that the regional EPFD values are appropriate and will ensure that any degradation caused by the MVDDS signal would result in only a small increase in the outage or "unavailability" of DBS service that now occurs due to rain or other precipitation.

In addition to the computations for the six cities listed above, sample computations were conducted for Anchorage, Alaska and Honolulu, Hawaii to demonstrate the appropriateness of the regional EPFD. This data is also presented below. The data for Alaska and Hawaii show "outage increases" from 2.2% to 23.3%, with a median value of 6.3% and a mean value of 8.5%. Because these calculations were based on the use of a larger receive antenna required in those locations these calculations were not included in the mean and median calculations for the six city sample described above.

While statistically precise samples were not developed either in our 32 city case or for our validation of the model, such efforts are not needed given the relatively small variations in the permitted EPFD values across the four regions and the wide variability in DBS service caused by differences in satellites used, the seasonal and yearly differences in climatic conditions, and other factors.

EPFD Analysis for Additional Cities

Baton Rouge, LA								
Satellite	Baseline Outage	Baseline Outage plus 10% Increase	EPFD For 10% Increase	FCC Adopted EPFD	Outage With FCC EPFD	Outage Increase		Difference Between Calculated And FCC EPFDs
	(minutes)	(minutes)	(dBW/m^2/4 kHz)		(minutes)	%	(minutes)	DB
101	1214	1335.4	-168.1	-168.4	1329	9.5	115	-0.3
110	1306	1436.6	-168.3	-168.4	1440	10.3	134	-0.1
119	1665	1831.5	-169.0	-168.4	1861	11.8	196	0.6

New Orleans, LA								
Satellite	Baseline Outage	Baseline Outage plus 10% Increase	EPFD For 10% Increase	FCC Adopted EPFD	Outage With FCC EPFD	Outage Increase		Difference Between Calculated And FCC EPFDs
	(minutes)	(minutes)	(dBW/m^2/4 kHz)		(minutes)	%	(minutes)	DB
101	1268	1394.8	-168.1	-168.4	1387	9.4	119	-0.3
110	1366	1502.6	-168.3	-168.4	1505	10.2	139	-0.1
119	1756	1931.6	-168.8	-168.4	1962	11.7	206	0.4

Shreveport, LA								
Satellite	Baseline Outage	Baseline Outage plus 10% Increase	EPFD For 10% Increase	FCC Adopted EPFD	Outage With FCC EPFD	Outage Increase		Difference Between Calculated And FCC EPFDs
	(minutes)	(minutes)	(dBW/m^2/4 kHz)		(minutes)	%	(minutes)	DB
101	950.7	1045.77	-168.4	-168.4	1049	10.3	98.3	0
110	1023	1125.3	-168.3	-168.4	1124	9.9	101	-0.1
119	1300	1430	-169.1	-168.4	1459	12.2	159	0.7

Billings, MT								
Satellite	Baseline Outage	Baseline Outage plus 10% Increase	EPFD For 10% Increase	FCC Adopted EPFD	Outage With FCC EPFD	Outage Increase		Difference Between Calculated And FCC EPFDs
	(minutes)	(minutes)	(dBW/m^2/4 kHz)		(minutes)	%	(minutes)	DB
101	117.1	128.81	-172.5	-172.1	131.5	12.3	14.4	0.4
110	118.9	130.79	-172.6	-172.1	133.8	12.5	14.9	0.5
119	161.2	177.32	-173.1	-172.1	183.8	14.0	22.6	1

Fargo, ND								
Satellite	Baseline Outage	Baseline Outage plus 10% Increase	EPFD For 10% Increase	FCC Adopted EPFD	Outage With FCC EPFD	Outage Increase		Difference Between Calculated And FCC EPFDs
	(minutes)	(minutes)	(dBW/m^2/4 kHz)		(minutes)	%	(minutes)	DB
101	495.4	544.94	-171.9	-172.1	544.4	9.9	49	-0.2
110	562.3	618.53	-172.0	-172.1	619.5	10.2	57.2	-0.1
119	810.3	891.33	-173.2	-172.1	926.7	14.4	116.4	1.1

Salt Lake City, UT								
Satellite	Baseline Outage	Baseline Outage plus 10% Increase	EPFD For 10% Increase	FCC Adopted EPFD	Outage With FCC EPFD	Outage Increase		Difference Between Calculated And FCC EPFDs
	(minutes)	(minutes)	(dBW/m^2/4 kHz)		(minutes)	%	(minutes)	DB
101	65.5	72.05	-172.3	-171.0	75.6	15.4	10.1	1.3
110	64.4	70.84	-172.5	-171.0	74.5	15.7	10.1	1.5
119	84.9	93.39	-173.4	-171.0	101.2	19.2	16.3	2.4

Omaha, Nebraska								
Satellite	Baseline Outage	Baseline Outage plus 10% Increase	EPFD For 10% Increase	FCC Adopted EPFD	Outage With FCC EPFD	Outage Increase		Difference Between Calculated And FCC EPFDs
	(minutes)	(minutes)	(dBW/m^2/4 kHz)		(minutes)	%	(minutes)	DB
101	360.3	396.33	-168.8	-169.8	389	8.0	28.7	-1
110	968.5	1065.35	-172.0	-169.8	1150	18.7	181.5	2.2
119	511.2	562.32	-169.4	-169.8	560.1	9.6	48.9	-0.4

Oklahoma City, Oklahoma								
Satellite	Baseline Outage	Baseline Outage plus 10% Increase	EPFD For 10% Increase	FCC Adopted EPFD	Outage With FCC EPFD	Outage Increase		Difference Between Calculated And FCC EPFDs
	(minutes)	(minutes)	($dBW/m^2/4$ kHz)		(minutes)	%	(minutes)	DB
101	454.2	499.62	-168.6	-169.8	489	7.7	34.8	-1.2
110	1182	1300.2	-171.4	-169.8	1379	16.7	197	1.6
119	620.6	682.66	-169.2	-169.8	677.6	9.2	57	-0.6

Boise, Idaho								
Satellite	Baseline Outage	Baseline Outage plus 10% Increase	EPFD For 10% Increase	FCC Adopted EPFD	Outage With FCC EPFD	Outage Increase		Difference Between Calculated And FCC EPFDs
	(minutes)	(minutes)	($dBW/m^2/4$ kHz)		(minutes)	%	(minutes)	DB
101	65.1	71.61	-172.4	-172.1	72.7	11.7	7.6	0.3
110	61.6	67.76	-172.8	-172.1	69.7	13.1	8.1	0.7
119	23.3	25.63	-170.7	-172.1	25.1	7.7	1.8	-1.4

Jackson, Mississippi								
Satellite	Baseline Outage	Baseline Outage plus 10% Increase	EPFD For 10% Increase	FCC Adopted EPFD	Outage With FCC EPFD	Outage Increase		Difference Between Calculated And FCC EPFDs
	(minutes)	(minutes)	($dBW/m^2/4$ kHz)		(minutes)	%	(minutes)	DB
101	1041	1145.1	-168.3	-168.4	1148	10.3	107	-0.1
110	1131	1244.1	-168.5	-168.4	1250	10.5	119	0.1
119	1476	1623.6	-168.9	-168.4	1656	12.2	180	0.5

EPFD Analysis for Alaska and Hawaii

Anchorage, AK								
Satellite	Baseline Outage	Baseline Outage plus 10% Increase	EPFD For 10% Increase	FCC Adopted EPFD	Outage With FCC EPFD	Outage Increase		Difference Between Calculated And FCC EPFDs
	(minutes)	(minutes)	($dBW/m^2/4$ kHz)		(minutes)	%	(minutes)	DB
101*	145.9	160.49	-167.8	-172.1	151.1	3.6	5.2	-4.3
110**	302.4	332.64	-171.4	-172.1	329.4	8.9	27	-0.7
119**	67.2	73.92	-167.8	-172.1	69.7	3.7	2.5	-4.3

* Based on 240 cm DBS Receive Antenna (*See*: www.directv.com/DTVAPP/learn/FAQ_DTVBasics.jsp)
**Based on 180 cm DBS Receive Antenna

Honolulu. HI								
Satellite	Baseline Outage	Baseline Outage plus 10% Increase	EPFD For 10% Increase	FCC Adopted EPFD	Outage With FCC EPFD	Outage Increase		Difference Between Calculated And FCC EPFDs
	(minutes)	(minutes)	($dBW/m^2/4$ kHz)		(minutes)	%	(minutes)	dB
101*	8758	9633.8	-174.9	-172.1	10796	23.3	2038	2.8
110*	468.7	515.57	-165.7	-172.1	479	2.2	10.3	-6.4
119*	1918	2109.8	-171.3	-172.1	2092	9.1	174	-0.8

* Based on 90 cm DBS Receive Antenna

SATELLITE OUTAGE ANALYSIS RESULTS

	EPFD Satellite @ 101 Deg. WL		EPFD Satellite @ 110 Deg. WL		EPFD Satellite @ 119 Deg. WL		Average EPFD		Regional Average EPFD
	dBW/m^2	W/m^2	dBW/m^2	W/m^2	DBW/m^2	W/m^2	W/m^2	dBW/m^2	dBW/m^2
	Reference Bandwidth = 4 kHz								
Greenville	-165.7	2.6915E-17	-168.6	1.3804E-17	-169.3	1.1749E-17	1.7489E-17	-167.6	-168.4
Charlotte	-165.9	2.5704E-17	-168.8	1.3183E-17	-169.6	1.0965E-17	1.6617E-17	-167.8	-168.4
Miami	-167.9	1.6218E-17	-168.1	1.5488E-17	-168.6	1.3804E-17	1.5170E-17	-168.2	-168.4
Tampa	-168.1	1.5488E-17	-168.2	1.5136E-17	-168.8	1.3183E-17	1.4602E-17	-168.4	-168.4
Orlando	-168.2	1.5136E-17	-168.2	1.5136E-17	-168.9	1.2882E-17	1.4385E-17	-168.4	-168.4
Washington DC	-166.1	2.4547E-17	-171.9	6.4565E-18	-169.5	1.1220E-17	1.4075E-17	-168.5	-168.4
Columbus	-166.1	2.4547E-17	-172.1	6.1660E-18	-169.5	1.1220E-17	1.3978E-17	-168.5	-168.4
Pittsburgh	-166.2	2.3988E-17	-172.2	6.0256E-18	-169.8	1.0471E-17	1.3495E-17	-168.7	-168.4
Philadelphia	-166.3	2.3442E-17	-172.0	6.3096E-18	-169.7	1.0715E-17	1.3489E-17	-168.7	-168.4
New York	-166.3	2.3442E-17	-172.2	6.0256E-18	-169.6	1.0965E-17	1.3478E-17	-168.7	-168.4
Atlanta	-168.4	1.4454E-17	-168.6	1.3804E-17	-169.3	1.1749E-17	1.3336E-17	-168.7	-168.4
Boston	-166.5	2.2387E-17	-172.4	5.7544E-18	-170.0	1.0000E-17	1.2714E-17	-169.0	-168.4
Houston	-168.3	1.4791E-17	-171.2	7.5858E-18	-168.9	1.2882E-17	1.1753E-17	-169.3	-169.8
Dallas	-168.4	1.4454E-17	-171.4	7.2444E-18	-169.0	1.2589E-17	1.1429E-17	-169.4	-169.8
Cincinnati	-168.6	1.3804E-17	-171.8	6.6069E-18	-169.4	1.1482E-17	1.0631E-17	-169.7	-169.8
Indianapolis	-168.6	1.3804E-17	-171.7	6.7608E-18	-169.5	1.1220E-17	1.0595E-17	-169.7	-169.8
St. Louis	-168.7	1.3490E-17	-171.7	6.7608E-18	-169.5	1.1220E-17	1.0490E-17	-169.8	-169.8
Nashville	-168.7	1.3490E-17	-171.8	6.6069E-18	-169.5	1.1220E-17	1.0439E-17	-169.8	-169.8
Kansas City	-168.6	1.3804E-17	-171.6	6.9183E-18	-169.4	1.1482E-17	1.0735E-17	-169.7	-169.8
Chicago	-168.8	1.3183E-17	-171.9	6.4565E-18	-169.7	1.0715E-17	1.0118E-17	-169.9	-169.8
Milwaukee	-168.9	1.2882E-17	-171.9	6.4565E-18	-169.7	1.0715E-17	1.0018E-17	-170.0	-169.8
Detroit	-168.9	1.2882E-17	-172.2	6.0256E-18	-169.6	1.0965E-17	9.9576E-18	-170.0	-169.8
Minneapolis	-169.0	1.2589E-17	-171.9	6.4565E-18	-169.7	1.0715E-17	9.9203E-18	-170.0	-169.8
Cleveland	-169.0	1.2589E-17	-172.1	6.1660E-18	-169.7	1.0715E-17	9.8235E-18	-170.1	-169.8
Phoenix	-171.5	7.0795E-18	-171.6	6.9183E-18	-169.5	1.1220E-17	8.4060E-18	-170.8	-171.0
San Diego	-169.1	1.2303E-17	-172.0	6.3096E-18	-172.5	5.6234E-18	8.0786E-18	-170.9	-171.0
Los Angeles	-169.2	1.2023E-17	-172.0	6.3096E-18	-172.4	5.7544E-18	8.0289E-18	-171.0	-171.0
Denver	-172.4	5.7544E-18	-172.3	5.8884E-18	-170.1	9.7724E-18	7.1384E-18	-171.5	-171.0
Sacramento	-171.6	6.9183E-18	-171.8	6.6069E-18	-172.4	5.7544E-18	6.4265E-18	-171.9	-172.1
San Francisco	-171.9	6.4565E-18	-171.7	6.7608E-18	-172.5	5.6234E-18	6.2803E-18	-172.0	-172.1
Portland	-171.9	6.4565E-18	-172.3	5.8884E-18	-172.6	5.4954E-18	5.9468E-18	-172.3	-172.1
Seattle	-171.9	6.4565E-18	-172.3	5.8884E-18	-172.7	5.3703E-18	5.9051E-18	-172.3	-172.1

	Regional Average EPFD	Satellite @ 101 Deg. WL		Satellite @ 110 Deg. WL		Satellite @ 119 Deg. WL	
	dBW/m2/4kHz	EPFD (dBW/m2/4kHz)	Difference from Regional Average (dB)	EPFD (dBW/m2/4kHz)	Difference from Regional Average (dB)	EPFD (dBW/m2/4kHz)	Difference from Regional Average (dB)
Greenville	-168.4	-165.7	2.7	-168.6	-0.2	-169.3	-0.9
Charlotte	-168.4	-165.9	2.5	-168.8	-0.4	-169.6	-1.2
Miami	-168.4	-167.9	0.5	-168.1	0.3	-168.6	-0.2
Tampa	-168.4	-168.1	0.3	-168.2	0.2	-168.8	-0.4
Orlando	-168.4	-168.2	0.2	-168.2	0.2	-168.9	-0.5
Washington DC	-168.4	-166.1	2.3	-171.9	-3.5	-169.5	-1.1
Columbus	-168.4	-166.1	2.3	-172.1	-3.7	-169.5	-1.1
Pittsburgh	-168.4	-166.2	2.2	-172.2	-3.8	-169.8	-1.4
Philadelphia	-168.4	-166.3	2.1	-172.0	-3.6	-169.7	-1.3
New York	-168.4	-166.3	2.1	-172.2	-3.8	-169.6	-1.2
Atlanta	-168.4	-168.4	0.0	-168.6	-0.2	-169.3	-0.9
Boston	-168.4	-166.5	1.9	-172.4	-4.0	-170.0	-1.6
Houston	-169.8	-168.3	1.5	-171.2	-1.4	-168.9	0.9
Dallas	-169.8	-168.4	1.4	-171.4	-1.6	-169.0	0.8
Cincinnati	-169.8	-168.6	1.2	-171.8	-2.0	-169.4	0.4
Indianapolis	-169.8	-168.6	1.2	-171.7	-1.9	-169.5	0.3
St. Louis	-169.8	-168.7	1.1	-171.7	-1.9	-169.5	0.3
Nashville	-169.8	-168.7	1.1	-171.8	-2.0	-169.5	0.3
Kansas City	-169.8	-168.6	1.2	-171.6	-1.8	-169.4	0.4
Chicago	-169.8	-168.8	1.0	-171.9	-2.1	-169.7	0.1
Milwaukee	-169.8	-168.9	0.9	-171.9	-2.1	-169.7	0.1
Detroit	-169.8	-168.9	0.9	-172.2	-2.4	-169.6	0.2
Minneapolis	-169.8	-169.0	0.8	-171.9	-2.1	-169.7	0.1
Cleveland	-169.8	-169.0	0.8	-172.1	-2.3	-169.7	0.1
Phoenix	-171.0	-171.5	-0.5	-171.6	-0.6	-169.5	1.5
San Diego	-171.0	-169.1	1.9	-172.0	-1.0	-172.5	-1.5
Los Angeles	-171.0	-169.2	1.8	-172.0	-1.0	-172.4	-1.4
Denver	-171.0	-172.4	-1.4	-172.3	-1.3	-170.1	0.9
Sacramento	-172.1	-171.6	0.5	-171.8	0.3	-172.4	-0.3
San Francisco	-172.1	-171.9	0.2	-171.7	0.4	-172.5	-0.4
Portland	-172.1	-171.9	0.2	-172.3	-0.2	-172.6	-0.5
Seattle	-172.1	-171.9	0.2	-172.3	-0.2	-172.7	-0.6

