Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
The Establishment of Policies and Service	)	
Rules for the Broadcasting-Satellite Service	)	
At the 17.3-17.7 GHz Frequency Band and	)	
At the 17.7-17.8 GHz Frequency Band	)	
Internationally, and at the 24.75-25.25 GHz	)	IB Docket No. 06-123
Frequency Band for Fixed Satellite Services	)	
Providing Feeder Links to the	)	
Broadcasting-Satellite Service and for the	)	
Satellite Services Operating Bi-directionally	)	
In the 17.3-17.8 GHz Frequency Band	)	

COMMENTS OF ECHOSTAR SATELLITE L.L.C.

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COMMENTS OF ECHOSTAR SATELLITE L.L.C.

EchoStar Satellite L.L.C. ("EchoStar") hereby submits its comments on the Notice of Proposed Rulemaking issued by the Commission in the above-captioned proceeding ("17/24 GHz NPRM"),[1] along with a Technical Annex prepared by Dr. Richard Barnett.[2] In this proceeding, the Commission proposes processing and service rules for the 17/24 GHz Broadcasting-Satellite Service ("BSS"). The 17.3-17.7 GHz band has been allocated for the BSS, both internationally and domestically, starting on April 1, 2007.[3]

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[1] *Establishment of Policies and Service Rules for the Broadcasting-Satellite Service at the 17.3-17.7 GHz Frequency Band and at the 17.7-17.8 GHz Frequency Band Internationally, and at the 24.75-25.25 GHz Frequency Band for Fixed Satellite Service Providing Feeder Links to the Broadcasting-Satellite Service and for the Satellite Services Operating Bi-directionally in the 17.3-17.8 GHz Frequency Band*, FCC 06-90, Notice of Proposed Rulemaking, IB Docket No. 06-123 (rel. Jun. 23, 2006) ("17/24 GHz NPRM"), *as corrected by* Erratum (rel. Jul. 5, 2006). The 17/24 GHz NPRM was published in the Federal Register on August 2, 2006. *See* 71 Fed. Reg. 43,687 (2006).

[2] *See* Exhibit 1 ("Technical Annex').

[3] *See 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*

I. INTRODUCTION AND SUMMARY

The licensing of BSS satellites operating in reverse band working ("RBW") mode in the 17/24 GHz BSS frequency bands augurs great opportunity for consumers. Deployment of this new spectrum could be a significant step towards alleviating the bandwidth handicap that, more now than ever, weighs down on the DBS providers' efforts to compete in the Multichannel Video Programming Distribution ("MVPD") market. Among other things, the RBW band will allow consumers to receive almost double the variety of programming services they receive today by using a single small dish.

But there are also risks that need to be averted. Reverse band working involves use of the same spectrum for RBW downlinks to consumers that the DBS operators use today to transmit programming from their uplink centers to their satellites. This spectrum overlap creates the potential for several interference scenarios. One of those scenarios is the threat of interference from the 17.3-17.7 GHz downlinks of the new RBW satellites into the conventional DBS satellites' receive antennas – the antennas receiving programming from the uplink centers for retransmission to the consumer. There is also a risk of interference into RBW consumer dishes from uplink stations that transmit to satellites in the conventional DBS service, particularly to those satellites with low-look angles from the uplink center. EchoStar believes that these risks can be contained, provided the Commission takes the necessary measures, as proposed in these comments.

Equally important is the question of licensing methods. Here, the Commission should be careful to avoid an overreaction to the decision of the DC Circuit in *Northpoint*

Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use, 15 FCC Rcd 13430, 13477-78 ¶ 99 (2000) ("*18 GHz Order*").

Technology, Ltd v. FCC.[4] While remanding the Commission's last auction decision, the court did not close the door on DBS auctions. Far from it. It virtually invited the Commission to provide a better explanation why DBS auctions need not be covered by the prohibition on auctions for "international" and "global" satellite systems in the Open-market Reorganization for the Betterment of International Telecommunications Act ("ORBIT Act").[5] There are ways for the Commission to satisfy that invitation.

Even if it were to decide against conducting an auction, the Commission should not process applications for RBW slots using the "first-come-first-served" method. That methodology is not designed to award licenses to an applicant fit to bring the spectrum to productive use. Nor is the Commission's current use of first-come-first-served for the Fixed-Satellite Service ("FSS") an apt precedent. First, the legality of such a system has been called into question by a court of appeals. Second, the inefficiencies of a first-come-first-served system may be tolerable in an environment of two degree spacing and relatively abundant orbital slots. But they become more severe as the orbital locations available for a new service become more scarce.

In light of the foregoing, the public interest would be best served by the adoption of the following RBW spacing, power and licensing rules:

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[4] *Northpoint Technology, Ltd. v. FCC*, 412 F.3d 145 (D.C. Cir. 2005). EchoStar, like others, has filed applications to use the RBW frequencies from a number of orbital locations.

[5] P.L. 106-180, 114 Stat. 48 (2000), *inserting* section 647 of the Communications Satellite Act of 1962 (47 U.S.C. § 765f). *See Northpoint*, 412 F.3d at 152 ("The Commission's argument that 'it would be unreasonable to conclude that Congress intended that the incidental provision of transborder service would convert an otherwise auctionable license into an unauctionable one' is . . . not unreasonable."); *id*. 156 ("Therefore, while the Commission's construction of section 647 of the ORBIT Act may not be prohibited by the statutory text (and may even represent a wise policy choice), it is an unreasonable construction *on this record* and the auction premised on it is unauthorized. Accordingly, we . . . remand this matter to the Commission for further consideration consistent with this opinion.") (emphasis added).

- 17/24 GHz BSS licensing should be based on 4.5° spacing plus or minus a separation distance of up to 0.4 degrees, including the conventional DBS slots allotted to the United States. This spacing is consistent with the proposal made by DIRECTV in its 1997 petition for rulemaking and comments filed in the *18 GHz* proceeding.[6] It also provides the basis for most of the applications filed to date with the Commission to use the 17/24 GHz BSS spectrum. While 4.5 degree spacing raises serious technical concerns for the conventional DBS service, it is more feasible for RBW satellites. This is because the wavelength is shorter at the higher frequency and therefore a small 45 cm receive dish will have a narrower beamwidth that can better reject the interference from the 4.5 degree spaced adjacent satellite. The allowance of up to 0.4° is necessary to permit co-location of RBW and conventional DBS satellites at the U.S.-allotted DBS slots such as 101°, 110° and 119° W.L.

- Shorter or variant spacing may be allowed if all affected conventional and RBW operators reach agreement.

- Only conventional DBS operators should be eligible for an RBW license for the same channel and slot as that being used by a conventional DBS satellite. The separation of up to 0.4° (relative to the center of the conventional DBS satellite cluster) is sufficient only to manage self-interference between two collocated (or nearly collocated) satellites operated by the same provider, but would not likely be enough if different operators were responsible for the RBW and conventional DBS satellites. Alternatively, if the Commission were to allow a different 17/24 GHz BSS licensee to be collocated with the conventional DBS licensee, it should require a pfd limit of no more than -43 $dBW/m^2/24MHz$ at the receive antenna of the conventional DBS satellite in order to provide interference protection and to reduce the chances that existing DBS services to millions of subscribers would be disrupted.

- The Commission should protect existing DBS uplink sites by providing that RBW downlink service in the vicinity of these sites is secondary to the conventional DBS uplinks and must tolerate interference from them. For new uplink sites, conventional DBS licensees should be allowed to locate additional sites at locations of their choosing, provided (1) they are located in a low population density area at the time of construction commencement, and (2) their EIRP density towards the horizon does not exceed a specified level.[7] If the new sites meet these requirements, consumer RBW dishes located within a certain distance from them should be secondary.

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[6] *See* DIRECTV Enterprises, Inc., Petition for Rulemaking at 7, RM No. 9118 (filed Jun. 5, 1997) ("*1997 DIRECTV Petition*"); *18 GHz Order* at ¶ 100.

[7] The EIRP limit would apply to the extent that the 17 GHz band is used for downlinks in the BSS service. Thus, if the 17.7-17.8 GHz band is not used to provide BSS service to consumers, operators of new conventional DBS uplink centers would not be subject to the EIRP limit for that spectrum.

- The Commission could conduct an auction of RBW slots, for example, by requiring that a percentage such as 80% of the satellite's capacity be devoted to serving the United States, making the international service "incidental" and ensuring that an auction is not barred by the ORBIT Act. Such an option would be consistent both with the letter and with the spirit of the ORBIT Act. The service that is subject to auction would be primarily domestic. And the auction would not implicate the policy concern underlying the ORBIT Act – that other administrations would do the same.[8] If another administration wished to conduct an auction for a satellite focused on serving that country from the same orbital location, it may be able to do so without prejudice to (or from) the U.S. auction process. This is because two collocated DBS satellites can often be coordinated if they are oriented so as to serve different geographic areas.

- If the Commission nonetheless were to decide against auctions, it should not use the first-come-first-served licensing approach. That system is not calculated to award the license to the most qualified applicant or to the applicant who can put the spectrum to the most efficient use. As mentioned above, the current use of the system for FSS purposes does not prove either its legal soundness or its efficiency.

- Instead of using the first-come-first-served system, the Commission should use a combination of strict qualification requirements and a processing round. As a threshold matter, the Commission should prescribe strict financial qualification requirements. Even if the FSS bond and milestone requirements were to apply, they would not enough to protect against speculation in unbuilt satellite licenses. Funding for the bond could be bootstrapped on the license received from the Commission, with no real prospect for the licensee to finance construction of a satellite.

- The Commission should consider a processing round procedure for the assignment of 17/24 GHz BSS licenses. This can be accomplished by placing the applications that have already been filed on public notice and opening a cut-off window for any other applications. The Commission should then make a threshold decision about the legal and financial qualifications of these applicants. In the event that mutual exclusivity is still possible after that decision, the Commission should give the remaining qualified applicants a period of time in which to negotiate an orbital plan that avoids mutual exclusivity. This is consistent with the Commission's approach to licensing for the two generations of Ka-band licensees. Barring a settlement, the Commission should award slots to qualified applicants based on the public

[8] *See* H.R. Rep. No. 105-494, at 65 (1998) (expressing concern over the burden that "concurrent or successive spectrum auctions in the numerous countries" might place on U.S. global satellite service providers.).

interest standard – the same process that the Commission used repeatedly in the 1980s and 1990s to allocate slots in the "domsat" FSS processing rounds.[9]

- At least for the initial term of the RBW licenses, the Commission should require that all of the capacity on RBW satellites be used for BSS service (with the exception of the 17.7-17.8 GHz band, whose operators should enjoy flexibility in light of the sharing issues in that segment, *see* below). That would reduce the risk that spectrum essential for enhanced MVPD competition might be either warehoused under the pretext of flexible uses or simply diverted to uses that do not advance the cause of MVPD competition.

- The 17.7-17.8 GHz band should be licensed for BSS downlinks on a secondary basis with respect to existing domestic terrestrial Fixed Services in the United States.

- Any public interest, geographic service or other obligations should be uniformly imposed on all RBW licensees.

- The Commission should reconfirm that 17/24 GHz BSS licensees are "satellite carriers" for purposes of the Copyright Act.

II. LICENSING FRAMEWORK AND SERVICE RULES

A. The Commission Should Establish Licensing and Service Rules for the 17/24 GHz BSS that Both Expands Competitive Opportunities in the MVPD Market While Preserving Existing DBS Services to Millions of Consumers

Since 1994, DBS has made great strides in establishing itself as a credible competitor in the MVPD market.[10] This progress has been largely a function of enlightened Commission policies.[11] DBS is perhaps the Commission's number one success story in the

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[9] *See, e.g.*, *Assignment of Orbital Locations to Space Stations in the Domestic Fixed-Satellite Service; In the Matter of the Applications of American Telephone and Telegraph Co.; EchoStar Satellite Corp.; GE American Communications; Hughes Communications Galaxy, Inc.; Loral Space and Communications Ltd.; Orion Network Systems, Inc.*, 11 FCC Rcd 13788 (1996); *Assignment of Orbital Locations to Space Stations in the Domestic Fixed-Satellite Service*, 3 FCC Rcd 6972 (1988).

[10] *See Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*, Twelfth Annual Report, 21 FCC Rcd 2503 at app.B, tbl.B-1 (2006) ("*2005 Video Competition Report*").

[11] *See Inquiry into the Development of Regulatory Policy in Regard to Direct Broadcast Satellites for the Period Following the 1983 Regional Administrative Radio Conference*, 90 F.C.C. 2d 676 (1982).

satellite area. But this success cannot be taken for granted, as there are reasons for serious concern. The main reason is that DBS operators suffer from a serious bandwidth handicap compared to terrestrial MVPD options – both cable systems and telephone companies. Cable systems have been aggressively deploying hybrid fiber/coaxial networks in many local markets with virtually limitless bandwidth and two-way broadband capability.[12] Telephone companies, too, are well on their way to deploying their own broadband networks for video service. In stark contrast, DBS providers remain generally confined to 500 MHz of bandwidth in the 12.2-12.7 GHz band from each orbital location, and no return link. In light of this bandwidth handicap, local-into-local service, high-definition programming, and local high-definition stations provide exponentially greater challenges for a national DBS operator than for the localized architecture of terrestrial MVPD competitors.[13] Reverse band working spectrum can almost double the bandwidth available to a DBS operator from its orbital locations, and provide additional slots with good coverage over the United States. This additional capacity will allow EchoStar to provide more content and become a more vibrant competitor in the MVPD market.

