Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of:	)	
	)	
NORTHPOINT TECHNOLOGY	)	RM No. 9245
	)	
Petition for Rule Making To Modify Section 101.147(p) of the Commission's Rules To Authorize Subsidiary Terrestrial Use of the 12.2-12.7 GHz Band By Digital Broadcast Satellite Licensees and Their Affiliates	)	

To: The Commission

OPPOSITION OF SKYBRIDGE

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EXECUTIVE SUMMARY

SkyBridge L.L.C. hereby opposes the Petition for Rule Making filed by Northpoint Technology, requesting the Commission to initiate a rule making proceeding to amend its rules to authorize terrestrial use of the 12.2-12.7 GHz band on a secondary basis by BSS licensees and their "affiliates." In brief, the Northpoint technology presents a substantial threat to the interference-free operation of the primary services in the subject band. As shown herein, the tests that Northpoint relies on to demonstrate the ability of its technology to co-exist with DBS systems are fatally flawed. Furthermore, Northpoint does not even address how it will protect NGSO FSS systems.

Fundamental engineering principles suggest that Northpoint would substantially interfere with DBS reception. First, the general ability of Northpoint to site its transmitters in a way that effectively honors the necessary exclusion zones -- while still covering a viable service area -- appears problematic. Furthermore, it is not clear how Northpoint will protect future DBS customers within the exclusion zones. Finally, in most environments in which Northpoint technology would be deployed, reflections from buildings, passing cars, etc., can be expected, causing Northpoint signals to enter the main lobes or near-main lobes of the DBS earth stations.

In addition, the test results relied upon by Northpoint utterly fail to establish the feasibility of DBS/Northpoint frequency sharing. The glaring flaws in Northpoint's tests include the following:

- The performance of the DBS antenna used in the tests was not satisfactorily determined, thereby rendering the data meaningless. Northpoint inexplicably

failed to replace defective equipment, confirm the integrity of the antenna used in its tests, or attempt to determine the cause of anomalous test results. Thus, it is impossible for Northpoint to claim that the data from the tests supports its non-interference claims.

- Northpoint failed to explain significant inconsistencies in the link measurements. Despite a clear line of sight between the Northpoint transmitter and the DBS receivers, the received signal power measurements deviate from those expected. Northpoint's apparent inability to make simple on-axis measurements in clear line-of-sight conditions substantially undermines the validity of the other results presented.

- Northpoint failed to assess the implications of the difference in the results between the two DBS signals tested. Such sensitivity to the particular system being tested (if real, and not a result of testing flaws) means that the likelihood of interference to a DBS customer will depend not only on the location of the customer within the Northpoint beam, but on the particular DBS system used by the customer and the customer's location within the DBS service area.

- Northpoint appears to have ignored the worst-case interference to DBS systems. Northpoint did not attempt to determine the relative sensitivities of the transponders, channels, or the placement of the Northpoint signal within the channels, used in the tests. Nor did it test representative DBS azimuth or elevation angles.

- As Northpoint concedes, because multipath is absent, the King Ranch test site is not representative of actual DBS environments. This concession is an admission that no real-world conclusions can be drawn from the tests conducted to date.

Northpoint offers no explanation for the obvious failure of the tests. Rather, it simply ignores the flaws and inconsistencies and suggests that: (1) it is time to move on to urban tests, using higher transmitter towers and increased power (where the threat of interference to DBS subscribers is quite real); and (2) the Commission should -- on the basis of this record -- proceed to establish rules authorizing this new service.

Furthermore, Northpoint does not address the potential impact of its proposed technology on NGSO FSS systems, such as the SkyBridge System. Under ITU rules, NGSO FSS systems are allocated in the subject bands on an primary basis,

while Northpoint itself proposes secondary status for its systems. Instead of facing this threshold issue, Northpoint questions the ability of provisional power limits applicable to NGSO FSS systems adopted at WRC-97 to protect Northpoint and DBS systems, and asks the Commission to weigh the respective public interest benefits of Northpoint and NGSO FSS systems. However, Northpoint has confused the various WRC-97 limits, and does not dispute the benefits of NGSO FSS systems, the services of which overlap significantly with those proposed by Northpoint. The real problem, which Northpoint has ignored, is the interference Northpoint will almost certainly cause to DBS and NGSO FSS systems.

For the reasons presented herein, the Northpoint Petition should be denied.