Results for the Satellite at 101 Degrees West Longitude						
	Baseline Outage (Due to rain)		New Outage (Rain plus MVDDS) Based on Regional Average EPFD		Difference in Outage	
	Minutes	Percent Availability	Minutes	Percent Availability	Minutes	Percent
Greenville	387.6	99.9263	408.7	99.9223	21.1	5.4
Charlotte	288.6	99.9451	304.6	99.9421	16.0	5.5
Miami	1720.3	99.6729	1873.0	99.6439	152.7	8.9
Tampa	1427.0	99.7287	1567.0	99.7021	140.0	9.8
Orlando	1480.4	99.7185	1626.0	99.6908	145.6	9.8
Washington DC	220.4	99.9581	233.1	99.9557	12.7	5.8
Columbus	203.1	99.9614	210.8	99.9599	7.7	3.8
Pittsburgh	168.8	99.9679	178.7	99.9660	9.9	5.9
Philadelphia	221.4	99.9579	238.5	99.9547	17.1	7.7
New York	200.1	99.9620	211.9	99.9597	11.8	5.9
Atlanta	866.0	99.8353	952.0	99.8190	86.0	9.9
Boston	163.7	99.9689	174.5	99.9668	10.8	6.6
Houston	1040.9	99.8021	1114.0	99.7882	73.1	7.0
Dallas	820.4	99.8440	879.9	99.8327	59.5	7.3
Cincinnati	469.1	99.9108	505.8	99.9038	36.7	7.8
Indianapolis	466.8	99.9112	477.3	99.9092	10.5	2.3
St. Louis	482.0	99.9084	519.3	99.9013	37.3	7.7
Nashville	552.8	99.8949	609.7	99.8841	56.9	10.3
Kansas City	425.1	99.9192	458.2	99.9129	33.1	7.8
Chicago	326.9	99.9378	353.4	99.9328	26.5	8.1
Milwaukee	311.3	99.9408	336.7	99.9360	25.4	8.2
Detroit	302.5	99.9425	327.4	99.9378	24.9	8.2
Minneapolis	303.3	99.9423	328.2	99.9376	24.9	8.2
Cleveland	369.9	99.9297	402.3	99.9235	32.4	8.8
Phoenix	661.5	99.8742	743.2	99.8587	81.7	12.4
San Diego	132.0	99.9749	140.4	99.9733	8.4	6.4
Los Angeles	82.2	99.9844	87.7	99.9833	5.5	6.7
Denver	148.6	99.9717	171.6	99.9674	23.0	15.5
Sacramento	766.9	99.8542	838.3	99.8406	71.4	9.3
San Francisco	653.9	99.8757	722.4	99.8626	68.5	10.5
Portland	571.1	99.8914	627.7	99.8807	56.6	9.9
Seattle	741.0	99.8591	813.9	99.8453	72.9	9.8

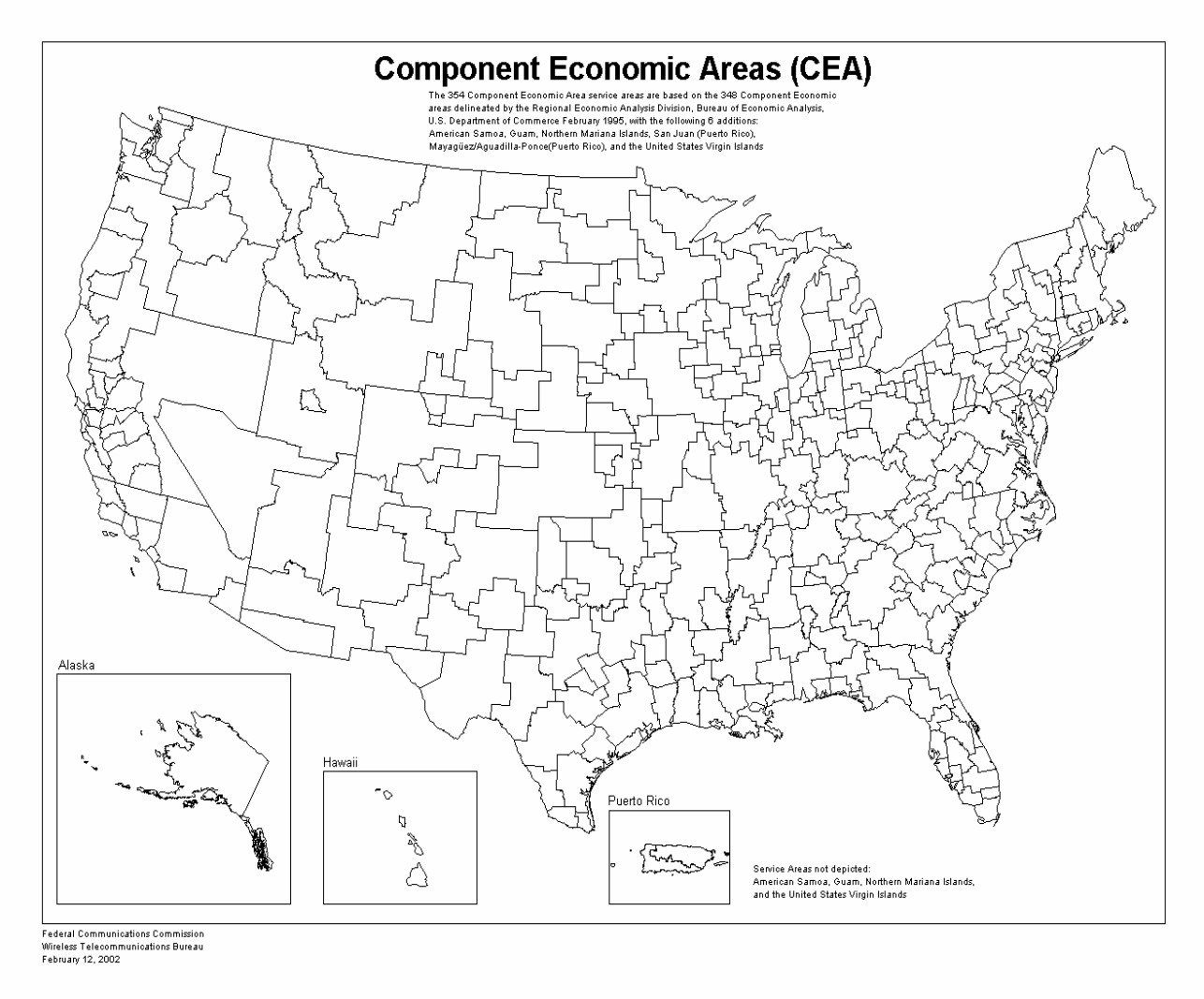
Results for the Satellite at 110 Degrees West Longitude						
	Baseline Outage (Due to rain)		New Outage (Rain plus MVDDS) Based on Regional Average EPFD		Difference in Outage	
	Minutes	Percent Availability	Minutes	Percent Availability	Minutes	Percent
Greenville	900.6	99.8288	999.6	99.8099	99.0	11.0
Charlotte	692.1	99.8684	779.3	99.8518	87.2	12.6
Miami	1930.3	99.6330	2117.0	99.5975	186.7	9.7
Tampa	1597.9	99.6962	1748.0	99.6676	150.1	9.4
Orlando	1668.4	99.6828	1836.0	99.6509	167.6	10.0
Washington DC	1388.3	99.7360	1765.0	99.6644	376.7	27.1
Columbus	1227.5	99.7666	1459.1	99.7226	231.6	18.9
Pittsburgh	1075.8	99.7955	1371.0	99.7393	295.2	27.4
Philadelphia	1429.0	99.7283	1842.0	99.6498	413.0	28.9
New York	1323.6	99.7483	1692.0	99.6783	368.4	27.8
Atlanta	976.1	99.8144	1082.0	99.7943	105.9	10.8
Boston	1156.8	99.7801	1506.5	99.7136	349.7	30.2
Houston	2476.2	99.5292	2832.0	99.4615	355.8	14.4
Dallas	2016.3	99.6166	2329.0	99.5572	312.7	15.5
Cincinnati	1324.0	99.7483	1554.4	99.7045	230.4	17.4
Indianapolis	1309.4	99.7510	1464.0	99.7216	154.6	11.8
St. Louis	1308.5	99.7512	1426.0	99.7289	117.5	9.0
Nashville	1504.4	99.7140	1850.1	99.6482	345.7	23.0
Kansas City	1134.8	99.7842	1329.7	99.7472	194.9	17.2
Chicago	936.4	99.8220	1105.0	99.7899	168.6	18.0
Milwaukee	898.8	99.8291	1061.9	99.7981	163.1	18.1
Detroit	899.4	99.8290	1075.0	99.7956	175.6	19.5
Minneapolis	853.6	99.8377	1009.0	99.8082	155.4	18.2
Cleveland	1094.9	99.7918	1306.0	99.7517	211.1	19.3
Phoenix	661.9	99.8742	744.6	99.8584	82.7	12.5
San Diego	334.4	99.9364	378.9	99.9280	44.5	13.3
Los Angeles	215.8	99.9590	245.6	99.9533	29.8	13.8
Denver	155.6	99.9704	178.1	99.9661	22.5	14.5
Sacramento	723.2	99.8625	798.9	99.8481	75.7	10.5
San Francisco	620.2	99.8821	678.8	99.8709	58.6	9.5
Portland	530.5	99.8991	589.6	99.8879	59.1	11.1
Seattle	689.0	99.8690	765.3	99.8545	76.3	11.1

Results for the Satellite at 119 Degrees West Longitude						
	Baseline Outage (Due to rain)		New Outage (Rain plus MVDDS) Based on Regional Average EPFD		Difference in Outage	
	Minutes	Percent Availability	Minutes	Percent Availability	Minutes	Percent
Greenville	1254.8	99.7614	1416.0	99.7308	161.2	12.8
Charlotte	995.7	99.8107	1134.0	99.7844	138.3	13.9
Miami	2614.1	99.5030	2899.0	99.4488	284.9	10.9
Tampa	2142.2	99.5927	2390.0	99.5456	247.8	11.6
Orlando	2255.1	99.5712	2516.0	99.5216	260.9	11.6
Washington DC	839.2	99.8404	954.0	99.8186	114.8	13.7
Columbus	708.7	99.8653	776.6	99.8523	67.9	9.6
Pittsburgh	628.3	99.8805	720.8	99.8629	92.5	14.7
Philadelphia	875.2	99.8336	1015.0	99.8070	139.8	16.0
New York	822.1	99.8437	943.6	99.8206	121.5	14.8
Atlanta	1331.7	99.7468	1510.0	99.7129	178.3	13.4
Boston	733.6	99.8605	844.5	99.8394	110.9	15.1
Houston	1380.0	99.7376	1496.0	99.7156	116.0	8.4
Dallas	1099.0	99.7910	1195.0	99.7728	96.0	8.7
Cincinnati	754.9	99.8565	826.3	99.8429	71.4	9.5
Indianapolis	661.5	99.8742	763.7	99.8548	102.2	15.4
St. Louis	717.4	99.8636	727.3	99.8617	9.9	1.4
Nashville	850.4	99.8383	954.7	99.8185	104.3	12.3
Kansas City	603.1	99.8853	659.6	99.8746	56.5	9.4
Chicago	513.4	99.9024	563.4	99.8929	50.0	9.7
Milwaukee	490.4	99.9068	538.6	99.8976	48.2	9.8
Detroit	511.7	99.9027	562.4	99.8931	50.7	9.9
Minneapolis	448.7	99.9147	492.9	99.9063	44.2	9.8
Cleveland	633.0	99.8796	694.7	99.8679	61.7	9.7
Phoenix	312.8	99.9405	335.4	99.9362	22.6	7.2
San Diego	418.4	99.9204	469.7	99.9107	51.3	12.3
Los Angeles	409.1	99.9222	469.7	99.9107	60.6	14.8
Denver	71.2	99.9865	77.2	99.9853	6.0	8.4
Sacramento	866.1	99.8353	967.3	99.8161	101.2	11.7
San Francisco	734.0	99.8604	820.3	99.8440	86.3	11.8
Portland	637.7	99.8788	717.6	99.8636	79.9	12.5
Seattle	828.1	99.8426	931.3	99.8229	103.2	12.5

Sample Results for the Satellite at 61.5 Degrees West Longitude						
	Baseline Outage (Due to rain)		New Outage (Rain plus MVDDS) Based on Regional Average EPFD		Difference in Outage	
	Minutes	Percent Availability	Minutes	Percent Availability	Minutes	Percent
Miami	804.2	99.8471	839.8	99.8403	35.6	4.4
Washington	177.8	99.9662	186.8	99.9645	9.0	5.0
New York	149.0	99.9717	157.4	99.9701	8.4	5.6
Kansas City	513.2	99.9024	548.1	99.8958	34.9	6.8
Detroit	276.1	99.9475	295.6	99.9438	19.5	7.1
Los Angeles	1616.0	99.6927	1792.0	99.6593	176.0	10.9
Seattle	9038.0	98.2816	11800.0	97.7564	2762.0	30.6

Sample Results for the Satellite at 148 Degrees West Longitude						
	Baseline Outage (Due to rain)		New Outage (Rain plus MVDDS) Based on Regional Average EPFD		Difference in Outage	
	Minutes	Percent Availability	Minutes	Percent Availability	Minutes	Percent
Seattle	8047.0	98.4700	9754.0	98.1454	1707.0	21.2
Portland	2054.0	99.6095	2640.0	99.4980	586.0	28.5
San Francisco	2619.0	99.5020	3294.0	99.3737	675.0	25.8
Los Angeles	396.0	99.9247	447.2	99.9150	51.2	12.9
Phoenix	355.0	99.9325	376.1	99.9285	21.1	5.9
Dallas	1962.0	99.6270	2110.0	99.5988	148.0	7.5
Detroit	1679.0	99.6808	1825.0	99.6530	146.0	8.7

APPENDIX H: CEA MAP



APPENDIX I: POFS PUBLIC SAFETY LICENSEES

LICENSEES (listed by call-sign)

Call Sign	Licensee	City	State
KHQ66	SANTA CLARA, COUNTY OF	PALO ALTO	CA
KMD36	SANTA CLARA, COUNTY OF	SAN JOSE	CA
KRU27	SANTA CLARA, COUNTY OF	MORGAN HILL	CA
WAM273	OKLAHOMA, STATE OF	ADA	OK
WAN212	KANSAS CITY, CITY OF	KANSAS CITY	MO
WAQ637	CALIFORNIA STATE UNIVERSITY CHICO	RED BLUFF	CA
WAQ638	CALIFORNIA STATE UNIVERSITY CHICO	CHICO	CA
WBD362	REGENTS OF THE UNIVERSITY OF CALIFORNIA	LA JOLLA	CA
WBD363	REGENTS OF THE UNIVERSITY OF CALIFORNIA	SAN DIEGO	CA
WBH636	PHILADELPHIA, CITY OF	PHILADELPHIA	PA
WBM576	PORT AUTHORITY OF NEW YORK AND NEW JERSEY	NEW YORK	NY
WBM577	PORT AUTHORITY OF NEW YORK AND NEW JERSEY	FORT LEE	NJ
WBM578	PORT AUTHORITY OF NEW YORK AND NEW JERSEY	FORT LEE	NJ
WBM579	PORT AUTHORITY OF NEW YORK AND NEW JERSEY	NEW YORK	NY
WBV242	ALASKA, STATE OF	FAIRBANKS	AK
WBV266	ALASKA, STATE OF	FAIRBANKS	AK
WCP806	REGENTS OF THE UNIVERSITY OF CALIFORNIA	SAN FRANCISCO	CA
WCP807	REGENTS OF THE UNIVERSITY OF CALIFORNIA	SAN FRANCISCO	CA
WCP808	REGENTS OF THE UNIVERSITY OF CALIFORNIA	SAN FRANCISCO	CA
WCP853	YONKERS, CITY OF	YONKERS	NY
WCP854	YONKERS, CITY OF	YONKERS	NY
WCP855	YONKERS, CITY OF	YONKERS	NY
WCP856	YONKERS, CITY OF	YONKERS	NY
WDQ35	OKLAHOMA, STATE OF	OKLAHOMA CITY	OK
WED535	WISCONSIN, STATE OF	MADISON	WI
WEE352	OKLAHOMA, STATE OF	MIAMI	OK
WEE353	OKLAHOMA, STATE OF	WELCH	OK
WEE355	OKLAHOMA, STATE OF	BARTLESVILLE	OK
WEE422	KENTUCKY, COMMONWEALTH OF	FRANKFORT	KY
WEE546	OKLAHOMA, STATE OF	GEARY	OK
WEE547	OKLAHOMA, STATE OF	EL RENO	OK
WEE548	OKLAHOMA, STATE OF	WEATHERFORD	OK
WEE841	OKLAHOMA, STATE OF	EMET	OK
WEE842	OKLAHOMA, STATE OF	DURANT	OK
WEE843	OKLAHOMA, STATE OF	FITTSTOWN	OK
WEG394	PORT AUTHORITY OF NEW YORK AND NEW JERSEY	UNION CITY	NJ
WEG805	COUNTY OF LARIMER	FORT COLLINS	CO
WEG806	COUNTY OF LARIMER	AULT	CO
WEH337	Detroit, City	DETROIT	MI
WEH808	Detroit, City	DETROIT	MI