To achieve this, however, particularly in urban areas, it is essential that DBS providers can expand their capacity without burdening the consumer with an unsightly larger dish. In that respect, as explained by Dr. Richard Barnett in the Technical Annex:[14]

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[12] *See Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*, Eleventh Annual Report, 20 FCC Rcd 2755, at ¶ 14 (2005) ("*2004 Video Competition Report*") ("The cable industry has upgraded almost 91 percent of its plant to 750 MHz capacity or higher."); *id*. at ¶ 34 ("NCTA estimated that the rebuilding and upgrading of cable systems to 750 MHZ or greater capacity with two-way capability would be 91 percent complete by July 2004.").

[13] *See 2005 Video Competition Report* at ¶ 85 ("DBS providers continue to offer HD service but remain constrained in what they can offer by the capacity limitations of their satellite fleets.").

[14] Technical Annex at 2-3.

> EchoStar has already successfully designed and fielded antennas that use a low-cost, dual-band, shared feed horn operating in both the 11.7-12.2 GHz FSS band and the 12.2-12.7 GHz BSS band. The additional range of bandwidth required for shared 12/17 GHz has been modeled with good results and EchoStar is confident that a mass-produced, low-cost and attractive 12/17 GHz single feed arrangement is technically and commercially feasible. The economies of a shared mechanical housing and some common electronics make this approach very desirable in terms of cost and size. The prospect of almost doubling the bandwidth of each existing feed location on a current triple feed BSS antenna system is compelling. The physical appearance of the current triple feed antenna system would not be drastically altered from what is being successfully installed today.
>
> The alternative to using dual-band 12/17 GHz receive feeds is to add more separate feeds to the receive antenna system. Separate feeds with closely spaced satellites require an increase in the focal length of the antenna to avoid mechanical interference between the feeds. A greater focal length implies a larger reflector and this means a more expensive, more difficult to install and more unsightly antenna, which is generally not acceptable to customers. Similarly, the use of separate feeds with widely spaced satellites also results in a larger reflector that is similarly unacceptable. It is essential, therefore, to use multi-frequency (12+17 GHz) feeds to effectively enhance the capacity of the DBS subscriber antenna. For consumers to secure these benefits, it is important in turn for the Commission to establish an orbital position plan for the 17/24 GHz band that allows near-collocation of the new 17/24 GHz satellites with the existing 12 GHz DBS satellites.

But there are also risks that need to be averted. Reverse band working involves use of the same spectrum for downlinks to consumers that the DBS operators use today to transmit programming from their uplink centers to their satellites. This spectrum overlap creates the potential for several interference scenarios. One of those is the threat of interference from the 17.3-17.7 GHz downlinks of the new RBW satellites into the conventional DBS satellites receive antennas – the antennas receiving programming from the uplink centers for retransmission to the consumer. There is also a risk from uplink stations that transmit to satellites in the conventional DBS service, particularly those satellites with low-look angles from

the uplink center. EchoStar believes that these risks can be contained, provided the Commission takes the necessary measures, as proposed in these comments.

EchoStar urges the Commission to adopt the following rules to promote the competitive opportunities presented by 17/24 GHz BSS while preserving existing DBS services to millions of Americans.

1. The Commission should adopt an orbital spacing plan based on approximately 4.5°separation between 17/24 GHz BSS satellites

The Commission's orbital spacing plan should provide for 4.5° orbital spacing. That spacing should include the U.S. conventional DBS slots with an allowance of up to 0.4° between the collocated satellites.[15] To capture different complexities that arise in different parts of the arc, the Commission should flexibly allow for departures from that plan subject to agreement among all the affected RBW and conventional DBS operators.

As detailed above, the advantages of allowing near-collocation of RBW satellites with existing 12 GHz DBS satellites are very significant. This is the best way of ensuring that consumers can receive RBW and conventional DBS satellites on one small attractive dish. This is a very important feature particularly for urban areas where the bandwidth superiority of terrestrial MVPD competitors is the most pronounced. In addition, 4.5° spacing based on the full-CONUS U.S. slots is consistent with DIRECTV's 1997 petition for rulemaking and past comments regarding rules for the 17/24 GHz BSS bands in the *18 GHz* proceeding.[16] It is also consistent with most of the existing 17/24 GHz BSS applications on file with the Commission.[17]

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[15] *See* Technical Annex at 3-14.

[16] *See 18 GHz Order* at ¶ 100 ("In its comments, DIRECTV proposes a 4.5° spacing environment in the 17.3-17.7 GHz band.").

[17] EchoStar has requested authority to use the RBW frequencies at 110° W.L., 114.5° W.L. and 119° W.L. *See* File Nos. SAT-LOA-20020328-00050, Sat-Loa-20020328-00051 and SAT-LOA-20020328-00052, as amended by SAT-AMD-20051118-00245, SAT-AMD-

2. Only conventional DBS operators should be eligible for an RBW license for the same channel and slot as that being used by a conventional DBS satellite.

At the DBS slots allotted to the United States under the ITU Region 2 Plan, only conventional DBS operators should be eligible for an RBW license for the same channel and slot as that being used by a conventional DBS satellite. The 0.4 degree separation mentioned above is sufficient only to ensure that self-interference between two satellites operated by the same operator is maintained at an acceptable level.

While EchoStar's orbital spacing plan would go a long way towards protecting existing DBS services from disruption, it does not by itself fully address the problem of collocated (or nearly collocated) DBS and 17/24 GHz BSS satellites. The potential for harmful interference from the 17 GHz BSS downlinks into the co-frequency DBS uplinks is most severe in such a scenario. Specifically, the presence of RBW satellites at or near the same orbital location as a DBS satellite could significantly constrain the DBS operator's ability to use its uplink frequencies. At worst, DBS service to millions of Americans could be disrupted by harmful interference from RBW satellites into the receive antennas of conventional DBS satellites. The public interest clearly would not favor such a result.

20051118-00246 and SAT-AMD-20051118-00247. Pegasus has requested to use the 91° W.L., 101° W.L. and 110° W.L. orbital locations. *See* File Nos. SAT-LOA-20060412-00042, SAT-LOA-20060412-00043 and SAT-LOA-20060412-00044. DIRECTV initially requested the 96.5° W.L., 101° W.L. and 105.5° W.L. slots. DIRECTV recently filed applications for the 99° and 103° W.L. but did not withdraw its earlier 4.5 degree-spaced filings. *See* File Nos. SAT-LOA-19970605-00049, SAT-LOA-20060908-00099, SAT-LOA-19970605-00050, SAT-LOA-20060908-00100 and SAT-LOA-19970605-00051, as amended by SAT-AMD-20051118-00224, SAT-AMD-20051118-00225 and SAT-AMD-20051118-00226. Only Intelsat has made filings wholly incompatible with this proposed spacing. Intelsat has requested use of the RBW frequencies at 67.5°W.L., 89.0° W.L., 97.0° W.L. and 121.0° W.L. *See* SAT-LOA-20050210-00029, SAT-LOA-20050210-00030 AND SAT-LOA-20050210-00031, as amended by SAT-AMD-20051118-00238, SAT-AMD-20051118-00239 and SAT-AMD-20051118-00240.

These risks would be averted by assigning RBW frequencies to the operator that already uses the frequency in question in the conventional DBS direction at the same nominal slot. The management of interference necessarily involves trade-offs between uplink performance in the DBS service and downlink performance in the 17/24 GHz BSS service. The existing licensees at the U.S.-allotted DBS slots are in the best position and have the best incentives to make the trade-offs that would optimize 12 GHz DBS and 17/24 GHz BSS service from the same orbital location, and should therefore be assigned 17/24 GHz BSS frequencies at those slots.

Power limits alone are not an adequate substitute. Trying to protect existing DBS licensees from a different 17/24 GHz BSS licensee operating at the same nominal orbital location by imposing power restrictions on the latter would lead to less efficient use of the spectrum. Such restrictions on RBW satellites would have to be strict in order to preserve service to millions of DBS subscribers. Specifically, as discussed in more detail in the Technical Annex, the RBW 17/24 GHz BSS satellites would have to be power restricted to a pfd of -43 $dBW/m^2/24MHz$ at the conventional DBS satellite's receive antennas to protect the uplink receivers on collocated DBS satellites. Even that limit may be insufficient depending on the assumptions underlying the pfd calculation, as explained by Dr. Barnett.[18]

There is an additional reason why the public interest would not be served by requiring different collocated DBS and 17/24 GHz BSS licensees to coordinate their operations in the shared 17.3-17.8 GHz band. As discussed earlier, the main public benefit from this new spectrum is to strengthen competition in the MVPD market. The best way to achieve this, in turn, is to permit the near-doubling of the DBS providers' capacity from the same slot and access

[18] *See* Technical Annex at 17-18, Appendix A.

to that capacity by use of a small, dual-band feed dish. In stark contrast, the public benefits from allowing others to use the same frequencies at the same slots used today by EchoStar and DIRECTV are dubious at best. As explained, it is uncertain whether the threat of interference into DBS uplinks can be avoided even by the pfd restrictions identified above. The possibility of interference may invite applications for 17/24 GHz BSS licenses at the U.S.-allotted DBS slots by persons with no intention of actually using those slots to provide service to the public in a timely manner. It is contrary to the public interest to risk warehousing or speculation in this valuable spectrum. Such risks would not exist if the 17/24 GHz BSS frequencies at the U.S.-allotted DBS orbital locations are simply assigned to the existing DBS licensees at those locations.

3. The Commission should prescribe power limits to protect 4.5 degree-spaced RBW satellites from on another.

To avoid interference between RBW satellites located approximately 4.5 degrees from each other, the Commission should establish RBW satellite downlink power limits at the earth's surface of -113 dBW/m^2/MHz in the high rain rate regions, -115 dBW/m^2/MHz in the medium rain rate regions and -117 dBW/m^2/MHz in the low rain rate regions.[19]

Combined with the approximate 4.5 degree orbital separation, such power limits would permit reasonable service to the public using spot beams and small 45 cm receivers, even during rainy conditions, while ensuring adequate protection for other DBS and 17/24 GHz BSS satellites. Again, higher power limits would be permitted if all affected operators agreed.

4. The Commission should protect existing DBS uplink stations.

The Commission should protect existing DBS uplink sites by providing that RBW downlink service in the vicinity of these sites is secondary to the conventional DBS uplinks and

[19] *See* Technical Annex at 15-17.

must tolerate interference from them. This "grandfathering" of existing uplink sites would apply to existing earth stations at those sites, as well as new earth stations within a mile of the easternmost, westernmost, northernmost and southernmost coordinates of existing earth stations in each site. For new uplink sites, conventional DBS licensees should be allowed to locate additional sites at locations of their choosing, provided (1) they are located in a low population density area at the time of construction commencement, and (2) their EIRP density towards the horizon does not exceed a specified level.[20] If the new sites meet these requirements, consumer RBW dishes located within a certain distance from them should be secondary.

B. The Commission Should Adopt an Auction or Processing Round Procedure for the Assignment of 17/24 GHz BSS Licenses at Orbital Locations Away from the U.S.-allotted DBS Locations

1. The Commission should consider an auction of RBW licenses.

For RBW slots other than the conventional DBS orbital locations allotted to the United States, the Commission should not dismiss auctions out of hand on account of the *Northpoint* decision[21] and the ORBIT Act prohibition on the auction of spectrum used for international and global satellite systems.[22] Even though the D.C. Circuit in that case remanded the Commission's DBS auction rules for inadequate explanation, the court noted that the ORBIT

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[20] The EIRP limit would apply to the extent that the 17 GHz band is used for downlinks in the BSS service. Thus, if the 17.7-17.8 GHz band is not used to provide BSS service to consumers, operators of new conventional DBS uplink centers would not be subject to the EIRP limit for that spectrum.

[21] *Northpoint Technology, Ltd. v. FCC*, 412 F.3d 145 (D.C. Cir. 2005).

[22] *See* ORBIT Act § 3, *inserting* Communications Satellite Act of 1962 § 647 (47 U.S.C. § 765f) ("Notwithstanding any other provision of law, the Commission shall not have the authority to assign by competitive bidding orbital locations or spectrum used for the provision of international or global satellite communications services. The President shall oppose in the International Telecommunication Union and in other bilateral and multilateral for a any assignment by competitive bidding of orbital locations or spectrum used for the provision of such services.").

Act "does not *expressly* prevent the auctioning of spectrum that is 'used for' domestic satellite communications services simply because that spectrum is also 'used for' international or global satellite communications services."[23] Moreover, the court found that "[t]he Commission's argument that 'it would be unreasonable to conclude that Congress intended that the incidental provision of transborder service would convert an otherwise auctionable license into an unauctionable one' is thus not unreasonable."[24] Essentially, the court in *Northpoint* was inviting a better explanation from the Commission.

