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

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In the Matter of	)	IB Docket No. 00-248
	)	
2000 Biennial Regulatory Review --	)	
Streamlining and Other Revisions of Part 25 of	)	
the Commission's Rules Governing the Licensing	)	
of, and Spectrum Usage by, Satellite Network	)	
Earth Stations and Space Stations	)	

RECEIVED

NOTICE OF PROPOSED RULEMAKING

Adopted: December 11, 2000 **Released: December 14, 2000**

Comment Date: 75 Days After Publication in the Federal Register
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By the Commission:

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I. INTRODUCTION

1. In this Notice of Proposed Rulemaking (*Notice*), we continue to fulfill our statutory mandate under Section 11 of the Communications Act of 1934, as amended (Act), to streamline our rules, where

appropriate.[1] In particular, we advance proposals that will reduce the burdens on earth station operators seeking routine authorizations and streamline the process for non-routine earth station applications. We make these proposals in an effort to establish a record that will enable us to adopt rules that will encourage innovation, significantly reduce the filing burdens on applicants and licensees, expedite the process of issuing licenses, accelerate the provision of service to the public, and promote service in rural and unserved areas.

II. BACKGROUND

2. Section 11 requires that the Commission, in every even-numbered year beginning in 1998, review all regulations that apply to the operations and activities of any provider of telecommunications service and determine whether any of these regulations are no longer necessary in the public interest as the result of meaningful economic competition between providers of the service.[2] Section 11 further instructs the Commission to "repeal or modify any regulation it determines to be no longer necessary in the public interest."[3] Accordingly, the Commission has initiated a comprehensive review of telecommunications and other regulations to promote meaningful deregulation and streamlining where competition and other considerations warrant such action.[4]

3. The Communications Act prohibits earth station operators from operating without a license.[5] The licensing of earth stations is not only statutorily required, satellite networks and global communications depend on the existence of licenses to establish an interference-free operating environment. Earth stations provide a critical link between satellites and terrestrial networks. Over the years, we have taken action to streamline our satellite and earth station licensing rules and procedures when warranted,[6] and increasingly, we have looked for ways that satellite operations can share spectrum with terrestrial-based operations. In addition, the International Bureau (Bureau) issued a public notice in 1999 initiating a new licensing process for certain types of earth station applications and inviting comment on a number of additional streamlining proposals.[7] As part of the 2000 biennial regulatory review, we are

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1 47 U.S.C. § 161.

2 47 U.S.C. § 161(a).

3 47 U.S.C. § 161(b).

4 Federal Communications Commission Biennial Regulatory Review 2000, CC Docket No. 00-175, Staff Report (released Sept. 19, 2000) (*2000 Biennial Review Staff Report*). In response to the *2000 Biennial Review Staff Report*, Hughes Network Systems (Hughes) made a number of recommendations. In this *Notice*, we invite comment on all Hughes' suggestions except one regarding the preemption of zoning regulations. Hughes Comments in Response to *2000 Biennial Review Staff Report* at 4-5. The Commission has already addressed that issue in another proceeding. Promotion of Competitive Networks in Local Telecommunications Markets, WT Docket No. 99-217 (released Oct. 25, 2000).

5 47 U.S.C. § 301.

6 Amendment of Part 25 of the Commission's Rules and Regulations to Reduce Alien Carrier Interference Between Fixed-Satellites at Reduced Orbital Spacing and to Revise Application Processing Procedures for Satellite Communications Services, First Report and Order, CC Docket No. 86-496, 6 FCC Rcd 2806 (1991); Streamlining the Commission's Rules and Regulations for Satellite Application and Licensing Procedures, Report and Order, IB Docket No. 95-117, 11 FCC Rcd 21581 (1996) (*1996 Streamlining Order*).

7 Commission Launches Earth Station Streamlining Initiative, Public Notice, DA 99-1259 (released June 25, 1999) (*Ka-band Auto-grant Public Notice*).

reviewing Part 25. We have found several cases in which we believe that modifying or eliminating rules will facilitate more streamlined licensing of earth stations.

4. We expect that, if adopted, these rule changes should expedite the provision of useful satellite services to the public, including, for example, Internet services and extending satellite services to rural areas, without unreasonably increasing the risk of harmful interference to existing operators. Companies are increasingly using satellite systems to deliver Internet traffic from international points to gateway earth stations and from the public Internet along the "last mile" to earth station antennas at customers' homes. In addition, over the past year, the Commission received over 2400 earth station applications, and the number of applications has been increasing in recent years. Therefore, we expect our streamlining efforts to become more important in the future as the number of earth station applications increases further.

5. With regard to terrestrial wireless operations, none of the proposals herein affect the pre-licensing coordination requirements between earth station applicants and terrestrial operators that exist today. As a result, we do not expect any of the proposals to affect terrestrial wireless operations in frequency bands that are shared with FSS operations. Currently, Section 25.203(b) requires earth station operators in shared bands to show that they have coordinated with terrestrial wireless operations in their license applications.[8] These coordination procedures are important, in part because some terrestrial operators in shared bands are police dispatchers and other public safety officials.[9] Accordingly, we do not propose any revisions to these coordination requirements and procedures in this Notice. Instead, we concentrate on proposals to streamline the procedures applicable *after* coordination with terrestrial wireless operations has been completed. Furthermore, we do not anticipate that any of the proposals in this Notice, if adopted, would affect the contours of any FSS earth station operating in shared bands, and so would not affect the coordination with terrestrial wireless operators required by to Section 25.203(b). We invite comments from any terrestrial wireless operator who believes its operations might be affected in some way by any of the proposals in this Notice.

6. In Section III of this Notice, we propose rule revisions to streamline the review of license applications filed by earth station applicants planning to use "non-routine" antennas or power levels. We propose relaxing or eliminating several requirements in Section IV, including the current power and power density limits, extending earth station license terms, and allowing certain temporary fixed earth stations to begin operation on an accelerated basis. Section V proposes streamlining a number of very small aperture terminal (VSAT) rules, and extending certain VSAT provisions to other types of earth stations. Section V also proposes revising the power level rules applicable to VSAT networks, in response to issues raised in the Spacenet Inc. (Spacenet) petition and associated pleadings. In Section VI of this Notice, we propose adopting a new earth station license application form, to be used when seeking routine authorizations, which we expect to be much easier to complete than the current form.[10] We also propose other revisions to license application forms, and propose expanding our electronic filing systems for earth station

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[8] 47 C.F.R. § 25.203(b). *See also* 47 C.F.R. § 25.277(c), (d), (e) (temporary fixed earth station operators in shared bands must coordinate with terrestrial wireless operators before beginning transmissions).