WGT37	PHILADELPHIA, CITY OF	PHILADELPHIA	PA
WGY341	KING, COUNTY OF	SEATTLE	WA
WHC763	OKLAHOMA, STATE OF	JET	OK
WHH456	DELAWARE RIVER AND BAY AUTHORITY	NEW CASTLE	DE
WHH457	DELAWARE RIVER AND BAY AUTHORITY	NEW CASTLE	DE
WHH458	DELAWARE RIVER AND BAY AUTHORITY	NEW CASTLE	DE
WHH459	DELAWARE RIVER AND BAY AUTHORITY	NEW CASTLE	DE
WHH460	DELAWARE RIVER AND BAY AUTHORITY	NEW CASTLE	DE
WHH829	PORTLAND, CITY OF	CORBETT	OR
WHH830	PORTLAND, CITY OF	SANDY	OR
WHI239	ATLANTIC CITY HOUSING AUTHORITY	INLET	NJ
WHI241	ATLANTIC CITY HOUSING AUTHORITY	SHORE PARK	NJ
WHI504	COUNTY OF LARIMER	FORT COLLINS	CO
WHJ780	KENTUCKY, COMMONWEALTH OF	FRANKFORT	KY
WIA653	JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE	BALTIMORE	MD
WIA810	CUYAHOGA COMMUNITY COLLEGE	CLEVELAND	OH
WIA812	CUYAHOGA COMMUNITY COLLEGE	PARMA	OH
WIA813	CUYAHOGA COMMUNITY COLLEGE	CLEVELAND	OH
WIA818	CALIFORNIA STATE UNIVERSITY CHICO	CHICO	CA
WIA951	CALIFORNIA STATE UNIVERSITY CHICO	REDDING	CA
WJB70	RHODE ISLAND, STATE OF	LINCOLN	RI
WJC97	RHODE ISLAND, STATE OF	SCITUATE	RI
WNER313	BREVARD, COUNTY OF	TITUSVILLE	FL
WNER314	BREVARD, COUNTY OF	SHARPES	FL
WNES281	BREVARD, COUNTY OF	MELBOURNE	FL
WNES282	BREVARD, COUNTY OF	ROCKLEDGE	FL
WNES283	BREVARD, COUNTY OF	MELBOURNE	FL
WNES690	JACKSON COUNTY SHERIFF	JACKSON	MI
WNES691	JACKSON COUNTY SHERIFF	NAPOLEON	MI
WNES692	JACKSON COUNTY SHERIFF	GRASS LAKE	MI
WNES693	JACKSON COUNTY SHERIFF	BROOKLYN	MI
WNES695	JACKSON COUNTY SHERIFF	JACKSON	MI
WNES696	JACKSON COUNTY SHERIFF	SPRINGPORT	MI
WNTK229	PENNSYLVANIA, COMMONWEALTH OF	HARRISBURG	PA
WOW71	SANTA CLARA, COUNTY OF	SAN JOSE	CA
WOW72	SANTA CLARA, COUNTY OF	SAN JOSE	CA
WOW73	SANTA CLARA, COUNTY OF	SAN JOSE	CA
WPO93	PORT AUTHORITY OF NEW YORK AND NEW JERSEY	NEW YORK	NY
WPP84	OKLAHOMA, STATE OF	WILBURTON	OK
WPZ80	HOUSTON, CITY OF	HOUSTON	TX

APPENDIX J: A METHOD TO CALCULATE MVDDS EPFD CONTOURS

Description of Methodology Used To Compute EPFD Contour.

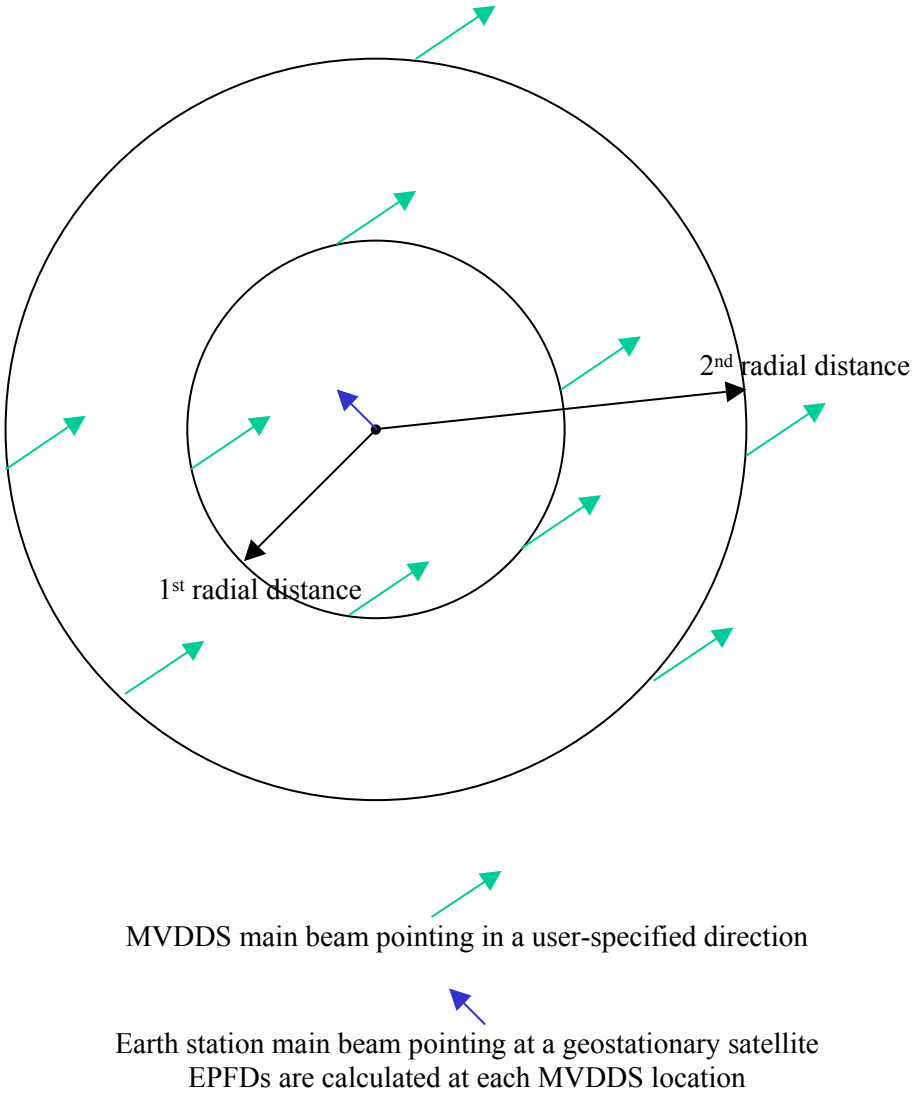
This computer model calculates the area around an MVDDS transmitting antenna where the specified EPFD limit may be exceeded within a DBS subscriber's earth station (DBS receive dish). This generally occurs when the DBS earth station has a direct line of sight to the MVDDS transmitting antenna and its distance and orientation relative to the MVDDS transmitting antenna are such that the MVDDS signal exceeds the specified EPFD limit.

The model calculates the MVDDS EPFD for all azimuths around the MVDDS transmitting antenna and a range of distances between the MVDDS transmitting antenna and the DBS earth station. These calculated EPFDs are then used to draw the contour within which the user specified EPFD level may be exceeded. The contour calculation is for the worst case, which assumes free space propagation loss and no cross polarization isolation. The program allows the user to specify antenna gain patterns for the MVDDS transmit antenna as well as the DBS earth station, so long as the data is in the format shown in Annex I. Mathematical details of the computational methods used are presented in Annex II and sample EPFD contour plots are shown in Annex III. The model was programmed using MATLAB and is available for downloading from the Commission's web site at http://www.fcc.gov/oet/dockets/et98-206/.

General Description of Model Methodology

Figure 1 presents a pictorial description of the general layout of the model. It shows the relative positions and orientations of the MVDDS transmitting antenna and DBS earth station within the model. This figure should be used as a reference throughout the following discussion.

Figure 1: Top View of System Configuration



The DBS earth station is located at a fixed location (user-specified latitude, longitude, and height above mean sea level (AMSL)) and points at a specified geostationary satellite. The MVDDS antenna is located at various positions around the DBS earth station and points in a specified azimuth direction (the user also specifies a tilt angle and AMSL). The algorithm places the MVDDS transmitting antenna a far distance from the DBS earth station and then computes the EPFD at each azimuth, in user-specified degree increments, as it is revolved around the DBS earth station. After EPFDs are computed for all azimuths, the MVDDS transmitting antenna is moved closer to the DBS earth station and the process is repeated. This process repeats until the MVDDS antenna reaches a user-specified distance from the DBS earth station.

Note: For simplicity in the modeling process, our implementation revolves the DBS earth station around the MVDDS transmitter. In practice, the EPFD contour must reflect the situation where a DBS earth station is revolved around the MVDDS transmitting antenna. In both cases, the shape of the EPFD

contour, over the distances of interest, is identical,[688] but the orientations are inverted in the North/South and East/West directions. Therefore, by relabeling the axes of the EPFD contour plot, one obtains the necessary plot.

Model Computations

A. The EPFD is calculated using the following equation:

$$EPFD = \frac{P_{out} * G_m(\theta_m,\phi_m) * G_e(\theta_e,\phi_e) * I}{G_{e,max} * 4\pi * d^2}$$

Where:

P_{out} = Total output power of the MVDDS transmitter (watts) into antenna

$G_m(\theta_m,\phi_m)$ = Gain of the MVDDS antenna in the direction of the DBS earth station

θ_m and ϕ_m are in polar coordinates. θ_m is the angle from the Z axis (θ_m =0°). The main beam of the MVDDS antenna is aligned with the X axis (θ_m =90°, ϕ_m =0°).

$G_e(\theta_e,\phi_e)$ = Gain of the earth station in the direction of the MVDDS antenna

θ_e and ϕ_e follow the same conventions as θ_m and ϕ_m.

I = Interference scaling factor for the earth station.[689] A detailed explanation of this term can be found in Section 3.3.2 of the MITRE Report (http://www.fcc.gov/oet/info/mitrereport/mitrereport_4_01.pdf)

$G_{e,max}$ = Maximum gain of the DBS earth station

d = the distance between the MVDDS transmitting antenna and the DBS earth station (meters)

B. The antenna gain pattern of the MVDDS transmitting antenna and DBS earth station are described in ASCII text files, which are entered as input variables. An example gain input file is shown in Annex I.

C. Azimuth and elevation angles of the DBS earth station and MVDDS transmitting antenna are defined and computed as follows (*see* Figure 2):

[688] This result occurs because the change in elevation angle of the DBS earth station over the distance of an MVDDS service area is negligible. For example, the elevation angle of a DBS earth station in Washington, DC (38.9° north latitude, 77.0° west longitude, 0.01 km AMSL) pointed toward the satellite at 101° west longitude is 38.52 degrees. If that earth station were moved 20 miles east (38.9° north latitude, 76.63° west longitude, 0.01 km AMSL), the elevation angle changes by 0.19 degrees to 38.33 degrees. Because MVDDS service areas will generally be much less than 20 miles across, the difference between the elevation angles of earth stations at the edges of the service area will be even less.

[689] The interference scaling factor is 1 dB for MVDDS transmitters employing the modulation discussed in Section 3.1.5 of the MITRE Report (*i.e.*, a QPSK modulated signal passed through a square-root raised cosine filter). For other modulation and filtering schemes, the interference scaling factor can be measured using the procedures described in Appendix A of the MITRE Report.

1. The user specifies the latitude, longitude, and height AMSL of the DBS earth station. Additionally, the user specifies the longitude of the geostationary satellite to which the earth station should point.

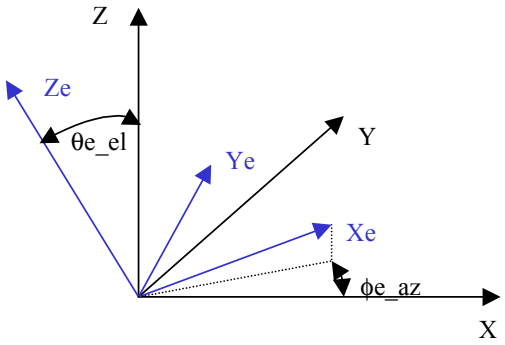
2. The elevation angle of the DBS earth station, θe_el, is the angle from the horizon to the main beam of the DBS earth station.

3. The azimuth angle of the DBS earth station, ϕe_az, is the angle from the projection of geographic south on the horizon to the projection of the main beam on the horizon.

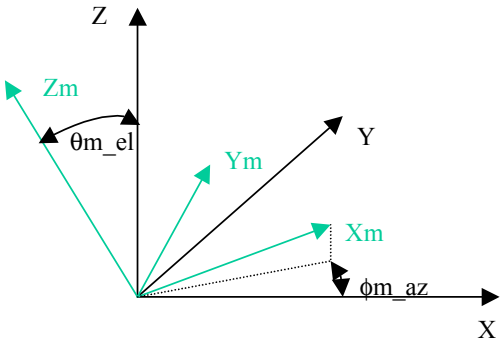
4. The tilt angle (θm_el) and the azimuth (ϕm_az) of the MVDDS antenna are user-specified input variables; defined by the same conventions as θe_el and ϕe_az.

5. The method used to calculate angles θ_e, ϕ_e, θ_m, and ϕ_m for all geometric configurations of the DBS earth station and the MVDDS transmitting antenna is presented in Annex II. (Note: Because calculated θ_e, ϕ_e, θ_m, and ϕ_m may not exactly match the values of these angles present in the input antenna gain files, a linear interpolation is performed to determine the values of $G_e(\theta_e, \phi_e)$ and $G_m(\theta_m, \phi_m)$ used in the EPFD calculation.

Figure 2: Azimuth and Elevation Angles



DBS Earth Station
Main Beam is aligned with Xe axis



MVDDS Transmitter
Main Beam is aligned with Xm axis

D. The EPFD for each of the geometric configurations is calculated and stored in a matrix. Once all EPFDs are calculated, the matrix is searched, along each azimuth radial, beginning at the farthest distance from the DBS earth station. At each distance, the calculated EPFD is compared to the user-specified threshold EPFD.

If the calculated EPFD is less than the threshold EPFD, then the EPFD at the next point closer to the MVDDS transmitting antenna along the same azimuth radial is compared to the threshold EPFD.

If the calculated EPFD is greater or equal to the threshold EPFD, then that MVDDS antenna location is plotted on a polar graph.

If the threshold EPFD is not exceeded at any distance along a given azimuth radial, then a point is plotted at the origin of the polar graph (the location of the DBS earth station)

This process is repeated until all azimuth radials have been checked.

Note: The described algorithm plots the first point it finds that exceeds the EPFD threshold for each azimuth radial and then moves on to the next azimuth radial. It is possible that if the EPFDs along a given azimuth are compared to the threshold at distances closer than this plotted point, the calculated EPFD could become lower than the threshold and then higher again (creating 'holes' within the larger contour where the EPFD limit is not exceeded). These 'holes' are not plotted under the current implementation of our model.

Annex I: Sample Antenna Gain Input File

Antenna gain data is provided over the complete sphere as a function of spherical coordinate angles in arbitrary incremental steps. As shown in Figure 2, the antenna is oriented so that the main beam is aligned with the X axis.

θ is the angle from the z axis in degrees.

ϕ is the angle of the projection onto the XY plane relative to the X axis.

Gain (dBi) is defined for each θ, ϕ, polarization, and frequency.

θ	ϕ	Gain	θ	ϕ	Gain	θ	ϕ	Gain	θ	ϕ	Gain
0	-180	0.79	54	-180	-19.2	108	-180	-25	162	-180	-29.7
1	-180	0.96	55	-180	-24.5	109	-180	-23.2	163	-180	-36.8
2	-180	0.95	56	-180	-27.1	110	-180	-23.5	164	-180	-35.6
3	-180	0.81	57	-180	-24.7	111	-180	-26.5	165	-180	-39.9
4	-180	0.45	58	-180	-32.8	112	-180	-23.9	166	-180	-40.5
5	-180	-0.15	59	-180	-31.3	113	-180	-22.3	167	-180	-29.4
6	-180	-0.38	60	-180	-20.5	114	-180	-22.5	168	-180	-24.6
7	-180	-0.66	61	-180	-19.3	115	-180	-22.7	169	-180	-24.3
8	-180	-1.8	62	-180	-19.6	116	-180	-24.2	170	-180	-31.9
9	-180	-2.72	63	-180	-17.4	117	-180	-29.2	171	-180	-32.3
10	-180	-2.93	64	-180	-20.2	118	-180	-32.8	172	-180	-25.8
11	-180	-3.1	65	-180	-16.2	119	-180	-29.5	173	-180	-26.3
12	-180	-3.93	66	-180	-14	120	-180	-26.7	174	-180	-28.8
13	-180	-5.49	67	-180	-11.7	121	-180	-25.2	175	-180	-32.5
14	-180	-5.91	68	-180	-10.3	122	-180	-24.5	176	-180	-59.6
15	-180	-5.38	69	-180	-12.3	123	-180	-24.8	177	-180	-34.1
16	-180	-6.67	70	-180	-182	124	-180	-25.6	178	-180	-31.4
17	-180	-9.66	71	-180	-24.3	125	-180	-27.2	179	-180	-35
18	-180	-8.43	72	-180	-20.8	126	-180	-33.6	180	-180	-37.5
19	-180	-7.21	73	-180	-14.4	127	-180	-35.6	0	-179	0.79
20	-180	-9.32	74	-180	-20.8	128	-180	-30.6	1	-179	0.96
21	-180	-11.3	75	-180	-21.1	129	-180	-30.7	2	-179	0.95
22	-180	-10.3	76	-180	-20.9	130	-180	-29.5	.	.	
23	-180	-12.2	77	-180	-26.5	131	-180	-28.9	.	.	
24	-180	-13	78	-180	-25.1	132	-180	-30.5	.	.	
25	-180	-11.6	79	-180	-25.2	133	-180	-35	180	180	
26	-180	-12.2	80	-180	-23.7	134	-180	-33.7			
27	-180	-15.5	81	-180	-21	135	-180	-36.8			
28	-180	-12.1	82	-180	-23.6	136	-180	-36.6			
29	-180	-11.1	83	-180	-21.9	137	-180	-33.9			
30	-180	-14.9	84	-180	-22.4	138	-180	-32.1			
31	-180	-16.1	85	-180	-21	139	-180	-32.4			
32	-180	-11.3	86	-180	-22.1	140	-180	-36.8			
33	-180	-13	87	-180	-20.9	141	-180	-46.6			
34	-180	-15.3	88	-180	-22.7	142	-180	-49.7			
35	-180	-12	89	-180	-24.8	143	-180	-34.3			
36	-180	-12.5	90	-180	-22.5	144	-180	-32.8			
37	-180	-15.5	91	-180	-19.9	145	-180	-32.1			
38	-180	-9.89	92	-180	-20.1	146	-180	-32			
39	-180	-9.51	93	-180	-17.4	147	-180	-34.3			
40	-180	-12.1	94	-180	-18.4	148	-180	-39.9			
41	-180	-7.12	95	-180	-16.6	149	-180	-41.5			
42	-180	-4.24	96	-180	-17.3	150	-180	-36.1			
43	-180	-5.76	97	-180	-17.8	151	-180	-35			
44	-180	-12.2	98	-180	-18.3	152	-180	-38			
45	-180	-16	99	-180	-19.8	153	-180	-45.8			
46	-180	-13.8	100	-180	-22	154	-180	-50.6			
47	-180	-19	101	-180	-22	155	-180	-45.1			
48	-180	-16.7	102	-180	-23.2	156	-180	-42.4			
49	-180	-16.7	103	-180	-27.5	157	-180	-44.6			
50	-180	-23.4	104	-180	-24.4	158	-180	-46.7			
51	-180	-18.1	105	-180	-25.6	159	-180	-56.8			
52	-180	-19.5	106	-180	-25.8	160	-180	-49.6			
53	-180	-23.2	107	-180	-24.7	161	-180	-27.1			