Thus, auctions of 17/24 GHz BSS spectrum are possible if the Commission can adequately demonstrate that the spectrum rights being auctioned are tied closely to the provision of domestic (rather than international) satellite service. There are a number of ways, including limiting the spectrum rights to the provision of domestic service if all competing applicants agree. In this regard, the Commission need not impose a "domestic service-only" restriction. As the court in *Northpoint* made clear, the Commission can reasonably conclude that the "incidental provision of transborder service would [not] convert an otherwise auctionable license into an unauctionable one,"[25] provided the Commission adequately distinguishes its past precedents and explains why the license being auctioned is predominantly for domestic service. On this basis, the Commission could clearly distinguish the 17/24 GHz BSS as a domestic service by requiring, for example, that a percentage such as 80% of an RBW satellite's capacity be devoted to serving the United States.

Such an option would be consistent both with the letter and with the spirit of the ORBIT Act. The spectrum rights subject to auction would be primarily domestic. A domestic

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[23] *Northpoint*, 412 F.3d at 152.

[24] *Id*. at 152.

[25] *Id*. at 152.

service-focused auction would also not implicate the policy concern underlying the ORBIT Act prohibition on auctions of international satellite spectrum – namely, that other administrations would do the same.[26] If another administration wished to conduct an auction for a satellite focused on serving that country from the same orbital location it may well be able to do so without prejudice to (or from) the U.S. auction process. This is because two collocated satellites can generally be coordinated if they are oriented so as to serve different geographic areas.

2. The Commission should not adopt a "first-come-first-served" procedure.

If the Commission nonetheless were to decide against auctions, RBW licenses should not be assigned using the "first-come-first-served" procedure that it presently uses for the licensing of geostationary space stations in the FSS.[27]

First, the legality of such a system has been called into question. To a significant extent, the Commission sought to justify the adoption of a first-come-first-served system for FSS licensing by relying upon its prior experience in the FM licensing context.[28] The FM system was significantly different, however. Importantly, it provided for an initial filing window. If

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[26] *See* H.R. Rep. No. 105-494, at 65 (1998) ("The Committee believes that auctions of spectrum or orbital locations could threaten the viability and availability of global and international satellite services, particularly because concurrent or successive spectrum auctions in the numerous countries in which U.S.-owned global satellite service providers seek downlink or service provision licenses could place significant financial burdens on providers of such services."). *See Northpoint*, 412 F.3d at 152 ("A strictly *domestic* satellite communications service, however, has nothing to do with multiple spectrum auctions in foreign jurisdictions.").

[27] *See Amendment of the Commission's Space Station Licensing Rules and Policies; Mitigation of Orbital Debris*, 18 FCC Rcd 10760, at ¶¶ 71 *et seq.* (2003) ("*First Space Station Licensing Reform Order*").

[28] *Id*. at ¶ 71 ("In the Notice, the Commission also invited comment on a first-come, first-served processing approach, based in large part on the procedure used for FM radio and television licenses from 1985 to 1998"); *id*. at ¶ 100 ("As the Commission explained in the Space Station Reform NPRM, it subsequently recognized that the first-come, first-served procedure also meets the *Ashbacker* requirements."), *citing Processing of FM and TV Broadcast Applications*, Final Rule, 50 Fed. Reg. 19936, at ¶ 16 (1985) ("*FMTV Order*").

mutually exclusive applications were filed within that window, they were resolved through comparative hearing. The first-in-time applicant would only cut off all others if no applications were received during that initial window.[29] The Commission devised this system after giving considerable attention to the principle established in *Ashbacker v. FCC*[30] and its progeny.[31]

Unlike the FM licensing procedure, the FSS "first-come-first-served" system is more of a true first-in-time system, as it provides for no filing window or possibility of a comparative hearing. Therefore, the FM licensing procedure is not a good foundation on which to rest the FSS licensing system. Indeed, in the FM context, the Commission rejected the proposal of one commenter, Mr. Hilding, for a "true" first-come-first-served system[32] on the

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[29] *See FMTV Order* at ¶ 1 ("[T]he Commission would announce a one-time, fixed filing period -- or "window" -- governing all applications for currently vacant channels in the commercial FM and TV Tables of Allotments or for modifications to existing facilities. All mutually exclusive applications filed during the window would be subject to comparative hearings to determine the best applicant. If only a single acceptable application is filed during the window, then that application alone would be grantable, subject to the usual qualification criteria. In the event a window closes and no acceptable applications have been filed during the window period, a 'first come/first serve' processing standard would then apply whereby the first acceptable application received would cut off the filing rights of any subsequent applicants.").

[30] *Ashbacker v. FCC*, 326 U.S. 327 (1945) (requiring the Commission to consider two mutually exclusive broadcast applications, both of which had been accepted for filing, in a comparative hearing before denying one and granting the other).

[31] *FMTV Order* at ¶ 17 (examining a number of cases following *Ashbacker* and concluding that "any regulations limiting the right to a hearing must give fair notice to the public of what is being cut-off. Therefore, although the Commission can be flexible in establishing 'housekeeping' rules, applicants must be treated equally and fairly by giving them notice of the due dates for their applications."); *id*. at ¶ 18 ("We believe this system fully comports with the requirements of *Ashbacker* and subsequent cases.").

[32] *See Processing of FM and TV Broadcast Applications*, Reconsideration and Clarification of Final Rule, 50 Fed. Reg. 43157, at ¶ 3 (1985) ("*FM Recon Order*") ("[Mr. Hilding] maintains that the Commission should have created a true 'first come/first serve' system for all new FM allocations that are not part of the Docket 80-90 proceeding. Specifically, Mr. Hilding proposes a system in which the applications of parties which have petitioned to amend the FM Table of Allotments would not be subject to competing applications during the relevant filing "window." Rather, only the party petitioning for the allotment change would be eligible to file in the window.").

grounds that it did not balance important public policy concerns.[33] Moreover, on petition for review, the Ninth Circuit issued an unpublished opinion affirming the Commission's rejection of Mr. Hilding's proposal and found that: "Hilding's self-serving proposal undermines the FCC's mandate to select the best qualified applicant pursuant to Ashbacker because it limits to one the number of applicants."[34] Thus, while the Ninth Circuit's unpublished opinion is not binding precedent, it clearly calls into question the legality of any true first-come-first-served system for assigning spectrum licenses.

Second, the FSS "first-come-first-served" system bears no relationship to the fitness of an applicant to be an FCC licensee. Also, while the inefficiencies of the first-come-first-served system may be tolerable in an environment of two-degree spacing and relatively abundant orbital slots, they become more severe under conditions of relative scarcity. In the 4.5° spacing environment proposed by most RBW applicants, there are far fewer 17/24 GHz BSS slots available for assignment than in the FSS. The measures that the FCC has imposed to combat speculation, warehousing and gamesmanship in the FSS are likely to be a less effective deterrent in the RBW context because the rewards of engaging in such conduct are likely to be higher when orbital resources are more scarce.

In addition, the considerations that led the Commission to reject the true "first-come-first-served" system proposed in the FM licensing context, should similarly lead to a rejection of a strict "first-come-first-served" system for the licensing of RBW licenses. In the

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[33] *Id*. at ¶ 4 ("In developing processing guidelines, then, the Commission must strike a balance between the dual and sometimes divergent goals of selecting the best possible applicant and the commitment to bring new service to the public as expeditiously as possible. We remain persuaded that the 'window filing – first come/first serve" processing system strikes this balance properly. . . Mr. Hilding has advanced no new facts nor raised any new arguments that convince us to modify our decision.").

[34] Hilding v. FCC, No. 86-7726, slip op. at 5 (9th Cir. Dec. 7, 1987). A copy of this unpublished opinion is attached as Exhibit 2.

FM context, the Commission emphasized the need to "strike a balance between the . . . goals of selecting the best possible applicant and the commitment to bring new service to the public as expeditiously as possible."[35] In the case of 17/24 GHz BSS, this balance should favor a process that selects the best applicant, rather than just the first-in-time, in view of the limited number of RBW slots available for assignment under the 4.5 degree spacing plan supported by most applicants.

3. The Commission should prescribe strict financial qualifications.

Instead of using first-come-first-served, the Commission should use a combination of strict qualification requirements and a processing round. Specifically, the Commission should prescribe strict financial qualifications to deter speculation and to ensure that an applicant has the financial resources to construct its proposed satellite. EchoStar proposes the reinstatement of the financial qualification rules applicable to FSS licensees prior to 2003.[36] Under those rules, FSS licensees had to show that they had financial resources to construct and launch the licensed satellite, and to operate it for one year. The licensee could make this showing through its balance sheet or through evidence of debt or equity financing arrangements.

Such additional protection is needed because even the FSS bond and milestone requirements[37] would not be enough to protect against speculation in the RBW band with its relatively limited number of slots. These requirements would still allow the bootstrapping of the funding for the bond on the license received from the Commission, with no real prospect for the licensee to finance construction of a satellite. Suppose speculative Applicant A obtains a license.

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[35] *FM Recon Order* at ¶ 4.

[36] *See* 47 C.F.R. § 25.140(c)-(d) (2002), *eliminated by First Space Station Licensing Reform Order* at ¶¶ 161-165.

[37] The FSS bond and milestone requirements are codified at 47 C.F.R. § 25.164. DBS licensees are subject to different due diligence requirements. *See* 47 C.F.R. § 25.148(b).

A then is able to enter into a satellite contract and obtain a $3 million bond from a surety based on that license and embarks on a concerted effort to transfer the bare license for a significant profit. A may even be able to meet the second FSS milestone – critical design review. If A is unable to transfer the license or to secure access to the hundreds of millions of dollars required for further progress, the license would be cancelled many years after grant, and the slot would continue to lie fallow for several more years until construction of a satellite by a future licensee.

4. The Commission should consider a processing round procedure.

If the Commission were to decide against an auction, it should adopt a processing round procedure for the assignment of RBW licenses. This can be accomplished by placing the applications that have already been filed on public notice and opening a cut-off window for any other applications. The Commission should then make a threshold decision about the legal and financial qualifications of these applicants and dismiss those that do not meet those requirements.

In the event that mutual exclusivity is still possible after such decisions, the Commission should give the remaining qualified applicants a period of time in which to negotiate an orbital plan that avoids mutual exclusivity. This is consistent with the Commission's approach to licensing for the two generations of Ka-band licensees.[38] Barring a settlement, the Commission should award slots to qualified applicants based on the public interest standard – the same process that the Commission has used separately in the 1980s and 1990s to allocate slots in the "domsat" FSS processing rounds.[39]

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[38] *See Assignment of Orbital Locations to Space Stations in the Ka-band*, 13 FCC Rcd 1030 (1997); *Assignment of Orbital Locations to Space Stations in the Ka-band*, 16 FCC Rcd 14389 (2001).

[39] *See, e.g., Assignment of Orbital Locations to Space Stations in the Domestic Fixed-Satellite Service; In the Matter of the Applications of American Telephone and Telegraph Co.; EchoStar Satellite Corp.; GE American Communications; Hughes Communications Galaxy, Inc.; Loral Space and Communications Ltd.; Orion Network Systems, Inc.*, 11 FCC Rcd 13788

C. The 17/24 GHz Frequency Bands Should be Reserved for BSS Use Only.

The 17/24 GHz frequency bands have been allocated internationally and domestically for BSS and represent the first expansion of spectrum reserved for the provision of direct-to-home services from high powered satellites since the conventional 12 GHz DBS bands were allocated in the 1980s. As mentioned above, this additional spectrum is vital for more vibrant competition in the MVPD market. By imposing a BSS-only restriction on the 17/24 GHz bands, the Commission would ensure that the opportunity presented by this spectrum to promote competition in the MVPD market is not lost because RBW licensees are permitted to use the spectrum for ancillary purposes. In this respect, a BSS-only restriction is similar to the use restrictions originally placed on conventional DBS licensees to ensure that the 12 GHz band was used to provide competitive video services.[40] The restrictions on ancillary uses were not lifted until 2002,[41] when DBS had been firmly established as a credible competitor in the MVPD market. Therefore, at least for the first term of RBW licenses, the Commission should require that the capacity in this band be used for BSS only. There is ample other spectrum allocated for FSS uses. The Commission should allow a narrow exception to this rule for the 17.7-17.8 GHz band in light of the sharing issues present in that spectrum segment.

(1996); *Assignment of Orbital Locations to Space Stations in the Domestic Fixed-Satellite Service*, 3 FCC Rcd 6972 (1988).

[40] *See Petition of United States Satellite Broadcasting Co., Inc. for Declaratory Ruling Regarding Permissible Uses of the Direct Broadcast Satellite Service*, 1 FCC Rcd 977, at ¶ 13 (1986) ("Any DBS operator which provides non-DBS service is fully expected to initiate DBS service during its first (five-year) license term. Thereafter, a DBS operator may continue providing non-DBS service during the remainder of the life of its first satellites (presuming its license is renewed) only on those transponders on which [it] continues to provide DBS service, and that non-DBS use cannot exceed fifty percent of each 24-hour day on any such transponder.").

[41] *See Policies and Rules for the Direct Broadcast Satellite Service*, 17 FCC Rcd 11331, at ¶¶ 145-55 (2002).