[9] *See* Mobile Satellite-Based Communications Services by Crescomm Transmission Services, Inc. and Qualcomm Incorporated, Order, 11 FCC Rcd 10944, 10948 (para. 10) (Int'l Bur. and OET, 1996) (operations in the C-band "cannot tolerate" harmful interference).

[10] By a "routine" earth station application, we mean an application for authority to operate consistently with the technical specifications of Part 25. *See* Amendment of the Commission's Regulatory Policies to Allow Non-U.S.-Licensed Space Stations to Provide Domestic and International Satellite Service in the United States, First Order on Reconsideration, IB Docket No. 96-111, 15 FCC Rcd 7207, 7213 n.30 (1999) (*DISCO II First Reconsideration Order*).

applications and comments. Finally, Sections VII proposes simplifying and clarifying other miscellaneous rules applicable to earth stations and space stations.

III. STREAMLINING NON-ROUTINE EARTH STATION LICENSING PROCESSES

A. Routine and Non-Routine Earth Stations

7. The Commission licensed the first commercial C-band antennas in 1973,[11] and the first Ku-band antennas in 1981.[12] As the satellite industry developed, the Commission, in 1983, instituted its 2° orbital spacing policy to maximize the number of satellites in-orbit.[13] Under the 2° spacing framework, the Commission assigns adjacent in-orbit satellites to orbit locations 2° apart in longitude. This framework also established technical rules to govern earth stations communicating with these satellites to ensure that their operations do not cause unacceptable interference to adjacent satellite systems. These standards involve both the powers at which the earth stations transmit and the size of the earth station antenna. The size of the earth station antenna is important since, in general, smaller antennas produce wider transmission beams, which, in turn, create more potential interference to adjacent satellite operations. As a result, we "routinely" license earth station facilities that meet these 2° spacing technical standards, now codified in Part 25 of our rules.[14] It is possible, however, for an earth station to operate without causing unacceptable interference in a 2° space station spacing environment without meeting all of the technical standards of Part 25, provided the operations are properly coordinated with all affected parties. Accordingly, we do not dismiss or deny these "non-routine" earth station applications without conducting a case-by-case review. In this section, we seek comment on specific cases where it may be possible to streamline our review of non-routine earth station applications.

B. Non-Routine Antenna Gain Patterns

1. Introduction

8. Currently, an earth station applicant seeking authority to use an antenna with a non-routine antenna gain pattern often must use a burdensome process[15] to demonstrate that its antenna will not cause unacceptable interference to adjacent satellite systems. We propose replacing this process with one we expect to be simpler and less burdensome. Specifically, we propose requiring applicants to either (1) reduce their power levels to those that would be produced if the maximum allowable power level were transmitted by an antenna that complies with the 2° spacing standards of the Commission's rules, or (2)

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[11] Western Union Telegraph Company, 38 FCC 2d 1197 (1973); Comsat General Corporation, 42 FCC 2d 677 (1973).

[12] *See* Assignment of Orbital Locations to Space Stations in the Domestic Fixed-Satellite Service, Memorandum Opinion and Order, 84 FCC 2d 584, 606 (para. 56).

[13] Licensing of Space Stations in the Domestic Fixed-Satellite Service and Related Revisions of Part 25 of the Rules and Regulations, Report and Order, CC Docket No. 81-704, FCC 83-184, 54 Rad. Reg. 2d 577 (released Aug. 16, 1983); Licensing Space Stations in the Domestic Fixed-Satellite Service, 48 F.R. 40233 (Sept. 6, 1983) (*Two Degree Spacing Order*).

[14] 47 C.F.R. Part 25.

[15] This process is the Adjacent Satellite Interference Analysis (ASIA). We discuss ASIA in detail below.

obtain affidavits from satellite operators demonstrating that the satellite operators are aware of the proposed non-routine earth station operations and have reflected those non-routine operations in agreements with other satellite operators. Earth station applicants would be required to reduce their power levels if they sought an ALSAT earth station license. They would need affidavits from satellite operators to obtain protection from receiving interference from other satellite systems. These points are explained in more detail below.

2. Antenna Gain Patterns

9. The gain of an antenna is the ratio of the power required at the input of a loss-free reference antenna to the power supplied to the input of the given antenna to produce, in a given direction, the same field strength or the same power flux-density at the same distance. When not specified otherwise, the gain refers to the direction of maximum radiation.[16] In other words, gain refers to an antenna's ability to collect, concentrate, and direct energy in a particular fashion, *i.e.*, a beam. Antennas are generally shaped like parabolas, or like large, curved bowls. The "axis," or boresight, is the line running through the center of the bowl and perpendicular to the plane of the edge of the bowl. The "off-axis" angle is the angle formed by the axis and another line running through the center of the bowl or the "boresight." The energy transmitted from an antenna forms "ripples," alternately increasing and decreasing in magnitude as the off-axis angle increases. Examples of these ripples can be seen in the antenna gain pattern diagrams in Appendix A. These ripples are called "side lobes."

10. The "gain" of any earth station antenna must fall within the limits defined by the equations set forth in Section 25.209(a) and (b). In other words, the "main lobes" and "side lobes" of an antenna must be less than the limits specified in the equations in Section 25.209. Allowing an antenna to operate with side lobes outside the Section 25.209 envelope, without making some other adjustment such as reducing power levels, creates a potential for unacceptable interference to adjacent satellite systems and, in some cases, to fixed services, *i.e.*, in low elevation angles.[17] Several antenna gain patterns are illustrated in Appendix A with the Section 25.209 envelopes superimposed on them.

11. In 1983, we recognized that beginning the Section 25.209(a)(1) side lobe envelope at 1° off-axis from the boresight places a limit on the minimum size of earth station antenna that can meet this standard.[18] As the diameter of an antenna decreases, the main lobe eventually will no longer be within the ±1° off-axis envelope. Consequently, the smallest diameter antenna routinely licensed at C-band is 4.5 meters, while at Ku-band the smallest antenna routinely licensed is 1.2 meters in diameter.[19]

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[16] 47 C.F.R. § 2.1.

[17] We note that "small" antennas are currently coordinated by frequency coordinators on a regular basis and the report of this coordination is required to be submitted by the earth station applicant. *See* 47 C.F.R. § 25.203(b). Our proposals here do not change this requirement, and, therefore, we do not believe there is any increased risk of interference to terrestrial wireless systems in frequency bands shared with FSS earth stations.