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OPPOSITION OF SKYBRIDGE

SkyBridge L.L.C. ("SkyBridge"), by its attorneys, hereby opposes the Petition for Rule Making (the "Petition") filed by Northpoint Technology ("Northpoint") on March 6, 1998, and placed on public notice by the Commission on March 19, 1998.[1/] The Petition requests that the Commission initiate a rule making proceeding to amend its rules (the "FCC Rules") to authorize terrestrial use of the

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1/ In the Matter of Northpoint Technology Petition for Rule Making to Modify Section 101.147(p) of the Commission's Rules to Authorize Subsidiary Terrestrial Use of the 12.2-12.7 GHz Band by Digital Broadcast Satellite Licensees and Their Affiliates, filed March 6, 1998; Public Notice, Report No. 2265 (March 19, 1998), Report No. 2265-corrected (March 23, 1998).

12.2-12.7 GHz band on a secondary basis by broadcasting-satellite service ("BSS") licensees and their "affiliates."[2/]

In brief, the Northpoint technology presents a substantial threat to the interference-free operation of the primary services in the subject band. As discussed in detail below, the tests[3/] that Northpoint relies on to demonstrate the ability of its technology to co-exist with direct broadcast satellite ("DBS") systems are fatally flawed. Furthermore, Northpoint does not even address how it will protect nongeostationary orbit ("NGSO") Fixed-Satellite Service ("FSS") systems. Therefore, Northpoint's petition is, at best, premature. Indeed, as described in detail below, the flaws in Northpoint's test results are so numerous and glaring -- defects regarding which Northpoint offers neither acknowledgment nor explanation -- that its Petition can and should be summarily dismissed; the "evidence" cited in the Petition does not begin to support the relief requested.

I. SKYBRIDGE'S INTEREST IN THE PROCEEDING.

SkyBridge currently has on file with the Commission an application (the "SkyBridge Application") for authority to launch and operate the "SkyBridge System," a global network of NGSO communications satellites operating in the Ku-

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2/ Petition, Attachment A.

3/ See Progress Report to the Federal Communications Commission on Experimental License WA2XMY, prepared by Diversified Communication Engineering, Inc., filed January 15, 1998 ("DCE Report"), and the accompanying Direct Broadcast Satellite (DBS) Measurement Report, prepared by Comsearch for Diversified Communication Engineering, October 28, 1997 ("Comsearch Report").

band, designed to provide broadband services in the FSS.[4/] SkyBridge proposes to operate downlinks in the 12.2-12.7 GHz band that is the subject of the Petition. Although a key feature of the SkyBridge System is its ability to share spectrum with geostationary orbit ("GSO") and terrestrial Fixed Service ("FS") systems, Northpoint and Diversified Communication Engineering, Inc. ("DCE"),[5/] have, in this and other forums, directly or indirectly questioned (without any technical analysis whatsoever) the ability of the SkyBridge system (and other NGSO systems) to co-exist with the Northpoint system.[6/] Moreover, Northpoint has, without any factual predicate, suggested that the Northpoint technology represents a higher and better use of the subject spectrum than that proposed by NGSO FSS systems such as SkyBridge.[7/]

4/ Application of SkyBridge L.L.C. for Authority to Launch and Operate a Global Network of Low Earth Orbit Communications Satellites Providing Broadband Services in the Fixed Satellite Service, File No. 48-SAT-P/LA-97, filed February 28, 1997; Amendment, File No. 89-SAT-AMEND-97, filed July 3, 1997.

5/ Up until the filing of the Petition, pleadings and experimental license requests related to the Northpoint technology have been made by DCE. The relationship between Northpoint and DCE is unclear, and is not explained in the Petition. For purposes of this proceeding, SkyBridge assumes that they are one and the same and, unless the specific context requires otherwise, will refer to both as Northpoint.

6/ See DCE Report cover letter to Regina Keeney, Chief, International Bureau, re: File Nos. 48-SAT-P/LA-97, 89-SAT-AMEND-97, January 15, 1998, at 2; Reply Comments of Diversified Communication Engineering, Inc.--Northpoint, RM No. 9147, September 11, 1997 at 2; Reply Comments of Northpoint Technology, File Nos. 48-SAT-P/LA-97, 89-SAT-AMEND-97, March 20, 1998 at 1.

7/ See Reply Comments of Diversified Communication Engineering, Inc.--Northpoint, RM No. 9147, September 11, 1997 at 6. Northpoint predicates this "public interest" assessment in part on the clearly erroneous assumption that the primary focus of NGSO FSS systems such as SkyBridge is in

(continued...)