D. Foreign-licensed 17/24 GHz BSS Satellites Should be Subject to the Same Market Access Rules as for DBS, DTH and DARS

The Commission should enforce the same market access rules on foreign-licensed 17/24 GHz BSS satellites as for foreign-licensed DBS, DTH FSS and DARS satellites. BSS services are not within the U.S.'s obligations under the Agreement on Basic Telecommunications, regardless of the frequency bands involved, and therefore should not attract the presumption in favor of entry by satellites licensed by WTO member countries. Rather, the *DISCO II* market access requirements, specifically the ECO-Sat test,[42] should be strictly enforced to prevent operators from simply using "flags of convenience" and to ensure that U.S.-licensed operators have the same opportunity to provide BSS to foreign countries as the satellites licensed by those countries have to serve the U.S.

III. PUBLIC INTEREST AND OTHER STATUTORY OBLIGATIONS

With respect to public interest, geographic service, EAS and EEO obligations, any such requirements should apply equally across the board to all RBW licensees. Specifically, with respect to public interest obligations, EchoStar notes that the statute by its terms does not apply to entities using this spectrum.[43] Nevertheless, comparable obligations may be appropriate as conditions to RBW licenses, so long as they are imposed uniformly. Geographic service

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[42] *Amendment of the Commission's Regulatory Policies to Allow Non-U.S. Licensed Satellites to Provide Domestic and International Service in the United States*, 12 FCC Rcd 24094, at ¶¶ 98-99 (1997) ("*DISCO II*"). *See also* 47 C.F.R. § 25.137(a).

[43] The statutory definition of "providers of direct broadcast satellite services" refers to the "Ku-band," *see* 47 U.S.C. § 335 (b)(5)(A)(II), which in turn the Commission has identified as the 11.7-12.2 GHz and 14.0-14.5 GHz frequency bands for FSS, and the 12.2-12.7 GHz frequency band for DBS service. *See Implementation of Section 25 of the Cable Television Consumer Protection and Competition Act of 1992, Direct Broadcast Satellite Public Interest Obligations*, 13 FCC Rcd 23254, ¶ 6 n.12 (1998). *See also id*. at ¶ 14 n.27 ("The Ku-band generally refers to a band of frequencies at approximately 12 GHz. DBS licensees under Part 100 of the Commission's Rules operate in the frequency band 12.2-12.7 GHz for the distribution of programming from satellites to subscribers' homes.").

obligations, too, may be reasonable if uniformly applied and technically feasible. In that regard, the technical feasibility of service from a particular slot may not be the same for the 12 and 17 GHz bands. EchoStar is continuing to study questions of coverage and technical feasibility, and will apprise the Commission of any relevant conclusions.

The 17/24 GHz NPRM also seeks comment on whether 17/24 GHz BSS licensees qualify as "satellite carriers" under the Copyright Act.[44] The Commission should reconfirm that the answer is yes, consistent with its statements in the *Significantly Viewed Order*.[45]

Sections 119 and 122 of the Copyright Act provide "satellite carriers" with statutory copyright licenses to retransmit distant and local broadcast station signals, respectively, under certain conditions. For purposes of both sections 119 and 122, the term "satellite carrier" is defined by section 119(d)(6) to mean:

> an entity that uses the facilities of a satellite or satellite service licensed by the Federal Communications Commission and operates in the Fixed-Satellite Service under part 25 of title 47 of the Code of Federal Regulations or the Direct Broadcast Satellite Service under part 100 of title 47 of the Code of Federal Regulations, to establish and operate a channel of communications for point-to-multipoint distribution of television station signals, and that owns or leases a capacity or service on a satellite in order to provide such point-to-multipoint distribution, except to the extent that such entity provides such distribution pursuant to tariff under the Communications Act of 1934, other than for private home viewing pursuant to this section.[46]

17/24 GHz BSS licensees (and entities leasing capacity from such licensees) that provide point-to-multipoint distribution of television station signals would appear to meet the definition of

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[44] 17/24 GHz NPRM at ¶ 21.

[45] *Implementation of the Satellite Home Viewer Extension and Reauthorization Act of 2004; Implementation of Section 340 of the Communications Act*, Report and Order, 20 FCC Rcd. 17278, at ¶ 59 (2005) ("*Significantly Viewed Order*").

[46] 17 U.S.C. §§ 119(d)(6), 122(j)(3) (cross-referencing § 119).

"satellite carrier." The administrative move of Part 100 of the Commission's Rules to Part 25 should not alter that conclusion. As the Commission stated last year in the *Significantly Viewed Order*: "This definition includes entities providing services as described in 17 U.S.C. § 119(d)(6) using the facilities of a satellite or satellite service licensed under Part 25 of the Commission's rules to operate in Direct Broadcast Satellite (DBS) or Fixed-Satellite Service (FSS) frequencies."[47] Notably, the definition of "satellite carrier" is not limited to Ku-band satellite systems, unlike the narrower definition of "providers of direct broadcast satellite service" in section 335(b)(5)(A)(II) of the Communications Act.

IV. OTHER TECHNICAL ISSUES

Other technical issues raised by the Commission in the 17/24 GHz NPRM are addressed in the Technical Annex. In these comments, EchoStar will simply cross-refer to the relevant parts of the Technical Annex for convenience.

A. Earth Station Uplink Power Levels

See Technical Annex at 18-21.

B. Frequency and Polarization Plans

See Technical Annex at 23-24.

C. Radar Interference in the 17 GHz Band

See Technical Annex at 24.

D. Use of the 17.7-17.8 GHz Band

See Technical Annex at 25-26.

[47] *Significantly Viewed Order* at ¶ 59. In a footnote to the quoted sentence, the Commission acknowledged that its Part 100 rules had been consolidated into Part 25. *Id*. at ¶ 59 n.169 ("Part 100 of the Commission's rules was eliminated in 2002 and now both FSS and DBS satellite facilities are licensed pursuant to Part 25 of the rules.").

E. Use of the 24.75-25.25 GHz Band

See Technical Annex at 26-27.

F. TT&C Spectrum

See Technical Annex at 23-24 (ground path interference from 17 GHz uplinks), 28-29 (guard bands, launch and early operations).

G. Satellite Antenna Cross-Polar Isolation

See Technical Annex at 29.

V. CONCLUSION

EchoStar urges the Commission to take into account the foregoing comments and the Technical Annex in formulating spacing, licensing and service rules for the 17/24 GHz BSS.

Respectfully submitted,

/s/
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EXHIBIT 1

TECHNICAL ANNEX

TECHNICAL ANNEX

A.1 INTRODUCTION

This annex addresses the technical issues raised in the Commission's Notice of Proposed Rulemaking ("NPRM").[1] The NPRM raises many of the important issues that must be taken into account in developing FCC rules, as well as an orbital location plan, for this new frequency band. Many of these issues are interrelated, and so a full discussion of the relevant factors is provided below.

A.2 KEY TECHNICAL FEATURES AND SERVICE ASPECTS OF THE NEW 17 GHZ BSS SERVICE

The 17/24 GHz band will provide much needed additional spectrum for DBS operations in the USA. Its implementation will enable DBS operators to maximize the total channel capacity a DBS satellite customer can receive on the smallest, most economically producible receive terminal. Such additional spectrum is absolutely necessary if DBS is to continue to compete effectively with terrestrial MVPDs.

As EchoStar is already a licensee and satellite operator in the 12 GHz DBS band, it has to consider how it would use this new 17/24 GHz band to enhance its DBS operations and maximize consumer benefit. After studying the technical and commercial aspects of this,

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[1] *Establishment of Policies and Service Rules for the Broadcasting-Satellite Service at the 17.3-17.7 GHz Frequency Band and at the 17.7-17.8 GHz Frequency Band Internationally, and at the 24.75-25.25 GHz Frequency Band for Fixed Satellite Service Providing Feeder Links to the Broadcasting-Satellite Service and for the Satellite Services Operating Bi-directionally in the 17.3-17.8 GHz Frequency Band*, FCC 06-90, Notice of Proposed Rulemaking, IB Docket No. 06-123 (rel. Jun. 23, 2006) ("NPRM"), *as corrected by* Erratum (rel. Jul. 5, 2006). This NPRM was published in the Federal Register on August 2, 2006. *See* 71 Fed. Reg. 43,687 (2006)..

EchoStar has determined that the most effective way is to use dish antennas of effective 45 cm diameter that can simultaneously receive both 12 GHz and 17 GHz downlink signals. This can be accomplished by two means – a multi-frequency (12 + 17 GHz) feed or by using separate 12 and 17 GHz feeds. However, the single multi-frequency feed is by far the best solution as it minimizes the cost of the overall subscriber antenna system, allows a smaller more aesthetically acceptable dish, and makes the offering more attractive to consumers, particularly those located in urban areas. For such a feed to be possible, the new 17/24 GHz satellites must be almost collocated with existing 12 GHz DBS satellites so that both satellites can be received simultaneously by the single feed without excessive losses. Typically, this requires that the new 17/24 GHz satellite that is being used to enhance the capacity for an existing DBS operator be located within approximately 0.4 to 0.5 degrees of the existing 12 GHz DBS satellite.

EchoStar has already successfully designed and fielded antennas that use a low-cost, dual-band, shared feed horn operating in both the 11.7-12.2 GHz FSS band and the 12.2-12.7 GHz BSS band. The additional range of bandwidth required for shared 12/17 GHz feeds has been modeled with good results and EchoStar is confident that a mass-produced, low-cost and attractive 12/17 GHz single feed arrangement is technically and commercially feasible. The economies of a shared mechanical housing and some common electronics make this approach very desirable in terms of cost and size. The prospect of almost doubling the bandwidth of each existing feed location on a current triple feed BSS antenna system is compelling. The physical appearance of the current triple feed antenna system would not be drastically altered from what is being successfully installed today.

The alternative to using dual-band 12/17 GHz receive feeds is to add more separate feeds to the receive antenna system. Separate feeds with closely spaced satellites require an increase in the focal length of the antenna to avoid mechanical interference between the feeds. A greater focal length implies a larger reflector and this means a more expensive, more difficult to install and more unsightly antenna, which is generally not acceptable to customers. Similarly, the use of separate feeds with widely spaced satellites also results in a larger reflector that is similarly unacceptable. It is essential, therefore, to use multi-frequency (12+17 GHz) feeds to effectively

enhance the capacity of the DBS subscriber antenna. For consumers to secure these benefits, it is important in turn for the Commission to establish an orbital position plan for the 17/24 GHz band that allows near-collocation of the new 17/24 GHz satellites with the existing 12 GHz DBS satellites. This matter is addressed in more detail in subsequent sections of this Technical Annex.

A.3 ORBITAL SPACING AND ORBITAL POSITION CONSIDERATIONS

The Commission rightly points out that the orbital spacing between 17/24 GHz satellites is a crucially important issue as it affects the types of services that can be offered and the efficiency of use of the geostationary orbit. Smaller subscriber earth station antennas will be possible with wider orbital spacing, but greater overall orbit capacity would be achieved with small orbital spacing. Historically there are two references for orbital spacing that are in use for satellite services in the USA: 2 degree spacing in the FSS bands (C, Ku and Ka) as mandated by the FCC and 9 degree spacing in the 12 GHz BSS ("DBS") service as dictated by the ITU's Region 2 BSS Plan. As explained in Section A.2 above, EchoStar plans to use 45 cm or equivalent subscriber antennas in the 17/24 GHz band, and this implies that the required orbital spacing can be less than 9 degrees (because of the shorter wavelength at 17 GHz compared to 12 GHz) but nowhere near 2 degrees, which would imply the use of an antenna much larger than 45 cm.

EchoStar agrees with the conclusions of the FCC's analysis of required receive antenna size versus orbital spacing, which is essentially that orbital spacing in the 4 to 4.5 degree range is sufficient to allow 45 cm subscriber antennas.[2] Accordingly, any orbital position plan for this new 17/24 GHz band should provide for nominal 4.5 degree orbital spacing.[3] A plan based on

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[2] Figure 1 in the FCC's NPRM clearly shows when using the BO.1213 mask, and allowing for some receive antenna mispointing and the additional topocentric advantage, that an orbital spacing greater than approximately 4 degrees puts the adjacent satellite on the part of the mask with lower gain and smaller gain-slope, and the latter is extremely important in case there are higher than expected pointing errors.

[3] It should be noted that the proposed use of 4 to 4.5 degree spacing in the new 17/24 GHz band cannot simply be extrapolated to the existing 12 GHz DBS situation. The incumbent DBS operations in the 12 GHz band,

this approach should align with the U.S. conventional DBS slots with an allowance for offsets of up to 0.4 degrees between the collocated satellites. To capture different complexities that arise in different parts of the arc, the Commission should flexibly allow for departures from that plan subject to agreement among all the affected 17/24 GHz and conventional DBS operators.

The advantages of allowing near-collocation of the 17/24 GHz satellites with existing 12 GHz DBS satellites are very significant. This is discussed in greater detail in Section A.2 above. This is the best way of ensuring that consumers receive 17/24 GHz satellites and conventional DBS satellites on one small dish.

