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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

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)
and)
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)

ET Docket No. 98-206
RM-9147
RM-9245

COMMENTS OF NORTHPOINT TECHNOLOGY, LTD.

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SUMMARY

Northpoint submits these comments in response to the Commission's NPRM on possible additional satellite and terrestrial services in the Ku-band. In the NPRM, the Commission seeks comment on a proposal to permit NGSO FSS operations in the Ku-band and on a proposal by Northpoint to retransmit local television broadcast signals on a terrestrial basis through the 12.2-12.7 GHz band.

In its comments, Northpoint demonstrates that its patented and proven technology provides an inexpensive and readily available solution to the local signal problem of DBS providers. Approving the Northpoint technology and granting the associated applications for licenses to provide service nationwide, the Commission can ignite competition to cable and the multichannel video program distributors.

Northpoint's ingenious technology relies on basic satellite sharing principles to retransmit local television signals terrestrially through the 12.2-12.7 GHz band on a non-interference basis to DBS. To list a few of its advantages, the Northpoint technology is readily deployed, requires low cost commercially available equipment and fosters spectrum efficiency. Northpoint's comments provide a detailed description of the ability of the proposed system to avoid interference to DBS. The Northpoint technology has been proven by extensive field testing conducted pursuant to experimental licenses issued by the Commission. Northpoint supported the conclusions of its field tests with detailed experimental test reports,

and engineering statements showing that its technology works and will not cause harmful interference to DBS.

The experimental test results prove that the Northpoint technology routinely provides a carrier-to-interference ratio of 20 dB (more than four times the C/I ratio actually needed to protect DBS). In those very small areas where the C/I may be less than 20 dB, (0.2 percent of Northpoint's service area), Northpoint could employ a variety of proven engineering techniques described in the Technical Annex or eliminate any harmful interference that may exist. Northpoint's service, moreover, will achieve an availability level sufficient to be simultaneously provided to DBS consumers.

Finally, the proposed Northpoint system and the NGSO FSS systems can coexist if certain modest modifications are made to the NGSO FSS proposals. Consistent with ITU regulations, the proposed systems should be deemed co-primary. A number of coordination techniques are available to Northpoint and the proposed NGSO FSS system to ensure compatibility. In light of the significant public interest benefits of Northpoint's proposed service offering, the Commission should promptly adopt rules allowing Northpoint's terrestrial use of the 12.2-12.7 GHz band.

TABLE OF CONTENTS

I.	THE DEVELOPMENT OF THE PATENTED NORTHPOINT TECHNOLOGY FOR REHARVESTING THE 12.2-12.7 ND	2
A.	Underpinnings of Northpoint's Innovative Sharing Technology ...	2
B.	Experimental Operations Validate the Northpoint Technology	5
C.	Northpoint's Petition for Rulemaking and the BroadwaveUSA Application	7
II.	THE NORTHPOINT TECHNOLOGY SOLVES THE LOCAL BROADCAST PROBLEM FOR DBS AND SERVES THE PUBLIC INTEREST	11
III.	THE ADVANTAGES OF THE NORTHPOINT TECHNOLOGY	14
A.	The Northpoint Technology Can Use Existing Commercially Available Equipment	14
B.	Northpoint's Technology Will Not Cause Harmful Interference to DBS Service	17
C.	Proven Engineering Techniques Will Ensure That Nominal "Mitigation Zones" Do Not Become "Exclusion Zones"	20
D.	Availability of Northpoint's Service	24
IV.	NGSO FSS SYSTEMS IN THE 12.2-12.7 GHz BAND REQUIRE MODEST MODIFICATIONS FOR COMPATIBILITY WITH NORTHPOINT	25
A.	Compatibility of the Proposed NGSO FSS Systems With Northpoint	25
B.	Coordination Between NGSO FSS and Northpoint Will Allow for Ubiquitous NGSO FSS Operations	28

C.	Adequacy of WRC-97 PFD Limits and Band Segmentation	31
V.	CONCLUSION	33

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COMMENTS OF NORTHPOINT TECHNOLOGY, LTD.

Northpoint Technology, Ltd. ("Northpoint"), by its attorneys, hereby submits these comments in response to the Notice of Proposed Rulemaking ("NPRM") released by the Federal Communications Commission ("Commission" or "FCC") on November 24, 1998, in the above-captioned proceeding.¹ In the NPRM, the Commission proposes, *inter alia*, to permit nongeostationary satellite orbit

¹ 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 and 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, ET Docket No. 98-206; RM-9147; RM-9245, FCC 98-310 (rel. Nov. 24, 1998).

("NGSO") Fixed Satellite Service ("FSS") operations in certain segments of the Ku-band.² In addition, the NPRM seeks comments on Northpoint's proposal to allow terrestrial use of the 12.2-12.7 GHz band for video programming, including the retransmission of local broadcast television signals, and data services. Northpoint urges the Commission to establish rules promptly to authorize the expeditious deployment of Northpoint's terrestrial technology.

I. THE DEVELOPMENT OF THE PATENTED NORTHPOINT TECHNOLOGY FOR REHARVESTING THE 12.2-12.7 GHz

A. Underpinnings of Northpoint's Innovative Sharing Technology

In the early 1990s, Carmen and Saleem Tawil (the "Tawils") of Diversified Communication Engineering, Inc. ("Diversified") theorized that the 12.2-12.7 GHz band could be used on a terrestrial basis to deliver local television broadcast signals using equipment that was already used by Direct Broadcast Satellite ("DBS") providers. Through sheer ingenuity and persistence, the Tawils eventually developed and received patents for a technology that can use the 12.2-12.7 GHz frequency band on a terrestrial basis to provide local television broadcast signals, both digital and analog television stations, and other multichannel video programming, as

² The Ku-band typically refers to frequencies between 12 GHz to 18 GHz range, but here the NPRM is concerned with the 10.7-12.7 GHz, 12.75-13.25 GHz, 13.75-14.5 GHz and 17.3-17.8 GHz bands.

well as deliver high-speed Internet services.³ This innovative technology can coexist in the 12.2-12.7 GHz band with DBS and existing point-to-point terrestrial licensees on a non-interference basis. The Tawils along with other investors formed Northpoint Technology, Ltd. to bring this revolutionary innovation (referred to as the "Northpoint technology") to market.