II. REGULATORY STATUS OF THE 12.2-12.7 GHz BAND.

The ITU Region 2 allocation for the 12.2-12.7 GHz band specifies, inter-alia, BSS and NGSO FSS[8/] downlinks, and FS, all on a co-primary basis; in the U.S., the band is currently allocated to BSS and FS on a co-primary basis. Both internationally and domestically, however, terrestrial systems are required to protect satellite services operating in accordance with the BSS plans for Region 2.[9/] Current FCC Rules permit terrestrial use of the bands on a non-interference basis to BSS systems, subject to certain technical requirements.[10/]

Northpoint proposes to amend the FCC Rules to permit BSS licensees and their affiliates to utilize the 12.2-12.7 GHz band on a secondary basis, "to transmit video entertainment material, data and other communications traffic related to the operation of the broadcasting-satellite system."[11/] According to Northpoint, such

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7/ (...continued)
underdeveloped, third world markets. See Reply Comments of Northpoint Technology, File Nos. 48-SAT-P/LA-97, 89-SAT-AMEND-97, March 20, 1998 at 1. As SkyBridge, Teledesic and Celestri all have made clear in their respective applications, industrialized countries such as the U.S. represent a vital segment of the overall global market for NGSO FSS systems. See, e.g., SkyBridge Application at 15; Application of Teledesic Corporation for a Low Earth Orbit ("LEO") Satellite System in the Fixed Satellite Service ("FSS"), File No. 22-DSS-P/LA-94, March 21, 1994, at 17-20; Application for Authority to Construct, Launch and Operate the Celestri Multimedia LEO System, File No. 79-SAT-P/LA-97, June 1997, at 6-11.

8/ See ITU Radio Regulations footnote S5.487A, in Final Acts of the World Radiocommunication Conference, Geneva, 1997 ("WRC-97 Final Acts") at 44.

9/ See ITU Radio Regulations footnote S5.490; 47 C.F.R. § 2.106, footnote 844.

10/ 47 C.F.R. §§ 101.147(p), 101.101-101.151.

11/ Petition, Attachment A. The scope of this proposed language is far from clear. Although Northpoint's Petition discusses the ability of its system to (continued...)

use would be fully coordinated with the affected BSS systems.[12/] However, Northpoint proposes that such use not be subject to the detailed technical requirements otherwise applicable to terrestrial systems operating in the band.[13/]

III. FUNDAMENTAL ENGINEERING PRINCIPLES SUGGEST THAT NORTHPOINT WOULD SUBSTANTIALLY INTERFERE WITH DBS RECEPTION.

Northpoint proposes to operate the Northpoint system on a co-frequency, co-geographic basis with DBS systems, hoping to avoid interference by exploiting the directionality of the DBS consumer earth stations. The Northpoint transmitters would point approximately due south, in an attempt to confine radiation to only the backlobes and sidelobes of the DBS earth stations. The Northpoint signals would be received by customers via a second antenna, pointed ideally due north.[14/]

The feasibility of the co-existence of the Northpoint system and DBS systems depends on Northpoint's adherence to an "exclusion zone." Northpoint must

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11/ (...continued)
transmit local television signals and non-commercial broadcasting services, Petition at 9-11, Northpoint argues that its technology "is ideally suited for the delivery of high-speed Internet services, broadband data offerings, and other innovative services completely distinct from typical DBS or satellite services." Petition at 11 (emphasis added). Northpoint also highlights its ability to provide "a new paradigm of services," such as "Enhanced Radio Broadcasting." Petition at 13.

12/ Petition, Attachment A.

13/ Id. See also Petition at 21.

14/ In fact, although the center of the Northpoint beam would be pointed roughly south, the Northpoint beam is wide in azimuth to cover a large service area. Northpoint receivers would therefore employ a wide range of pointing directions depending on the azimuth of each receiver relative to the transmitter.

site its transmitter a sufficient distance from any DBS customer. The distance will depend not only on the transmitter power and antenna pattern of the Northpoint transmitter, but also on the azimuth of each DBS customer relative to the transmitter. Furthermore, the signal strength of the Northpoint signal past the boundaries of the exclusion zone must be capable of providing service to the DBS customers in a sufficiently expansive "service area."