We note the desire by some parties to collocate, or near-collocate, the 17/24 GHz satellites with existing or planned FSS satellites (Ku and/or Ka-band). In this regard it should be noted that actual collocation may not be beneficial for all operators, depending on whether they plan to use the 17/24 GHz band for full-CONUS or spot beam services. In the case of full-CONUS service it is likely that the 17/24 GHz band will require its own dedicated spacecraft platform because of the high RF and DC power requirements. This is because full-CONUS service at high EIRP levels in the 17 GHz band will consume a large amount of satellite power and likely require the full power capability of even the latest spacecraft designs if the entire available 400 MHz of the 17/24 GHz band is used. If, however, a spot beam type of service is to be used in the 17/24 GHz band, then satellite DC power requirements may not be very high, and it is possible that the new 17/24 GHz service could be implemented with an add-on payload to an existing spacecraft that operates in some other frequency band (although the requirements for a relatively large and complex spot beam antenna may tend to lead to a separate spacecraft implementation anyway). It should also be noted that the collocation of conventional DBS satellites and 17/24 GHz

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where tens of millions of subscriber terminals are already in operation, presents a very different interference situation, due to pointing accuracy and dish performance issues. In addition, the lower frequency of the 12 GHz band and the correspondingly longer wavelength is a significant factor that affects the required orbital spacing in that band. In the 12 GHz band a 4.3-4.5 degree spaced satellite would appear on the steep gain slope of the BO.1213 mask because it is on the edge of the main beam of the receive antenna pattern, and this makes the link particularly susceptible to antenna pointing errors.

satellites is generally more advantageous for consumers than the collocation of 17/24 GHz satellites with FSS satellites that may not be intended to provide Direct-to-Home video services.

Usable orbital positions for 17/24 GHz satellites will be partly dictated by the need to address the potential interference from transmitting 17 GHz satellites to receiving 17 GHz satellites operating in the conventional 12/17 GHz DBS frequency band.[4] The orbital spacing required to limit this interference to acceptable levels, based on certain assumptions, is addressed in Appendix A of this Technical Annex. An important point to note is that orbital separation may also need to be maintained (or other measures taken) with respect to non-U.S. Region 2 BSS Plan assignment orbital locations, regardless of their uplink or downlink service areas, because the satellite-to-satellite interference path is completely independent of the satellite footprint on the Earth, as it involves the sideways-looking antenna gain, and not the gain towards the Earth.[5]

Physical crowding of C, Ku and Ka-band satellites around the integer orbital locations of the FCC's 2 degree spacing plan (i.e., at odd integer longitudes) is increasingly becoming an issue and necessitating that satellites be located east or west from the nominal integer location by typically 0.1 or 0.2 degrees. Recent action by the FCC indicates its desire to address this issue as early as possible in the licensing process, and so this should also be factored into any 17/24 GHz orbital position plan that is being developed. This is also addressed in more detail in Section A.3.1 below.

A.3.1 Proposed 17/24 GHz Orbital Position Plan

Table A.3.1-1 below provides data that illustrates the need for the Commission to afford operators location flexibility if they can reach agreement. The first column of this table gives the

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4 See paragraphs 71-79 of the NPRM.

5 Coordination of this interference mechanism arising from the introduction of 17/24 GHz satellite networks must be completed under ITU rules according to Annex 4 of Appendix 30A of the Radio Regulations. Note that Administrations are entitled to bring these original Plan assignments into use at any time with no regulatory deadline, and therefore coordination of the 17 GHz satellite-to-satellite interference mechanism with these assignments is definitely required.

country responsible for the assignment or satellite, as well as the satellite name in the case of an actual satellite. The second column gives the orbital positions (and ranges in the case of orbit "clusters") from the original ITU Appendix 30/30A Region 2 Plan assignments. Appendix A indicates that any 17/24 GHz satellite may need to avoid these orbital positions by a margin of around 0.2 degrees or more (i.e., equivalent to 0.4 degrees from the nominal center location of a Region 2 BSS "cluster" location) in order to improve its chances of being able to successfully coordinate with them under ITU procedures.[6] The third column of the table gives actual physical satellite positions in the geostationary orbit that are currently in use, and which may need to be avoided by between 0.1 degrees (in the case of a U.S. licensed satellite with an East-West station-keeping tolerance of ±0.05 degrees) and 0.15 degrees (in the case of a foreign licensed satellite that might only comply with the ITU's 0.1 degree station East-West station-keeping tolerance).[7] Note that the entries in this third column would need to be updated as subsequent satellites are launched and operated in this portion of the GSO arc.

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[6] Such formal ITU coordination would not of course be required in the case of U.S. Region 2 assignments, and this matter would be dealt with by establishing appropriate FCC rules and procedures.

[7] This data has been taken from publicly available sources, but theses sources conflict in a few cases.

Table A.3.1-1: Constraints on Orbital Positions for 17/24 GHz Satellites

Country / Satellite	Orbital Position (°W)	
	Original Region 2 Plan Assignments	Physical Satellite
USA	175.0 ± 0.2	.
USA / TDRS 8		175.0
USA / TDRS 6		173.8
USA / TDRS 5		171.0
USA	166.0 ± 0.2	
USA	157.0 ± 0.2	
USA / TDRS 7		151.0
USA / TDRS 7		150.0
USA	148.0 ± 0.2	
USA / EchoStar 1		148.0
USA / EchoStar 2		
UK / Inmarsat 3F4		142.0
USA / AMC 8		139.0
USA / AMC 7		137.0
USA / AMC 10		135.0
USA / Goes 11		
Canada	138.0 ± 0.2	
Mexico	136.0 ± 0.2	
USA / Galaxy 15		133.0
USA / AMC 11		131.0
Costa Rica	130.8	
Canada	129.0 ± 0.2	
Canada / EchoStar 5		129.0
USA / Intelsat Americas 7		
Mexico	127.0 ± 0.2	
USA / Galaxy 13		127.0
Japan / Horizons 1		
USA / EchoStar 9		121.0
USA / Intelsat Americas 13		
Panama	121.0	
USA / DirecTV 7S		119.1
USA	119.0 ± 0.2	
USA / EchoStar 7		118.9
USA / AMC 16		118.8
Mexico / Satmex 5		116.8
Turks & Caicos	115.8	
Cayman Islands		
Belize		

Country / Satellite	Orbital Position (°W)	
	Original Region 2 Plan Assignments	Physical Satellite
Venezuela	115.2	
Peru		
Ecuador		
Colombia		
Bolivia		
USA / XM 2		115.1
USA / XM 1		115.0
Mexico / Solidaridad 2		114.9
USA / Goes 10		114.0
Mexico / Satmex 6		113.0
Canada / Anik F2		111.1
USA / EchoStar 10		110.2
USA / EchoStar 6		
USA	110.0 ± 0.2	
USA / EchoStar 8		110.0
USA / DirecTV 5		109.8
El Salvador	107.3	
Nicaragua		
Honduras		
Guatemala		
Canada / Anik F1-F1R		107.3
Canada / MSAT 1		106.5
Easter Island	106.2	
Chile	106.0 ± 0.2	
USA / ACTS		105.5
USA / Gstar 1-3		105.2
USA / AMC 15		105.0
USA / Satcom C4		
Venezuela	103.8	
Colombia	103.2	
USA / AMC 1		103.0
USA / Spaceway 1		102.8
Brazil	101.8	
USA / DirecTV 4S		101.1
USA / AMC 4		
USA	101.0 ± 0.2	
USA / AMSC 1		101.0
USA / DirecTV 1R		100.9
USA / DirecTV 8		100.7
Paraguay	99.2	
USA / Spaceway 2		99.2
USA / Galaxy 16 / 4R		99.0

Country / Satellite	Orbital Position (°W)	
	Original Region 2 Plan Assignments	Physical Satellite
UK / Inmarsat 2F2		98.0
USA / Intelsat Americas 5		97.0
Bermuda	96.2	
USA / Galaxy 3C		95.0
Equador	94.8	
Argentina	94.0 ± 0.2	
USA / Intelsat Americas 6		93.0
Jamaica	92.7	
Barbados		
Jamaica	92.3	
Caribbean		
Belize		
Bermuda		
Bahamas		
Brazil / Brasilsat B4		92.0
Canada / Nimiq 4i		91.2
Canada / Nimiq 1		91.1
Canada	91.0 ± 0.2	
USA / Galaxy 11		91.0
USA / Goes 13		89.5
Cuba	89.2	
USA / Intelsat Americas 8		89.0
Bolivia	87.2	
Bahamas		
USA / AMC 3		87.0
Peru	85.8	
USA / XM 3		85.1
USA / AMC 2		85.0
Trinidad & Tobago	84.7	
Surinam		
Guyana		
Brazil / Brasilsat B3		84.0
Haiti	83.3	
Dominican Republic		
USA / AMC 9		83.0
Canada	82.0 ± 0.2	
Canada / Nimiq 3		82.0
Canada / Nimiq 2		
Brazil	81.0 ± 0.2	
British Virgin Islands	79.7	
Saint Kitts and Nevis		
Montserrat		
Antigua and Barbuda		

Country / Satellite	Orbital Position (°W)	
	Original Region 2 Plan Assignments	Physical Satellite
Saint Vincent and the Grenadines	79.3	
Saint Lucia		
Grenada		
Dominica		
USA / AMC 5		79.0
Mexico	78.0 ± 0.2	
USA / EchoStar 4		77.0
USA / Galaxy 4R		
USA / Goes 12		75.0
USA / Galaxy 9		74.2
Brazil	74.0 ± 0.2	
USA / SBS 6		74.0
Canada	72.5 ± 0.2	
USA / DirecTV 1		72.5
USA / AMC 6		72.0
Argentina / Nahuel 1		71.8
Uruguay	71.7	
Canada	70.5 ± 0.2	
Brazil / Brasilsat B1		70.0
Mexico	69.2	
Brazil / Brasilsat B2		65.0
Brazil	64.0 ± 0.2	
Brazil / Estrela do Sul 1		63.0
USA / TDRS 9		62.0
USA / Rainbow 1		61.6
USA	61.5 ± 0.2	
USA / EchoStar 3		61.5
Spain / Amazonas		61.0
USA Panamsat 9		58.0
Grenada	57.2	
Falkland Islands + Antarctica		
USA / Intelsat 805		55.5
Argentina	55.0 ± 0.2	
Saint Pierre and Miquelon	53.2	
Greenland		
UK / Inmarsat 4F2		53.2
USA / Intelsat 707		53.0
Guiana	52.8	
Netherlands Antilles		
USA / Intelsat 705		50.0

Based on the required orbital separations discussed above, the following conclusions regarding a 17/24 GHz orbital position plan can be reached:

(a) Integer orbital positions (with 4 degree nominal separation) cannot be used as the basis of the plan. This conclusion is very obvious given the heavy use of integer orbital positions, such as 99°W, 101°W, 103°W, 105°W and so on, for existing geostationary satellites, as shown in the third column of Table A.3.1-1.

(b) Constant offset from integer orbital positions (with 4 degree nominal separation) cannot be used throughout the arc. The logical way around the problem identified in (a) above is to consider offsetting the 17/24 GHz orbital positions by a constant amount to the east or the west of the integer orbital positions. If this approach is investigated we find that constant, or near-constant, offsets from integer positions in the same direction (e.g., to the east) cannot be used because of conflicts in Table A.3.1-1. To illustrate this consider the integer position of 103°W where a westerly offset to 103.1°W does not work because of the Colombian Region 2 BSS assignment at 103.2°W (0.3 degree nominal separation would likely be required from this assignment). So let's consider instead using an easterly offset to 102.9°W which would work for 103°W, but conflicts arise at many other locations such as 80.9°W, 84.9°W, 90.9°W, 92.9°W and 94.9°W (not a complete list of conflicts), due to other Region 2 BSS Plan assignments. The result of these conflicts would be a non-uniform offset across the arc which has the result of either (a) reducing the orbital spacing to less than 4 degrees between certain 17/24 GHz orbital positions, or (b) making certain 17/24 GHz orbital positions unusable, thereby reducing the orbit efficiency of the plan.

(c) 4.5 degree spacing with up to 0.4 degree offsets in either direction and possible other variances subject to agreement among operators is the best solution. This spacing rule is realistic, makes efficient use of the geostationary orbit, and yet is flexible enough to accommodate the uncertainties concerning which companies will eventually be the licensees for this new service. Specifically, this rule will accommodate the following:

(i) Nominal orbital separation of 4.5 degrees between 17/24 GHz satellites, subject to the necessary flexibility to avoid orbit conflicts listed in Table A.3.1-1 above;

(ii) The significant benefits to consumers from near-collocation of new 17/24 GHz satellites with existing 12 GHz DBS satellites for the reasons explained in Section A.2 above;

(iii) Provision of additional 17/24 GHz satellites at positions mid-way between existing 12 GHz satellite clusters (e.g., 105.5°W, 114.5°W) to increase orbit efficiency;

(iv) The ability of affected operators to agree on variances from this spacing. The discussion below and Table A.3.1-2 illustrate the features of one possible outcome of such agreements for 17/24 GHz orbital positions.

- For the 101°W, 110°W and 119°W orbit cluster positions assigned to the USA, and the 72.5°W, 82°W, 91°W, 129°W and 138°W orbit cluster positions assigned to Canada in the Region 2 BSS Plan there are near-collocated 17/24 GHz satellite positions that are nominally positioned 0.4 degrees away from the center of each cluster. They may be positioned either side of the cluster to optimize their proximity to, and separation from, the operational 12 GHz BSS satellites in the cluster, thereby enabling a single feed on a low-cost subscriber dish antenna to receive both the 12 GHz and 17 GHz downlink signals. The 0.4 degree offset is designed to provide 0.2 degrees nominal spacing from a 12 GHz BSS satellite that may be operating at the edge of the cluster, thereby allowing the 17 GHz satellite-to-satellite interference to be maintained at an acceptably low level, depending on the off-axis gain discrimination performance of the interfering and interfered-with satellites.