The Northpoint technology has its genesis in fundamental satellite frequency sharing principles. Satellite service providers are able to coexist in the same frequency band by proper spacing of their satellites since land-based receivers are capable of distinguishing among different satellite signals emanating from varying azimuths and elevation angles. The Northpoint technology takes advantage of this ability of DBS antennas to discriminate between signals coming from different satellite "orbital slots" over the equator separated by 9 degrees. Accordingly, the Northpoint technology essentially creates a "terrestrial slot" with more than a 9-degree separation from DBS satellites and re-uses the 12.2-12.7 GHz spectrum in different local markets without causing harmful interference to existing DBS services.⁴

³ See U.S. Patents No. 5,483,663 (January 9, 1996) by Saleem Tawil of DCE and No. 5,761,605 (June 2, 1998) by Saleem Tawil and Carmen Tawil of DCE, Austin, TX.

⁴ Northpoint can coexist with DBS systems without causing mutually harmful (continued...)

DBS satellites orbit over the equator. This means that all North American DBS dishes point generally south. The Northpoint technology relies on this southern orientation of domestic DBS dishes and contemplates that Northpoint consumers must use a dish pointed generally to the north to receive signals from Northpoint directional terrestrial transmitters pointed to the south. A combined service could use both a DBS antenna pointed south and a Northpoint antenna pointed north.

Since the Northpoint technology operates in the same band, and uses the same digital processing as conventional DBS, the equipment necessary to deploy Northpoint's system is commercially available. This will allow Northpoint to rapidly and inexpensively bring its valuable service to market. Not only would deployment of the Northpoint technology create sufficient capacity in the 12.2-12.7 GHz band to deliver all of the local television signals in every market, but it could also deliver other video programming and high-speed Internet service. Northpoint plans to deliver its services in the 12.2-12.7 GHz band through a series of low-cost cascading cells, each with a transmitter serving approximately 100 square miles. The cells will be

⁴ (...continued)
interference because end-user DBS satellite receivers are directional and are oriented to a signal emanating from a specific orbital slot while suppressing signals from other orbital slots. In some cases (e.g., East and West continent users), the inability to "see" some orbital slots also aids in mitigating harmful interference.

strategically located in a terrain specific manner to include service to all parts of a community, including areas that are in a valley or over a hill. With the Northpoint system, most customers will have at least three directions to point their dish to pick up Northpoint's service. These multiple line-of-sight options will enable better delivery of local broadcast station signals.

B. Experimental Operations Validate the Northpoint Technology

In order to verify the operational viability of this technology, the Tawils contacted the FCC in 1994 and applied for an experimental authorization in November, 1995. The Commission granted the application on July 8, 1997, and issued an experimental authorization (FCC call sign WA2XMY).⁵ The first test of the Northpoint technology under the experimental authorization began the week of October 6, 1997, on the King Ranch property near Kingsville, Texas (the "King Ranch test") which is a large, privately-owned ranch that is the size of the state of Rhode Island.⁶ This test was conducted as a proof of concept test with the test results providing significant evidence that Northpoint's proposed system could operate

⁵ See Experimental License WA2XMY, File No. 5020-EX-PL-95.

⁶ See Alan Peppard, *Day Calls for Fancy Dressing*, THE DALLAS MORNING NEWS, Nov. 25, 1998, at 33A.

effectively in the 12.2-12.7 GHz band without causing harmful interference to DBS consumers.⁷

With promising results in the rural test completed, Northpoint sought confirmation of the ability of its proposed system to work well in an urban area and under a wide variety of environmental conditions. To this end, on January 8, 1998, Diversified filed to modify the experimental authorization to begin testing of the Northpoint technology in Austin, Texas. Pursuant to the modified experimental license,⁸ Northpoint in December 1998, set up a transmitter in downtown Austin and began testing its service in a variety of environmental conditions ranging from high-rise buildings in the downtown area to residential neighborhoods with varied terrain and foliage (the "Austin testing"). Moreover, the Austin testing was conducted under a wide variety of weather conditions ranging from clear sky to severe rain. Again, Northpoint's technology works and the Austin testing demonstrated that the Northpoint technology does not cause harmful interference to DBS.⁹

Prior to the Austin testing, Northpoint had prepared a detailed test plan with input from DBS providers DirecTV and USSB. DirecTV visited the Austin test

⁷ See King Ranch Test Report, attached as Exhibit 4.

⁸ Experimental License WA2XMY, File Nos. 6001-EX-MR-1998, granted July 20, 1998.

⁹ See Austin Test Report, attached as Exhibit 6.

site prior to and during the testing. In fact, Northpoint even established a hotline between DirecTV's national call center and the Northpoint transmitter for consumers to call should they experience any degradation to their signal. This hotline number was also published in the local newspaper. **NOT A SINGLE DBS** consumer called to report interference attributable to Northpoint's operation. The results of this test conclusively demonstrated that Northpoint's system functions effectively in urban areas. Northpoint has submitted these test results and progress reports to the Commission revealing the success of these experiments.¹⁰

C. Northpoint's Petition for Rulemaking and the BroadwaveUSA Applications

Given the success of the King Ranch tests, Northpoint filed a petition for Rulemaking¹¹ with the Commission on March 6, 1998. In its Rulemaking Petition, Northpoint sought a minor amendment to part 101.147(p) of the Commission's rules to allow it to deploy its new patented technology in the 12.2-12.7 GHz band on a secondary basis with DBS and on a co-primary basis with other licensed

¹⁰ See Filings attached as Exhibit 5.