[18] *Two Degree Spacing Order*, 54 Rad. Reg. 2d at 605 (para. 93).

[19] Although an antenna 1.2 meters in diameter does not fit within the envelope established in Section 25.209(a)(1) between 1° and 1.25° off-axis, the Commission found that this slight failure to meet the Commission's antenna gain standards does not generally cause unacceptable interference, and therefore created an exception for 1.2-meter antennas operating in the Ku-band. Specifically, the side lobe envelope for a 1.2 meter antenna operating in the Ku-band was revised to begin at 1.25° off-axis. *See* 47 C.F.R. § 25.209(g); Amendment of Part 25 of the Commission's Rules and regulations to Reduce Alien Carrier Interference Between Fixed-Satellites at Reduced Orbital Spacings and to Revise Application Processing Procedures for Satellite Communications Services, Second

12. There are strong economic and other incentives to use the smallest possible aperture earth station antenna. Smaller antennas are less expensive to manufacture, and it is easier to find suitable locations to install smaller antennas. In addition, with the improvement of transmitter and receiver technology on board satellites, satellite communications systems have been able to maintain service performance while decreasing the aperture of the earth station antennas used to deliver satellite services to end users. For these two reasons, we are receiving numerous applications to use earth station antennas that do not meet the antenna gain pattern envelope. For example, we recently adopted a Notice of Proposed Rulemaking to address certain issues raised by an application filed by Onsat Network Communications, Inc. (Onsat).[20] Onsat proposed operating C-band earth station antennas that are 3.7 meters in diameter, less than the diameter specified in the Commission's rules.[21]

13. An applicant seeking a license to use an earth station antenna that is non-conforming with Section 25.209(a)(1) must now rely upon "a finding by the Commission that unacceptable levels of interference will not be caused under conditions of uniform 2° orbital spacing."[22] Presently, the Commission does not make such findings without the provision of earth station antenna gain patterns and a technical study demonstrating compatibility with uniform 2° orbital spacing. This technical study usually takes the form of an analysis using the Adjacent Satellite Interference Analysis (ASIA) program as described in Section 25.134(b).[23] The ASIA requirement is often difficult and time consuming to perform, for two reasons.[24] First, the ASIA is burdensome because the data needed for the analysis are not readily available from any one source, and the results of an ASIA can be subject to interpretation. Second, the ASIA results for the non-routine antenna's operations must be coordinated with adjacent satellite operators.[25] The ASIA requirement often delays the introduction of new services and technological innovation to the public.[26]

Report and Order and Further Notice of Proposed Rulemaking, CC Docket No. 86-496, 8 FCC Rcd 1316, 1322 (paras. 38-39) (1993).

[20] FWCC Request for Declaratory Ruling on Partial-Band Licensing of Earth Stations in the Fixed-Satellite Service that Share Terrestrial Spectrum, Notice of Proposed Rulemaking, IB Docket No. 00-203, FCC 00-369 (released Oct. 24, 2000) (*FWCC/Onsat NPRM*). The *FWCC/Onsat NPRM* seeks comment on codifying rules and establishing fees governing blanket licensing in the C-band.

[21] 47 C.F.R. § 25.212(d).

[22] 47 C.F.R. §25.209(f).

[23] The ASIA computer program and interference assessment methodology is cited in Section 25.134(b) of our Rules. The ASIA program and methodology was originally employed to analyze the impact of 2° orbital spacings in the C and Ku bands in Appendices B and C of the *Two Degree Spacing Order*.

[24] Conducting an interference assessment using the ASIA program requires the collection of very specific modulation and link budget parameters for all of the communication links being analyzed. Parameters such as modulation indices, baseband frequencies, data and error correction coding rates, noise temperatures, antenna gains, powers, and sometimes carrier frequency plans are required for the interfering and desired communication links. Once these parameters are collected, the ASIA computer program computes carrier-to-interference (C/I) ratios between the desired and interfering links. Such detailed parameters are not collected in the earth station licensing process and are generally available only from the individual satellite system operators.

[25] *See* Hughes Comments in Response to *2000 Biennial Review Staff Report* at 1-2 (procedures for non-routine antenna applications are burdensome).

[26] Hughes Comments in Response to *2000 Biennial Review Staff Report* at 2-3.

14. ASIA is not the only method available, however, to ensure the compatibility of these non-compliant antennas with 2° orbital spacing. There are at least two alternatives that are not specifically recognized by our rules: (1) requiring the earth station operator to reduce its power enough to avoid potential adjacent satellite interference; and (2) requiring the earth station operator to submit affidavits from space station operators showing that they have coordinated the earth station's proposed non-routine operations with all other affected satellite systems, and that they will continue to reflect those non-routine operations in future coordination discussions. We believe that applicants seeking authority to operate non-routine antennas should be given the option of either or both approaches. Deciding not to pursue either option, however, may require other conditions to be placed on the license. We propose both options below.

a. Power Reduction

15. A reduction in the transmitted earth station power is a tool available to ensure an acceptable interference environment for adjacent satellite operations. In other words, a power reduction can reduce the side lobe energy to levels that fall within the levels that would be produced if the maximum allowable power level were transmitted by an antenna that complies with the antenna gain pattern envelope in Section 25.209(a) and (b). Accordingly, we propose creating a new Section 25.220 to effectively implement an equivalent isotropically radiated power (EIRP)[27] density vs. off-axis angle criterion beginning at 1° off-axis. In this way, the off-axis EIRP density would be maintained equivalent to that provided by routine earth stations at 2° and beyond. Although the Commission staff will continue to process these earth station applications to use antennas less than 4.5 meters for the C-band or 1.2 meters for the Ku-band on a case-by-case basis, our proposed rule would enable the staff to process those applications more rapidly.

16. While a power reduction by itself should be sufficient to prevent the non-routine earth station from causing interference to other satellite systems, it would not affect the potential for receiving interference from other satellite systems. Therefore, we tentatively conclude that non-routine earth station applicants taking advantage of this procedure should not be granted protection from interference from other satellite systems, unless they also obtain the affidavits discussed below. Because the power reduction should be sufficient to prevent unacceptable interference to 2° compliant satellite systems, we tentatively conclude that non-routine earth station applicants taking advantage of this procedure should be eligible for ALSAT earth station licenses for transmit-only operations, and transmit/receive operations where the earth station operator does not request any receive protection from adjacent satellite interference.[28]

17. We believe that this proposed rule will benefit earth station applicants by reducing the uncertainty associated with licensing non-compliant earth station antennas having side lobe levels those of routinely licensed earth stations. Both the Commission staff and the earth station applicant benefit by

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[27] EIRP is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna. 47 C.F.R. § 2.1.