Annex II: Method Used to Calculate θ_e , ϕ_e , θ_m , and ϕ_m

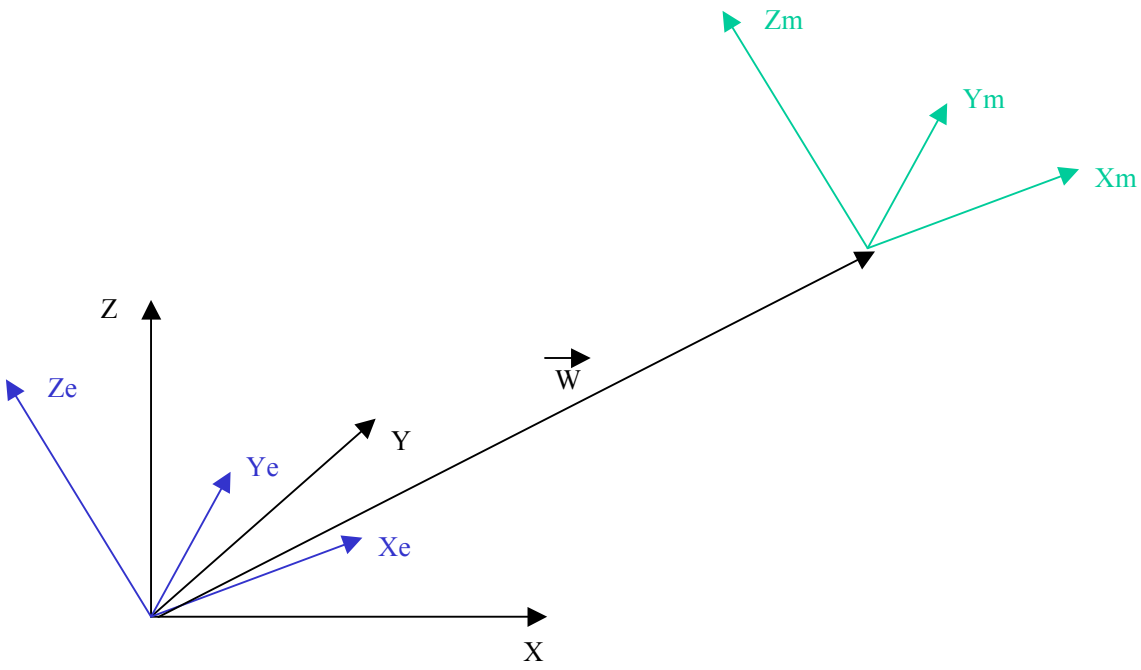
Three coordinate systems are defined and vector analysis is used to determine θ_e , ϕ_e , θ_m , and ϕ_m. These coordinate systems, depicted in Figure 3 are:

1. (X, Y, Z), represents the earth, where X is geographic south and Y is geographic east, and Z is a perpendicular to the surface of the earth.
2. (Xe, Ye, Ze) represents the DBS earth station with its main beam aligned with the Xe axis.
3. (Xm, Ym, Zm) represents the MVDDS transmit antenna with its main beam aligned with the Xm axis.

Note: Coordinate systems (Xe, Ye, Ze) and (Xm, Ym, Zm) are in the same orientation as the antenna gain input files.

The Vector W, is the vector between coordinate systems (Xe, Ye, Ze) and (Xm, Ym, Zm) which connects the two antennas.

Figure 3: Relationship Between the Coordinate Systems



In this Figure, the earth station has an arbitrary azimuth angle (ϕe_az) and an arbitrary elevation angle (θe_el) which are calculated based on its latitude, longitude, height AMSL, and satellite to which it is pointing. The MVDDS antenna also has an arbitrary azimuth angle (ϕm_az) and an arbitrary tilt angle (θm_el), which are user-specified inputs.

(a) Computational Method

To determine θ_e, a dot product operation between W and Ze is performed.

To find ϕ_e, an arctan operation between Wy and Wx is performed.
The same process is used to calculate θ_m, and ϕ_m, except in this case W is negative.

The detailed computational method is presented below.

DBS Antenna:

$$\vec{X}e = \cos(\theta e\_el) * \cos(\phi e\_az) * \vec{X} + [\cos(\theta e\_el) * \sin(\phi e\_az)] * \vec{Y} + \sin(\theta e\_el) * \vec{Z}$$

$$\vec{Y}e = -\sin(\phi e\_az) * \vec{X} + \cos(\phi e\_az) * \vec{Y}$$

$$\vec{Z}e = -[\sin(\theta e\_el) * \cos(\phi e\_az)] * \vec{X} - [\sin(\theta e\_el) * \sin(\phi e\_az)] * \vec{Y} + \cos(\theta e\_el) * \vec{Z}$$

Solve for X, Y, and Z:

$$\vec{X} = [\cos(\phi e\_az) * \cos(\theta e\_el)] * \vec{X}e - \sin(\phi e\_az) * \vec{Y}e - [\cos(\phi e\_az) * \sin(\theta e\_el)] * \vec{Z}e$$

$$\vec{Y} = [\cos(\theta e\_el) * \sin(\phi e\_az)] * \vec{X}e + \cos(\phi e\_az) * \vec{Y}e - [\sin(\phi e\_az) * \sin(\theta e\_el)] * \vec{Z}e$$

$$\vec{Z} = \sin(\theta e\_el) * \vec{X}e + \cos(\theta e\_el) * \vec{Z}e$$

$$\theta_e = \arccos\left[\frac{\left(\vec{W}e \bullet \vec{Z}e\right)}{\left|\vec{W}e\right| * \left|\vec{Z}e\right|}\right]$$

$$\phi_e = \arctan\left(\frac{\vec{W}_y}{\vec{W}_x}\right)$$

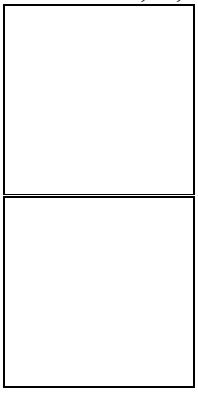
MVDDS antenna:

$$\vec{X}m = \cos(\theta m\_el) * \cos(\phi m\_az) * \vec{X} + [\cos(\theta m\_el) * \sin(\phi m\_az)] * \vec{Y} + \sin(\theta m\_el) * \vec{Z}$$

$$\vec{Y}m = -\sin(\phi m\_az) * \vec{X} + \cos(\phi v\_az) * \vec{Y}$$

$$\vec{Z}m = -[\sin(\theta m\_el) * \cos(\phi m\_az)] * \vec{X} - [\sin(\theta m\_el) * \sin(\phi m\_az)] * \vec{Y} + \cos(\theta m\_el) * \vec{Z}$$

Solve for X, Y, and Z:



Annex III: Sample EPFD Contour Plots

A sample EPFD contour plot is presented for one city in each of the regions defined in the *Second Report and Order*. These are Washington, DC in the East, Indianapolis, IN in the Midwest, Phoenix, AZ in the Southwest, and Seattle WA in the Northwest. Unless indicated, each of these plots represents the worst-case (or largest zone); the MVDDS transmit antenna and the DBS earth station are at the same height AMSL. In addition, plots for Washington DC show the effect on the size of the EPFD contour of different DBS receive antennas and when the MVDDS transmitting antenna is raised 50 meters above the DBS earth station.

Each plot is drawn under the following conditions:

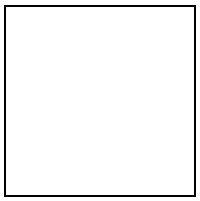
DBS earth station antenna pattern: 18 inch single feed, 24x18 inch single and dual feed (as indicated on plot)
DBS antenna pattern data is available for downloading at http://www.fcc.gov/oet/info/mitrereport/

MVDDS transmitting antenna pattern: Northpoint large sector horn (as measured by MITRE)
Antenna pattern data as measured by MITRE is available for downloading at http://www.fcc.gov/oet/info/mitrereport/

DBS earth station pointing toward the satellite at 110^{o} West Longitude
MVDDS transmitter pointing toward geographic South

In all cases, these plots are drawn by revolving the MVDDS transmitter around a DBS earth station. As explained above, the EPFD contour is inverted prior to plotting.

Figure 1: Washington, DC EPFD Contour Using Eastern Region EPFD.
MVDDS Transmit and DBS Receive (18-inch Reflector) Antennas Are At Same Height.



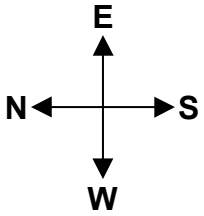
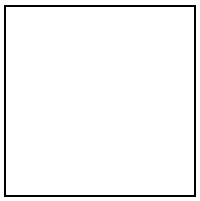


Figure 2: Indianapolis, IN EPFD Using Midwestern Region EPFD.
MVDDS Transmit and DBS Receive (18-inch Reflector) Antennas Are At Same Height.



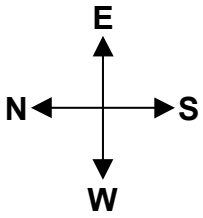
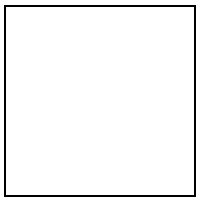


Figure 3: Phoenix, AZ EPFD Contour Using Southwestern EPFD.
MVDDS Transmit and DBS Receive (18-inch Reflector) Antennas Are At Same Height.



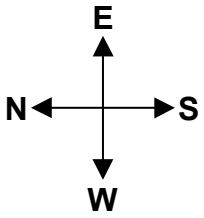
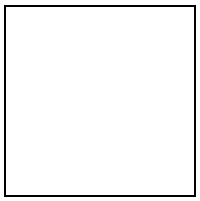


Figure 4: Seattle, WA EPFD Contour Using Northwestern EPFD.
MVDDS Transmit and DBS Receive (18-inch Reflector) Antennas Are At Same Height.



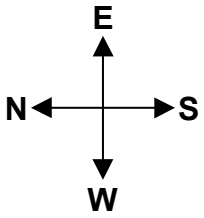
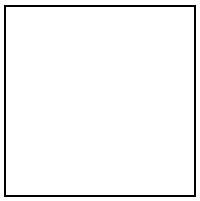


Figure 5: Washington, DC EPFD Contour Using Eastern Region EPFD.
MVDDS Transmit Antenna is 50 Meters higher than DBS Receive (18-inch Reflector) Antenna.



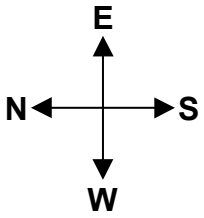
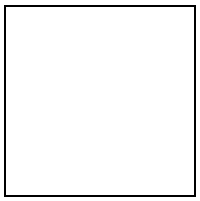


Figure 6: Washington, DC EPFD Contour Using Eastern Region EPFD.
MVDDS Transmit and DBS Receive (24 x 18-inch Reflector With Single Feed) Antennas Are At Same Height.



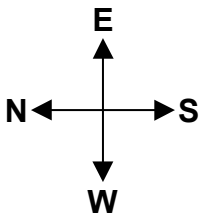
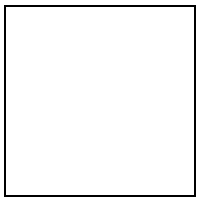
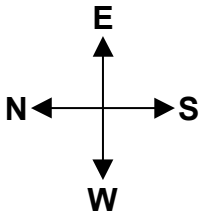


Figure 7: Washington, DC EPFD Contour Using Eastern Region EPFD.
MVDDS Transmit and DBS Receive (24 x 18-inch Reflector With Dual Feed) Antennas Are At Same Height.





JOINT STATEMENT OF CHAIRMAN MICHAEL POWELL AND COMMISSIONER KATHLEEN Q. ABERNATHY

In re: 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 (ET Docket No. 98-206, RM-9147, RM-9245) (rel. May 23, 2002).

This proceeding has challenged the Commission to balance conflicting goals, promote competition through new technology, and minimize interference to existing licensees. We believe the Commission and its excellent staff have done an admirable job.

Nonetheless, we believe a few aspects of the decision deserve particular attention. First, the Commission has wisely chosen not to saddle the new Multichannel Video Distribution and Data Service (MVDDS) with regulatory burdens based on the types of services some expect it to provide. Instead the Commission has exercised regulatory restraint to allow MVDDS to evolve in the marketplace first and as a topic of regulation second. In addition, we believe the Commission wisely adopted strict interference rules for MVDDS operations to ensure a regulatory regime that is clear and enforceable, yet flexible. Although many well-intentioned proposals were considered, including compensation formulas, mandated service calls, mitigation zones and hundreds of precision measurements, we believe the Commission correctly chose the best approach in this Order that limits the equivalent power flux density (EPFD) at DBS receive sites. Although there has been some criticism of certain variables used in the technical analysis, we believe the Commission's engineering staff has developed a reasonable calculation methodology consistent with best engineering practices and the record in this proceeding.

What is MVDDS?

The short answer is that we do not know. Its name, Multichannel Video Distribution and Data Service, seems to suggest everything is possible – and perhaps it is. But the service rules the Commission has adopted do not require MVDDS to provide any particular kind of service – it could be a multichannel video, or data, or digital radio service, or any other permutation on spectrum use. The Commission was once in the business of requiring spectrum holders to provide a certain type of service. That approach failed because government is a very bad predictor of technology and markets – both of which move a lot faster than government. Over the past decade or so, the Commission has adopted more flexible service rules that bound a service based largely on interference limitations and its allocation (fixed or mobile, terrestrial or satellite). In this Order, we follow that flexible model for MVDDS.

Regardless of the type of service MVDDS ultimately is, if successful, it has remarkable potential to benefit the American people.

If successful, MVDDS creates the possibility of an additional competitive provider of MVPD service. That service is now dominated by the satellite and cable platforms. In turn, consumers spend a significant amount of their communications budget on these services. In response to the limited intermodal competition for MVPD services, the Commission has long sought to facilitate the development of a terrestrial wireless alternative, with limited success. MVDDS offers the possibility of another MVPD alternative.

Yet it is also quite possible that MVDDS will be used to provide a one-way data path for broadband services. Today that market too is dominated by two platforms – cable and wireline telephony. As demand for broadband increases, it will become increasingly important to Americans' communications needs. The Commission has sought to facilitate the development of a wireless alternative, thus far with limited success. MVDDS offers the possibility of another broadband alternative.

Because the Commission has not dictated what type of service MVDDS will become, we believe it is premature to impose obligations inherent in other service offerings (like Title VI cable television regulation or Title II common carrier regulation). For example, imposing must carry obligations on a broadband service does not serve the public interest; nor would open access be a reasonable regulation of MVPD service. Moreover, some mandates – such as must carry – are statutorily limited to certain platforms (such as cable or satellite).[690] It is not at all clear that we have the statutory authority to impose these obligations on other MVPD providers, such as MVDDS. Since we do not believe it is desirable or necessarily legal to impose these obligations, we would not do so here. Moreover, potential individual licensee's business plans should not guide Commission policy because the Commission cannot know who will prevail at auction. Developing service rules based on one applicant's business plan, even with the best of intentions, may inadvertently tip the auction in their favor. If MVDDS ultimately offers a service that fits squarely into one of our regulatory boxes, we can assess what additional regulatory safeguards, if any, are required. In the meantime, we are not troubled that a nascent service may initially not be constrained by legacy regulatory strictures.