¹¹ Northpoint Petition for Rulemaking 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, RM-9265 (filed Mar. 6, 1998) ("Rulemaking Petition"). See FCC Public Notice, Report No. 265 (Mar. 19, 1998).

services in the band.¹² As set forth in the Rulemaking Petition, Northpoint's technology would solve DBS's inability to provide local signals without causing interference to DBS in the 12.2-12.7 GHz band.¹³

While some DBS providers acknowledged that Northpoint's Rulemaking Petition was based on a worthy goal of solving their local signal problem, other providers unexpectedly challenged the idea that Northpoint could coexist with DBS without causing harmful interference.¹⁴ Certain DBS commenters stated that Northpoint would cause harmful interference unless it provided a minimum protection or carrier-to-interference ratio ("C/I") to DBS receivers of at least 19 or 20 dB C/I. While this C/I protection ratio is arbitrary and unsupported by any technical showings, in reply comments, Northpoint answered that the requested value of 19 or 20 dB would be accomplished in 99.5 percent of its service area. Northpoint then laid out a number of interference mitigation techniques it developed to provide additional

¹² The Rulemaking Petition sought to add a new subsection p(1) that would provide that "Broadcasting-Satellite Service licensees and their affiliates may utilize the 12,200 to 12,700 MHz band terrestrially on a secondary, shared, non-interference basis to transmit video entertainment material, data and other communications traffic related to the operation of the broadcasting-satellite system . . ." See Rulemaking Petition at Attachment A.

¹³ Rulemaking Petition at 4.

¹⁴ See *e.g.* Opposition Pleading of DirecTV at 2.

protection to DBS consumers in the 0.5 percent of its remaining service area.¹⁵

Northpoint thus demonstrated that it could meet the technical concerns of the DBS industry.¹⁶ However, despite this technical showing, DBS opposition to the Northpoint service continued.¹⁷

Similarly, SkyBridge L.L.C. ("SkyBridge") raised objections to Northpoint's technology as potentially causing problems for its proposed NGSO FSS operation in the same band.¹⁸ In Northpoint's reply comments, Northpoint demonstrated that SkyBridge's assertions were unsupported by any technical analysis whatsoever and furthermore that SkyBridge's claims regarding its inability to coexist with Northpoint were totally inconsistent with its past representations to the Commis-

¹⁵ As shown in the attached Technical Annex, with the use of additional mitigation techniques, 99.8 percent of the area has a protection of 20 dB or greater and 100 percent has 17 dB or greater.

¹⁶ See Technical Annex attached as Exhibit 1 at 12.

¹⁷ In the NPRM, the Commission discussed neither the results of Northpoint's experimental tests nor the Technical Annex to Northpoint's reply comments.

¹⁸ In July, 1997, SkyBridge had filed a petition for Rulemaking requesting that the Commission amend Parts 2 and 25 of its rules to permit NGSO FSS systems to operate in the 10.7-12.7 GHz band for NGSO space-to-earth links (downlinks) and in the 12.75-13.25 GHz, 13.75-14.5 GHz, and 17.3-17.8 GHz bands for NGSO earth-to-space (uplinks). SkyBridge submitted an application to provide NGSO FSS service in the Ku-Band in August of 1997. The SkyBridge petition for Rulemaking and application envision providing some of the NGSO FSS services in the same band in which Northpoint planned to provide its service.

sion.¹⁹ Northpoint quoted SkyBridge's application wherein SkyBridge had represented that its proposed system "will impose no operational constraints on satellite and terrestrial operations."²⁰

The Commission issued the instant NPRM on November 24, 1998. The Commission called for comments on whether Northpoint's proposed system could coexist in the same band as DBS and the NGSO FSS systems.²¹ In the same NPRM, the Commission also requested comment on whether a proposed NGSO FSS system, such as SkyBridge's proposal, should be allocated certain frequencies in the Ku-Band.²² In fact, the Commission proposed to make certain allocations in the Ku-Band for NGSO FSS systems in the Ku-Band.²³ Moreover, the Commission proposed to adopt certain WRC-97 interference protection standards.²⁴

Shortly before releasing the instant NPRM, the Commission, on November 2, 1998, issued a public notice for other applications to be considered concurrently with the SkyBridge proposal by establishing a cut-off date for additional

¹⁹ Reply Comments of Northpoint at 11.

²⁰ SkyBridge, L.L.C. Application, 89-SAT-Amend-97 at 22.

²¹ NPRM at ¶ 91-96.

²² NPRM at ¶ 13-14.

²³ NPRM at ¶ 14-15.

²⁴ NPRM at ¶ 18.

applicants for the Ku-Band frequency specified therein.²⁵ Since Northpoint proposes to offer its service in all 211 television markets across the U.S. in part of the spectrum identified in the cut-off notice, Northpoint and its affiliates submitted their applications under this cut-off notice. Northpoint has established a network known as BroadwaveUSA which is a group of 68 locally-based affiliates. These affiliates filed applications on January 8, 1999, to provide Northpoint's service in the 211 television DMAs.²⁶ In an effort to assist the Commission in establishing rules to allow Northpoint to provide its planned services at the earliest possible time, Northpoint offers the following specific responses to the issues posed in the NPRM.

II. THE NORTHPOINT TECHNOLOGY SOLVES THE LOCAL SIGNAL PROBLEM FOR DBS AND SERVES THE PUBLIC INTEREST

In its NPRM, the Commission seeks comment on the desirability of a system like Northpoint's to solve the local signal problem.²⁷ It is widely recognized that DBS providers have limited ability to offer local programming through satellite.