Even ignoring for the moment the fundamental flaws in Northpoint's technical showing demonstrated below, it is far from clear how its system would work in practice, without seriously jeopardizing reception by a significant percentage of DBS customers. As an initial matter, the general ability of Northpoint to site its transmitters in a way that effectively honors the exclusion zones -- while still covering a viable service area -- appears problematic. How, for example, will Northpoint serve the center or southern portions of a large city? Any Northpoint transmitter placed at the southern end of the service area of another Northpoint transmitter to extend service south over a city will have its own exclusion zone, presumably in a populated area. Furthermore, how will Northpoint protect future DBS customers within the exclusion zone? Will Northpoint continuously relocate its transmitters as urban sprawl progresses or as existing households decide to become DBS subscribers?

Northpoint mentions in its Petition that DBS subscribers in an exclusion zone could be provided "individualized accommodations."[15/] However, Northpoint

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15/ Petition at 16. Northpoint also claims that the exclusion zones can be minimized by use of non-offset antennas. DCE Report at 10. There is no basis for this claim, and Northpoint provides no explanation for such a difference between antenna types. It is not even clear whether the RCA

(continued...)

fails to describe what such accommodations would entail. Issues relating to the extent of the additional expense (and who would pay) and dislocation of such accommodations, the level of consumer acceptance of whatever additional equipment may be required,[16/] and the number of consumers potentially affected all go unaddressed by Northpoint.

Furthermore, in most environments in which Northpoint technology would be deployed, reflections from other buildings, passing cars, etc., can be expected, causing Northpoint signals to enter the main lobes or near-main lobes of the DBS earth stations.[17/] It is important to recognize that the wide-beam transmit antennas that Northpoint would use will cause far more multipath problems than FS point-to-point transmissions. With a narrow-beam point-to-point signal, the laws of geometric optics require that the reflecting surface be south of the victim receiver and oriented at a precise angle relative to the transmitter and the receiver in order for a reflected signal to enter the main lobe of the receive antenna, a requirement unlikely to be met in most cases. But with wide-beam transmitters, reflecting surfaces that are south of the victim receiver oriented at a wide range of angles will provide a signal path from the transmitter to receiver. In other words, the Northpoint transmissions

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15/ (...continued)
antenna used in the testing was offset or non-offset.

16/ For example, significantly larger DBS receivers would not likely be acceptable to most consumers.

17/ Further complicating the analysis, the placement of the Northpoint consumer receive antennas in close proximity to the DBS receive dishes can be expected to affect the antenna pattern of the DBS receive dishes.

are almost certain to cause interference into south-pointing DBS receivers in any area that is occupied by structures offering reflecting surfaces.[18/]

For these reasons, it is not clear how the Northpoint system could ever be successfully deployed, without endangering reception by a substantial number of DBS customers. It is not surprising, therefore, that while Northpoint claims that its "technology can solve several problems for the DBS operators and eliminates their biggest barrier to being truly competitive to cable television,"[19/] the DBS community has yet to embrace the Northpoint system. Indeed, the DBS operators whose signals were tested in its experiments (DirecTV and EchoStar) apparently refused to cooperate in the tests, or even provide information on their signals.[20/]

IV. THE NORTHPOINT TEST RESULTS UTTERLY FAIL TO ESTABLISH THE FEASIBILITY OF DBS/NORTHPOINT FREQUENCY SHARING.

The cover letter to the DCE Report claims that "the technical feasibility of Northpoint has been empirically established."[21/] In its Petition, Northpoint relies solely on these tests as a demonstration of "how Northpoint's technology can provide local television signals without interference to existing systems."[22/] However, for the reasons summarized below, the cited experiments fail to validate in any way the

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18/ The 10-mile service area that Northpoint postulates for a single transmitter (see Petition at 19) would be insufficient to cover major population centers. The deployment of multiple Northpoint transmitters -- to provide seamless service coverage over large areas -- would only compound such interference.

19/ DCE Report at 9.

20/ Id. at 3, 5.

21/ DCE cover letter to DCE Report at 2. See also Petition at 17.

22/ Petition at 2.

ability of this technology to co-exist with DBS systems, even operating in the most absurdly optimistic environment imaginable.

Northpoint conducted three sets of tests.[23/] In the first, Northpoint performed measurements to determine the carrier-to-interference levels required by the DBS receiving systems, thereby permitting an approximation of the exclusion zones and power constraints that the Northpoint system must honor to protect DBS systems. In the second set, measurements were taken to determine the changes in the DBS receiver antenna gain in the direction of the Northpoint transmitter as the DBS antenna was rotated through 360° (at a fixed elevation of 32°[24/]). Finally, changes in the DBS antenna gain were measured as the antenna elevation was changed from 50° to 70° (at a fixed azimuth of 180°, i.e., pointing directly away from the Northpoint transmitter[25/]).