[28] "ALSAT" means "all U.S.-licensed space stations." Originally, under an ALSAT earth station license, an earth station operator providing fixed-satellite service in the conventional C- and Ku-bands could access any U.S. satellite without additional Commission action, provided that those communications are in accordance with the same technical parameters and conditions established in the earth stations' licenses. *See DISCO II First Reconsideration Order*, 15 FCC Rcd at 7210-11 (para. 6). The *DISCO II First Reconsideration Order* expanded ALSAT earth station licenses to permitted access to any satellite on the Permitted List. *DISCO II First Reconsideration Order*, 15 FCC Rcd at 7215-16 (para. 19).

clearly stating the power restrictions imposed and the exhibits required in the FCC Form 312 application. Fewer incomplete earth station applications should be filed with the Commission, and we should have fewer returned or delayed applications. By clarifying Commission requirements, we hope to speed the review of these applications, and ultimately result in more rapid service to the public. In addition, the elimination of the burdens associated with the ASIA requirement in the alternative for this category of non-routine earth station applications will benefit earth station applicants, space station operators, and Commission staff.

18. Some parties may criticize this approach, believing that it might not allow some earth stations to operate at adequate power levels. We tend to disagree. While we are not proposing an explicit lower limit upon the size of earth station antennas, earth station applicants seeking authority to use a non-compliant antenna will have to reduce the earth station transmit power and power density to the extent necessary to compensate, decibel for decibel, for any shortfall in the antenna performance relative to the antenna standards of Section 25.209. We recognize that this power reduction inherently restricts the capacity of extremely small antennas. We believe this power level reduction method for extremely small antennas will likely be practical only for narrowband, relatively low data rate, digital services, and possibly systems employing spread spectrum techniques. These small antennas and low power levels, however, might be very practical for satellite-delivered Internet services.[29]

19. We seek comment on our Section 25.220 proposals, particularly from satellite operators involved in adjacent satellite coordination, earth station operators proposing to access satellites with non-routine earth station antenna parameters, and frequency coordinators for those bands where earth stations and terrestrial wireless systems share spectrum. We note that we have not proposed streamlined procedures for all non-routine earth station antennas, but believe that our streamlining proposals will facilitate the examination of the majority of non-routine applications. We invite commenters to address these proposals and/or to propose methods for streamlining our processes for specific non-routine earth station antenna applications. In particular, we invite terrestrial wireless operators to comment, to the extent that they believe that these proposals to streamline the processing of earth station license applications in the Fixed-Satellite Service might affect their coordination and operations.

b. Affidavits

20. While an earth station operator with a non-routine antenna gain pattern can avoid causing interference to other satellite systems by reducing the earth station's power below routine levels, we do not propose limiting earth station operators to this approach. We believe that the earth station operator should be permitted to operate at higher than routine power levels if other satellite systems can and are willing to accommodate those higher power levels and the operations are properly coordinated with terrestrial systems in shared frequency bands.

21. We believe we can establish a streamlined process for licensing earth stations with antennas that do not conform to the off-axis requirements of Section 25.209(a)(1), and eliminate the burdens associated with the ASIA requirement, while still ensuring that communications with those antennas are coordinated with other operating satellites. In order to accomplish that goal, we propose a second procedure in Section 25.220.[30] In summary, earth station applicants will be able to expedite Commission staff review of their application by submitting information on the antennas they propose to use, and an

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[29] Appendix A of this Notice discusses our calculations related to antenna diameter.

[30] We anticipate that this procedure would apply only to antennas that comply with all the applicable power level and other technical requirements in Part 25.

affidavit from the operator of each satellite with which it plans to communicate stating, among other things, that the satellite operator has coordinated the proposed earth station operations with affected satellite systems, and that the satellite operator will take the earth station into account when negotiating future coordination agreements. We would not limit this requirement to the satellite systems immediately neighboring the satellite with which the earth station applicant plans to communicate. Depending on the antenna gain pattern and uplink and downlink power levels, coordination could be required with operators of satellites as far as six degrees away.[31] We believe that establishing a bright line rule would facilitate this affidavit process, and we believe that, in most cases, satellites located more than six degrees away will not be affected by non-routine earth station antennas. Therefore, we propose requiring a satellite operator completing an affidavit to coordinate with the operator of all other satellites located within six degrees of its satellite. The satellite operator would be permitted but not required to coordinate with the operators of satellites more than six degrees away before the earth station application is filed. This approach would enable earth station operators to begin operations and enter the market sooner than they would under our current procedure. This approach is also consistent with the approach we took with the Onsat application and other FSS applications.

22. We recognize that a non-routine antenna could affect a satellite more than six degrees away in some cases. For example, if the earth station operator's antenna gain pattern exceeds the envelop at eight degrees off-axis, or the satellite downlink power is significantly high, then it could affect a satellite located eight degrees away in the geosynchronous orbit or earth stations accessing that satellite. In such a case, if the operator of the satellite communicating with the earth station had not coordinated with the operator of the satellite eight degrees away, the operator of the satellite eight degrees away would have an opportunity to raise its concerns, pursuant to the procedure we propose in Section III.D. below.

23. Once the earth station applicant demonstrates that current and future adjacent satellite system operators will take the non-routine operations into account when negotiating coordination agreements, we will rely on this to conclude that the earth station will neither cause unacceptable interference to nor receive unacceptable interference from adjacent satellite systems. Accordingly, we propose extending protection from receiving interference to these earth stations while they operate over the particular satellites that have coordinated such operations. We do not propose issuing ALSAT earth station licenses to applicants taking advantage of the process we propose here. This is because affidavits from adjacent satellite operators in a particular segment of the geosynchronous arc by themselves do not support a conclusion that the non-routine earth station will not cause interference to or receive interference from satellite systems in other segments of the arc. This proposed process should expedite the case-by-case examination of earth station applications proposing to use antennas smaller than 4.5 meters for C-band and 1.2 meters for Ku-band. We invite comment on this tentative conclusion. We also invite comment on whether and to what extent these proposals might affect terrestrial wireless operations.