²⁵ FCC Public Notice: 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 the 10.7-12.7 GHz Frequency Bands, Report No. SPB-141 (Nov. 2, 1998) ("cut-off notice").

²⁶ In addition to Northpoint and SkyBridge's applications, five other parties submitted applications. Those applicants are Hughes, Boeing, Teledesic, Virgo and Denali.

²⁷ NPRM at ¶ 92.

DBS systems which do not have the bandwidth capacity to carry all local TV signals in all of the markets they serve. As the chairman of one of the country's leading DBS providers has suggested, DBS cannot effectively compete in the multichannel video programming distribution ("MVPD") marketplace without being able to offer local programming.²⁸

Northpoint has created a tested and proven technology that will enable DBS service providers to offer local broadcast signals and truly challenge cable's stronghold on the MVPD market.²⁹ Northpoint's technology fosters "localism"³⁰ by enabling DBS service providers to deliver programming of local stations. In addition, Northpoint's innovative approach to solving the local signal problem fosters an

²⁸ See Testimony of Charlie Ergen, Chairman of EchoStar Communications Corporation before the Antitrust and Business Rights Subcomm. of the Senate Comm. on the Judiciary, Jan. 27, 1999, attached as Exhibit 3.

²⁹ A recent Commission report on competition in the multichannel video programming distribution market revealed that locally franchised cable operators control 85 percent of the MVPD market. See In the Matter of Annual Assessment of the Status of Competition in Market for the Delivery of Video Programming, Fifth Annual Report, CS Docket No. 98-102, FCC 98-335 (rel. Dec. 23, 1998).

³⁰ Localism has been a fundamental principle of broadcast policy since the Radio Act of 1927. Broadcasters must provide service to their local communities which require information regarding local news, weather and public affairs. See Radio Act of 1927 § 9, Pub. L. No. 632 (current version at 47 U.S.C. § 307(B) (1997)).

important Commission policy of efficient spectrum use.³¹ The Northpoint technology reharvests 500 MHz of spectrum between the 12.2-12.7 GHz band to provide high quality digital television and Internet access throughout the country. The Commission has recognized that the sharing of scarce spectrum between two services promotes efficient spectrum use.³² This new spectrum resource will be able to service Americans in both rural and urban areas with high quality digital video programming and Internet services.

Northpoint's service has several advantages that warrant its introduction, such as its low cost, and it requires only minor modifications to off-the-shelf equipment.³³ Northpoint's local programming solution will be easy to integrate through either a wholesale relationship with DBS service providers or on a stand-alone basis through direct contractual arrangements with DBS customers. In fact, this technology can be employed to provide up to 96 channels of video programming along with high-speed Internet access, Northpoint's service has the capacity to offer all local television signals, analog and digital, in full compliance with any "must

³¹ See 47 U.S.C. § 303(g).

³² In re Amendment of Part 15 of the Commission's Rules, Report and Order, 12 FCC Rcd. 17828, 17843 (1997).

³³ Northpoint plans to provide a package of local signals to DBS consumers for as little as \$7.00 per month. Moreover, the cost of modifying the commercially available equipment to use Northpoint's service will be between \$50 to \$100 per dish and should decline over time.

carry" obligation. Without question Northpoint's market entry will stimulate competition in the MVPD market and make DBS truly competitive with cable.

III. THE ADVANTAGES OF THE NORTHPOINT TECHNOLOGY

A. The Northpoint Technology Can Use Existing Commercially Available Equipment

The NPRM questioned whether equipment already in use in the 12.2-12.7 GHz band could be used and whether this would make Northpoint's service less expensive than using another frequency band.³⁴ One of the greatest benefits of Northpoint's local programming solution is its ability to be deployed in the 12.2-12.7 GHz band using commercially available equipment for both the end user and the Northpoint infrastructure.³⁵ Northpoint's service contemplates using typical DBS antennas and receivers to pick up terrestrial signals from Northpoint transmitters. Accordingly, to access Northpoint's service, DBS consumers would simply add another DBS dish which would be pointed in a northerly direction. Consumers who are not DBS subscribers and who chose to receive their service from Northpoint would have just one antenna pointed north.

³⁴ NPRM at ¶ 93.

³⁵ Northpoint's technology can be deployed using the DBS equipment that can be purchased at many retail stores. Of course, the equipment would have to be modified, but the modifications needed to enable Northpoint's technology to function would cost \$50 to \$100 per dish.

Moreover, Northpoint cannot deploy its technology in another band without incurring substantial costs and time delays associated with developing different equipment. The success of DBS and other satellite systems has resulted in dramatic reductions in the price of receiving equipment which could not be achieved for many years, if ever, were Northpoint required to operate in different spectrum. Set top boxes from multiple manufacturers are available within this band for \$99 - \$249. This is the result of the "experience curve" where consumer equipment drops greatly in price as more units are sold. Since Northpoint will operate in the same band using the same digital processing as standard DBS, Northpoint's end-user antenna can be connected to existing commercially available receivers and the local programming can be decoded. There are already 10 million DBS consumers who have invested at least three billion dollars in equipment that can be readily used with the Northpoint technology. Given the modest modifications that have to be made to commercially available equipment, it is clear that the Northpoint technology offers the greatest promise to provide local signals inexpensively in the 12.2-12.7 GHz band.

The "experience curve" has also greatly reduced the costs of transmission equipment available in the 12.2-12.7 GHz band. This will result in low cost deployments in the 211 television markets where the BroadwaveUSA affiliate

network intends to operate. Low cost facilities will translate into lower costs to consumers and increased competition to cable.