Only the results of the first of these three tests are discussed in the DCE Report. It is on the basis of this one set of data that Northpoint purports to have demonstrated the technical feasibility of its system. The other two tests are discussed in the Comsearch Report, although their purpose is not entirely clear. As discussed in detail below, the azimuth tests in particular were not successful, and raise significant doubts as to the reliability of the measurements presented in the first test relied on by Northpoint for validation of its system.

23/ See Comsearch Report, § 1.1.

24/ As discussed below, 32° is not logically related in any way to the elevation angles of the DBS systems actually tested at the test site.

25/ This configuration is not worst-case, or even typical of the alignments of Northpoint transmitters and DBS receivers that would occur in a real system.

A. The Performance of the DBS Antenna Used in the Tests Was Not Satisfactorily Determined, Thereby Rendering the Data Meaningless.

Northpoint provided three DBS systems to Comsearch (with the brand names of RCA, EchoStar, and Channel Master). Two were rejected outright: the EchoStar for having a faulty low noise block-down converter, and the Channel Master for being either defective or for a different frequency band.[26/] No explanation is offered as to why the defective systems were not replaced; such equipment is readily available at low cost at a variety of retail outlets. Instead, the RCA antenna was used for all of the experiments.[27/]

Even after encountering problems with two out of the three systems, Northpoint apparently did not take the preliminary step of confirming the integrity of the antenna pattern of the RCA antenna by, e.g., testing for inclusion of the boresight (pointing the main beam directly at the transmitter and rotating it in azimuth). This would have revealed whether the feed was properly centered, or if any other anomalies existed. A repeat of such tests at the end of the test campaign would have established whether the integrity of the antenna was maintained throughout the tests.

As Comsearch notes, the "exact DBS antenna characteristics were not known."[28/] The data from the only pattern tests conducted -- the elevation and

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[26/] Comsearch Report, § 1.3, 2.4.

[27/] The DirecTV and EchoStar set-top boxes required to decode the DirecTV and EchoStar signals are not discussed or analyzed in the reports.

[28/] Comsearch Report, § 4.1.

azimuth tests conducted on the DBS antenna[29/] (which are no substitute for the boresight test mentioned above) -- appear to be internally inconsistent, indicating either faulty measurements or a defect in the DBS equipment used in the tests.

Most notably, in the azimuth tests, the signal level received by the antenna as it was rotated 360° degrees in azimuth was far from symmetric. As much as a 7 dB difference was measured, depending on whether the antenna was turned to a +X° azimuth as opposed to a -X° azimuth.[30/] As a result, Comsearch states that "[t]here are no conclusions made based on this data."[31/] Nonetheless, Northpoint apparently did not think it important enough to attempt to determine the cause of these anomalous results, e.g., by at least checking whether the results differ if the antenna is replaced.[32/]

Furthermore, the azimuth tests were conducted with the DBS antenna pointed at a 32° elevation. This is an odd choice, given that the elevation for DirecTV and for EchoStar at the test site were, according to Northpoint, 58° and

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29/ Id., §§ 3.2, 3.3, 4.2 and 4.3.

30/ Furthermore, with the DBS antenna pointed up at a 32° elevation angle, a terrestrial signal enters the antenna well outside the main beam. If the DBS antenna is a parabolic dish, one might speculate that the receive signal levels should therefore be more or less the same at all azimuths. The actual test results suggest some kind of peculiar reflections from the antenna structure itself. If that were the case, then all of the other measurement results are suspect.

31/ Comsearch Report, Table 4.2-1 (emphasis added).

32/ Even if one were to take the results at face value, as Northpoint has done, the variation in these measurements would suggest that interference thresholds will vary unpredictably depending on the azimuth, so that interference will vary randomly from one part of the country to another, and from one DBS system to another. Northpoint does not address such complications.

56°[33] respectively.[34] Nor does 32° represent the worst-case elevation in the U.S., as discussed in Section IV.D below. No explanation for the choice of 32° appears in either the DCE Report or the Comsearch Report. The choice of elevation angle is not academic; the test results presented in the Comsearch Report[35] (if taken at face value) show substantial sensitivity to the elevation angle.