24. Alternatively, if an earth station applicant with a non-routine antenna is willing to reduce its power levels and obtains affidavits from adjacent satellite systems, we would consider granting it an ALSAT earth station license for transmit operations with conditions protecting it from receiving interference from adjacent satellite systems only where affidavits show receive protection is coordinated and agreed to. We also invite comment on this proposal from all interested parties.

3. Submission of Antenna Gain Patterns

[31] Our experience with nonconforming earth stations operations demonstrates that, if coordination is completed with adjacent satellite operations plus or minus six degrees of the satellite that is accessed, the potential for unacceptable adjacent satellite interference is significantly reduced.

25. We currently require applicants seeking authority to use non-routine antennas to certify that certain specific radiation pattern tests have been performed, including co- and cross-polarization, at the bottom, middle, and top of each allocated frequency band, in both the vertical and horizontal planes, plus and minus nine degrees.[32] We often must request copies of the antenna gain patterns for these test plots from the earth station applicant for non-conforming antennas in order for Commission staff to assess the potential for adjacent satellite interference.[33] These requests can be time-consuming, and so result in the delay of service to the public. Therefore, we propose requiring that earth station applicants submit a copy of these antenna gain patterns when they seek authority to use a non-routine antenna.

26. By directing the applicant to obtain these test plots from the manufacturer and submit them with its application, the Commission removes itself from the role of inefficient "middleman." In addition, because the earth station operator has an established relationship with its antenna manufacturer, this requirement should pose minimal additional burdens on earth station applicants. Furthermore, the satellite operators will require this information to understand the impact that the non-conforming antenna operations will have on adjacent satellite systems. Therefore, we expect this antenna gain pattern submission requirement to accelerate licensing of nonconforming antennas, thereby accelerating the provision of services to the public. In addition, we believe that this proposed filing requirement, together with the power reduction and affidavit proposals discussed above, will be less burdensome for earth station applicants than the current ASIA requirement. We invite comment on this proposal from all potentially affected parties, and we also invite other proposals to streamline this process.

4. Other Non-Routine Antenna Gain Pattern Issues

a. Station Keeping

27. We note that, as an antenna gets smaller, its mainbeam gets wider. As a result, there may be more occurrences of interference to or from adjacent geostationary satellite systems if those satellites drift away from their assigned orbital location. We do not anticipate that interference resulting from drifting satellites will be a serious concern in most cases, because Section 25.210(j)(1) establishes station-keeping requirements for satellites that preclude all but very minor drifting.[34] The Commission has authority to relax its station-keeping requirements in particular cases, however,[35] and some non-U.S.-licensed satellites may not have the same station-keeping capabilities as U.S.-licensed satellites. Therefore, we solicit comment on whether an increase in the number of authorized earth stations with antennas that do not conform to the off-axis requirements of Section 25.209(a)(1) would unreasonably increase the likelihood of unacceptable interference given the station keeping tolerances of current satellite systems.

b. Interleaved Satellites

28. In 1983, we determined that earth station antennas that comply with the Section 25.209(a)(1) antenna gain pattern envelope at and beyond 2° off-axis from boresight could successfully operate within a

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[32] 47 C.F.R. § 25.132(a).

[33] 47 C.F.R. § 25.132(b)(1).

[34] 47 C.F.R. § 25.210(j)(1) (space stations must be designed with the capability of being maintained in orbit within 0.05° of their assigned orbital longitude).

[35] 47 C.F.R. §§ 25.210(j)(2), (3).

uniform 2° spacing environment.[36] In other words, an earth station with a routine antenna gain pattern envelope at and beyond 2° off-axis communicating with a particular satellite will not cause unacceptable interference to adjacent satellites located at or beyond 2° away from the particular satellite, provided that both satellite systems comply with all the Commission's routine 2° spacing standards. As a result, there is no need for any other protection from mutual interference, such as, for example, requiring adjacent satellite systems to maintain geographic spatial isolation between the two networks (*i.e.*, precluding the satellites from operating with overlapping footprints).[37]

29. Several U.S.-licensed satellites are closer than 2° away from their adjacent satellite systems, however.[38] Satellites licensed by other countries, in particular South American countries, have often been interleaved at 1° between U.S. satellites that are spaced 2° apart. This situation has given rise to an adjacent satellite spacing of approximately 1° between a U.S. satellite serving North America and a foreign-licensed satellite serving South America.[39] These satellite systems do not currently cause interference into each other, however, because the footprints of the U.S. and South American satellites do not overlap (*i.e.*, the satellites are not co-coverage).[40] However, if there is an increase in the number of earth stations with antennas that fail to meet our antenna gain pattern envelope less than 2° off-axis, the fact that the footprints of these satellites do not overlap may no longer be sufficient to prevent interference. This is illustrated by our discussion and antenna gain patterns in Appendix A.

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[36] *Two Degree Spacing Order*, 54 Rad. Reg. 2d at 605-06 (para. 95). Operation of such small antennas, however, must also conform to our power and power density standards established in Sections 25.211 and 25.212. These very small antennas will most likely carry only narrowband traffic, as they may not provide an adequate noise margin for full transponder traffic.

[37] Other sources of isolation are frequency offset between carrier channels and cross-polarization. Satellite radio waves can be oriented, or "polarized," in several ways, including parallel to the equatorial plane of the earth, and perpendicular to the earth's equatorial plane. Under certain technical conditions, horizontally polarized transmissions will not interfere with vertically polarized transmissions while they are transmitted simultaneously. When both senses of polarization are transmitted simultaneously, the signals are "cross-polarized." The Commission's rules require satellites to be designed to transmit cross-polarized signals to promote spectrum efficiency. 47 C.F.R. § 25.210(i).

[38] INTELSAT satellites are generally spaced at least 2.5° away from non-INTELSAT satellites. However, the Commission recently granted INTELSAT waivers of several 2° spacing rules. *See* INTELSAT LLC, Memorandum Opinion, Order, and Authorization, FCC 00-287 (released Aug. 8, 2000) (*INTELSAT Order*).

[39] Several U.S. satellites located in the eastern part of the orbital arc (*i.e.*, east of approximately 105° W.L.), are adjacent to South American satellites located 1° or less away. Moreover, while U.S. satellites located in the western part of the geostationary orbital arc (*i.e.*, west of approximately 120° W.L.) are generally not currently interleaved with foreign satellites, they may become interleaved in the future as South American nations bring more satellites into operation.