Relatedly, we do not support adopting a rule barring DBS providers from holding an MVDDS license. We are generally extremely reluctant to artificially limit auction participants for any reason. We agreed to limit cable providers ability to bid in their own regions based on the well-reasoned economic analysis in the Order. In contrast, DBS providers explain that they may well have a need for a terrestrial MVDDS component as either a broadband pipe or as an alternative path to carry even more local signals. DBS providers contend that they are currently capacity constrained for broadband offerings and comprehensive local-into-local service. Indeed, the original vision for the new, terrestrial use of this spectrum was as a method for DBS licensees to get local broadcast signals to their subscribers.[691] Based on these factors, the best course is to allow DBS the opportunity to hold these licenses. There are two important caveats to this policy. First, MVDDS networks should not be utilized by DBS providers as a means of avoiding their carry-one carry-all responsibilities. Second, in the event that the EchoStar-DirecTV merger is approved, the Commission may need to re-examine the eligibility of the combined provider to bid for MVDDS. With these two caveats, we believe open eligibility to DBS best serves the interests of the American people by providing an alternative method to expand broadband and local broadcast carriage.

DBS Installations More than Thirty Days After MVDDS Begins Service

The dissent raises a legitimate concern about the fate of DBS antennas installed more than thirty days after initiation of MVDDS service.[692] The interference limits in the new rules will apply to all existing DBS customers 30 days after the MVDDS provider notifies the DBS carriers that it intends to construct a tower. During this period, the MVDDS provider is responsible for ensuring that no DBS customers will experience greater than the mandated EPFD limit at the site of each DBS antenna. It is important to recognize that there may be substantial variation in the amount of interference based on antenna placement. That is, an antenna placed on an exposed roof may exceed the EPFD limit, while an antenna under the eaves of the same roof may not. Once the DBS provider is on notice of the pending MVDDS tower, it is reasonable to expect the DBS provider to place future antenna dishes so as to ensure that interference is minimized. The burden on DBS to act responsibly to avoid interference is consistent with

[690] See 47 U.S.C. § 614 (cable); 47 U.S.C. § 338 (satellite).

[691] See Northpoint Petition for Rulemaking, RM 9245, filed March 6, 1998.

[692] The term "dissent" here and subsequently refers to Commissioner Martin's dissent.

the approach we have taken for similarly situated services and is consistent with our statutory charge.[693] In contrast, if we were to require the EPFD limit to be met for DBS antennas installed more than 30 days after notice of the MVDDS tower's construction, each MVDDS tower could be forced to "turn off" whenever a customer places their DBS antenna such that the EPFD limit is violated. Since DBS and MVDDS are likely competitors, the ability of any single DBS customer to force MVDDS off the air due to poor antenna placement would render the service unworkable.[694] Whether by preventing MVDDS deployment in certain areas or showing some interference to new DBS deployments, there will be some limitations on each service as a result of our decision today. These are difficult choices – but we believe getting a new competitor for the vast majority of the American people outweighs the possible loss of a single competitor for a few.[695]

Calculation Methodological Concerns

Interference issues are among the most vexing public policy problems this agency faces. The Commission has defined "harmful interference"[696] – but our service rules are generally based on a permissible level of interference that far more narrowly restricts operations. Here the Commission has followed the permissible interference course and determines that MVDDS service should not exceed an EPFD limit set in each of four regions.[697] The EPFD limits are designed to limit the increase in average outage times to an average of 10%. Therefore if the average consumer loses service for 10 minutes a year, the EPFD figure is calculated so that the average increase would be to no more than 11 minutes of total outage a year. The 10% figure and the Commission's calculation methodology echoes the

[693] The Commission elsewhere requires primary users to incorporate protective measures, up to and including antenna replacement, to avoid receiving harmful interference. See, e.g., 47 C.F.R. 74.937(a) ("Should interference occur and it can be demonstrated that the existing [primary ITFS] receiving antenna is inadequate, a more suitable antenna should be installed. In such cases, installation of the new receiving antenna will be the responsibility of the [ITFS] system operator serving the receive site."); 47 C.F.R. 101.115(d) ("The Commission shall require the replacement of any [primary Fixed microwave directional] antenna . . . that does not meet performance Standard A . . . at the expense of the licensee operating such antenna, upon a showing that said antenna [is likely to] receive interference from . . . any other authorized antenna or applied for station whereas a higher performance antenna is not likely to involve such interference."); 47 C.F.R. 90.361 (finding that primary multilateration LMS systems cannot claim harmful interference from parts 15 and 97 operations that operate under certain conditions).

[694] The dissent notes that the majority "allows MVDDS licensees to cause harmful interference . . after one year . . . even if it is caused by a change in MVDDS operation." Yet the Order concluded that any major modification would trigger a new one year period during which complaints could be filed. Major modifications include: any change in frequency tolerance, bandwidth, emission type, transmit antenna height more than 3 meters, antenna polarization, in the radius of a circular area of operation, or any change in any other kind of area operation. See 47 CFR § 1.929(d)(1).

[695] A similar argument applies to DBS interference complaints that arise more than a year after the MVDDS service is installed. Any interference issues should be detected and repaired in a reasonable time – and providing all parties a year to "get it right" strikes a reasonable balance of the interests.

[696] See 47 C.F.R. 2.1 ("harmful interference" is defined as "interference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades obstructs, or repeatedly interrupts a radiocommunication service.. .. ") Harmful interference has never been defined on a service specific basis. Therefore the dissent's criticism of our "failure" to do so here also rings hollow. Prior to initiation of service and for one year thereafter, existing DBS subscribers may bring a claim asserting MVDDS has exceeded the EPFD limit. The MVDDS base transmitter must then turn off if it exceeds the cap.

[697] The four regions were created to account for variations in DBS reliability due to changes in rainfall and the satellite power and antenna gain pattern for different locations.

international approach adopted in this band for NGSO/DBS sharing.[698] The 10% figure is also significantly less than the variation in outage times between different parts of the country, different satellites, different providers or weather variations in a given region from year to year. For example, the outage levels from different DBS dishes serving New York currently vary dramatically: 200.1 minutes per year from the satellite at 101°, 1323.6 minutes per year from the satellite at 110°, and 822.1 minutes per year from the satellite at 119°. Based on this multitude of variables, the Commission adopted rules that create average interference thresholds. Of course, in some averaged areas, the outage time will be less and in other areas more.

To the extent that individual market areas have rain or other characteristics not adequately captured by the regional EPFD limits, the Commission has adopted a safety valve approach that allows licensees to petition the Commission for a distinct EPFD limit for that license area.[699]

The Commission's calculations are very conservative and likely overstate the amount of additional interference that will result from MVDDS operations. None of these calculations take into account any natural shielding or manmade attenuation that occurs for the vast majority of DBS antennas. Our calculations essentially assume the worst case scenario – that no attenuation due to natural shielding or manmade structures occurs. This is a highly unlikely event and as a result the model will generally overstate the amount of increased interference that any individual DBS subscriber may experience. The Commission model also adopted a conservative assumption regarding a second key variable – the relative strength of the DBS and MVDDS signals. The model assumed a rain-faded DBS signal and a full strength MVDDS signal. Yet rain would likely impact the MVDDS signal as well, further reducing outage times.

The dissent attempts to make much of the alleged imprecision of the Commission's EPFD figures and the alleged corresponding lack of protection for DBS subscribers. While these arguments may seem facially persuasive, the Order adopts a more sound approach. As an initial matter, the dissent fails to describe how it would calculate these figures, and instead second-guesses our engineering staff's calculations. It appears, however, that one of the dissent's proposed alternatives would be to impose a "hard and fast" 10% limit per service area. Even putting aside the failure to acknowledge the conservative assumptions about shielding and the strength of the MVDDS signal set out above, there is no technical way to achieve, in all cases and in all circumstances, the "hard and fast" 10% limit the dissent claims as its goal. As in all of our proceedings where the Commission grants licensees the privilege of accessing public airwaves that are necessarily shared with others, it strives to achieve rational sharing rules. And in all cases the licensees utilize the spectrum with the knowledge that interference protection will not be exactly the same across the country with diverse terrain and atmospheric conditions.

Fundamentally, the dissent's two stated goals are mutually exclusive. The very use of any generalized formula requires that some consumers will experience a greater than 10% increase in outage times. For example, even if the Commission were to average the satellite orbital position, power, and antenna gain pattern across five DBS satellites (as the dissent argues), any individual DBS customer is likely only to receive service from one. Then, under this standard, by definition some subscribers would experience greater than 10% interference, thereby violating the steadfast limit. Similarly, in 2001 Louisville

[698] The DBS community reached a voluntary agreement on NGSO/DBS sharing with the same 10% figure. The 10% for NGSOs is also an "average" and is based on the construction and operation of 3.5 NGSO systems. In that case, the parallel calculations were based on data from 14 U.S. cities – rather than the 32 cities used for our calculations here.

[699] Significantly the sum total of the entire range of EPFDs across all 32 markets and all three satellites is less than 8 dB. We note that DBS providers would have the right to petition for special relief from our rules even if we chose not to adopt a specific safety valve procedure. *See, e.g.,* 47 CFR §§ 1.2, 1.3.

Kentucky may have received 50 inches of rain, and the dissent would have us base that service area's EPFD limit on last year's rainfall amount. Yet this year Louisville may receive half that amount, resulting in a significant increase in the outage time percentage for the entire service area – once again, violating the steadfast limit. So even if one believes in a "hard" limit – there is no practical sustainable way of achieving it.[700] In fact, it would seem to require an impossibly burdensome and complex individualized real-time dynamic measurement at each DBS subscriber's home.

If we move beyond these inconsistencies, it appears the dissent's concerns are not with the formula used to calculate the EPFD limits – rather the concerns are with weather prediction and failure to include two DBS satellite orbital locations in the interference calculation. Thus, it is the input data points for two variables in the formula – rather than the calculation itself that appears to motivate the dissent.

The EPFD limits are based on at least seven key variables – satellite orbital position, power, antenna gain pattern, receiver elevation angle, antenna size, gain and pattern, and a propagation and rain model. Each DBS customer has a unique combination of these variables – plus a unique shielding pattern based on where the dish is installed, etc. So even assuming some of the variable modifications in the dissent were adopted, there would still be thousands of customers that would have interference levels above and below what the model produces. Each customer has a distinct combination of a particular satellite with a particular orbital position, power and antenna gain pattern. Each customer would also have distinct receiver elevation angle, antenna size, gain and pattern. Finally each customer has distinct weather conditions.[701]

Fundamentally, the dissent is mostly concerned about the imprecision of weather forecasting. While we recognize that reasonable people can disagree about the best method, the Commission has exercised its reasoned technical judgment with the advice and consultation of the FCC engineering staff to arrive at the regionalized rainfall estimates. The dissent argues that the Commission should predict annual rainfall in each of 354 areas.[702] Others argued that the Commission should conduct measurements at each MVDDS transmitter. We believe that a regionalized approach that divides the country into four rainfall zones is appropriate. Yet rainfall varies significantly from year to year and even within the same region. The Commission used the top 32 cities to generate the regionally averaged rainfall data. When plotted they appeared to cluster into four sets, each representing a relatively small incremental change in EPFD characteristics. For example, under the -172.1 EPFD limit for the Northwest, there is a 9.3% average potential increase in outage times in Sacramento, 9.8% in Seattle, 9.9% in Portland, and 10.5% in San Francisco. Our engineering staff also did some random sampling of additional locales to confirm the legitimacy of the regional figures. For example, applying the regional average to Alaska yields an average increase in outage times of 5.4% and for Hawaii 11.5%. As a technical matter these measurements confirm that the overall rainfall data and the regionalized figures are reasonable. Although more data points (through the addition of more locales or the tower-by-tower approach) could be added, we believe they would add little to the accuracy of the EPFD.

[700] Similarly the dissent criticizes the model for failing to weight the rainfall data based on the population. For example by weighting Los Angeles at four times the weight given to Denver based on population. Yet if such weighting were to occur it would only further diminish the weight given to the rural areas that the dissent later argues need to be given greater weight.

[701] Obviously each customer also has a unique DBS antenna mount with particularized shielding and protection dynamics that are not accounted for in any proposed formula. These protections make the actual occurrence of the predicted interference levels unlikely.

[702] The dissent's most recent draft adds the failure to use Nielsen's Designated Market Areas (DMAs) to its criticisms. Although we are sympathetic to the use of DMAs, the Commission does not have a blanket licenses from Nielsen to use these designations. The Commission pursued possible use of DMAs with Nielsen during this proceeding, but ultimately concluded that use of DMAs could raise copyright infringement issues. To the extent the FCC can overcome this legal hurdle, the use of DMAs may well serve the public interest.

The assertion that the Order "ignored" two satellites is inaccurate. The Commission decided to utilize three satellites because those three (101, 110 and 119) are the only orbital locations with full coverage of the United States and provide the overwhelming majority of service to DBS subscribers today.[703] Including the two satellites would actually make the ultimate calculations less precise because they would give equal weight to satellites that do not provide service to a similar number of consumers. In order to assure that customers receiving service from these two satellites do not suffer from dramatically different interference, the staff sampled data from these locations in assessing the accuracy of the other numbers. The staff concluded that the two excluded satellite slots have similar operating characteristics to the other three. Thus, there are sound interference reasons for looking predominantly to the three satellites that provide most DBS service.[704] The dissent also later argues that the Order failed to adopt the Mitre Report's recommendation that EPFD be based on a single satellite with the largest baseline of unavailability.[705] Yet such an approach would, by necessity, render the first criticism (ignoring two satellites) completely irrelevant because under the Mitre approach we would ignore four of the five. The Commission rejected the Mitre approach because the satellite that would have set the baseline is soon to be retired.

Concerns were also raised regarding the final drafting of the item that should be addressed.[706] In response to the draft item, the dissent raised some concerns about various aspects of the Order that had not previously been discussed. Some of those concerns were well thought-out and prompted the majority to rethink its position and further explain its rationale.[707] Those steps improved this Order – and in turn resulted in a higher quality product for the American people. At the end of the day that should be the goal of all the Commissioners. It is ours. And while ideally we would engage in the dialogue at an earlier stage, continuous improvement of our items is the right thing to do. The end result is one that this Commission can and should be proud of – efficient and effective spectrum sharing on a broad scale that allows us to license an entirely new service.

Why an auction?

Broadwave USA (commonly known as Northpoint), and its affiliates, have vigorously argued that an auction is not required or in the public interest for these licenses. Northpoint arrived at the Commission many years ago with a proposal for a new and innovative way to share the DBS spectrum. Today, thanks in large part to its fine work and diligence, that service will go forward. Many have claimed that Northpoint deserves a nationwide 500 MHz terrestrial license for free based on its regulatory and technical efforts to make this service a reality. We sympathize with the sentiments that underlie these claims. There is little question that had it not been for Northpoint, the MVDDS service would not be

[703] The dissent makes much of some city data that shows a potential increase in unavailability of 20-30%. However that data is largely from the satellite at 110 degrees – a satellite that is scheduled to be retired long before MVDDS is due to be deployed.

[704] The selectivity of the dissent's data points is illustrated by its discussion of the Seattle market. The dissent chooses to analyze Seattle's increase in outage times based on a satellite designed to serve the Eastern United States.

[705] The satellite with the largest baseline outage time is actually at 119 degrees. In February 2002 Echostar launched a new more powerful satellite to this orbital position.

[706] There is nothing procedurally inappropriate in making changes, substantive or non-substantive, after adoption to further elucidate the rationale for the Commission's decision. Such revisions are permissible when all non-dissenting Commissioners concur in the changes. Here all of the Commissioners who supported the relevant sections agreed to the post-adoption edits.

[707] The Commission did not alter the fundamental policy approach – that an EPFD based on a average increase of 10% in outage time was appropriate.

ready to move forward today. Northpoint has put significant time and resources into developing its service model as well as its Commission and congressional advocacy over a long period of time. We applaud these efforts. But the statute does not support exempting this spectrum from auction nor does it grant Northpoint the exclusive privilege it seeks. We also do not believe other licensing distribution mechanisms that avoid mutual exclusivity are appropriate for this service. While we understand the equitable basis for Northpoint's claims, we cannot support that equitable concern trumping the auction regime Congress created in the statute, or the value of allowing other competitors to vie for a chance to offer service to the public. If Northpoint's service model is a winner, the market will reward it just as it has done for other technology companies.

* * * * *

This has been an extremely difficult docket for the Commission, but I believe we have arrived at a policy that appropriately balances the competing interests while allowing an important new service to move forward. We look forward to an auction for these licenses and the provision of the corresponding new services to the American people.

STATEMENT OF COMMISSIONER
MICHAEL J. COPPS
Approving in Part and Dissenting in Part

RE: 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 (ET Docket No. 98-206; RM-9147 and RM-9245); 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.

Authorizing and licensing the Multichannel Video Distribution and Data Service (MVDDS) serves the public interest. Therefore I agree with today's decision to move forward with authorizing MVDDS. I continue to believe, however, that the Commission can reduce uncertainty and promote greater efficiency by establishing a more universal understanding of the meaning of "harmful interference" rather than establishing new standards each time a dispute arises. Such an effort would reduce uncertainty and would lead to fewer firefights between new and incumbent spectrum users. Short of this larger effort, however, I believe that the rules established here will allow a new service to move forward and will protect customers of existing services. I therefore agree with the interference portions of the item.

I regret that I must dissent, however, to two portions of today's order. I am of firm belief that the open eligibility established by this Order will not maximize the potential benefits of MVDDS or minimize the potential pitfalls of an unconditioned auction. Therefore I must dissent to the eligibility and auction portions of the order.

Additionally, I believe that one of the main benefits of the MVDDS service is the opportunity to increase the distribution of local television programming. One potential MVDDS applicant has offered to accept full must carry responsibilities as a condition of becoming a licensee. I am opposed to determining at this stage that MVDDS licensees should be exempt from the must carry obligations carried by their cable and DBS competitors. Those obligations were imposed to advance the public interest; I see no reason for jettisoning them here.

I want to commend the work of the FCC staff who worked on this incredibly difficult proceeding over a period of several years. Each time a thorny spectrum dispute arises, I become more convinced that the FCC has the best engineers and communications lawyers in the country working for our consumers. We are all lucky to have them as public servants.