- For the 61.5°W and 148°W orbit cluster positions assigned to the USA in the Region 2 BSS Plan, there are near-collocated 17/24 GHz satellite positions that are nominally positioned 0.4 degrees away from the center of each cluster. In

these cases the 17/24 GHz satellite positions could be located 0.4 degrees to the east of 148°W, and 0.4 degrees to the west of 61.5°W, in order to provide slightly improved visibility and higher elevation angles towards CONUS.

- Additional 17/24 GHz orbital positions would be mid-way between the existing 61.5°W, 72.5°W, 82°W, 91°W, 101°W, 110°W, 119°W, 129°W, 138°W and 148°W orbital clusters, resulting in spacing between 4.1° and 5.1° (depending on the adjacent cluster slots and after taking into account the 0.4 degree offset) from the nearest 17/24 GHz satellite positions that are immediately adjacent to the clusters. This would give additional 17/24 GHz orbital positions at 56.9°W, 67°W, 77.2°W, 86.5°W, 95.9°W, 105.5°W, 114.5°W, 124°W, 133.5°W and 143°W.

Table A.3.1-2: Proposed 17/24 GHz Orbital Position Plan

Nominal Orbital Position (°W)	Comments
147.6 (Note 1)	
143.0	
138.4 / 137.6 (Note 1)	This satellite may be located at one or the other of these two positions. Note that 138°W ± 0.2° is a Canadian 12 GHz BSS cluster location.
133.5	
129.4 / 128.6 (Note 1)	This satellite may be located at one or the other of these two positions. Note that 129°W ± 0.2° is a Canadian 12 GHz BSS cluster location.
124.0	
119.4 / 118.6 (Note 1)	This satellite may be located at one or the other of these two positions.
114.5 (Note 2)	
110.4 / 109.6 (Note 1)	This satellite may be located at one or the other of these two positions.
105.5 (Note 2)	
101.4 / 100.6 (Note 1)	This satellite may be located at one or the other of these two positions.
95.9 (Note 2)	Easterly offset from mid-way position is necessary to avoid 96.2°W assignment of Bermuda by 0.3°.
91.4 / 90.6 (Note 1)	This satellite may be located at one or the other of these two positions. Note that 91°W ± 0.2° is a Canadian 12 GHz BSS cluster location.
86.5 (Note 2)	
82.4 / 81.6 (Note 1)	This satellite may be located at one or the other of these two positions. Note that 82°W ± 0.2° is a Canadian 12 GHz BSS cluster location.
77.2	
72.9 / 72.1 (Note 1)	This satellite may be located at one or the other of these two positions. Note that 72.5°W ± 0.2° is a Canadian 12 GHz BSS cluster location.
67.0	
61.9 (Note 3)	
56.9	Easterly offset necessary to avoid 57.2°W assignment of Grenada and Falkland Isl. by 0.3°.

Note 1: This satellite position may be adjusted to be closer to the center of the closest Region 2 BSS cluster location, provided coordination can be agreed with the 12 GHz BSS operator at that orbital position concerning satellite-to-satellite interference in the 17 GHz band.

Note 2: This satellite position may be offset by up to 0.2 degrees east or west in order to achieve, if necessary, ITU coordination with the operator or ITU Administration responsible for the collocated Mod filing (Article 4 of Appendix 30/30A). In the event that the Mod filing ceases to be active, the 17/24 GHz orbital position must be returned to the exact position stated here.

Note 3: This orbital position may be adjusted to be closer to 61.5°W, provided coordination can be agreed with the U.S. 12 GHz DBS licensee at that orbital position concerning satellite-to-satellite interference in the 17 GHz band.

A.4 POWER LIMITS

A.4.1 Satellite Power Limits

Satellite power limits will be necessary (in the 17 GHz band) in order to control two unrelated interference mechanisms, addressed in more detail in the sub-sections below, which are:

(a) The downlink interference into adjacent 17/24 GHz satellite networks, and

(b) The satellite-to-satellite interference into the 17 GHz satellite receivers of existing and planned 12/17 GHz satellite networks.

A.4.1.1 Downlink Interference into Adjacent Satellite Networks

This interference can be controlled by an appropriate PFD limit at the Earth's surface. In determining this limit, account must be taken of the likely maximum PFD that will be required for the 17/24 GHz service, considering the types of services to be deployed, as well as the characteristics of the receiving earth stations. EchoStar proposes that the following be considered:

(a) The use of both CONUS coverage and spot beam coverage satellites in the 17/24 GHz band. Spot beams have proved to be invaluable in the existing 12 GHz DBS satellites, as they permit very efficient broadcasting of local TV channels to restricted geographic areas, thereby conserving both spectrum (by virtue of the resulting spatial frequency re-use) and satellite power (by virtue of the high gain of the spot beams);

(b) Service availability comparable to that of existing 12 GHz DBS satellites, which implies somewhat higher rain margins than are used at 12 GHz because of the higher rain attenuation in the 17 GHz band;

(c) Receiving antennas of 45 cm effective diameter.[8]

The use of spot beams generally implies higher peak EIRP than for a CONUS coverage beam, due to the fact that the spot beam will likely need to cover geographic areas that are significantly below the -3 dB relative gain contour level. This arises because of the irregular shape of the DMAs (Designated Market Areas) and the need to keep spot beams small to allow for maximum spatial frequency reuse.

Taking account of the above factors it is likely that EIRP levels (per 24 MHz transponder) as high as approximately 63 dBW may be required in the regions subject to the highest rain attenuation, which corresponds to a PFD at the Earth's surface of approximately -113 dBW/m^2/MHz. Somewhat lower levels would be required in geographic regions subject to lower rainfall rates and hence less rain attenuation. Therefore it may be useful to consider downlink PFD limits that are a function of geographic territory, with a limit of -113 dBW/m^2/MHz in the highest rain rate regions, -115 dBW/m^2/MHz in medium rain rate regions, and -117 dBW/m^2/MHz in regions of low rain rates. Further study would be required to determine the optimum boundaries of these three regions which are likely to be a function of both latitude and longitude.

Any PFD limit for the 17/24 GHz service should apply in a similar way to the existing PFD level in Ka-band (see §25.138(a)(6)) insofar as it is effectively a coordination threshold, above which the agreement of the neighboring satellite operators needs to be obtained. However, in the case of the 17/24 GHz service, because of the wider orbital spacing than at Ka-band, it would be preferable to only have to obtain the agreement of the immediately adjacent satellite operators, and not the second and third adjacent satellite operators as well, although this would have to be linked to the magnitude of the exceedence (e.g., 3 dB). This would likely provide sufficient protection yet still enable a reasonable exceedence of the limit in a manageable way if required.

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[8] The "effective" antenna diameter is referred to here because multi-feed receiving antennas inevitably have somewhat larger apertures in the east-west direction to allow for the offset feeds.

If an exceedence of greater than say 3 dB but less than say 6 dB is required then the licensee should be required to also obtain the agreement of the second adjacent satellite operators. Exceedences of greater than 6 dB should not be allowed.

A.4.1.2 Satellite-to-Satellite Interference in the 17 GHz Band

The satellite-to-satellite interference path from transmitting 17 GHz satellites into the 17 GHz receivers of 12/17 GHz satellites can be controlled by establishing a PFD threshold level at the victim (i.e., interfered with) satellite above which coordination will be required. This PFD level should apply to all proposed 17/24 GHz satellites in relation to all potential interfered with satellites, which includes actual satellites as well as original ITU Region 2 BSS Plan assignments.

The proposed PFD coordination threshold level will likely not be triggered for satellite spacing in excess of a few tenths of a degree. To apply this as a regulatory requirement the 17/24 GHz applicant will need to provide the necessary technical information for its proposed 17/24 GHz satellites, including reliable evidence of the off-axis gain of the satellite transmitting antenna in all directions that could correspond to other 17 GHz receiving satellites or assignments. Such information has not been required of satellite applicants in the past.

Appendix A provides a derivation of the proposed PFD threshold level to be used, which is -43 $dBW/m^2/24MHz$. Note that this level is intended to be consistent with that used by the ITU in determining whether coordination is required between administrations for this interference mechanism. However, as explained in Appendix A, compliance with this PFD level does not absolutely guarantee that existing US DBS satellites will be adequately protected from interference because the derivation of the PFD level is based on certain assumptions about the performance of the receiving satellite for which there is little, if any, measured data and no domestic regulatory performance requirement.

A.4.2 Earth Station Power Limits

Some limitation in the maximum off-axis EIRP density used by feeder link earth stations transmitting in the 24 GHz band is required to ensure adequate interference protection of adjacent satellite networks.[9] However, EchoStar believes that the maximum level should be somewhat higher than the level tentatively proposed by the Commission in the NPRM (which corresponds to an EIRP density of 5.6 dBW/Hz with a 65.1 dBi gain (~12 meter) transmitting antenna, for the following reasons:

(a) The level tentatively proposed by the Commission has been derived from a small set of particular applications and does not necessarily provide for the levels that might be required for all future satellite networks in this band;

(b) Levels higher than that tentatively proposed by the Commission will not cause harmful interference into adjacent satellite networks, when the nominal orbital spacing between 17/24 GHz satellites is approximately 4 degrees or greater, as proposed by EchoStar.

The assertion made in paragraph (b) above is supported by an analysis whose results are summarized in Table A4.1-1 below. In this analysis there are four columns of results. The first two assume the values tentatively proposed by the Commission, and the last two assume the alternative values proposed by EchoStar, which are approximately 6.4 dB higher. Each pair of columns assumes a spot beam type uplink in the adjacent satellite in the left hand column and a CONUS type uplink in the adjacent satellite in the right hand column, with corresponding peak G/T values of +10 dB/K for the spot beam and 0 dB/K for the CONUS beam. The resulting worst-case interference levels are expressed as delta-T/T values in the last row of the table. Even with the higher levels proposed by EchoStar the delta-T/T is only 4.8% for the spot beam uplink and 0.5% for the CONUS beam uplink, which should be perfectly acceptable, especially in light of the fact that BSS feeder links operate at relatively high C/N values compared to the

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[9] See paragraphs 48-52 of the NPRM.

downlink and so the delta-T/T degradation in the uplink will likely be completely masked by the downlink.

Table A.4.1-1: Analysis of Uplink Interference into Adjacent Satellites

		FCC		EchoStar	
		Spot	**CONUS**	**Spot**	**CONUS**
Tx Power into antenna (per channel)	(W)	27.53	27.53	120.4	120.4
Tx Power into antenna (per channel)	(dBW)	14.40	14.40	20.81	20.81
Tx Antenna Diameter	(m)	**12**	**12**	**12**	**12**
Antenna Gain (13 m)	(dBi)	65.00	65.00	65.00	65.00
EIRP (per channel)	(dBW)	79.40	79.40	85.81	85.81
EIRP SD	(dBW/Hz)	**5.60**	**5.60**	**12.00**	**12.00**
Channel bandwidth	(MHz)	24	24	24	24
Geocentric orbital spacing	(°)	4.0	4.0	4.0	4.0
Topocentric orbital spacing (average)	(°)	4.4	4.4	4.4	4.4
Off-axis gain towards victim satellite	(dBi)	12.91	12.91	12.91	12.91
Maximum Interfering EIRP towards victim satellite	(dBW)	27.31	27.31	33.72	33.72
Maximum Interfering EIRP SD towards victim satellite	(dBW/Hz)	-46.49	-46.49	-40.08	-40.08
Tx E/S Range to Satellite	(km)	36,500	36,500	36,500	36,500
Carrier Frequency	(MHz)	25,000	25,000	25,000	25,000
Free Space Loss	(dB)	211.6	211.6	211.6	211.6
G/T towards Interfering E/S (Beam Peak)	(dB/K)	10.0	0.0	10.0	0.0
ΔT/T	(%)	1.1%	0.1%	4.9%	0.5%

EchoStar therefore proposes that the tentatively assumed peak EIRP density of 5.6 dBW/Hz be increased to 12.0 dBW/Hz. EchoStar further believes that the rule that controls this interference be expressed as a limitation on the off-axis EIRP density in a suitable reference bandwidth, in a similar way to that used for Ka-band blanket licensing.[10] Such a rule would therefore define that the off-axis EIRP density should not be greater than the equivalent of 12.0-65.1+29-25log(θ) dBW/Hz (= -24.1-25log(θ) dBW/Hz), but expressed in a 1 MHz reference bandwidth as 35.9-25log(θ) dBW/MHz, for the range of angles that includes the immediately adjacent

[10] See §25.138(a).

satellite. (e.g., $2° \leq \theta \leq 7°$). The limit should then change to a 3 dB higher one for off-axis angles greater than 9.23°, to reflect the usual off-axis gain mask used in the FCC rules.

