Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington, DC 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;	)	
	)	
Applications of Broadwave USA, PDC Broadband Corporation, and Satellite Receivers, Ltd. to Provide a Fixed Service in the 12.2-12.7 GHz band	)	

COMMENTS OF THE BOEING COMPANY

The Boeing Company ("Boeing"), by its attorneys, hereby provides comment on the MITRE Corporation Report ("MITRE Report")[1] regarding the potential for interference from Multichannel Video Distribution and Data Service ("MVDDS") networks such as Northpoint into direct broadcast satellite ("DBS") consumer receivers.[2]

---

[1] *See MITRE Technical Report, Analysis of Potential MVDDS Interference to DBS in the 12.2-12.7 GHz Band*, The MITRE Corporation (April 2001) ("*MITRE Report*").

[2] *See* Public Notice, "*Comments Requested on The MITRE Corporation Report on Technical Analysis of Potential Harmful Interference to DBS from Proposed Terrestrial Services in the 12.2 – 12.7 GHz Band (ET Docket 98-206),*" DA 01-933 (Apr. 23, 2001).

Boeing urges the Commission to consider carefully the tests and analysis that are included in the MITRE Report when developing rules for spectrum sharing between MVDDS and non-geostationary fixed satellite service ("NGSO FSS") networks. While the MITRE Report addresses interference to DBS receivers, its analysis focuses on many issues that are relevant to the problem of MVDDS interference into NGSO FSS consumer receivers.

For example, the MITRE Report recommends that each applicant for a MVDDS authorization be required to implement interference mitigation techniques to protect DBS receivers prior to obtaining its operating license.[3] The report indicates that this coordination should be completed in each local community by calculating the potential for interference into DBS receivers on a site-by-site basis.[4]

The Commission should employ this same advance coordination approach to minimize interference into NGSO FSS receivers. Both the Commission[5] and Northpoint[6] have

---

[3] *See MITRE Report*, at 6-8.

[4] *See id.*

[5] *See id.*, ¶ 167.

[6] *See Letter to Magalie Roman Salas, Secretary, FCC, from Antoinette Cook Bush, Counsel for Northpoint Technology, Ltd.* (Jan. 27, 2000) (indicating that Northpoint "has also advocated . . . coordination between NGSO FSS systems and Northpoint); *Letter to Mr. Donald Abelson, Chief, International Bureau, from Antoinette Cook Bush, Counsel for Northpoint Technology, Ltd.* (Jan. 20, 2000) (noting that the use of shielding would require coordination with Northpoint)*; Letter to Magalie Roman Salas, Secretary, FCC, from Antoinette Cook Bush, Counsel for Northpoint Technology, Ltd.*, at unnumbered page 40 (Sept. 9, 1999) (arguing that "[a]s co-primary services both NGSO and Northpoint have the burden of coordination"); *Reply Comments of Northpoint Technology, Ltd.*, ET Docket No. 98-206, at 27 (April 14, 1999) (proposing that NGSO FSS systems and Northpoint would be required to coordination with each other"); *see also Order*, ¶ 220 n.474 (*citing Comments of Northpoint Technology, Ltd.*, ET Docket No. 98-206 at 27, 31 (March 2, 1999)) (noting that "Northpoint indicates that earth stations in the vicinity of its transmitters could be coordinated to enable ubiquitous NGSO FSS operations").

acknowledged the need for coordination between MVDDS and NGSO FSS networks. Unfortunately, in its *Further Notice*, the Commission tentatively declined to require such coordination, stating without explanation that it "may be overly burdensome."[7]

The Commission should also adopt the MITRE Report recommendation that MVDDS applicants be required to pay all or part of the cost of interference mitigation.[8] Again, while the report made this recommendation with respect to DBS networks, it is equally applicable to NGSO FSS receivers. If the Commission fails to require MVDDS licensees to share in the cost of mitigating interference into NGSO FSS receivers, then MVDDS operators will have no incentive to minimize interference into NGSO FSS networks. Furthermore, MVDDS operators could erect transmitters or increase power in areas already served by NGSO FSS systems and thereby eliminate NGSO FSS reception. No NGSO FSS operator would be able to attract customers on such a basis.

Another important recommendation included in the MITRE Report is that the Commission should adopt protection criteria for MVDDS interference.[9] Furthermore, the criterion should be a C/I ratio consistent with a 10% relative increase in unavailability.[10] While Boeing has no opinion as to the appropriate criteria for assessing interference into DBS receivers,

---

[7] *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*, FCC 00-418, ¶ 281 (Dec. 8, 2000) ("*Order*" or "*Further Notice*").

[8] *See MITRE Report* at 6-5.