VIII. MVDDS OFFERS GREAT POTENTIAL VALUE TO CONSUMERS

In November, 2000, in the *First Report and Order and Further Notice of Proposed Rulemaking* in this proceeding we concluded that "[a]fter an exhaustive analysis and the time-consuming development on the international front of a consensus regarding critical technical issues, we have made a major threshold determination to authorize a new service, MVDDS, that will be capable of delivering local broadcast television station signals to satellite television subscribers in unserved and underserved local television markets."[708]

[708] *First Report and Order and Further Notice of Proposed Rulemaking*, 16 FCC Rcd 4096, ¶ 18 (2001)

I commend the previous Commission for this correct and forward-looking decision. I believe that authorizing and licensing this new service has great potential to serve the public interest. Companies hoping to win licenses have stated on the record that an MVDDS system can be a low-cost terrestrial wireless multi-channel video and broadband Internet service. This service has the potential to further several of my most important goals as a Commissioner.

First, MVDDS has the potential to serve as an important new competitor to cable and DBS in the provision of video services. Encouraging such competition is an important Commission responsibility. Improved competition in multi-channel video services can drive down prices and create incentives for service improvements. As consolidation throughout the communications industry continues unabated, the creation of a new competitor is of great importance.

Secondly, MVDDS has the potential to provide service in rural areas where today DBS is the only option. Encouraging rural service is, of course, a high responsibility incumbent upon the FCC.

Thirdly, MVDDS has the potential significantly to increase the availability of local television service. Because MVDDS technology uses local facilities to transmit signals, it can transmit local television signals, much like a cable service. While some rural areas receive local television signals via DBS, most do not. Potential MVDDS operators have promised, on the record, that they will offer local television stations where they offer service. One company has volunteered to accept full must carry responsibilities and provide all local television channels in all 210 local television markets.

Fourthly, MVDDS has the potential to speed the deployment of broadband telecommunications services throughout the country, and especially to rural America. The MVDDS service includes the ability to offer broadband services, such as Internet access, via terrestrial wireless facilities. Today, many rural consumers are unserved by *any* broadband service provider. In many other areas a single provider serves residential consumers. MVDDS can therefore bring broadband services to literally millions of rural Americans, and it can increase competition throughout the country. Congress in 1996 instructed the Commission to make broadband deployment a top priority. By licensing a viable new MVDDS service, we would be working toward Congress's mandate and the Commission's own priority.

Finally, authorizing the MVDDS service in the 12.2 – 12.7 GHz band is an efficient and innovative use of increasingly scarce spectrum. The FCC has determined that MVDDS operators can provide terrestrial service in the same band used by others to provide satellite services. As we struggle with ever increasing demands on spectrum resources, we should work hard to find ways to allow innovative spectrum arrangements where they are technically possible, do not cause harmful interference, and serve the public interest.

IX. THE MAJORITY'S FORM OF AUCTION UNDERMINES THE VALUE OF MVDDS

It is our obligation to develop an assignment mechanism that maximizes the potential value of the MVDDS service. This means, as outlined above, finding a way of assigning MVDDS licenses so that licensees: (1) provide new competition to cable and DBS; (2) increase the distribution of local television channels; (3) can combine multi-channel video services with broadband telecommunications services so as to speed broadband deployment; and (4) use the spectrum efficiently and intensively.

The Commission could easily have designed an auction and licensing process to further these goals. We should have limited auction participation to entities that would provide new competition in the multi-channel video market. That would have meant excluding DBS licensees. In addition, we should have committed to explore ways to ensure that the process placed a priority on the value of local ownership, sustainable rural service, diversity, small business ownership, and the provision of local

television stations. Instead, the Commission sacrificed these public interest mandates to the theory that an unconstrained auction will, by itself, yield the best result.

Auctions are far from perfect in recent history. Examples in both in the United States and across the world invalidate the assumption that auctions will automatically assign spectrum to an entity that will put spectrum to its most efficient, highest, and best use. Nonetheless, in order to avoid legal challenges and in the interest of stabilizing our spectrum management system, I was willing to use a carefully constructed auction to assign MVDDS licenses provided that eligibility for those licenses was limited so as to promote competition. Unfortunately we did not get there. I am pleased, however, that the Commission will at least bar dominant cable providers from this service, and will permit some small business incentives.

But I am still faced with an auction process where incumbent DBS companies can buy spectrum that I hoped would be used to heighten competition. Futhermore, I am left without any guarantees that we will be aggressive in finding service and auction rules that, consistent with *Adarand*, can account for the value of local ownership, sustainable rural service, diversity, and the provision of local television channels. These values are substantial, and we must work to make sure that they play a central role in any assignment mechanism. In this case they are, however, marginalized.

Given the choice between a bad auction and no auction, I must choose no auction. Therefore, I will dissent from both the eligibility and the auction provisions of this order.

X. THE COMMISSION SHOULD NOT PRECLUDE MUST CARRY RESPONSIBILITIES

Local television is of great importance to consumers and Congress. Promoting the increased availability of local channels has always been a priority of the Commission. Broadcast stations are at the center of a locality's marketplace of ideas, a function critical to our democratic society. It is important that any multi-channel video distribution service licensed by the Commission serve the particular needs of local communities.

Broadcasting is a uniquely local medium. Local broadcasters understand what it means to serve their community. They provide local news, public affairs, and entertainment programming that serves the particular needs of ethnic or demographic groups within their community. One hundred and fifty-five million Americans regularly receive their news from local TV stations; another sixty-seven million often do. If localism becomes a casualty of this Commission's fear of rules, American consumers will suffer; the country will suffer.

That is why I believe we should ask the question of whether MVDDS licensees should have must carry obligations. As already noted, one potential MVDDS applicant has offered to accept must carry. It understands that must carry here is feasible and workable. Why, then, do we cast overboard this important public interest principle? Both cable and DBS have important must carry obligations. There may be unique reasons to create service-specific must carry for MVDDS, but we have an ongoing obligation to American consumers to ensure the continued viability of the free-over-the-air broadcast service, and local television stations in each market. By prematurely closing the door on must carry for MVDDS at this stage we are not meeting that obligation.

Additionally, I believe that the combination of foreclosing must carry responsibilities here and allowing DBS to hold MVDDS licenses creates an opportunity to evade the will of Congress. Congress imposed a "carry-one, carry-all" rule on DBS. If a DBS company carries one local station in a community, it must carry ***all*** local stations in a community. Exempting MVDDS service from such a requirement and allowing DBS to hold MVDDS licenses means that a DBS company would have the technical and legal means to circumvent the carry-one, carry-all rule. Such a company could use a

MVDDS license to distribute a selected group of local channels in a community without distributing all the channels, while continuing to provide national channels via their satellites. This end-run around the will of Congress would make a mockery of the public interest.

In order to protect local broadcasting and to eliminate a carry-one, carry-all loophole, therefore, I would have at least asked whether MVDDS should have must carry responsibilities, and, if so, what responsibilities. Because the majority disagreed, I must strongly dissent from the must carry portion of the order.

XI. CONCLUSION

I have high hopes for MVDDS. The market cries out for competition. I, for one, would have welcomed the legal rationale to proceed immediately to license a service. Unfortunately, that legal underpinning could not be found. This being so, I believe the approach I have outlined herein is, far and away, the best available option. MVDDS has the technical ability to compete and offer valuable new service to consumers. I also believe that FCC rules can reduce interference to an acceptable level and can provide mechanisms to resolve unacceptable interference.

I fear, however, that our auction design, and our premature foreclosure of must carry responsibilities will result in MVDDS failing to reach its potential. For these reasons I respectfully agree in part and dissent in part to this order.

STATEMENT OF COMMISSIONER
KEVIN J. MARTIN
Dissenting in Part and Approving in Part

RE: 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 (ET Docket No. 98-206; RM-9147 and RM-9245); 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.

After several years and thousands of pages of debate, today the Commission finally acts on Northpoint's application. I am glad we are finally moving forward. I am glad that the majority is revealing its technical criteria for introducing MVDDS service into the 12 GHz band.

I fear, however, that the Commission is placing too much of the burden of MVDDS deployment on the backs of DBS licensees and their customers. The arbitrary nature of the technical requirements in this item are both disappointing and troubling. By law, DBS service is entitled to protection from "harmful interference."[709] Even more important, existing DBS customers deserve to be protected from unreasonable interference. This item does neither. Indeed, today the majority rejects language it adopted only a few weeks back proclaiming that "all DBS customers, regardless of which satellite(s) they are using, are entitled to interference protection."[710] While I admire their elimination of any such pretense and appreciate their candor, I am disturbed by the implications of this viewpoint.

I believe that all DBS customers are entitled to interference protection. I support a 10% limit per service area for increased interference caused by MVDDS. A 10% limit strikes a reasonable balance among the services sharing this band. Indeed, in the version of the Order adopted on April 11th, the majority seemed to agree. At that time, they announced at least eight times that the technical requirements which they were adopting would "limit" the outages caused by MVDDS to "10%" over the baseline.[711] The majority further concluded in the April 11th version that this "10%" criterion was the

[709] See Rural Local Broadcast Signal Act (RLBSA) § 2002(b)(2). See also Order at ¶¶ 8 and 18-20, discussing the non-interference provisions of RLBSA and SHVIA; and 47 C.F.R. § 2.106, Footnote S5.490 (prohibiting "harmful interference" by terrestrial radiocommunications services to DBS services).

[710] Order as adopted on April 11 at ¶ 78.

[711] "We used a prescribed methodology and a predictive model to calculate EPFD values, based on a criterion that would *limit the amount of increased BSS unavailability to ten percent* over a baseline level of BSS unavailability due to the presence of MVDDS." (emphasis supplied). Order as adopted on April 11 at ¶ 67.

"At the outset, we conclude that the appropriate criterion on which to base the EPFD level is DBS unavailability of an *additional ten percent over the baseline* unavailability, and that this increase in unavailability would be in addition to the unavailability allowance relied upon for developing NGSO FSS limits." [711] Order as adopted on April 11 at ¶ 73 (emphasis supplied).

"We also conclude that our decision *to use a ten percent increase* in unavailability as a criteria for developing EPFD limits for MVDDS, in addition to the unavailability allowance relied upon for developing NGSO FSS limits, *strikes an appropriate balance* among the three services that will share this frequency band." Order as adopted on April 11 at ¶ 74 (emphasis supplied).

(continued....)

"appropriate" measure because it would "ensure that any interference caused to DBS customers will not exceed a level that is considered permissible."[712] I was encouraged by this language in the Order. I was concerned however, because the complex methodology contained in the Appendix, which was used to implement the "10%" criterion in the Order, resulted in actual levels of interference higher than 10% - even double or triple those levels - to vast numbers of DBS customers. I distributed a detailed statement to my colleagues explaining my support for the 10% limit contained in the Order, but my concerns with the implementation of that limit as reflected in the Appendix.

I was hopeful that in response to my statement, the majority would adjust the implementation methodology in the Appendix to comply with the "10% limit" they had concluded was "appropriate" in the text of the adopted Order. Instead, they did the opposite. They chose, post-adoption, to change the language of the adopted Order to coincide with the implementation methodology in the Appendix. Frankly, I am a little surprised that my colleagues were more familiar with the complex implementation methodology found in the Appendix and that it more accurately reflected their conclusions than the simple and straightforward 10% "limit" contained in the Order.

Regardless of my surprise, I appreciate their adjustment of the Order to conform to the Appendix. In the post-adoption version of the Order, the former "10% limit" is now merely a "starting point" for an analysis. Indeed, they now proclaim that increased interference as high as 20-30% is "acceptable,"[713] and that "even higher percentage increases in unavailability in the range of 30% or higher would still constitute a relatively minor change."[714] I am surprised by this change in language and in tone. And I am disturbed by their removal and rejection of the basic principle that "all DBS customers…are entitled to interference protection."[715]

(...continued from previous page)
"We now conclude, based on further analysis of these issues by Commission staff and independent analysis performed by MITRE, that calculating MVDDS EPFD *limits based on a criterion on ten percent strikes a reasonable balance* between protecting DBS from interference and deploying MVDDS." Order as adopted on April 11 at ¶ 75 (emphasis supplied).

"In addition, a criterion of *ten percent unavailability for developing MVDDS EPFD limits* is the same used by NGSO FSS for the aggregate interference level from all of the NGSO FSS systems." Order as adopted on April 11 at ¶ 75 (emphasis supplied).

"We believe that in this band, under these circumstances, a *ten percent increase in unavailability* is the correct basis on which to calculate EPFD limits for MVDDS. On a going forward basis, the DBS operators should take this into account in designing future satellites." Order as adopted on April 11 at ¶ 75 (emphasis supplied).

"We modeled the satellites at 61.5 degrees and 148 degrees west longitude to ensure that the effect of our adopted EPFD limits on outage time is consistent with the protection criterion from which we started (i.e., allow *additional outage of ten percent* over baseline)." Order as adopted on April 11 at ¶ 80, note 198 (emphasis supplied).

"Using the parameters and assumptions described above, we analyzed the top 32 television markets to determine an EPFD value for each market consistent *with limiting additional DBS outages to ten percent* over the baseline." Order as adopted on April 11 at ¶ 80 (emphasis supplied).

[712] Order as adopted on April 11, at ¶ 67.

[713] Order at ¶ 84, note 210.

[714] Appendix G at 151, note 668.

[715] Order as adopted on April 11 at ¶ 78.

I find the choices made by my colleagues to be curious, at best. Why would they *allow* "harmful" interference to some DBS customers and reject *any* practical limit on interference to existing DBS customers? Why would they claim to implement a percentage-based interference approach without actually picking a specific "harmful" or even "permissible" interference percentage? My colleagues now express that there is "no technical way to achieve" a "10% limit."[716] Why, then, after declaring just weeks ago that a 10% limit is the "appropriate" and "correct" measure of the burden that should be placed on DBS customers, would the majority change their minds post-adoption to reject the once "appropriate" and "correct" 10% limit and convert it to merely a "starting point"? And, if the majority believes that "in the range of 10%"[717] means "20-30%,"[718] then does "in the range of 30% or higher"[719] mean 60-90%? Why do they prefer to keep us guessing? Why, after originally concluding that a 10% limit "strikes a reasonable balance," do they now emphasize five times post-adoption that seemingly *any* amount of MVDDS-related interference is "balanced" by the ability of MVDDS to deploy?[720] Unfortunately, these questions seem to lead to only one conclusion: the majority's technical requirements are driven by a desire for MVDDS deployment, regardless of cost to DBS licensees and their customers.

I have often expressed my belief that we should proactively seize opportunities to encourage, and even insist on, more efficient use of current spectrum, particularly through sharing. But the Commission must do so in a manner that protects the rights of existing licensees and their customers. At the very least, we should be clear about the levels of protection we are providing. As we exploit new technological opportunities for sharing, we must carefully weigh the costs, and ensure that the harms do not outweigh the benefits. Unfortunately, today's Order fails to strike an appropriate balance. It places too much of the burden of MVDDS deployment on the backs of DBS licensees and their customers. It rejects any interference limits. It injects uncertainty into the spectrum market. Accordingly, I dissent from the majority of this decision.[721]

The Adopted Technical Parameters are Arbitrary and Capricious

Agencies are required to act in a reasoned fashion – not arbitrarily and capriciously. The Commission must explain its actions – and its explanation must reflect reasoned decision making.[722] Unfortunately, I believe this Order does not reflect sufficiently reasoned decisionmaking.

One of the Commission's most important responsibilities related to spectrum management is to define the interference parameters under which licensees may operate. The Commission's rules define "harmful interference" generally as interference which "seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service."[723] Both by statute and under the Commission's rules, MVDDS is

[716] Joint Statement of Chairman Michael Powell and Commissioner Kathleen Abernathy at 5.

[717] Order at ¶ 78.

[718] Order at ¶ 84, note 210.

[719] Appendix G at 151.

[720] Order at ¶ 68. See also Order at ¶¶ 53, 72, 76 and 85.

[721] I approve only the auctions, eligibility and broadcast carriage sections of the Order at §§ V.B.5, V.B.2.b and V.B.1.d respectively.

[722] *Fox Television Stations v. FCC,* 280 F.3d 1027, 1042 (D.C. Cir. 2002); *United States Telephone Association v. FCC,* 188 F.3d 521 (D.C. Cir. 1999).

[723] 47 C.F.R. § 2.1.

prohibited from creating "harmful interference" to the DBS service.[724] And, as the majority states, it is of "primary importance" that these technical requirements do not cause MVDDS-interference to "exceed a level" that is considered "permissible."[725] Yet the majority will not reveal to us what that important "permissible level" actually is. Instead, the majority asserts, with "confidence," that the adopted rules will "limit" interference potential from MVDDS to a level that "does not rise to 'harmful interference.'"[726] I am not so confident.

The original version of the item, as it was adopted on April 11, emphasized at least eight times that a "10% limit" on such interference is the "appropriate" measure of the burden that should be placed on DBS customers.[727] Post-adoption, however, the majority has deleted from the item all references to a "10% limit." Post-adoption, they decided to change the original 10% "limit" to a 10% "starting point"[728] for the interference analysis. And, in their new version of the Order, the possibilities for MVDDS interference seem limitless. Indeed, the majority now concludes that "the additional service outage that may result here over and above the 10% starting point falls within the permissible level."[729] Without defining "permissible level," they now simply characterize the resulting interference - even interference that is *more than double* or *triple* 10% - as "approximately," "on average," "about," and "in the range of" 10%, and therefore "permissible."[730] Such hasty and dramatic changes, and continued refusal to adopt any "limit" on interference, do not, at least to me, seem to reflect careful and reasoned decisionmaking.