The off-axis EIRP density limits proposed above should be applied as blanket licensing levels, with the ability to exceed them subject to obtaining the agreement from the neighboring satellite operators. Because of the wider orbital spacing proposed for the 17/24 GHz band, EchoStar considers that it is sufficient to obtain the agreement of only the immediate neighboring satellite operators (spaced approximately 4 to 4.5 degrees away) for exceedences up to 3 dB, with the additional agreement of the second adjacent satellite operators for exceedences up to 6 dB. No exceedence greater than 6 dB should be permitted.

All the discussion above relates to the clear-sky situation and uplink power control should be permitted under rain fade conditions, such that the interference received by the neighboring satellites under such rain fade conditions when the uplink power is increased does not exceed the interference under clear-sky conditions. EchoStar considers that the specification for the performance of the uplink power control scheme currently used in §25.138(a)(5) should also be used for the 17/24 GHz uplinks considered here.

The Commission also requests comments on the potential interference from 24 GHz feeder link earth stations and terrestrial fixed service in the 25.05-25.25 GHz band.[11] The Commission rightly points out that there is an existing regulation (§25.204(b)) that applies in this case, which limits the EIRP density from a transmitting earth station towards the horizon (0° elevation) to a value not exceeding 64 dBW in any 1 MHz band, with a corresponding increase permitted as a function of the elevation angle. It is useful to note that the transmissions from earth stations that comply with the uplink off-axis EIRP density limits proposed above (to protect adjacent satellite networks from interference) would actually produce an EIRP towards the horizon of only 3.4 dBW/MHz even for elevation angles as low as 20 degrees. This value is more than 60 dB below

[11] See paragraphs 91-93 of the NPRM.

the limit given in §25.204(b), and therefore no further restriction is needed. Also, the relatively small number of 24 GHz feeder link earth stations should result in no significant interference problems occurring in practice. Any fixed service licensee in this band would be able to identify potential 24 GHz feeder link earth stations, including geographic location, orientation and transmission characteristics, at the stage that applications for their licenses are made.

A.5 LIMITATIONS ON 17 GHZ FEEDER LINK EARTH STATIONS

As the Commission noted in the NPRM ground path interference can occur between the signals from the transmitting feeder link earth stations operating in the 17.3 – 17.7 GHz band and the receiving earth stations operating in the same band.[12] Currently there are a relatively small number of 17 GHz BSS feeder link earth stations and the majority of them are located in less populated areas and therefore do not pose a significant problem. Therefore, the existing 17 GHz feeder link earth station sites should be grandfathered and not be subject to any rules that may be applied to new 17 GHz feeder link earth stations, *i.e.* 17 GHz downlink service must tolerate interference from these existing sites. This "grandfathering" would apply to existing earth stations at those sites and new earth stations within a mile of the easternmost, westernmost, northernmost and southernmost coordinates of existing earth stations in each site.

EchoStar does, however, recognize the possible negative consequences of unbridled deployment of a significant number of new 17 GHz feeder link earth station centers to the provision of BSS services in the 17 GHz band. In order to mitigate this interference to an acceptable level it is proposed that new feeder link earth stations that operate in the 17.3 – 17.7 GHz band comply with a specified EIRP density limit towards the horizon and are only allowed to be deployed within a low population density area.[13] If these requirements are met, 17 GHz receive dishes

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[12] See paragraphs 57-66 of the NPRM.

[13] In the event that the Commission permits BSS operators to also use the 17.7-17.8 GHz band, as explained in section A.6.3, these limitations on new 17 GHz feeder link earth stations should apply also in the 17.7-17.8 GHz band.

should be secondary to such new earth station centers within a specified distance. These limitations on the deployment of new 17 GHz BSS feeder links should not be over-burdensome on the earth station licensee yet will provide the necessary degree of interference protection to ubiquitously deployed 17 GHz BSS receiving earth stations. The methodology to be used to derive the parameters for such rules is addressed below.

There are several ITU references that could be used as the basis for a methodology to determine the necessary spacing between a transmitting 17 GHz feeder link earth station and a 17 GHz receiving earth station, as a function of the transmitted EIRP towards the horizon, and the Commission only refers to one of these – Appendix 7 of the Radio Regulations - in the NPRM. Other references that should be considered are ITU-R Recommendation P.452 and ITU-R Recommendation S.1712. The former defines a general propagation model that could be applied in this case, while the latter, although specifically addressing the 14 GHz frequency band, may nevertheless provide additional methodologies that could be useful to the 17 GHz situation. Any methodology adopted should take account of the specific terrain surrounding the proposed feeder link earth station as this will significantly affect the separation distances and hence the viability of certain feeder link sites. EchoStar is still evaluating the various options for the calculation methodology, and the necessary parameters to be used in this methodology, and expects to provide its conclusions to the FCC in the near future.

A.6 OTHER ISSUES

A.6.1 Frequency and Polarization Plans

The Commission seeks comments on the frequency and polarization plans that could or should be used in the 17/24 GHz BSS service. EchoStar plans to use orthogonal circular polarization on both uplink and downlink, with the same channelization plan as used for the 12/17 GHz DBS service. However, EchoStar would prefer to see a scheme adopted in this frequency band across the geostationary orbit, where the senses of polarization are alternated between adjacent orbital positions in order to provide for the benefit of the guard bands in the primary interfering

satellites appearing within the transponder bandwidth of the interfered-with satellite, which provides typically 1 dB of interference reduction. By also standardizing the channel plan there would be potential benefits in the exchange of satellites between operators as has occurred on occasions in the past. In addition, 24 MHz channels should be preserved for the purpose of licensing 17 GHz operations at the conventional U.S. DBS slots. Different channelization plans should be subject to agreement among the affected operators.

EchoStar believes that full frequency re-use of the available 17/24 GHz spectrum should be required by the FCC rules, when averaged across the overall frequency band. Such re-use could be through the use of orthogonal polarizations, or through a spatial re-use scheme, or a combination of both.

The Commission also raises the issue of the ground path interference between transmitting feeder link (and telecommand) earth stations at 17 GHz into possible 17 GHz telemetry receiving earth stations, especially in light of the fact that such earth stations would likely be located within the same earth station complex.[14] EchoStar believes that this interference can be avoided by careful frequency planning of the 17 GHz uplink and 17 GHz downlink signals so as to avoid transmitting from the uplink earth station on the same frequency as the 17 GHz telemetry downlink.[15] The necessary frequency planning could be conducted by the operator alone within his own earth station complex and without the need for coordination with other operators, but it would be facilitated if a small amount of bandwidth was set aside at the lower end of the 17.3-17.7 GHz band for telemetry downlinks, such as 17.300-17.310 GHz. See also the related discussion of these TT&C guard bands in section A.6.5 below.

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[14] See paragraphs 67-68 of the NPRM.

[15] It may be necessary to include guard bands to overcome possible out-of-band interference effects.

A.6.2 Radar Interference in the 17 GHz band

Radar interference in the 17 GHz downlink band is a serious problem that needs to be fully addressed as early as possible in order to accurately determine its consequences. Although the information concerning the U.S. government radars provided in Appendix C of the NPRM is useful in highlighting the severity of the problem it is insufficient to allow a thorough assessment to be made. Based on the Appendix C data EchoStar has determined that both interference mechanisms (out-of-band interference and overload), unless mitigated in some way, are likely to prevent the 17 GHz BSS receiver from operating while the radar signal is present. The out-of-band interference will interfere most with BSS frequencies closest to 17.3 GHz, but signals up to 100 MHz above this edge of the band could be seriously impaired. The overload interference will simply stop the 17 GHz receiver from operating on any channel at all while the radar signal is present.

EchoStar is strongly in favor of the 17/24 GHz proponents and the U.S. government operator responsible for these radar systems entering into detailed technical and operational discussions in order to quickly determine the full extent of this interference problem and to develop proposed mitigation techniques to ameliorate it.

A.6.3 Use of the 17.7-17.8 GHz Band

The Commission raises the question of whether there could be a problematic downlink interference path from the satellite transmitters in the 17.7-17.8 GHz band causing interference into the terrestrial fixed service receivers operating in this band.[16] The answer to that question is that, with the PFD limits for the 17 GHz downlinks that are proposed in Section A.4.4.1 above, which are intended to protect adjacent satellite networks, there would be no risk of interference being caused to the terrestrial fixed service. The highest proposed downlink PFD limit is -113

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[16] See paragraphs 28-33 of the NPRM.

dBW/m^2/MHz, and this is 8 dB lower than the existing FCC (§25.208(c)(3)) and ITU (Article 21.16 of the Radio Regulations) PFD limits of -105 dBW/m^2/MHz (for elevation angles greater than 25°) that apply in the immediately adjacent Ka-band downlink frequency ranges, and which are intended to provide adequate interference protection to terrestrial services. Therefore there should be ample interference protection for any terrestrial services operating in this band.

In light of the fact, explained above, that satellite downlinks in the 17.7-17.8 GHz band will not interfere with the licensed terrestrial users in this band, EchoStar further requests the FCC to allow satellite operators in the 17/24 GHz band to also serve U.S. based receiving stations in the 17.7-17.8 GHz band <u>on a non-interference basis</u> (i.e., no interference protection afforded to the BSS receivers). EchoStar believes this is viable because of the fact that terrestrial fixed systems in this band use directional antennas and the signals at this frequency are readily blocked by buildings and vegetation, thereby reducing the risk of harmful interference occurring. In the event that such interference does occur at particular subscriber locations, relatively minor adjustments to the 17 GHz BSS receiver installations will likely overcome the interference. A similar approach has been adopted already by the Commission in the extended Ku-bands, and there is every reason to also allow a similar usage of this band to occur.

The need to be able to generally access the 17.7-17.8 GHz band for 17/24 GHz BSS networks may become even more important if the issue of radar interference into 17 GHz subscriber receivers operating just above 17.3 GHz becomes a significant factor, as some spectrum there may become effectively unusable (see Section A.6.2).

A.6.4 <u>Use of the 24.75-25.25 GHz Band</u>

The Commission proposes to allow the 24.75-25.25 GHz band to also be used for feeder links for DBS satellites that transmit in the 12 GHz band.[17] The Commission's rationale for this is

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[17] See paragraph 69 of the NPRM.

that such use would alleviate some of the ground interference issues in the 17 GHz band (see Section A.5). EchoStar strongly disagrees with this proposal for the following technical reasons:

(a) If the 24.75-25.25 GHz band was made available for feeder links to DBS satellites which operate their downlinks in the 12 GHz DBS band then that would preclude locating any 17/24 GHz satellite close to such a 12 GHz DBS satellite. As EchoStar has explained in Sections A.2 and A.3 of this Technical Annex, it is crucially important to the development of the DBS industry that the new 17/24 GHz satellites are able to be nearly collocated with existing and future 12 GHz DBS satellites, so that a single multi-frequency feed in a low-cost receive terminal can simultaneously receive both 17 GHz and 12 GHz downlink signals. This implies that the 12 GHz downlink and 17 GHz downlink satellites be located within approximately 0.5 degrees of each other. Such small orbital separation would not permit re-use of the 24.75-25.25 GHz band between the two satellites;

(b) 17/24 GHz satellites are likely to be implemented, in some cases, using multiple downlink spot beams, in a similar way to the currently operational 12 GHz spot beam DBS satellites. Such designs are essential to be able to efficiently provide local broadcasting. By the use of spatially separated spot beams very high levels of frequency re-use are obtained.[18] This results in similarly high levels of required feeder link spectrum re-use, which is achieved by using multiple geographically separated uplink spot beams, each with its associated feeder link earth station. In these cases the fact that there might be 500 MHz of raw feeder link spectrum available (24.75-25.25 GHz) but only 400 MHz of corresponding downlink spectrum (e.g., 17.3-17.7 GHz) is unimportant, because the additional uplink spectrum can be fully used in a spot beam system in order to minimize the number of required uplink spot beams and hence require fewer feeder link earth stations in the 24.75-25.25 GHz band. This in turn reduces overall system costs and also reduces the inter-service sharing issues in the 24.75-25.25 GHz band;

(c) As explained in Section A.6.3 EchoStar wishes to make as full use as possible of the 17.7-17.8 GHz downlink band and, in the case of a satellite design that uses large regional beams (i.e., with no spatial frequency re-use) the optimum design will require the same amount of uplink spectrum as there is downlink spectrum. In this case all of the 24.75-25.25 GHz band will be required to match the 500 MHz of downlink spectrum (17.3-17.8 GHz);

(d) The measures proposed by EchoStar to control the ground path interference between transmitting and receiving 17 GHz earth stations (see Section A.5) should be perfectly adequate to allow future 17 GHz feeder link earth stations to be deployed without a significant burden on either the feeder link earth station licensee or the 17 GHz BSS downlink service provider. Therefore there is no justifiable reason for creating the problems explained in (a) though (d) above by making the 24.75-25.25 GHz band available for feeder link use for future 12 GHz DBS satellites.

Therefore, for the reasons stated above, EchoStar urges the FCC not to make any of the 24.75-25.25 GHz band available for feeder links for 12 GHz DBS satellites, but rather to make it available in its entirety for feeder links for the new 17/24 GHz service.

A.6.5 <u>TT&C Spectrum</u>

Consistent with §25.202(g), EchoStar proposes that certain guard bands be set aside for on-station TT&C operations that can realistically take place at the edges of the 17/24 GHz bands.[19] Such guard bands would typically be of 10 MHz bandwidth each and no communications signals other than TT&C should be permitted within them. In the 17 GHz band, however, while such a guard band could be located at the lower end of the frequency range (i.e., 17.300-17.310 GHz) it would be unwise to define a guard band around 17.7 GHz because of the planned use of the

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[18] Spatial frequency re-use of the downlink spectrum in the EchoStar-10 satellite is in excess of 12 times.