Given the anomalous results of the antenna pattern tests, there is a substantial likelihood that the test antenna was defective. As the co-existence of the Northpoint system with DBS systems is critically dependent on the DBS antenna characteristics, the lack of an explanation for the facially unreliable results represents a fatal defect in the experiments. Thus, it is impossible for Northpoint to claim that the data from the tests supports its non-interference claims (or provides any useful

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[33] Northpoint reports that to receive EchoStar's signal, the DBS antenna was pointed at an elevation of 56° and an azimuth of 205°. DCE Report at 6; Comsearch Report, Figs. 3.1-2(B), 3.1-4(B), 3.1-6(B), 3.1-8(B), 3.1-11(B), 3.1-13(B), 3.1-15(B), 3.1-17(B), 3.1-19(B), 3.1-21(B). However, as shown in Table II attached, at King Ranch, Texas, this azimuth and elevation point toward the unoccupied DBS orbital assignment at 110° W.L. Such an obvious error only raises further questions regarding the quality of the Northpoint tests.

[34] Furthermore, the elevation angle cited in the Engineering Report accompanying DCE's supplement to its application for an experimental license, dated May 29, 1997, is 40°, based on a Hughes report for DirecTV. Engineering Report at 2.

In several other respects, there appear to be substantial deviations from what was proposed in the experimental application. For example, the application and experimental license specify a transmission bandwidth of 30 MHz and an authorized power of 1 kW ERP (30 dBW), while the tests were conducted with an 8 MHz carrier and an ERP of 29 dBm. This represents a net decrease in power density of 25 dB. It is not clear which, if any, of these levels are more representative of what would be used in practice.

[35] Comsearch Report, § 3.3.

information regarding the extent of the service and exclusion areas).[36/] The assertion that the feasibility of the Northpoint system has been proven is absurd on its face.

B. Northpoint Fails to Explain Significant Inconsistencies in the Link Measurements.

Northpoint conducted tests for 12 different DBS receiver sites.[37/] Despite a clear line of sight between the Northpoint transmitter and the DBS receivers (except possibly in one case[38/]), the received signal power measurements deviate from those expected. The attached Table I compares the measured and free space path

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36/ Furthermore, the calibration tests performed by Northpoint appear flawed. For instance, the EchoStar calibration was performed at 12,450 MHz (see Figure 2.3-4 of the Comsearch Report), while the EchoStar tests were conducted at 12,460 MHz. Moreover, the calibration signal does not appear to be an 8 MHz signal, as was used in the tests, or to be modulated (although the set-up description indicates that it was). See Figures 2.3-3 and 2.3-4 of the Comsearch Report. Compare, for example, Figures 2.3-3 and 3.1-7, (taking into account that the sweep is 1 MHz/div in the first figure and 5 MHz/div in the second).

37/ Northpoint provides no explanation of the criteria used to select the receiver sites. Standard industry practice in field testing dictates that sites be selected with some specific purpose in mind (to achieve a good statistical sampling of distances, to test the effects of specific terrain or some other purpose). See, e.g., "Field Test Results of the Grand Alliance HDTV Transmission System," submitted to FCC Advisory Committee on Advanced Television Service, September 16, 1994, at 8.

38/ Comsearch Report, § 2.7 (noting that some trees may have been present in the 9.9 mile tests).

losses.[39] Significant deviations between the measured and theoretical values are evident, even for the on-axis and main lobe cases.

For example, the measurements for site #7 (about one mile due south from, and on-axis with, the Northpoint transmitter) suffer from unexplained inconsistencies. Two different values of received signal strength are given in the Comsearch report. In Section 4.2 (DBS Antenna Azimuth Test), the Comsearch calibration antenna measured a signal power of -89 dBmi -- "7.5 dB below the predicted line-of-sight level."[40] Comsearch notes this discrepancy, but does not provide a reason for such a large on-axis power difference. On the other hand, Figure 3.1-10 shows a received signal of -82 dBmi for the same test site, representing a more acceptable 0.5 dB deviation from the predicted level.[41]

Standing alone, Northpoint's apparent inability to reproduce such a simple on-axis measurement in clear line-of-sight conditions substantially undermines the validity of the other results presented. Any doubts in this regard are eliminated by Comsearch's unambiguous refusal to draw any conclusions from the results from

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[39] The DCE Report fails to provide an antenna pattern for the Seavey custom horn antenna apparently used for the transmitter in the tests. However, a pattern was included in Figure 2 of the Engineering Report accompanying a supplement to DCE's application for the experimental license, dated May 29, 1997, and this data was used by SkyBridge in the instant computations. SkyBridge has no way of knowing whether the same antenna described in the experimental application was used in the tests. However, if the antenna pattern is not taken into account in the computations, the path loss deviations are even greater.