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[724] See note 1, supra.

[725] Order at ¶ 68.

[726] Order at ¶19.

[727] See note 3, above.

[728] Order at ¶ 72: "In adopting these EPFD limits, we find that an increase of 10% over current DBS unavailability is the appropriate *starting point* for our analysis but need not be a strict limit." (emphasis supplied). See also ¶¶ 79 and 84, note 210, and Appendix G at 150.

[729] Order at ¶ 72.

[730] See, e.g., Order at ¶¶ 72 and 78, And Appendix G at 150, 151 and 156.

Order at ¶ 72: "Our EPFD limits result in increased unavailability of *approximately 10%* -- in some instances it is greater than 10% of current unavailability, while in others it is less than 10%." (emphasis supplied).

Order at ¶ 78: "We now conclude, based on further analysis of these issues by Commission staff and the independent analysis performed by MITRE, that calculating MVDDS EPFD limits that allow additional increased unavailability *in the range of 10%* ensures DBS of protection from harmful interference while creating an opportunity to deploy MVDDS." (emphasis supplied).

Appendix G at 150:

- "It should be noted that this 10% *criterion is not used as a strict limit but rather as a guideline* in developing the actual regional EPFD requirements, described below." (emphasis supplied).
- "In specific cases, calculated outages *may be above or below this 10% value*." (emphasis supplied).
- In light of the conservative nature of this overall approach, sound engineering judgment suggests that using the *10% average unavailability criterion* as a strict limit is unnecessary and inappropriate especially given the wide variability in the provision of DBS services noted above." (emphasis supplied).

Appendix G at 151:

- "Based on the wide deviation already present in the provision of DBS service, an increase in unavailability of *about 10%* is a relatively minor change and should not be perceptible to DBS customers." (emphasis supplied).
- "…even higher percentage increases in unavailability *in the range of 30% or higher* would still constitute *a relatively minor change*." (emphasis supplied).

(continued....)

The Order sets certain EPFD[731] levels that that are no longer keyed to guarantee a specific level of interference protection.[732] Rather than setting an interference limit, the majority announces that these EPFD levels are based on "10%" as a "starting point" for an increase in DBS outages caused by MVDDS.[733] However, as reflected in Appendix G, the method used to calculate the EPFD levels is so unrelated to actual interference levels experienced by vast numbers of consumers that it appears to be arbitrary. As explained in more detail in my own Appendix, the methodology used to implement the "10% starting point" only exacerbates the majority's failure to limit interference. The EPFD levels are calculated using a complex, underinclusive, "double-averaging" approach that further removes the 10% starting point from 10%. The calculations exclude altogether two out of the five orbital slots through which DBS service is provided, and they count only the top 32 television markets. Then the majority averages the level of interference across the three selected orbital slots. On top of this, the majority again averages those satellite interference averages within each of four Commission-constructed "regions" (which consist of anywhere from seven to 23 states), based on the results of the 32 selected cities.

As a result of this complex implementation methodology, increased interference caused by MVDDS is usually higher than 10%. Appendix G reveals that, as a result of the implementation scheme, DBS customers in 31 out of the 32 television markets from which the majority basis its interference calculations will experience increased interference higher than 10%. The new "additional city" analysis in Appendix G shows that customers in 11 out of the 12 additional cities will also experience outage increases higher than 10%.[734] And for many customers in the top television markets alone, the actual increases in interference will be *double and triple* the "10% starting point" referenced in the order. For example, by the Commission's own estimates, some DBS customers in Seattle will experience more than a 30% increase in unavailability, translating to over 45 additional hours of outages annually caused by MVDDS. Other DBS customers in Portland, San Francisco, Washington D.C., Pittsburgh, Philadelphia, New York, Boston and Nashville all will experience a 23-30% increase in DBS unavailability caused by MVDDS.[735]

More fundamentally, however, it is not clear to me why *any* customer should be subject to interference greater than the "10% limit" originally adopted by the majority. Indeed, a few weeks ago, the majority believed that a "10%" outage increase was defensible because such a limited interference

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Appendix G at 156:

- "That is, the EPFD for the region would *generally ensure* that for locations within the region any increase in DBS outage would be consistent with our *10% approximate increase in unavailability guideline."* (emphasis supplied).
- "Further, the data for all locations show outage increases for locations throughout the U.S. are consistent with our *10% approximate increase in unavailability guideline."* (emphasis supplied).

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[731] EPFD represents the MVDDS signal power detected by the DBS transmitter.

[732] See Order at ¶ 68.

[733] See Order at ¶¶ 72, 79, 84, note 210, and at Appendix G at 150.

[734] These 11 cities include Baton Rouge, Louisiana; New Orleans, Louisiana; Shreveport, Louisiana; Billings, Montana; Fargo, North Dakota; Salt Lake City, Utah; Omaha, Nebraska; Oklahoma City, Oklahoma; Boise, Idaho; Jackson, Mississippi; and Honolulu, Hawaii.

[735] See Appendix G.

increase is "not perceptible to the DBS customer in most cases."[736] (Now it seems they believe that regardless of the percentage increase, the interference will be "imperceptible" and "insubstantial."[737])

I support a 10% interference limit per service area. Indeed, MITRE, the Commission's own expert, recommends allowing no more than a 10% increase in MVDDS-related outages per service area.[738] And, instead of averaging the satellite calculations, MITRE recommended using only the DBS satellite at each longitude having the largest baseline unavailability.[739] The majority fails to explain sufficiently why it rejected these recommendations and proposals.

Even the Further Notice asked whether the Commission should "allow MVDDS to cause *up to 10% increased unavailability,"* which, as was explained, "is the same criteria developed by the ITU-R for interference from all NGSO FSS systems."[740] I do not agree with the suggestion of my colleagues that the "approximately 10%" measure as used by the majority either "echoes" the international approach to NGSO/DBS sharing.[741] The 10% NGSO/DBS sharing criteria is an *aggregate measure*- a *maximum limit* - quite the opposite of the 10% "starting point" used here.[742] Although the majority no longer seems to feel constrained by any upper limit, I have outlined in my own Appendix some reasonable measures that could have been implemented to at least keep interference much closer to their new 10% "starting point," and additional arguments and concerns regarding the majority's Appendix G.

The majority recently implemented a "safety valve" to address some of my concerns. The item now allows DBS licensees to present evidence that the appropriate EPFD for a given service area should be different from the region wide EPFD level. However, there is no guidance as to how much interference would cause the majority to trigger that safety valve. Apparently, even interference in the 20-30% range, or even higher than 30%, would not be enough. Moreover, the fact that a safety valve is necessary is recognition of the fact that the proposed interference scheme will not adequately protect DBS consumers in all parts of the country.

I find the majority's failure to limit MVDDS-related interference to DBS customers troubling. It is arbitrary to allow such varying and unlimited levels of interference to different groups of DBS subscribers particularly where, as explained in my Appendix, some more reasonable measures are available. In a separate context, the agency was recently chided for failing to provide "clarity as to its choice of the appropriate interference threshold."[743] The court found the "omission of an explanation" to be "particularly troubling" because the test data relied upon by the Commission did not include a representative real-world sampling.[744] I fear the Commission is repeating those mistakes.

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[736] April 11th version of item.

[737] See Order at ¶¶ 71, 72, 79 and 85.

[738] MITRE report at 6-5. MITRE is the independent expert selected by the Commission to analyze the potential for harmful interference between DBS and an entity applying to provide terrestrial service in the 12 GHz band.

[739] See MITRE report at 6-5 - 6-7.

[740] Further Notice, 16 FCC Rcd. at 4197, ¶ 269. The majority characterizes the Further Notice as seeking comment on percentage-based increases in unavailability such as "2.86%, ten percent, *or any other percentage*." Order at ¶ 78. If they actually picked some other percentage, that may have been helpful. However, the majority seems to have interpreted "any other" percentage to mean either *every other* percentage, or *no particular* percentage.

[741] Joint Statement of Chairman Powell and Commissioner Abernathy at 4.

[742] See Order at ¶¶ 40, 42-44. See also Further Notice, 16 FCC Rcd. at 4197, ¶ 269.

[743] *AT&T Wireless Services, Inc. v. FCC,* 270 F.3d 959, 968 (D.C. Cir. 2001).

[744] Id.

The Technical Rules are Contrary to Law

The approach taken by the majority is contrary to statute, and contrary to the "fundamental principle that existing co-primary spectrum users are protected from harmful interference that may be caused by later-in-time co-primary users."[745]

The Rural Local Broadcast Signal Act requires the Commission to "ensure" that MVDDS licensees do not cause "harmful interference" to the primary users of the spectrum occupied by DBS operations.[746] Despite this statutory directive, the Order allows MVDDS licensees to cause harmful interference to significant numbers of DBS subscribers. The rule adopted today only prohibits harmful interference during the initial deployment to existing customers. However, the Order *allows* MVDDS licensees to cause harmful interference to new DBS subscribers.[747] Consumers living in proximity to an MVDDS transmitter may be subject to so much interference from MVDDS that as a practical matter, they are excluded from having even the choice of DBS service.[748] Indeed, new DBS customers "shall have no further rights of complaint" against the MVDDS licensee.[749] The majority has recently added language to the Order expressing its belief that new DBS licensees "can take modest measures, e.g., siting and shielding steps or use of a larger antenna, to account for the presence of an MVDDS signal."[750] However, the majority does not dispute that there still may be exclusion zones where consumers will not be able to receive DBS service due to MVDDS interference, despite such measures. The Order also allows MVDDS licensees to cause harmful interference to pre-existing DBS subscribers after one year of MVDDS operation, even if the increased interference is caused by a change in the MVDDS operation.[751] And, the Order allows MVDDS licensees to cause harmful interference to pre-existing DBS subscribers who decide to move to a new location where there is a pre-existing MVDDS transmitter. Similarly, the Order allows MVDDS licensees to cause harmful interference to pre-existing DBS subscribers who may not have provided notification of interference in the one-year complaint deadline.

In addition, the majority's decision to protect only existing DBS subscribers for one year is also contrary to the MITRE report, which recommends that future DBS customers be protected for "as long as

[745] *Preparation for International Telecommunication Union World Radiocommunication Conferences,* IC Docket 94-31, *Report,* 10 F.C.C.R. 12,783, 12,803 (1995).

[746] RLBSA §2002(b)(2); See also Order at ¶¶ 8, 18-20.

[747] See Order at Appendix D, § 101.1440(e).

[748] See Order at ¶ 55 ("there will likely be an area surrounding the MVDDS transmitting antenna where the interference criteria may not be met without some form of mitigation being performed"). However, the Order allows continued operation even if there are no techniques that would mitigate such interference to new DBS customers.

[749] Order at Appendix D, § 101.1440(e).

[750] Order at ¶ 92.

[751] See Order at Appendix D, § 101.1440(g). The rules require the MVDDS licensee to provide the technical parameters of its operation at a particular transmitting site to the DBS licensee prior to deployment. However, the MVDDS licensee may later change those parameters without notice as long as the change does not qualify as a "major modification" or cause an "increase in the EPFD contour in any direction" pursuant to 47 C.F.R. §1.929. See Order at Appendix D, § 101.1440(f). The Order does not protect existing DBS subscribers in such situations.

the MVDDS transmitter operates."[752] I am disappointed that the majority rejected MITRE's recommendation to place interference limits on MVDDS operation going forward.

The approach is also contrary to the Commission's own rules and precedent. The definition of "harmful" interference in the Commission's own rules is not limited to blanketing interference. On its face it includes serious degradation, obstruction, or repeated interruption of a radiocommunication service.[753] It does not depend on "averages."

Moreover, this scheme is a significant departure from the established principle that new users of spectrum must not impede or interfere with existing uses that serve the public interest.[754] This "first in time, first in right" doctrine, which the Commission has described as "the mainstay of interference protection"[755] has long governed the sharing of frequencies by co-primary licensees:

> Under our first-in-time rule, the first co-primary licensee is entitled to protection from harmful interference by subsequent licensees. . . . [T]he subsequent licensees . . . have the option of sharing spectrum . . . , provided that they do not cause harmful interference to the incumbents.[756]

The majority is violating this fundamental principle by allowing MVDDS, the second co-primary licensee, to cause harmful interference to DBS. Inexplicably, the majority narrowly applies the first in time rule only to *existing DBS customers,* and not to the *DBS licensees,* which obtained their licenses first, and have already expended several billion dollars to construct, launch and run satellite systems that operate throughout the entire United States. The majority further departs from the first in time rule by allowing protection for even those current customers *for only one year.* I find such limited protection for existing licensees to be quite troubling. Indeed, this would be akin to telling cell phone service providers that, in order to make room for a new competitor, they are suddenly entitled to limited interference protection for only their *current* customers. And, by the way, those current customers are entitled to protection for only one year. I cannot support such an approach.

This Order Unduly Burdens DBS Subscribers

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[752] MITRE Report at 6-6.

[753] 47 C.F.R. § 2.1(c).

[754] *See, e.g., Midnight Sun Broadcasting Co.,* 11 F.C.C. 1119 (1947); *Sudbrink Broadcasting of Georgia,* 65 F.C.C.2d 691 (1977).

[755] *Deployment of Wireline Services Offering Advanced Telecommunications Capability,* CC Dockets 98-147, 96-98, *Third Report and Order in CC Docket 98-147 and Fourth Report and Order in CC Docket 96-98,* 14 FCC Rcd. 20,912, ¶ 211 (1999).

[756] *Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum at 2 GHz for Use by the Mobile-Satellite Service,* ET Docket 95-18, *Second Report and Order and Second Memorandum Opinion and Order,* 15 FCC Rcd. 12,315, ¶ 133 (2000).

This order unfairly places the burden of MVDDS deployment on the backs of DBS licensees and their customers. These rules are unfair to DBS customers, who have purchased a dish and have contracted for service based on the expectation of a certain level of reliability. These subscribers are left with no idea regarding how much additional interference the majority would be willing to permit. The rules are unfair to consumers who wish to purchase DBS service in the future, but who may now be blocked from having that choice as a result of MVDDS deployment. They are unfair to DBS licensees, who have invested tremendous resources to construct and operate a system without the opportunity to build into its costs the additional level of interference, and potential exclusion zones, that may now be caused by the MVDDS service.

The asserted justification for this scheme is "simplicity, clarity and ease of implementation."[757] I believe it would be much more simple and straightforward to have a hard and fast interference limit than a scheme that arbitrarily sanctions varying, and unpredictable, amounts of additional interference to different consumers. Moreover, the safety valve process will undermine the simplicity they advocate.[758] Providing a standard EPFD limit, and then allowing case-by-case and service area-by-service challenges to those EPFD limits if the limits are not "appropriate" will create a series of challenges that the Commission will still have to resolve. Such a process is far from "simple, clear, or easy." Simplicity of process, clarity of decision making, and achievement of an easy implementation standard that protects consumers from unreasonable interference all dictate in favor of establishing a clear, consistent, and rational interference limit in each service area up front.

To add insult to injury, the MVDDS licensee may begin operations even in the face of a protest by the DBS licensee that the required EPFD levels in the order will not be met. The complaint procedures set forth in the order do not allow for a Commission resolution of a dispute prior to the MVDDS licensee turning on its system. Furthermore, there is no expedited complaint resolution procedure in place to quickly resolve such an allegation even after MVDD has turned on its system.

I do not believe that such a scheme is in the public interest. There is always a varying degree of commercial risk in any business venture. The Commission's decisions should strive to minimize the amount of "regulatory risk" faced by the industry, by promoting predictability and regulatory certainty. I fear that this order injects uncertainty into the spectrum market. Allowing such a significant change to the spectrum environment has undermined the commercial decisions made by DBS licensees in purchasing their spectrum and building out their systems. Moreover, as the majority continues to be silent with respect to precisely how much interference they will be willing to permit, both DBS and MVDDS licensees will waste resources making decisions based on guesswork. Creating such uncertainty will negatively impact the market for spectrum going forward.

Service Areas

The majority attempts to justify the interference caused to DBS with the assertion that such harms are "outweighed by the potential benefit to the public of providing for a new potential competitor in the multichannel video and data markets."[759] However, it is not clear that the adopted licensing approach will promote such competition. In order to compete effectively with cable and DBS service, MVDDS will need to be able to offer local broadcast service. The majority observes that most MVPD service remains local or regional service,[760] and notes that "MVDDS is technologically well suited for fulfilling the local

[757] Joint Press Statement of Chairman Michael Powell and Commissioner Kathleen Abernathy (April 23, 2002).

[758] See Order at ¶¶ 83 and 85.

[759] Order at ¶ 53.

[760] Order at ¶ 132.

signal delivery goals of RLBSA."[761] The majority spends some time discussing how MVDDS may be used to fill a void with respect to local broadcast service.[762] Yet if the majority had wanted to take advantage of this capability and wanted to promote the carriage of local broadcast signals, it should have chosen service areas corresponding to local television markets. The obvious choice would have been the 211 designated market areas (DMAs), which correlate directly to those local television markets. Instead, the majority has chosen much smaller service areas – 354 Component Economic Areas (CEAs).[763] This approach makes it more difficult for MVDDS licensees to carry local broadcasts because it may have to acquire multiple CEAs to cover one local television market. Furthermore, depending on how the CEA boundary is drawn, there may be subscribers from more than one local television market in a given CEA, adding to the difficulty.