[40] In other words, when the Administrations originally coordinated use of the geostationary arc over the Americas, South American satellites, namely, served only the Southern Hemisphere, while U.S. satellites served only the Northern Hemisphere. Geographic isolation is accomplished by isolating satellite antenna coverage areas or "footprints." The magnitude of satellite antenna pattern isolation depends upon where the service area for the other satellite network is located. For example, a satellite serving Argentina will provide more isolation to a satellite network serving the United States than will a satellite serving Venezuela because the satellite coverage areas are further separated from those of satellites serving the United States. Likewise, an earth station located in Kansas will have more isolation from a satellite serving South America than an earth station located in Puerto Rico based on earth station or space station antenna isolation. This arrangement permitted 1° spacing between the U.S. and non-U.S. satellites.

30. The 3.7-meter antenna proposed by Onsat exceeds the Commission's antenna gain pattern envelope between 1° and 2° off-axis.[41] Our proposed affidavit process would allow other earth station operators to exceed the Commission's antenna gain pattern envelope between 1° and 2° off-axis. This would affect primarily operators of satellites that have been interleaved with satellites with non-overlapping footprints located between 1° and 2° away. Accordingly, we seek comment particularly from satellite network operators with existing coordination agreements on whether earth station antennas that do not comply with Section 25.209(a)(1) at 1° to 2° off-axis would adversely impact existing coordination agreements if the Commission adopts these proposed processing rules for non-routine antennas.

C. Non-Routine Power Levels

31. In addition to establishing requirements for antenna gain patterns, the Commission's 2° spacing rules establish power limits for different kinds of earth stations operating in the FSS.[42] As we explained above, earth station applicants are not prohibited from seeking authority to operate at higher power levels, but the Commission reviews those applications on a case-by-case basis rather than processing them routinely. Section 25.134 requires earth station applicants seeking a VSAT license to submit an ASIA if they plan to operate at non-routine power levels.[43] Other power level rules do not explicitly set forth any procedure for demonstrating that a higher power level will not cause interference in a particular case. As a result, applicants requesting authority to operate at power levels higher than those specified in those rules often submit an ASIA. This analysis, as explained earlier, is very burdensome for earth station applicants because it requires a substantial amount of time to complete.

32. Accordingly, we seek comment on replacing the ASIA requirement for non-routine power levels with a self-certification process. Under this process, an earth station applicant would provide, as exhibits to its application, affidavits of its own and the operator of each satellite with which the non-routine earth station power and power density levels will be implemented. The earth station operator would be authorized to use the non-routine power and power density levels only over those satellites for which affidavits are provided (*i.e.*, we would not issue ALSAT earth station licenses[44] pursuant to this process). These affidavits shall include:

- A statement from the satellite operator acknowledging the proposed operation of the subject non-routine earth station with its satellite;
- A statement from the satellite operator that the operation of the non-routine earth station accessing its satellite(s) is consistent with any existing coordination agreement for its satellite(s);
- A statement from the satellite operator that the satellite operator will include the non-conforming earth station power and power densities in all future satellite network coordination for the specific satellite at the desired orbital location;

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41 *See* Onsat Petition, Exhibit B.

42 47 C.F.R. §§ 25.134 (VSAT networks), 25.211 (video transmissions), 25.212 (narrowband transmissions).

43 *See* 47 C.F.R. §25.134(b).

44 We explain above that an ALSAT earth station license authorizes the earth station to communicate with all U.S. licensed satellites and all non-U.S.-licensed satellites on the Permitted List.

- A statement from the earth station applicant certifying that the earth station operations will comply with all coordination agreements reached by the satellite operator(s), or the earth station operator will reduce its power to routine levels.

33. Our proposal will reduce regulatory and administrative burdens on the Commission and earth station applicants and create a more efficient application process. It will however, require greater cooperation between earth station and space station operators, and among space station operators. We invite comment on our proposal. We also invite comment on the effects this proposal might have, if any, on terrestrial wireless operations.

D. Satellite Coordination Negotiations to Reflect Non-Routine Antennas and Power Levels

34. Satellite operators must maintain a cooperative working relationship with each other to help resolve coordination issues that come up from time to time. Therefore, we expect that, in most cases, satellite operators will be able to coordinate with operators of other affected satellites to accommodate an earth station's non-conforming operations fairly easily, and we do not expect this affidavit process to be very burdensome for earth station operators or space station operators. To facilitate this coordination process further, however, we propose establishing a procedure to expedite the affidavit process. Specifically, we propose describing the non-conforming earth station operations in enough detail in public notices so that all satellite operators can determine for themselves immediately whether they are potentially affected by the proposed non-conforming earth station operations. In addition, we propose establishing a time schedule to ensure that the satellite operators address these coordination issues in a timely fashion. We explain this procedure in more detail below.

35. First, we propose retaining two elements of our current procedure. We propose continuing to place non-routine applications on Public Notice with frequency bands, antenna diameters, power and power density information describing each antenna, and the satellite or satellites intended to be used. The public will also continue to have 30 days to comment, and to notify the Commission of any potential interference from the proposed earth station or, in the case of VSAT applications, network of stations. In addition to those current requirements, our new proposed procedure would establish a deadline of 60 days from the date comments are due for satellite operators to notify the Commission staff that they have resolved all outstanding coordination issues that may be identified in the 30-day comment period. As noted above, coordination issues could be raised with respect to any potentially affected satellite, even if the satellite it is located more than six degrees away, depending on the antenna gain pattern and power level. After the 60-day deadline, the Commission will act upon the earth station to communicate at its requested higher power levels with all satellites for which it has submitted affidavits, and for which there are no unresolved objections to the application.[45]

36. We seek comment on this approach, particularly from satellite operators and any other operators, including terrestrial operators. We believe that this approach will support our goals to have satellite services delivered to consumers more quickly by decreasing delays in processing earth station applications. Specifically, the Commission will not need to delay action on a license application merely because the space station operator has not completed coordination agreements with all potentially affected adjacent satellite system operators.

E. Public Notice Language

[45] This ten-day deadline assumes that there are no other defects in the application that warrant denial or dismissal of the application.

37. If the benefits of streamlined processing are to be fully realized -- getting satellite communications services to the public faster -- we must place earth station applications on the required 30-day public notice as quickly as possible. To facilitate that process, we invite comment on whether we should require applicants to submit the language that will appear in the public notice with their applications.

38. We believe that this requirement to provide specific language for the public notice will strike a reasonable balance between minimizing the small increase in filing burden for applicants with other interested parties' need to make an adequately informed decision regarding whether to file a petition to deny an application. Specifically, we propose to require applicants to provide the following minimum set of information for the public notice.