[40] Comsearch Report, § 4.2.

[41] As shown in Table I, tests at sites #4 and #9, both outside of but near the transmitter main lobe, also exhibited deviations in excess of 7 dB.

the azimuth tests.[42/] It is telling that Northpoint offers no explanation regarding the matter.

C. Northpoint Fails to Assess the Implications of the Difference in the Results Between the Two DBS Signals Tested.

The results of the Northpoint tests, to the extent that they signify anything, depend on the particular DBS signal being tested. Most notably, the site #7 one-mile measurements produced different results for DirecTV and EchoStar.[43/] No interference was observed for the antenna for the DirecTV measurement at a Northpoint transmit power of 29 dBm, but to eliminate interference to the EchoStar signal, it was necessary to reduce the transmit power to 20 dBm. However, both DBS systems use similar modulations and their signal levels appear to be very similar.[44/] The difference may be attributable to the different pointing azimuths and/or elevations for the two DBS satellites.[45/] However, Northpoint did not attempt to explain or study the cause of the differences in results for the two systems.

Even if it is assumed arguendo that the discrepancy is due to the difference in azimuth and/or elevation for the two measurements, the result is troubling. The two DBS systems studied require pointing azimuths at King Ranch of

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42/ Comsearch Report, § 4.2.

43/ DCE Report at 6.

44/ See Comsearch Report, Figure 3.1-11.

45/ Northpoint reports that the difference in elevation angles for the two DBS satellites was only 2°. However, this appears to be an error; the actual difference was likely 8°. See n.33 supra.

186° (DirecTV) and 205°[46] (EchoStar). For DBS systems requiring pointing azimuths even farther from 180°, such as the DBSC/EchoStar satellite now operating at 61.5° W.L. or the next EchoStar satellite expected to be located at 148° W.L. (or future services provided from, e.g., Mexican DBS orbital locations), the results can be expected to be even more unpredictable.[47]

In any case, such sensitivity to the particular system being tested demonstrates the difficulty in reaching any conclusions about Northpoint exclusion zones or service areas from such a limited -- and patently flawed -- study. Whether interference is caused by the Northpoint system to a DBS customer will depend not only on the location of the customer within the Northpoint beam, but on the particular DBS system used by the customer and the customer's location within the DBS service area.

D. Northpoint Appears to Have Ignored the Worst-Case Interference to DBS Systems.

The method Northpoint used to choose the frequency for its test transmissions, and to monitor the DBS system for interference, leaves several important unanswered questions. First, Northpoint notes that DirecTV and EchoStar did not cooperate in the tests, and in particular would not release channel loading

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[46] This is the figure reported by Northpoint, but appears to be in error. The actual azimuth appears to be 220° W.L. See n.33 supra.

[47] Most likely, the interference from Northpoint to such systems would be even greater than for the tested systems, but this will depend on the actual antenna pattern of the receive dishes for such systems.

information.[48] Therefore, Northpoint had to perform tests to determine the correspondence between frequencies and channels. Although it was able to determine that 12,470 MHz was near the middle of the DirecTV transponder that carries channel 242, and that 12,460 MHz was near the middle of the EchoStar transponder that carries channel 220,[49] Northpoint obviously did not have full information on the signals it was receiving.

First, Northpoint apparently did not have any information as to which transponders may be most sensitive to interference. Transponders on the same satellite age differently, and can have significantly different transmission characteristics. Northpoint reports testing only one channel on one transponder for each of DirecTV and EchoStar, apparently ignoring the likelihood of transponder variation.

In addition, Northpoint states that "[s]ince the DBS modulation is TDMA, an interfering signal in any portion of the transponder will affect all channels on that transponder equally."[50] This not necessarily correct. Multiple video signals, as carried by DirecTV and EchoStar, are likely multiplexed together within a transponder using either MPEG transport packets or some other form of time division multiplexing. Whether all channels on the transponder are affected equally depends

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[48] DCE Report at 6. Northpoint acknowledges that this had a negative impact on the probity of its test results. Id. at 3.

[49] DCE Report at 13.

[50] Id. at 5. Actually, the modulation is QPSK; TDMA is an access method, not a modulation method.

on the nature of the interference (bursty or constant) and the amount of channel capacity devoted to each of the individual signals.