The reasons offered by the majority against employing DMAs seem odd. The Order notes that Nielsen is the copyright owner of the DMA listing and "has not given the Commission a blanket license to use its copyrighted DMA listing for MVDDS."[764] However, a quick check of the Nielsen website reflects that Nielsen has granted all members of the public use of their papers and publications (which would include their DMA listing and DMA map of local markets) as long as that material is used only for non-commercial purposes.[765] So it seems that the Commission could, in fact, use the copyrighted DMA listing for the non-commercial purpose of dividing the country into service areas. At the very least it would seem worthwhile simply to ask Nielsen whether Nielsen would consider such a use of the DMA listing to be a copyright violation.

The majority next states that, although some potential MVDDS licensees favor DMA-based service areas,[766] the decision not to employ DMAs is for their own good.[767] They state that rejecting DMAs will protect MVDDS licensees against possible claims of copyright infringement that may be brought by Nielsen.[768] It is not obvious how simply holding a license with specific geographic boundaries based on DMAs would subject a licensee to a claim of copyright infringement. The majority offers no legal analysis to support this strange conclusion. Given the advantages of using service areas based on local television markets, it would seem worthwhile to think more carefully about the rationale for rejecting DMAs.

Competitive Bidding

This item concludes that by statute, we are required to auction mutually exclusive applications submitted by potential MVDDS licensees. Compelling statutory, policy and equitable arguments were made both in support of auctions and against them under these circumstances. The arguments favoring an auction rely primarily on Section 309(j) of the Communications Act, which mandates that the

[761] Order at ¶ 24.

[762] Order at ¶¶ 23-24.

[763] Order at ¶ 4, note 10.

[764] See Order at ¶ 132.

[765] See www.nielsenmedia.com/copyright.html.

[766] See Northpoint comments at 32; see also SRL comments at 3.

[767] See Order at ¶ 132.

[768] Order at ¶ 132.

Commission grant mutually exclusive applications through competitive bidding.[769] On the other hand, Northpoint argues that, consistent with its statutory obligation to avoid mutual exclusivity generally,[770] the Commission should reject applications from any entity other than Northpoint because it is the only potential licensee that has complied with the independent testing requirement of the LOCAL TV Act.[771] Alternatively, Northpoint argues that the ORBIT Act bars an auction because that same spectrum is used "for the provision of international or global satellite communications services."[772] Northpoint's most recent application to provide satellite service on those frequencies bolsters this argument. As a general policy matter I agree that competitive bidding can be a useful mechanism for distributing licenses, but auctions are not a goal in and of themselves. For me, this was a very close call, and it is with some difficulty that I support the recommended decision to support auctions in this case. I am sensitive, however, to the impact that the Commission's lengthy delay has had on all the parties to this proceeding, and proceed today to avoid the harms resulting from even further delay.

Conclusion

The Commission should always work hard to promote creative and innovative uses of spectrum. Indeed, as I have said before, one of the Commission's objectives should be to create incentives for the efficient utilization of spectrum at every given point in time, by both established users and new entrants. However, it should exercise particular care in the implementation of schemes that will impact existing licensees and their customers. All DBS licensees and their customers are entitled to interference protection. The Commission should take an approach which specifies rational and defensible interference limits, and then clearly and simply implements those limits. The public deserves no less. Yet this Order sanctions the severe disruption of DBS service for an untold number of consumers when some additional reasonable limits could have been adopted. I am disappointed that the majority has taken this approach. Accordingly, I must dissent.

[769] See Order at ¶ 239.

[770] See 47 U.S.C. § 309(j)(6)(E).

[771] See 47 U.S.C. § 1110.

[772] See 47 U.S.C. § 647. See also *National Public Radio,* 254 F.3d 226 (D.C. Cir. 2001).

APPENDIX

The originally adopted April 11th version of the item contained language in the Order "limiting" MVDDS-related interference to 10%. While I supported a 10% interference limit, I criticized the implementation methodology in Appendix G because it failed to result in an actual 10% limit. In response to my criticism, the majority has, post-adoption, eliminated any interference limit, and is now using 10% as a "starting point" for their interference analysis. As explained in my statement, I find the majority's dramatic shift in viewpoint and unwillingness to place any limits on MVDDS-related interference to be disturbing.

The methodology used to implement the "10% starting point" only exacerbates the majority's failure to limit interference. The EPFD levels are calculated using a complex, underinclusive, "double-averaging" approach that further removes the 10% starting point from 10%. The calculations are underinclusive in two fundamental respects. First, they exclude altogether two out of the five orbital slots through which DBS service provided. Second, they count only the top 32 television markets. The majority then further distances the results from 10% by averaging the level of interference across the three selected orbital slots. On top of this, the majority averages those interference averages within each of four Commission-constructed "regions" (which consist of anywhere from seven to 23 states), based on the results of the 32 selected cities. The Order concludes that the MVDDS licensee need only meet this underinclusive, double-averaged EPFD level when it initially deploys. As long as it meets this initial threshold, there is no cap on the actual amount of interference from MVDDS that DBS customers may experience.

For example, the calculations exclude entire states with high DBS penetration rates and unique geographic characteristics, such as Montana (where an estimated 39% of the television households subscribe to DBS), Maine (with a 24% penetration rate), Louisiana (with a 19% penetration rate), and Alaska (with a 15% penetration rate).[773] Indeed, half of the Nation's population, and most of the Nation's geography, is not considered in calculating the appropriate interference protection standards. This is particularly troubling because DBS is such an important service to the millions of consumers who live in rural areas and do not have access to cable. Yet those are the very subscribers whose interference levels are not directly considered when evaluating whether the new service meets the "range of 10%" additional outage level the majority has now deemed appropriate.

I find quite perplexing their rejection of even reasonable measures to at least keep MVDDS-related interference closer to their new "10% starting point." For example, the majority rejected the following measures:

1. <u>The majority rejected consideration of two orbital slots.</u>

The majority could have considered all of the orbital slots used to provide DBS service to consumers in the United States, instead of calculating EPFD levels based on the results for only *three* of those

[773] Penetration rate statistics taken from www.echostarmerger.com. See also state-by-state penetration rate statistics provided by SBCA in CS Docket No. 01-129, *Matter of the Annual Assessment of the State of Competition in the Market for Delivery of Video Programming* (Aug. 3, 2001).

slots.[774] Thus, customers receiving service from the excluded satellites (located at 61.5˚and 148˚) could experience significantly more interference than the "10% starting point."

Only limited sample data is provided for the satellites at 61.5˚and 148.˚ The majority explains that the three selected slots provide the majority of service to DBS subscribers today.[775] Even if this is true, this does not explain why it is reasonable or legally defensible to ignore altogether the interference caused to the subscribers purchasing service from the excluded satellites. Echostar has stated on the record that it serves over 400,000 thousand subscribers from those two satellites.[776] Moreover, the majority itself acknowledges protection for these other satellites is "essential" because at least one service provider, Dominion, "operates solely from the satellite located at 61.5˚**,"** and also because "the other DBS licensees could shift programming to make heavier use of [those] satellites … in the future."[777]

Furthermore, the conclusory opinion that "the specified EPFD levels will also protect these [excluded] orbital locations"[778] seems contrary to the sample results in Appendix G – which reveal an additional *45 hours* of additional annual outage to DBS subscribers in Seattle using one of those "other" satellite slots. MITRE recommended excluding only the locations with more than 100 hours of baseline unavailability.[779] The Order fails to explain why this would not have been a more appropriate standard. Indeed, the majority even cites to this MITRE recommendation in attempting to justify its failure to consider the 45 additional outage hours in Seattle.[780] But the majority can't have it both ways. If the majority believes it is justifiable based on MITRE to exclude Seattle from protection, then it is equally imperative, based on MITRE, to *include* all locations with less than 100 hours of baseline availability. Considering all of the satellites would cause fewer DBS customers to experience increased interference greater than 10%.

2. The majority rejected basing its EPFD calculations on the satellite with the largest baseline unavailability.

The majority could have chosen the satellite with the largest baseline unavailability as the basis for its EPFD calculations. Instead, the majority *averages* the results for the three chosen satellites, further distancing the "10% starting point" from 10%. The majority defends this choice with the following *non sequitur*: "Averaging ensures that the EPFD for neither the 'worst case' nor the 'best case' satellite predominates."[781] Yes – obviously, averaging "ensures" such a result. But this still does not explain why it is reasonable to allow even more increases in outage. MITRE did not recommend averaging, and

[774] DBS service is provided from the satellites located at the following five orbital slots: 61.5°, 101.0°, 110.0°, 119.0°, and 148.0°. Order at ¶ 82, and note 205. The Order considers only the satellites providing service to the contiguous United States - 101.0°, 110.0°, and 119.0,° and excludes the satellites at 61.5° and 148.0°.

[775] Order at ¶ 82.

[776] Letter from Pantelis Michalopoulos and Steven Reed, counsel for Echostar Satellite Corporation, to William F. Canton, Acting Secretary, Federal Communications Commission, (February 12, 2002), ex parte comment in CS Docket No. 00-96, *In the Matter of Implementation of the Satellite Home Viewer Improvement Act of 1999; Broadcast Signal Carriage Issues*.

[777] Order at ¶ 82 (emphasis added).

[778] Order at ¶ 82.

[779] MITRE report at 6-5 – 6-7; see also Appendix G at 152, note 672.

[780] Appendix G at 152, note 672.

[781] Appendix G at 154**.**

instead recommended using the satellite with the largest baseline unavailability.[782] Under the MITRE approach, fewer DBS customers would experience increased interference greater than 10%.

3. The majority rejected utilizing data from more cities and towns.

The majority could have utilized data from more cities and towns. The EPFD levels are based only on 32 cities in the entire nation. They are the top 32 television markets – no other city or town is averaged into the calculation.[783] Consumers in entire states do not even get counted in the averaging process.[784] Approximately 55% of the nation's population lives in those 32 cities.[785] This means 45% of the nation's population is left out of the process. Ironically, consumers in rural areas, who are likely to benefit most from both DBS and MVDDS service because they may not have access to cable, are the very consumers who are left out of the calculations altogether. The majority recently added language to defend this limited sampling, stating that: "choosing a limited number of representative satellite links for analysis purposes to determine an appropriate EPFD or similar value is an acceptable engineering and scientific approach."[786] While this may be true for some purposes, it is equally clear that such an approach is not acceptable here, where the methodology does not result in EPFD levels that provide any upper limit on increased DBS outages.

4. The majority rejected basing its EPFD calculations on a wider variety of geographic areas.

The majority could have taken data from a wider variety of geographic areas. The majority's 32-city approach excludes enormous geographic areas of the country, including all of Alaska and all of Hawaii, from the process. However, the EPFD levels and interference effects are very sensitive to rain models and geography, which vary dramatically from across geographic areas and from city to city.[787] After acknowledging that EPFD levels vary across geographic conditions, I am confused as to why the majority picks such a small geographic sample, and ignores states with unique characteristics.

The majority contends that the "additional precision that would be provided by analyzing additional or other locations is unnecessary and unlikely to be significant given other factors, such as, the large variability that already exists in rainfall patterns from season to season and year to year."[788] Strangely, the majority seems to be defending a less precise methodology for MVDDS interference calculations based on the variability of non-MVDDS factors.

The majority further contends that the results of those 32 cities "in fact apply to much larger areas…because satellite signal strength and rainfall patterns tend to change only gradually over great

[782] MITRE report at 6-5 – 6-7.

[783] See Appendix G at 152.

[784] The following 28 states are not included in the sampling: Alabama, Alaska, Arkansas, Connecticut, Delaware, Hawaii, Idaho, Iowa, Kentucky, Louisiana, Maine, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, North Dakota, Maryland, Oklahoma, Rhode Island, South Dakota, Utah, Vermont, Virginia, West Virginia, Wyoming.

[785] January 1, 2002 Nielsen Media Research Estimates.

[786] Appendix G at 152.

[787] See Order at ¶ 79, note 179.

[788] Appendix G at 152.

distances."[789] "Therefore," the majority continues, "the results for New York and Philadelphia reasonably apply for the areas between those cities [as they do] for Chicago and Cincinnati, Los Angeles and San Diego, Seattle and Portland, etc."[790] Yet even this rough "gradual change" rationale does not explain why huge swaths of the Nation are excluded from the analysis. For example, even assuming there is only a "gradual change" in the areas between Portland, Seattle, Sacramento and San Francisco, this still does not explain why it is rational to apply the results of those four cities to all of Alaska, Hawaii, Idaho, Montana and North Dakota, states from which no data is collected. Indeed, the limited sample results recently added to Appendix G reflect the folly of this rationale. The majority's methodology of applying the data from those four cities actually results in DBS outages greater than 10% in four out of the five excluded states - Hawaii, Idaho, Montana and North Dakota,[791] and 11 out of the 12 "additional cities" sampled.[792]

5. The majority rejected using smaller regions.

The majority could have picked smaller areas for application of their EPFD levels, such as states or smaller regions. The majority divides the entire United States into four enormous regions (ranging anywhere from seven to 23 states), and then picks an EPFD level for that entire region based on the results of only a few cities in the entire region. For example, the limit for the 7-state "southwestern region" only includes data from 3 cities, and excludes any data from 5 of the states in the region - Nevada, New Mexico, Utah, Arizona and Wyoming.[793] Similarly, the limit for the 8-state "northwestern region" is based on only 4 cities, and excludes altogether any data from Hawaii, Alaska, Montana, North Dakota and Idaho.

6. The majority rejected using the most stringent EPFD level per region.

Given the majority's determination to section the entire nation into four large regions and the very limited number of data points within each region, the majority could have used the most stringent EPFD limit for the region. Instead, the majority *averages* the level of interference within that region based on those few cities within the multi-state region. Their averaging approach further distances the "10% starting point" from 10%.

7. The majority rejected using weighted averages for its EPFD calculations.

Given the majority's determination to base interference levels on data from a few major cities in each large region, they could have used weighted averages to reflect the population in a given city. For example, the EPFD limit for the 7-state southwestern region is based on the levels for three cities, including Los Angeles and Denver. Although Los Angeles has a population four times larger than Denver, they are given equal weight in the averaging process. I do not understand my colleagues' contention that weighted averaging "would only further diminish the weight given to the rural areas."[794] Given that no weight at all is given to rural areas, and data is only taken from the top 32 television markets, I am not sure how it is possible for the majority to even further diminish their consideration of

[789] Appendix G at 152.

[790] Appendix G at 153.

[791] Appendix G at 158-160.

[792] Appendix G at 157-160.

[793] See Appendix G.

[794] Joint Statement of Chairman Powell and Commissioner Abernathy at 5, note 7.

rural areas. If the majority had included data from any rural area, as opposed to only data from the top 32 television markets, then I might agree to not include weighted averages.

As a result of this complex underinclusive, double-averaging approach, many DBS customers will, by the majority's own estimates, experience increased interference double and triple the 10% starting point. The majority attempts to justify the 20-30% interference increases on various grounds. First they state that the corresponding decrease in service unavailability is "only" 0.05-0.08%.[795] If the majority believes that "corresponding decrease in service availability" is a relevant test, then why not pick a strict number for an interference limit, instead of the loose "about in the range of 10% average approximate guideline"? Ironically, the majority has emphasized in the latest version of the item that "it is important to bear in mind that DBS is, on the whole, extremely reliable with typical service availabilities on the order of 99.8 to 99.9 percent."[796] That being the case, then even a 0.05-0.08% decrease in service availability significantly impacts the extreme levels of reliability that DBS licensees have invested billions of dollars to achieve. Indeed, as a practical matter, additional interference in the 20-30% range can mean increases in outages ranging from 300 to almost 3,000 minutes.[797] The majority next contends that additional interference in the range of 20-30% is "not significant" because there are "other factors," both in the control of DBS licensees and out of their control, which could result in similar or greater increases in unavailability.[798] It seems strange to justify sanctioning varying and high levels of MVDDS-induced interference simply because other factors may also be variable. The opposite should be true -- if other factors really do cause such large variability, then it is even more imperative to be as precise as possible when sanctioning additional interference caused by MVDDS. Finally, the majority states that increased unavailability in the 20-30% range is justifiable because such increases are "only" in the case of the satellite at 110.°[799] This is incorrect as a factual matter. The limited "additional city" sampling in Appendix G reflects that some customers in Hawaii obtaining service from the satellite at 101° will experience a 23.3% increase in outages.[800] Customers obtaining service from the satellites at 61.5° and 148° also will experience increased outages in the 20-30% range.[801] Furthermore, there is simply not enough analysis to determine whether customers in other locations will experience similar increases in outages.

I am forced to conclude that the majority's approach and implementation is not rationally related to actual interference levels, and thus the resulting EPFD limits are arbitrary and capricious. At the very least, the public deserves more precision. The Commission could have calculated interference based on service areas rather than multi-state regions. The Commission could have measured the effect of the worst performing satellite, rather than averaging the impact of three orbital slots. Indeed, neither the Further Notice nor the MITRE report proposed the rough approach reflected in today's Order.[802] The Further Notice asked whether the Commission should "allow MVDDS to cause *up to 10% increased*

[795] Order at ¶ 84, note 210.

[796] Order at ¶ 67.

[797] See Appendix G.

[798] Order at ¶ 84, note 210.

[799] Order at ¶ 84, note 210. The majority states that this satellite will be replaced with a newer, higher-powered satellite.

[800] Appendix G at 160.

[801] Appendix G at 167.

[802] See Further Note, 16 FCC Rcd 4096, ¶¶ 266-276; MITRE Report at 6-5 – 6-7.

unavailability."[803] The Further Notice then applied the protection criteria to *each MVDDS transmitter* and did not discuss averaging.[804] Similarly, MITRE recommended a 10% increase in relative unavailability for each *service area,* and did not recommend averaging.[805] The majority fails to explain sufficiently why it rejected these recommendations and proposals.

[803] Further Notice at ¶ 269.

[804] Id. at ¶ 270.

[805] MITRE Report at 6-5 - 6-7.