- A detailed description of the service to be provided, including frequency bands and satellites to be used.
- The diameter of the antenna.
- Proposed power and power density levels.
- Identification of any random access technique, such as the Aloha multiple access technique, if applicable, listed in our proposed revisions to Section 25.134(a) of the Commission's rules.[46]
- Identification of any rule or rules for which a waiver is requested.

Since our proposals will require greater attention to public notices by satellite operators and fixed wireless operators in order to assess the impact of non-conforming operations, we specifically seek guidance from commenters on the most relevant and minimum amount of information we should require in our public notices.

IV. RELAXATION OF CURRENT REQUIREMENTS

A. Relaxation of Earth Station Power and Power Density Limits

39. We seek comment on increasing the power level limits contained in Sections 25.134, 25.211, and 25.212.[47] Since the 1980s, the Commission has dramatically decreased its earth station antenna diameter requirements to reflect technical advances. They were initially 9 meters and later reduced to 4.5 meters for operations in the C-band.[48] In the Ku-band, antennas had to be 5 meters in diameter, but were later reduced to 1.2 meters.[49] The power spectral density requirements from the earth station, however, have remained unchanged. The current power limits and the Orders in which we adopted those limits are summarized in Appendix F.

40. Today's technology allows smaller diameter antennas to meet the side lobe requirements of our antenna performance rules in Section 25.209, which previously required the larger antennas.

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[46] *See* Appendix B. Random access techniques are used primarily in VSAT systems. We discuss them in more detail in Section V.B. and Appendix E of this Notice.

[47] 47 C.F.R. §§ 25.134, 25.211, 25.212.

[48] *See 1987 VSAT Order*, 2 FCC Rcd at 2149 (para. 2).

[49] *See 1987 VSAT Order*, 2 FCC Rcd at 2150 (para. 8).

Decreasing antenna size decreases mainbeam antenna gain. Therefore, more input power into the antenna may be required to achieve the same output EIRP to complete the satellite communication link. Accordingly, we invite interested parties to propose higher power limits in Part 25 to reflect technological advances and smaller antenna requirements. Commenters should provide an analysis to demonstrate that the proposed levels are adequate to protect existing and future users from receiving and causing harmful interference to or from adjacent satellite networks, especially as smaller and smaller diameter antennas are being deployed. In addition, commenters should show that their recommended power levels would be consistent with radiofrequency emission exposure limits in Part 1, Subpart I of the Commission's rules. Accordingly, we solicit comment on this proposal from all potentially affected parties, including terrestrial wireless operators.

41. We also seek comment on the terms "narrowband" and "wideband." Currently, we use these terms in our rules to categorize applications such as analog voice and digital video. In particular, Section 25.212 establishes power limits for narrowband transmissions in the Fixed-Satellite Service. We invite comment on whether the use of these terms is still appropriate and, if so, whether or how these terms should be defined or clarified.

B. Temporary Fixed Earth Stations

42. We invite comment on establishing a procedure to enable operators of temporary fixed earth stations in the Ku-band to begin operation immediately upon placement of the application on public notice. We propose that this procedure to be limited to applications filed electronically. We further propose to limit this procedure to "routine" temporary fixed earth stations operating in the conventional Ku-band. Finally, we expect to limit the points of communication for temporary fixed earth stations to U.S.-licensed satellites and non-U.S.-licensed satellites on the "Permitted List." Parties are invited to comment on this proposal. Section 309(b)(2) of the Communications Act lists several types of licenses for which the Commission must allow at least 30 days for comment.[50] The narrow class of temporary fixed earth station is not included on this list. Therefore, we tentatively conclude that we have legal authority to adopt this proposal, provided that there is adequate support for it in the record developed in this proceeding. We seek comment on this tentative conclusion.

43. Parties supporting this approach may also propose applying this procedure or similar procedures to other types of earth stations. If we were to extend this procedure to temporary fixed earth stations in shared bands, however, we would retain the existing coordination requirements for those bands. Currently, operators of temporary fixed earth stations in the C-band, for example, must coordinate any operations prior to initiating service.[51] Furthermore, applicants that have completed coordination prior to submitting applications are permitted to include the coordination reports in their applications. Accordingly, we do not contemplate revising the coordination requirements at this time for this frequency band for temporary fixed earth stations. Rather, we invite comment only on expediting the process for temporary fixed earth stations in shared bands.

C. License Term

44. Section 25.121 currently states that earth station license terms may be at most 10 years.[52] We invite comment on revising Section 25.121 to permit longer license terms for earth station licenses. We

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[50] 47 U.S.C. § 309(b)(2).

[51] 47 C.F.R. § 25.277(c), (d), (e).

[52] 47 C.F.R. § 25.121.

propose extending the license term for all earth stations to 15 years. In the *2 GHz Report and Order*, we observed that the Telecommunications Act of 1996 granted the Commission authority to establish longer license terms for particular classes of satellites, and established 15-year terms for earth stations operating in the 2 GHz band.[53] Accordingly, we seek comment on establishing a 15-year term for all earth station licenses.

45. We also solicit comment on extending the term for receive-only earth station registrations from 10 years to 15 years. We note, however, that most receive-only earth stations are residential users. It is not clear how many registrants currently use their earth stations for the full ten-year term. Allowing unused receive-only earth stations to remain registered for an additional five years may make it more difficult to for other spectrum users to coordinate their operations, particularly in bands that are shared with terrestrial operations. Therefore, we solicit comment, particularly from terrestrial wireless operators, on whether to extend the terms of receive-only earth station registrations, either in all frequency bands or in bands that are shared with terrestrial operations.

D. Construction Completion Requirement for Satellite Mobile Earth Stations

46. Currently, Section 25.133(a) of the Commission's rules requires each earth station licensee to complete construction of its earth station within one year of the date the license is granted.[54] In cases where we have authorized multiple satellite mobile earth station terminals (METs), it is not clear that any policy goal is served by requiring the licensee to construct all the METs authorized within a year of the grant of the license, provided that a reasonable number of METs have been constructed and the licensee has started to offer service within a year.[55] Accordingly, we propose revising Section 25.133(a) to require MET licensees only to bring their networks of earth stations into operation within a year. We also propose revising Section 25.133(b) to require MET licensees to certify that they have brought their networks of earth stations into operation within a year of receiving their licenses. If a MET licensee has not brought all the earth stations permitted by its license into operation at the time of renewal, we would renew its license only for those earth stations that have been brought into operation. We currently have a similar requirement for VSAT networks.[56] We seek comment on this approach.