[9] *See id.*

[10] *See id.*

Boeing has long believed that this is the correct criterion to assess MVDDS interference into NGSO FSS receivers.[11]

Unfortunately, not only did the Commission fail to adopt a 10% unavailability criterion to protect NGSO FSS, but the Commission also failed to propose any criteria at all to assess MVDDS interference into NGSO FSS receivers. The adoption of protection criteria is a fundamental first step in any sharing analysis between two radiocommunication services, a fact that the Commission has repeatedly acknowledged in this proceeding.[12]

The MITRE Report's primary conclusion is that MVDDS "poses a significant interference threat to DBS operation in many realistic operational situations."[13] The report also concludes that "a wide variety of mitigation techniques exists that, if properly applied under appropriate circumstances, can greatly reduce the geographical extent of the regions" (but not the absolute threat) "of potential MVDDS interference impact upon DBS."[14]

The tests and analysis that are included in the MITRE Report support the conclusion that MVDDS transmitters will cause significant interference to both DBS and NGSO FSS receivers.

---

[11] *See, e.g., Letter from David A. Nall, Counsel for The Boeing Company, to Magalie Roman Salas, Secretary, FCC* (Feb. 22, 2000); *Letter from David A. Nall, Counsel for The Boeing Company, to Magalie Roman Salas, FCC Secretary, FCC* (Feb. 16, 2000).

[12] *See Further Notice*, ¶ 267; *Order*, ¶ 218 (indicating that a major objective of its *Further Notice* is to identify "protection criteria" that can be used to ensure that "BSS operations will not be threatened by MVDDS operations"); *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*, Notice of Proposed Rule Making, FCC 98-310, ¶ 96 (Nov. 24, 1998) (requesting comment "on what criteria would be necessary to protect NGSO FSS downlinks from interference from Northpoint").

[13] *MITRE Report* at 6-1.

[14] *Id.*

Unfortunately, the mitigation techniques that are discussed in the report may provide little or no protection to NGSO FSS receivers.

For example, on the subject of harmful interference, the report notes the potential for unacceptable interference associated with antenna backlobes from MVDDS transmitters into DBS receivers.[15] This includes both interference emanating from the backlobes of MVDDS transmit antennas and interference into the backlobes of DBS antennas.[16] As Boeing has repeatedly demonstrated to the Commission, MVDDS interference will also come continuously into the antenna backlobes of NGSO FSS receivers.[17] As a result, NGSO FSS networks will be unable to use satellite diversity to attempt to serve customers in exclusion zones around MVDDS transmitters.[18]

NGSO FSS networks will also be unable to use other mitigation techniques that were addressed in the MITRE Report. For example, the report places great reliance on using natural shielding and clip-on shielding to protect DBS receives.[19] NGSO FSS receivers cannot benefit from either of these mitigation techniques because NGSO FSS receivers must track satellites

---

[15] *See id.* at § 5.

[16] *See id.* at 6-8.

[17] *See, e.g., Letter from David A. Nall, Counsel for The Boeing Company, to Magalie Roman Salas, Secretary, FCC* (Feb. 22, 2000); *Letter from David A. Nall, Counsel for The Boeing Company, to Magalie Roman Salas, FCC Secretary, FCC* (Feb. 16, 2000).

[18] The MITRE Report also indicates that test results indicate that the waveform of DBS signals are relatively resilient to the constant envelope QPSK MVDDS interference from Northpoint MVDDS transmitters as compared to Gaussian noise. *See MITRE Report* at 3-14. In contrast, NGSO FSS signals will not employ the same waveform as DBS and may not reflect a significant level of resilience to MVDDS interference.

[19] *See id.* at 6-4.

down to relatively low elevation angles in all directions, particularly northerly directions where the bulk of NGSO FSS satellites will be located when serving the United States. Natural shielding would often block transmissions with NGSO FSS satellites and clip-on shielding would interfere with mechanical tracking and provide no protection as the antenna tracks in different directions.

The MITRE Report also considers the mitigation potential of employing a 7 MHz frequency offset between MVDDS and DBS carriers and/or using the same system of alternate senses of polarization for adjacent channels.[20] Modifying the MVDDS signal and channeling structure will do nothing to protect NGSO FSS networks, however, which will use channeling that is quite different than DBS. Changing the polarization of the MVDDS transmissions will also be of no assistance in reducing interference to NGSO FSS receivers because, as noted above, MVDDS transmissions will enter the backlobes of the NGSO FSS receive antennas, where polarization isolation capability is very low.

Admittedly, the MITRE Report does include some mitigation techniques that could help both DBS and NGSO FSS receivers. Regrettably, the Commission did not propose to require MVDDS operators to employ any of these mitigation techniques in its *Further Notice* in this proceeding.

For example, the MITRE Report indicated that the most important mitigation technique is "[k]eeping the MVDDS transmitter power as low as possible . . .."[21] Unfortunately, the Commission proposed in its *Further Notice* to permit MVDDS operators to transmit at a nominal

[20] *See id.* at 6-2, 6-3.

[21] *Id.* at 6-2.

power level of up to 12.5 dBm.[22] The Commission also proposed to permit MVDDS operators to transmit at power levels of up to +10 dBW whenever MVDDS operators invoke certain limitless exceptions, such as providing service in any community that is close to a mountain, body of water, or other uninhabited area.[23] Such excessive power levels and exceptions clearly cannot be construed as keeping MVDDS transmitter power as low as possible.