In reviewing other efforts at establishing wireless competitors to cable, the lack of existing low cost off-the-shelf consumer equipment proved to be a limiting factor.³⁶ For example, wireless cable providers do not have equipment that is available at attractive price points in consumer electronics retailers.³⁷ This has forced many wireless cable providers to lease equipment to the consumers. The high capital cost of this leased equipment, which is borne by the provider, is recognized as one of the factors that has undermined the financial viability of a number of the wireless cable operators.³⁸ On the other hand, the low cost of readily available consumer and transmission equipment will be a key factor in the successful launch of Northpoint and its BroadwaveUSA affiliates and is in stark contrast to the high equipment costs that have crippled the wireless cable industry.

By deploying the Northpoint technology specifically in this band, the Commission can leverage the experience curve for the benefit of consumers while at

³⁶ Monica Hogan, *CS Wireless Tries to Avoid CAI Bankruptcy Shadow*, MULTICHANNEL NEWS, Jul. 13, 1998, at 54.

³⁷ Id.

³⁸ *S&P Says Analog Wireless Cable Isn't Viable, Downgrades Industry*, COMM DAILY, Apr. 17, 1998, at 2.

the same time maximizing spectrum efficiency. No other band provides such an opportunity.

B. Northpoint's Technology Will Not Cause Harmful Interference to DBS Service

The Commission, in the instant NPRM, raised a number of concerns regarding possible interference to DBS consumers and the potential for sharing in the 12.2-12.7 GHz band.³⁹ In short, the Northpoint technology was developed specifically to coexist with DBS systems without causing harmful interference consistent with Commission rules. The Northpoint technology is based upon the premise that terrestrial transmitters can be established using directional antennas, in conjunction with known satellite positions, to simultaneously provide point-to-multipoint service in tandem with GSO-DBS transmissions. The Northpoint technology relies upon using the known "look angle" and orientation of the DBS receiver to essentially create a land-based "terrestrial slot" that re-uses DBS spectrum in different local markets in harmonious existence with DBS. As fully demonstrated in the Technical Annex, Northpoint can offer simultaneous transmission with DBS to consumers without causing any harmful interference to consumers' reception of DBS signals.⁴⁰

³⁹ NPRM at ¶ 95.

⁴⁰ See Technical Annex attached as Exhibit 1 at 12.

Commission rules and precedent recognize that in order for "harmful interference" to exist there must be 1) repeated interruption and 2) serious degradation.⁴¹ Undeniably, as evidenced in the Technical Annex, Northpoint's technology will neither 1) repeatedly interrupt DBS service nor 2) cause serious degradation. Northpoint technology will provide a carrier-to-interference ratio ("C/I ratio") sufficient to avoid causing harmful interference to DBS. In opposing Northpoint's Rulemaking Petition, some DBS providers claimed that they require a C/I ratio of 19-20 dB to avoid harmful interference. Even with rain, and making worst-case assumptions about other sources of noise, DBS providers only need a C/I ratio of 9 dB to avoid harmful interference.⁴² Northpoint's experimental tests, however, revealed that as long as a C/I ratio of approximately 5 dB was maintained, DBS providers would not experience harmful interference.

In any event, as the Technical Annex clearly demonstrates, the Northpoint technology achieves a C/I ratio of 20 dB or greater in 99.8 percent of its reliable service area as a matter of course. This C/I ratio of 20 dB is far greater than what DBS providers actually require, and as stated previously, has never been demonstrated to be required. In those very limited areas where Northpoint's service

⁴¹ See 47 C.F.R. § 2.1.

⁴² See Technical Annex attached as Exhibit 1 at 12.

does not achieve a C/I ratio of 20 dB (which will be .2 percent or less of the coverage area), the Northpoint technology can employ a variety of localized mitigation techniques such as:

- Repositioning poorly pointed DBS antennas to eliminate pointing losses;
- Replacing the standard DBS antenna with one with better rejection characteristics;
- Relocating DBS subscriber receivers away from line-of-sight of the Northpoint transmitter; and,
- Installation of shielding to protect DBS customers.

Moreover, it is well-recognized that terrain blockage and natural shielding will fully protect the majority of DBS customers.

Northpoint seeks to work cooperatively with DBS licensees and urges the Commission to adopt rules allowing the flexibility to engineer solutions for DBS/terrestrial sharing taking into account site specific engineering and propagation considerations. For example, while a link budget can be prepared for a typical locale, different areas may warrant deployment of a system with higher or lower power, greater or lesser antenna height, beam tilt, or other modifications of transmission characteristics as prescribed by Northpoint's system all of which will prevent harmful interference from occurring.

C. Proven Engineering Techniques Will Ensure That Nominal "Mitigation Zones" Do Not Become "Exclusion Zones"

The instant NPRM raised concerns about exclusion zones and Northpoint's ability to minimize exclusion zones.⁴³ Exclusion zones are those areas where there would be harmful interference to DBS by the Northpoint signals. Northpoint believes that its system will not create any "exclusion zones" or "exclusion areas." Therefore, Northpoint uses the term "mitigation zone" to describe the area where its terrestrial transmitter theoretically could afford less than 20 dB C/I protection to DBS receivers, but where Northpoint technology and other engineering techniques can be used to mitigate and avoid harmful interference.

As fully explained in the Technical Annex, the Northpoint system will actually provide this level of protection (*i.e.*, 20 dB) automatically to 99.8 percent of the terrestrial reliable service area, even without using additional localized engineering techniques.⁴⁴ In some parts of the country, there are no mitigation zones, and a C/I ratio of 20 dB or more is provided to 100 percent of DBS customers. Indeed, this value considers only free space propagation effects, the direction isolation of con-

⁴³ NPRM at ¶ 95.