Furthermore, Northpoint transmitted a single 8 MHz interfering signal (the type of video modulation was not described), and studied the interference this caused to a 24 MHz DBS signal. Northpoint indicates that its signal was tuned to near the center of the victim signal. However, Northpoint apparently did not study the effect of: (1) an off-center 8 MHz signal; (2) multiple 8 MHz signals; (3) or even the 30 MHz carrier that had been specified in its experimental license. Nor does Northpoint offer any explanation as to why it apparently considers such tests unnecessary.[51/]

In fact, a centered 8 MHz signal will largely overlap the guard band of a cross-polarized DBS channel. If the 8 MHz signal were not centered, it would overlap to a greater extent (or even entirely) parts of the cross-polarized signal, which could be expected to affect the results. In brief, even ignoring the glaring flaws and inconsistencies in the data obtained, Northpoint's simplistic test regime overlooked several critical areas of inquiry.

Finally, as illustrated in Table II attached, the location of the test site in the far southern reaches of the United States, and the azimuth of the pointing direction to the DirecTV and EchoStar satellites tested, means that the elevation angle for the tests was near optimum, and not in the least representative of the range of smaller elevation angles that will be encountered throughout the United States. For

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[51/] Interestingly, Northpoint calculates a threshold C(N+I) of 4.8 dB, which is close to 10 log (BW_{DCE}/BW_{DBS}), suggesting a possible connection to the bandwidth used in the experiments.

example, at a site in the northwestern part of the United States, an antenna pointed at the DBSC/EchoStar location at 61.5° W.L. would require an elevation angle as low as 20°. For a site in the northeastern United States, an antenna pointed at the EchoStar location at 119° W.L. would require an elevation angle as low as 18°.[52/]

E. Because Multipath is Absent, the King Ranch Test Site is Not Representative of Actual DBS Environments.

The King Ranch is described in the DCE Report as being very rural and almost flat, and without obstructions (other than the possibility of some trees in one test[53/]).[54/] These tests are therefore not representative of the typical urban, suburban, treed and/or hilly environment where most DBS subscribers live. Although Northpoint attempts to argue that "the technical feasibility of Northpoint has been empirically established,"[55/] it readily concedes that further tests are necessary to test for, inter alia, the effect of multipathing due to reflections.[56/] What Northpoint

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52/ See Table II attached.

53/ Comsearch Report, § 2.7.

54/ DCE Report at 4. Northpoint states that, during the tests, no complaints from DBS customers were received. DCE Report at 2. This is not surprising. First, the tests were conducted in virtually unpopulated territory. It is not clear from the DCE Report whether any DBS subscribers even existed in the test region. Indeed, in an amendment to DCE's experimental license application dated March 26, 1997, as a result of the remoteness of the test site from even very small population centers, Northpoint characterized the likelihood of interference to DBS customers as "nonexistent." Furthermore, in the same document, Northpoint notes that the King Ranch principals agreed to accept any interference to DBS receivers that might occur on the King Ranch property. In brief, it borders on disingenuous to tout the apparent lack of complaints from DBS subscribers.

55/ DCE cover letter to DCE Report at 2.

56/ DCE Report at 4.

apparently fails to grasp is that, even ignoring the patent unreliability of its data, this concession is an admission that no real-world conclusions can be drawn from the tests conducted to date.

As discussed in Section III above, the threat posed by multipath problems is substantial. In a non-rural environment, the adverse impact of reflected signals into the main lobe and side lobes of DBS dishes is likely to be quite severe. The problem that Northpoint faces at this juncture is that, assuming arguendo that the King Ranch tests had any validly, there is no rational basis for undertaking a rulemaking until rigorous analysis or testing, taking into account a more realistic environment, is conducted. The fact that the King Ranch data are essentially worthless only underscores the lack of any basis upon which to grant the relief sought by Northpoint.

F. No Conclusions Regarding the Feasibility of the Northpoint Technology Can Be Drawn From the DCE Report.

As demonstrated above, the experiments performed by Northpoint are fatally flawed. Particularly in view of the unknown characteristics of the DBS dish used in the experiments, it is frivolous for Northpoint to suggest that the results demonstrate that its system can co-exist with DBS systems.[57/]

Northpoint offers no explanation for the obvious failure of the tests.[58/] Rather, it simply ignores the glaring flaws and inconsistencies and suggests that:

[57/] DCE cover letter to DCE Report; DCE Report at 9.

[58/] Time limitations do not appear to have been the issue. Comsearch's report was completed 2-1/2 months before DCE filed it with the Commission. It is not clear why further tests to resolve the inconsistencies and other problems were not performed in response to Comsearch's less than enthusiastic report.