The MITRE Report also indicated that maintaining a minimum MVDDS transmitter height of at least 100, or even 200 meters above the level of the victim DBS receiver reduces the size of the area where DBS consumers will suffer unacceptable interference.[24] This mitigation technique may also reduce interference into NGSO FSS receivers (depending on the type of MVDDS transmitter that is used). Unfortunately, raising the MVDDS antenna height may also produce more interference to NGSO FSS receivers if the higher towers increase the number of in-line events between MVDDS transmitters and NGSO FSS satellites.

In any event, the Commission failed to propose in its *Further Notice* any restrictions on the minimum height of MVDDS transmitters. Without such restrictions, there is no reason to believe that MVDDS operators will construct higher transmitting towers in order to help protect DBS and NGSO FSS licensees.

The Commission also failed to propose any requirements with respect to a minimum antenna size for MVDDS receivers. Instructively, the MITRE report indicated that imposing a

---

[22] *See Further Notice*, ¶ 280.

[23] *See id.*, Appendix E, § 101.113(a) n.10. Permitting ultra-high power levels when the MVDDS transmitter is mounted on a mountain ridge that is over one kilometer from populated subscriber areas, and when MVDDS transmitting systems are located on tall structures that are adjacent to bodies of water or other significant and clearly unpopulated areas. *See id.*

[24] *See MITRE Report* at 6-2.

minimum antenna size on MVDDS receivers could reduce interference into other spectrum users by permitting MVDDS networks to operate using low power levels.[25]

The MITRE Report also addressed other mitigation techniques that may have little or no benefit for DBS and NGSO FSS receivers. For example, the report concluded that adjusting the elevation tilt of MVDDS transmitting antennas "may not be particularly effective."[26] In contrast, the report concluded that requiring MVDDS operators to employ real-time power control would reduce interference into DBS receivers during periods of rain.[27] As Boeing has indicated previously, however, power control is unlikely to be a practical interference mitigation tool for MVDDS because heavy rain events are usually very localized.[28] As a result, heavy rain cells may often reduce DBS signal strength in areas served by MVDDS transmitters without producing heavy rain at the MVDDS transmitter location.

In summary, there is overwhelming evidence that MVDDS networks cannot operate in the 12.2-12.7 GHz band without cause harmful and unacceptable interference into NGSO FSS receivers. That evidence is buttressed (indirectly, but convincingly) by the independent MITRE Report on MVDDS interference into DBS networks. NGSO FSS operators will not be able to mitigate interference adequately from MVDDS transmitters and, as a result, NGSO FSS licensees may be forced to abandon their use of the 12.2-12.7 GHz band.

---

[25] *See id.* at 6-4.

[26] *Id.* at 6-2.

[27] *See id.* at 6-3.

[28] *See Reply Comments of The Boeing Company*, ET Docket No. 98-206, at 45-49 (Apr. 14, 1999) (using NASA Publication 1082(04) to illustrate the small-cell nature of heavy rain events).

Northpoint seems to acknowledge the difficult position of NGSO FSS operators, arguing that even if NGSO FSS networks do lose access to the 12.2-12.7 GHz band, they will still have access to nearly 2500 MHz of spectrum in which to operate.[29] Of course, this argument is absurd. The 12.2-12.7 GHz band was allocated by the Commission for NGSO FSS space-to-earth service links, the most bandwidth intensive link in any satellite communications network. NGSO FSS operators cannot arbitrarily operate space-to-earth service links in gateway or service uplink spectrum. Instead, if NGSO FSS operators are forced to abandon the 12.2-12.7 GHz band, then they will need to confine their forward service link communications to the 11.7-12.2 GHz band.

As the Commission recently acknowledged, "there is not enough allocated Ku-band spectrum to accommodate – without potential interference – all proposed NGSO FSS systems if each system were to use the full amount of spectrum it has requested."[30] The spectrum shortage will be doubly worse if NGSO FSS licensees are unable to provide services to consumers in half of the downlink service spectrum that has been allocated to their service. Therefore, the Commission should promote the public interest by either withdrawing its allocation for MVDDS in the 12.2-12.7 GHz band, or by adopting rules that require MVDDS operators to take an active role in mitigating interference into NGSO FSS receivers. The Commission should also expedite

[29] *See Northpoint Technology, Ltd., and Broadwave USA, Inc., Opposition to Petitions for Reconsideration of First Report and Order*, ET Docket No. 98-206 at 11 (Apr. 24, 2001)

[30] *The Establishment of Policies and Service Rules for the Non-Geostationary Satellite Orbit, Fixed Satellite Service in the Ku-Band*, FCC 01-134, ¶ 16 (May 3, 2001).

the provision of broadband, two-way communication services to consumers in all regions of the world be promptly licensing NGSO FSS networks.

Respectfully submitted,

THE BOEING COMPANY

By: /s/ David A. Nall

R. Craig Holman
Office of the Group Counsel
New Ventures Group
The Boeing Company
P.O. Box 3999, M/S 84-10
Seattle, Washington 98124-2499
(253) 773-9645

David A. Nall
Bruce A. Olcott
Stephen J. Duall
Squire, Sanders & Dempsey L.L.P.
1201 Pennsylvania Avenue, N.W.
P.O. Box 407
Washington, D.C. 20044-0407
(202) 626-6600

Its Attorneys

May 15, 2001