⁴⁴ Importantly, the King Ranch tests did not employ any of the interference mitigation techniques available to Northpoint (*e.g.*, higher tower, beam tilt, *etc.*).

sumer DBS dishes (based on DBS-provided antenna patterns), vertical isolation of the Northpoint transmitter. Line of sight blockage will further reduce any power levels of interference.⁴⁵ Clearly, if either the C/I ratio of 20 dB is excessive or the line-of-sight blockage is greater in practice, the percentage of area in the mitigation zone could be reduced to significantly less than 0.1 percent.

The NPRM asked about the efficacy of Northpoint's proposed engineering solutions to minimize any exclusion zones.⁴⁶ Northpoint's technology contemplates that the techniques described in the Technical Annex can and will be used in conjunction to limit -- or even eliminate⁴⁷ --the mitigation zone for specific

⁴⁵ As explained in the Technical Annex, a significant number of DBS antenna installations will not have line-of-sight to a Northpoint transmitter given the manner in which the antenna is mounted. For example, a DBS antenna mounted on the side of a house with southern exposure will be blocked by the house from line-of-sight to a Northpoint transmitter. While Northpoint estimates only 50 percent blockage, the actual effect of line-of-sight blockage is likely to be significantly higher. Indeed, RCA's dish installation instructions indicate roof mounts, which are more likely to have line-of-sight to a Northpoint transmitter, are only a "last resort" and Sony's installation instructions state "[m]ounting on the roof is also not recommended." See <<http://www.sel.sony.com/SEL/consumer/dss/page8.htm#place>>.

⁴⁶ NPRM at ¶ 95.

⁴⁷ Indeed, in any major metropolitan areas, such as New York, Phoenix, San Francisco, and Los Angeles, local conditions allow placement of Northpoint transmitters at heights greater than 200m. At these antenna elevations, there is sufficient attenuation through vertical plane discrimination, beam tilting, and path loss to maintain a constant RSSi below critical levels throughout the
(continued...)

deployment scenarios. As discussed below, there are a variety of techniques within the nominal mitigation zone to eliminate harmful interference to specific DBS antennas. Through careful site selection, the percentage of the population within the 20 dB mitigation zone can be reduced well below 0.2 percent. Northpoint will employ engineering techniques including 1) beam tilting; 2) transmit antenna discrimination in the vertical plane; 3) natural shielding and terrain blockage; and 4) modification to customer equipment. These techniques are described in detail in the Technical Annex. Northpoint's testing has provided substantial evidence of the effectiveness of these techniques in reducing interference.⁴⁸

Northpoint systems will be deployed strategically with interference minimization in mind. For example, where the tower owner or terrestrial licensee owns the affected area, they can be assured that no DBS receivers will be present in the mitigation zone. Where this is not possible, siting areas can still be easily identified in which the population density is far lower than the average throughout the service area. Thus, even in a scenario where the requested 20 dB C/I ratio mitigation zone may compromise 0.2 percent of the land area, the percentage of the service area

⁴⁷ (...continued)
entire service area -- allowing complete DBS/Northpoint sharing without any mitigation zone.

⁴⁸ See Austin Test Report attached as Exhibit 6.

population within the mitigation zone can be designed to be far less than 0.2 percent of the served inhabitants.

Moreover, as secondary licensees, whenever there is harmful interference with DBS users, the burden is on Northpoint to resolve the problem. Hence, the Commission should adopt rules requiring that Northpoint and its BroadwaveUSA affiliates eliminate harmful interference caused to DBS users.⁴⁹ Thus, the BroadwaveUSA affiliates -- at their own expense -- would eliminate harmful interference caused by simultaneous DBS and Northpoint co-channel sharing. In some cases, poorly pointed DBS dishes may simply require repointing or minimal relocation (for example, from the top of the roof to the side of the house). In other cases, an antenna upgrade could be used to provide additional protection to the DBS subscriber. In more extreme cases, low cost RF shielding could also be employed. In fact, in the Austin test work conducted in December 1998, Northpoint demonstrated this shielding solution using a small aluminum disk.⁵⁰ Thus, an array of individualized solutions exists that can be implemented by local BroadwaveUSA affiliates -- at their

⁴⁹ The Commission has imposed these type of obligations in other contexts on secondary licensees to maximize the service available to the public from spectrum. See e.g., Neighborhood TV Company, Inc. v. FCC, 56 Rad. Reg. 2d 1131 (1984) (Low power TV is a secondary service and must remove any harmful interference it causes).

⁵⁰ See Austin Test Report attached as Exhibit 6.

expense -- to rectify any of the very few situations where a DBS subscriber's reception could potentially be adversely affected by a Northpoint system.⁵¹

Northpoint's technology assures complete protection for DBS subscribers. Through the various engineering methods embodied in Northpoint's technology, well over 99.8 percent of DBS subscribers automatically will receive interference protection of 20 dB or greater. For the remaining 0.2 percent of DBS subscribers within the mitigation zone, a variety of techniques are available to ensure the integrity of the DBS signal. In short, Northpoint's terrestrial reuse of the 12.2-12.7 GHz band poses no legitimate threat of adverse effects to DBS licensees.

D. Availability of Northpoint's Service

In the NPRM, the Commission questioned whether the Northpoint technology was designed with sufficient availability to be offered simultaneously with DBS.⁵² The Northpoint technology will provide at least 99.7 percent service availability at the edge of its service area.⁵³ This service availability level is fully consistent with the availability of existing DBS services.⁵⁴ As described in the

⁵¹ See Technical Annex attached as Exhibit 1 at 18.

⁵² NPRM at ¶ 95.

⁵³ See Technical Annex attached as Exhibit 1 at 7.

⁵⁴ See Engineering Statement of Darryl DeLawder attached as Exhibit 2.