[19] See paragraphs 81-86 of the NPRM.

entire contiguous frequency range 17.3-17.8 GHz under certain conditions (see Section A.6.3). A better frequency for the upper guard band would be 17.790-17.800 GHz.[20] This additional upper guard band is advisable because of the risk of radar interference in the lower guard band just above 17.3 GHz (see Section A.6.2). Guard bands for telecommand and ranging transmissions could conveniently be located at 24.750-24.760 GHz and 25.240-25.250 GHz. Any communications transponder frequency plan for 17/24 GHz satellites should avoid these guard bands.

In certain situations of hybrid satellites or complex fleet management arrangements it may be desirable to use TT&C frequencies in other bands for the on-station operations of a 17/24 GHz satellite. Such bands would likely include the 12/17 GHz DBS bands, the Ka-FSS bands, or the Ku-FSS bands. EchoStar believes the Commission should be prepared to grant such requests based on the merits of each application.

The issue of TT&C during the launch and early operations phase of a 17/24 GHz satellite is a separate problem. At present there is no global network of TT&C stations operating in the 17/24 GHz bands, and so it is essential that the Commission permit other frequency bands to be used for TT&C during these phases of a mission.

A.6.6 Satellite Antenna Cross-Polar Discrimination

The Commission notes that the requirement for 30 dB cross-polar discrimination of satellite antennas may or may not be appropriate in the 17/24 GHz bands.[21] EchoStar's experience on this matter suggests that the existing rule (§25.210(i)) can be interpreted as too stringent and difficult to comply with. This rule requires that 30 dB of cross-polar antenna discrimination be

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[20] Such telemetry downlinks would be of narrow bandwidth (< 1 MHz) and operate at sufficiently low PFD levels as not to cause any harmful interference to overlapping terrestrial fixed services in this small segment of the band.

[21] See paragraph 90 of the NPRM.

provided "… within its primary coverage area", which could be interpreted as within its service area. The problem is that many satellite antennas fail to meet this level of cross-polar discrimination in a small part of their service area, and the shortfall is usually no more than around 3 - 4 dB. Therefore, rather than relaxing the rule completely across the whole service area EchoStar proposes that the rule as it applies in the 17/24 GHz bands be more carefully defined to read as follows: "… shall be at least 30 dB over 90% of the land within its service area and at least 26 dB over the remaining 10%."

APPENDIX A

SATELLITE-TO-SATELLITE INTERFERENCE IN THE 17 GHZ BAND

In this Appendix we present an analysis of the satellite-to-satellite interference path between the transmitting 17 GHz satellites (operating in the 17/24 GHz band) and receiving 17 GHz satellites (operating in the 12/17 GHz band).

The ITU criterion for this interference mechanism is given in Annex 4 of Appendix 30A of the Radio Regulations, and is a delta-T/T value of 6%. Therefore the analysis below attempts to determine the minimal spacing between satellites so as not to exceed this criterion.

A reference calculation is given in Table A below.

TABLE A: CALCULATION OF REQUIRED SEPARATION BETWEEN TRANSMITTING AND RECEIVING 17 GHZ SATELLITES

Frequency	MHz	17,300
Channel bandwidth	MHz	24
Interfering satellite Tx EIRP per channel at beam peak	dBW	65
Interfering satellite off-axis Tx antenna discrimination (towards victim satellite)	dBW	50
Victim satellite off-axis Rx antenna gain (towards interfering satellite)	dBi	0
Victim satellite Rx system noise temp	K	600
Delta-T/T Criterion	%	6%
Required space loss	dB	154.2
Required orbital separation	km	71.1
Required geocentric angular separation	deg	0.097
Max allowed PFD at victim satellite (per 24 MHz channel)	dBW/m^2	-43.0

The rationale used for determining the assumptions used in the analysis in Table A is as follows:

- The transmitting satellite is radiating relatively high peak EIRP (65 dBW in a 24 MHz bandwidth channel);

- The transmitting satellite off-axis discrimination towards the receiving satellite is assumed to be 50 dB. This assumes that the direction of this interfering signal path is well away from the direction of maximum gain of the transmitting antenna. Such a high level of discrimination would likely require careful measures in the design of the transmitting satellite;

- The receiving satellite off-axis gain towards the interfering satellite is assumed to be 0 dBi. This is consistent with the assumed technical parameters for DBS satellite receive antennas given in Section 3.7.3 of Annex 3 of Appendix 30A of the Radio Regulations, where the off-axis discrimination is assumed to be equal in magnitude, but of opposite sign, to the peak gain of the antenna, for off-axis angles greater than approximately 20 degrees.

The resulting separation required between transmitting and receiving satellites from Table A is 71.1 km, which is equivalent to a geocentric angular separation of approximately 0.1 degrees. Allowing for ±0.05° east-west station-keeping tolerance, this corresponds to a separation of approximately 0.2 degrees between the nominal orbit positions of the two satellites, according to the assumptions in Table A. Note that if the transmit antenna off-axis discrimination was only 44 dB (instead of 50 dB assumed in Table A) then the required minimum separation distance would double to approximately 0.2 degrees and the nominal orbital separation would be 0.3 degrees or higher, allowing for station-keeping tolerances. Similarly, if the receive antenna off-axis discrimination was less than the ITU assumption, greater spacing would be required than indicated above.

The last row in Table A above gives the corresponding PFD at the receiving satellite for the interference criteria to be met, which is -43 dBW/m^2/24MHz. Specifying this PFD level as a

coordination threshold would be a reasonable regulatory mechanism for the FCC to use to control this 17 GHz interference mechanism between U.S. licensees. However, it should be noted that this PFD limit alone may not be sufficient to ensure interference protection of the existing US DBS satellites, in the event that their receive antenna off-axis gain discrimination falls short of the ITU assumption.[22]

[22] Existing US DBS satellites have not been required by FCC rule to meet any specified performance level for their receive antenna off-axis gain discrimination, and neither has this performance parameter necessarily been measured for these satellites, because this potential interference mechanism has not hitherto been an issue.

CERTIFICATION OF PERSON RESPONSIBLE

FOR PREPARING ENGINEERING INFORMATION

I hereby declare under penalty of perjury that I am the technically qualified person responsible for preparation of the engineering information contained in the foregoing submission, that I am familiar with Part 25 of the Commission's rules, that I have either prepared or reviewed the engineering information submitted in this pleading, and that it is true and correct to the best of my knowledge and belief.

_____/ss/_____

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Dated: October 16, 2006

EXHIBIT 2

Hilding v. FCC

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U.S. COURT OF APPEALS

UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

ERIC R. HILDING, Petitioner,	)	No. 86-7726 F.C.C. No. 85-555
v.	)	MEMORANDUM*
FEDERAL COMMUNICATIONS COMMISSION, Respondent.	)	

On Appeal from Petition for Review of Orders of the
Federal Communications Commission

Argued and Submitted October 7, 1987
San Francisco, California

Before: GOODWIN, ALARCON, and LEAVY, Circuit Judges

Pro se petitioner Eric R. Hilding seeks review of the Federal Communications Commission's (FCC) new rules which govern the process of applying for licenses to operate new commercial FM radio stations. On September 18, 1984, the FCC published a general notice of proposed rule making with respect to the application process in 49 Fed. Reg. 36,523, pursuant to Section 4 of the Administrative Procedure Act, 5 U.S.C. § 553. Section 4 requires the agency to give interested persons an opportunity to participate in the rule making through submission of written data, views, or arguments. 5 U.S.C. § 553(c).

Hilding filed comments in response to the notice. He proposed rules very different from those of the FCC. On May 6,

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* This disposition is not appropriate for publication and may not be cited to or by the courts of this circuit except as provided by Ninth Circuit Rule 36-3.

1985, however, the FCC formally adopted rules similar to those it had originally proposed.

Hilding filed a petition for reconsideration on June 4, 1985. In it he referred to a separate petition he filed with the FCC on May 8, 1985. Part of that petition requested the FCC to initiate another rule making proceeding to amend its policy giving preferences to women and minorities in the comparative hearing process. The FCC is required to use a comparative hearing process to select the best qualified applicant from all competitors for a new FM channel. See Ashbacker Radio Corp. v. FCC, 326 U.S. 327, 333 (1945) (mutually exclusive bona fide applicants are entitled to a hearing for station licenses).

The FCC unanimously denied Hilding's petition for reconsideration. It considered the parts of his May 8, 1985 petition which were relevant to the process of applying for licenses for new FM channels, but ignored the request to amend the comparative hearing process, because that issue was outside the scope of the proceedings before it. The FCC dismissed yet another petition for reconsideration which Hilding filed on November 15, 1985, because it was factually repetitious.

Standard of Review

This court will set aside an agency action only if it is arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law. 5 U.S.C. § 706(2)(A); Western Oil & Gas Ass'n v. E.P.A., 767 F.2d 603, 605-06 (9th Cir. 1985); Montana Power Co. v. E.P.A., 608 F.2d 334, 344 (9th Cir. 1979).

Under this standard, a court must engage in a "substantial inquiry," Citizens to Preserve Overton Park v. Volpe, 401 U.S. 402, 415 (1971), but should not substitute its judgment for that of the agency. Motor Vehicles Mfrs. Ass'n v. State Farm Mutual Auto. Ins., 463 U.S. 29, 43 (1983). The court's role is to ensure that the agency considered all of the relevant factors and that its decision contained no "clear error of judgment." Motor Vehicles, 463 U.S. at 43; Overton Park, 401 U.S. at 416.

Judgments concerning the application process for radio channels are peculiarly within the FCC's competence. See FCC v. National Citizens Comm. for Broadcasting, 436 U.S. 775, 780-83 (1978). Considerable deference is granted to the FCC when it issues an order based upon its expertise. See Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc., 435 U.S. 519 (1978).

DISCUSSION

Under the new rules, a "window" system is used for applications for licenses to operate new FM channels. 47 C.F.R. § 73.3573 (1985). These rules specify a one-time, fixed filing period, or "window," during which applications from all interested parties are accepted.

This system replaced a "cut-off" system in which a notice was published that the FCC had received an application for a new channel. The notice established a "cut-off" date for additional applications. Under the new system, no notice is published when the first application is received. The "window" system was to

remedy the abuses of the "cut-off" system, which triggered competitive applications and allowed later applicants to copy data which the first applicant had compiled.

Hilding argues that the FCC should establish a true "first come/first serve" system when an individual petitions the FCC for rule making for the allotment of a new channel. He contends that only that individual should be allowed to apply during the "window" period, rather than all interested parties. He argues that individuals who discover and petition for new channels are penalized by the competition allowed under the new rules. Hilding claims his suggestion of a "leadership window" is a means of rewarding initiative, providing incentives for allotment of new channels, reducing the administrative processing burden, and thereby expediting and expanding service to the public.

The FCC may allot new channels only after consideration of a "fair, efficient, and equitable distribution of radio service" pursuant to Section 307(b) of the Communications Act of 1934, as amended, 47 U.S.C. § 307(b). The FCC did not think that, on balance, Hilding's proposal served the public interest under this mandate. In denying Hilding's petition for reconsideration, it stated that his proposal did not serve the FCC's goal of striking "a balance between the dual and sometimes divergent goals of selecting the best possible applicant and the commitment to bring new service to the public as expeditiously as possible." The FCC found Hilding's approach unacceptable because it "does not accord

adequate attention to the full range of policy concerns at issue in devising appropriate processing standards."

In light of its policies and its expertise in this area, the FCC reasonably rejected Hilding's proposed rules. It did not act arbitrarily or capriciously, abuse its discretion, or commit a clear error of judgment when it determined that Hilding's proposal would not serve the public interest. Hilding's self-serving proposal undermines the FCC's mandate to select the best qualified applicant pursuant to Ashbacker because it limits to one the number of applicants. We will not substitute Hilding's judgment for that of the FCC. His request to order the FCC to substitute his rules for those it adopted is denied.

Hilding claims the FCC rejected his May 8, 1985 petition for rule making to amend their policy on preferences given to women and minorities. However, the parts of this petition which dealt with the application process were considered in adopting the new rules. The remaining parts exceeded the scope of the rules under consideration, because they dealt with comparative hearings, an entirely separate process.

No final agency action has taken place with respect to Hilding's May 8, 1985 petition. The FCC represents to this court that it is still pending before the agency, since the FCC presently is inquiring into preferences for women and minorities in the comparative hearing process. See Notice of Inquiry, Reexamination of the Commission's Comparative Licensing, Distress Sale and Tax Certificate Policies Premised on Racial, Ethnic or

Gender Classifications, 1 FCC Rcd 1315 (1986); Order Granting Motion for Extension of Time for Filing Comments, DA 87-545, released May 6, 1987.

Consequently, Hilding does not state a claim for which federal judicial relief is available. This court does not have jurisdiction to review the FCC's alleged inaction on Hilding's pending petition for rule making to amend the FCC's comparative hearing process.

We affirm the FCC's denial of Hilding's motions to reconsider the adoption of its new rules.