Technical Annex, the Northpoint link is designed for robust availability. Even with atmospheric effects on link availability (*e.g.*, fading), fixed sources of interference and satellite sources of interference, the Technical Annex demonstrates that Northpoint will have a service availability sufficient to be simultaneously provided to DBS customers.⁵⁵

IV. NGSO FSS SYSTEMS IN THE 12.2-12.7 GHz BAND REQUIRE MODEST MODIFICATIONS FOR COMPATIBILITY WITH NORTHPOINT

A. Compatibility of the Proposed NGSO FSS Systems with Northpoint

The NPRM seeks comment on whether the Northpoint system would be compatible with NGSO FSS systems in the 12.2-12.7 GHz band.⁵⁶ Terrestrial and NGSO FSS systems can, and in fact do, share spectrum without causing harmful interference to each other.⁵⁷ In order for the proposals in this proceeding to be compatible with the Northpoint system, certain modest modifications will have to be

⁵⁵ See Technical Annex attached as Exhibit 1 at 9; See also DeLawder attached as Exhibit 2.

⁵⁶ NPRM at ¶ 96.

⁵⁷ See *e.g.*, In the Matter of Redesignation of the 17.7-19.7 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, Notice of Proposed Rulemaking, IB Docket No. 98-172, RM-9005, RM-9118, FCC 98-235 (rel. Sept. 18, 1999).

made to the proposed systems. In fact, in developing the Northpoint system, Northpoint has already made modifications to its system and identified a number of mitigation techniques to use in order to reduce interference from Northpoint to the NGSO FSS systems.⁵⁸ Even taking Northpoint's changes into consideration, the NGSO FSS systems would still have to make changes for their systems to be compatible with Northpoint. Of the proposed NGSO FSS systems, the following systems would not cause interference to Northpoint: Denali, Virgo, Boeing IDS, Boeing BDS, and Teledesic.⁵⁹ The remaining systems, Hughes Link, Hughes Net and SkyBridge, would need to alter their systems or operations to protect Northpoint.⁶⁰

The Commission should find that the proposed Northpoint system and the proposed NGSO FSS systems are co-primary. In fact, the international spectrum table for the 12.2-12.7 GHz band contains primary allocations for both fixed and broadcasting services, as well as for the broadcasting-satellite service. Northpoint's proposed offerings will include both fixed and broadcasting service but, however classified, its operations are co-primary in the band. Northpoint's fixed and broadcast services also are co-primary with NGSO FSS in Region 2, as a result of the S5,487A

⁵⁸ See Technical Annex attached as Exhibit 1 at 5..

⁵⁹ See Technical Annex attached as Exhibit 1 at 20.

⁶⁰ Id.

footnote added at WRC-97. Thus, under the ITU treaty, any NGSO use of 12.2-12.7 GHz would be co-primary with terrestrial FS and DBS operations such as that planned by Northpoint. Accordingly, the Commission should adopt rules in this proceeding recognizing the co-primary status of Northpoint and NGSO FSS systems.

Consistent with their co-primary status, NGSO FSS systems and Northpoint should be required to coordinate their systems to avoid causing each other interference. As explained in the Technical Annex, the proposed NGSO FSS systems have the ability and flexibility to mitigate interference to Northpoint's system in a number of ways, most notably through terrestrial arc avoidance.⁶¹ Terrestrial arc avoidance is a means of mitigating interference at low elevation angles as described more fully in the Technical Annex.⁶² In addition, these NGSO FSS proposals seek 1000 MHz of service spectrum while another licensed NGSO FSS system (*i.e.*, Teledesic) provides a similar type of service with only 500 MHz. The Commission should maximize the benefits that can be delivered to the public in this Rulemaking by authorizing Northpoint's service in the 12.2-12.7 GHz band while requiring all of the proposed systems to cooperate by making adjustments to their systems to prevent

⁶¹ See Technical Annex attached as Exhibit 1 at 28.

⁶² Id.

causing each other interference. This will result in the greatest public interest benefit as more services will be made available to the public.

B. Coordination Between NGSO FSS and Northpoint Will Allow for Ubiquitous NGSO FSS Operations

With regard to compatibility of Northpoint with NGSO FSS systems, under the Northpoint proposal, there would be an NGSO FSS coordination area around each Northpoint transmitter. The size of the coordination area will vary according to the system, and can be as small as 200 meters in the cases of Denali, Boeing IDS, Boeing BDS and Virgo.⁶³ In no case will the coordination area be larger than a few kilometers. Coordination between NGSO FSS systems and Northpoint will allow for ubiquitous provision of NGSO FSS services.

The proposed NGSO FSS systems have the ability and flexibility to mitigate interference from Northpoint's system through a variety of techniques such as satellite diversity,⁶⁴ and other changes in system or operations, such as the use of increased antenna gain, and higher elevation masks can significantly reduce the size of the coordination area and thus provide for a more efficient use of the spectrum.

⁶³ See Technical Annex attached as Exhibit 1 at 32.

⁶⁴ Each point in the U.S. will typically have more than one satellite in view at all times and usually more than two satellites in view. Therefore, the NGSO FSS provider has the option to use another satellite to mitigate interference. See Technical Annex attached as Exhibit 1 at 34.

The most promising interference mitigation technique, however, is the "Alternate Beam Assignment."⁶⁵

Alternate Beam Assignment provides NGSO FSS operators with complete flexibility and compatibility with Northpoint. The concept of Alternate Beam Assignment is remarkably uncomplicated. With Alternate Beam Assignment, NGSO FSS operators will assign those customers within the coordination area frequencies outside of the 12.2-12.7 GHz band.⁶⁶

NGSO FSS systems already have sophisticated network management software to handle traffic loading and handovers between satellites. As a matter of course, at each handover, network control will assign each NGSO FSS customer to a specific frequency and satellite. These assignments will need to consider many factors, such as including obscura, GSO arc avoidance, and satellite elevation to name a few. The location of all NGSO FSS customers will be known to NGSO FSS operators. It is therefore a simple matter to assign those few customers in the Northpoint coordination area to a frequency outside of the 12.2-12.7 GHz band.⁶⁷

The implementation of this interference mitigation technique does not

⁶⁵ Id.

⁶⁶ NGSO FSS systems have the 10.7-12.7 GHz band. See Resolution 130 WRC-97.

⁶⁷ See Technical Annex attached as Exhibit 1 at 34.

have any impact on NGSO FSS systems. The size of the largest coordination zone for NGSO FSS is less than 10 percent of the Northpoint service area. Even if this figure were as large as 50 percent, NGSO FSS operators would not be impacted, as more than 50 percent of the NGSO FSS spectrum is allocated outside of the 12.2-12.7 GHz band. Through coordination, and the practice of terrestrial arc avoidance, NGSO FSS systems can coexist in the band 12.2-12.7 GHz.⁶⁸

The Commission also sought comment on what criteria would be necessary to protect NGSO FSS downlinks from interference from Northpoint.⁶⁹ Northpoint's proposed system and the NGSO FSS proposed systems should be co-primary in the 12.2-12.7 GHz. Accordingly, if any protection criteria is developed at all, it should reflect Northpoint's co-primary status. Initially we note that the SkyBridge proposal expressly stated that it "will impose no operational constraints on satellite and terrestrial operations."⁷⁰ In light of this pledge, it would offend every notion of equity to allow NGSO FSS applicants to do an "about face" and claim that they need protection. The Commission must not allow such a result to obtain in this proceeding.

⁶⁸ See Technical Annex attached as Exhibit 1 at 36.

⁶⁹ NPRM at ¶ 96.

⁷⁰ See SkyBridge, L.L.C. application, 89 SAT-Amend-97 at 22.

As discussed above, some coordination among the proposed systems must occur. However, by using Alternate Beam Assignment, this coordination will not diminish the capacity or add to the cost of the NGSO operators. As fully described in the Technical Annex, Northpoint is willing to work towards the common good of the public by making modest adjustments to its system where necessary to avoid interference.

C. Adequacy of WRC-97 PFD Limits and Band Segmentation

The NPRM asked whether the WRC-97 pfd limits were adequate to protect Northpoint's technology.⁷¹ Northpoint's technology requires more protection than what the WRC-97 pfd limits provide. As fully explained in the Technical Annex, for provisional pfd limits below 5 degrees, Northpoint needs 10 dB more protection below 5 degrees elevation than the provisional PFD limits identified in WRC-97 provide. In fact, five of the eight proposed systems already meet this requirement (Boeing IDS, Boeing BDS, Teledesic, Denali and Virgo).⁷² The remaining NGSOs, SkyBridge, Hughes Net and Hughes Link, would only require modest changes to their systems. Moreover, those systems could also implement terrestrial

⁷¹ NPRM at ¶ 96.

⁷² See Technical Annex attached as Exhibit 1 at 29.

arc avoidance to meet the necessary limit, without impacting the NGSO FSS ability to provide ubiquitous service.⁷³

The Commission inquired as to whether NGSO FSS or Northpoint's proposal could be accommodated by other means or if the bands can be segmented for deployment of multiple systems.⁷⁴ The NGSO FSS proposals clearly demonstrate that they can operate in a different band without any change to their equipment.⁷⁵ Given that there are NGSO FSS systems currently operating in other bands, clearly these systems could also operate on other bands. On the other hand, Northpoint's technology contemplates using equipment that is already ubiquitously deployed in the 12.2-12.7 GHz band. There could be substantial development cost for exploring and developing new equipment to use in another band. There are already 10 million American consumers who have invested at least 3 billion dollars in equipment that can be made more usefully and valuably Northpoint's service.⁷⁶

⁷³ See Technical Annex attached as Exhibit 1 at 28.

⁷⁴ NPRM at ¶ 97.

⁷⁵ See Technical Annex attached as Exhibit 1 at 34.

⁷⁶ Teledesic, an NGSO FSS provider, operates outside of the 12.2-12.7 GHz band. See e.g., In the Matter of Redesignation of the 17.7-19.7 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

(continued...)

Finally, in response to the question concerning the ability of multiple Northpoint-like systems to operate in the Ku-band, only Northpoint's BroadwaveUSA affiliates filed applications in response to the Commission's November public notice setting a cut-off date for additional applications to use the Ku-band. In any event, as detailed in the Technical Annex, the existence of another broadcast transmitter in the cell would create harmful interference to Northpoint.⁷⁷

V. CONCLUSION

As fully explained above and in the attached exhibits, the Northpoint technology fosters efficient spectrum use and can be easily deployed at a low cost to consumers. The Northpoint technology can be implemented in the 12.2-12.7 GHz band on a non-interference basis. In those limited instances where interference occurs, Northpoint has developed a variety of mitigation techniques that will eliminate or reduce harmful interference. In addition, the proposed NGSO FSS systems can coexist with Northpoint if only modest changes are made to their systems.

⁷⁶ (...continued)
Broadcast Satellite-Service Use, Notice of Proposed Rulemaking, IB Docket No. 98-172, RM-9005, RM-9118, FCC 98-235 (rel. Sept. 18, 1999).

⁷⁷ See Technical Annex attached at 11.

In light of the substantial public interest benefits of Northpoint's proposed service, the Commission should promptly adopt rules to allow Northpoint and its affiliates to commence service in the 12.2-12.7 GHz band.

Respectfully submitted,
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