47. Interested parties are also invited to discuss whether there is any need to review the number of terminals brought into operation at various points in the license term. For example, should MET licensees be required to file periodic reports stating the number of terminals in use? Should MET licensees be required to bring a certain percentage of their authorized terminals into use within a certain time after they receive their licenses? If so, what percentage would be reasonable, and what time period would be appropriate?

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[53] The Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band, Report and Order, IB Docket No. 99-81, FCC 00-302 (released Aug. 25, 2000) at para. 101 n.359, *citing* Telecommunications Act of 1996, Pub. L. No. 104-104, Title II, § 203, 110 Stat. 56, 112 (1996) (amending Section 307 of the Communications Act to eliminate ten-year term and creating new Section 307(c)(1) granting the Commission authority to determine licenses for particular classes of stations, including satellite space and earth stations).

[54] 47 C.F.R. § 25.133(a).

[55] Originally, the Commission required VSAT operators to construct their networks within four years, but later eliminated that requirement in the *1996 Streamlining Order*, 11 FCC Rcd at 21592 (para. 26).

[56] 47 C.F.R. § 25.134(d).

E. Part 23

48. We also request that interested parties propose revision or elimination of any provision in Part 23, governing International Fixed Public Radiocommunication Services (IFPRS). These services are defined simply as a publicly available fixed service between the United States and foreign points.[57] The Commission has not adopted any extensive revisions to its Part 23 rules since 1973.[58] In addition, there are currently only three IFPRS licensees.[59] Because of the few licensees that remain subject to Part 23 rules, and the time that has passed since we have reviewed these rules, it seems likely that some of these requirements can be streamlined or eliminated.

49. We have not developed specific proposals for revising Part 23 as we have Part 25. We see no reason at this time to limit attention to any particular provisions in Part 23. Rather, we invite interested parties to examine Part 23 in its entirety, without any restrictions on their examinations. We will consider proposals to revise or eliminate any Part 23 requirement, provided that the commenter explains why those rules are no longer necessary in the public interest.

V. VSAT LICENSING ISSUES

A. Background

50. The Commission's rules permit parties to obtain a license for a large number of technically identical small aperture antenna earth stations. These networks are referred to as very small aperture antenna terminal (VSAT) networks. VSAT networks are currently permitted only in the Ku-band, and are comprised of a hub station transmitting to transponders on a satellite and then down to multiple technically identical remote small aperture antennas.[60]

B. Establishment of Power Limits for VSAT Networks Using Random Access Techniques

51. VSAT networks employ different techniques to prevent or limit the transmissions to and from the multiple remote earth stations from interfering with each other, and to prevent them from interfering with other adjacent satellite networks. The original VSAT systems used a Single Channel Per Carrier (SCPC) channelization approach, in which each remote earth station was assigned its own block of spectrum. Subsequently, VSAT system operators developed techniques that enabled some remote earth stations to share frequency bands. One sharing technique is known as time division multiple access (TDMA). Using this technique, each remote earth station is assigned a different time to transmit and receive information. Another technique is, frequency division multiple access (FDMA). The FDMA technique assigns different frequency bands to different remote earth stations. A third approach, code division multiple access (CDMA), prevents interference between remote earth stations by assigning a

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[57] 47 C.F.R. § 23.1.

[58] Amendment of Part 23 of the Commission's Rules and Regulations, International Fixed Public Radiocommunications Services, Report and Order, Docket No. 19073, FCC 73-859, 28 Rad. Reg. 2d 313 (released Aug. 15, 1973).

[59] Our records show that the only IFPRS providers still in operation are AT&T of the Virgin Islands, Inc., Broadcast Media Satellite, Inc.; and Interisland Telephone Corporation.

[60] Routine Licensing of Large Networks of Small Antenna Earth Stations Operating in the 12/14 GHz Frequency Bands, 51 Fed. Reg. 15067 (Apr. 22, 1986) (*1986 VSAT Order*). *See also* 47 C.F.R. §25.134(a).

different digital code to different earth stations. We discuss each of these methods in more detail in Appendix E to this Notice.

52. On April 5, 2000, Spacenet, Inc. (Spacenet) filed a petition for declaratory ruling or rulemaking, requesting a ruling that random access schemes such as its Aloha access technique, explained further below, in which "collisions" of transmissions from two or more earth stations are statistically infrequent, do not violate Section 25.134's prohibition merely because the power levels produced by such "collisions" exceed the power levels specified for tens of milliseconds.[61]

53. As an alternative to a declaratory ruling, Spacenet sought the initiation of a rulemaking to amend Section 25.134 to state that Aloha-type multiple access systems are permissible as long as the probability of one or more collisions is less than an amount specified by a statistical equation.[62] In summary, the probability of a transmission collision can be derived from the traffic load or average transmissions per time period, and the utilization or throughput per time period.[63] Therefore, a VSAT operator can limit the number of transmission collisions by adjusting the average transmissions per time period, and the information throughput per time period.

54. We decide not to solicit comment on the statistical equation that Spacenet recommended for our rules. Although Spacenet claims that its proposed equation could be applied to a variety of multiple access techniques to limit transmission collisions,[64] we believe that a more general and simplified approach will better facilitate the licensing of earth stations that use these techniques. In response to Spacenet's petition, Hughes Network Systems (Hughes) suggested an alternative rule revision. Hughes asserted that it would be better to develop a rule requiring that the total average power radiated toward the target satellite by all the remote earth stations in the network, using an averaging period of one second, is less than that of a single remote earth station transmitting continuously.[65] We also decide not to seek further comment on Hughes's revision, because it would not adequately address cases where the bandwidth used for an earth station causing interference is wider than the bandwidth used by an earth station impacted by the

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61 *See* Spacenet Petition at 5-7. The Bureau recently denied Spacenet's petition for declaratory ruling because Sections 25.134(a) and (b) specify maximum input power density limits for each earth station in a VSAT network. 47 C.F.R. § 25.134(a), (b). When signals from two or more earth stations collide, the resulting power level exceeds the limits specified in Sections 25.134(a) and (b), and so the Aloha method, and variants such as slotted Aloha, cannot be construed to comply with the letter of Section 25.134 if each terminal transmits at the maximum power density limit. The Bureau, however, concluded that Spacenet adequately showed that its slotted Aloha method may not cause unacceptable interference to other satellite systems. Accordingly, the Bureau granted Spacenet and other VSAT operators that employ various multiple access techniques a waiver of Section 25.134 for purposes of continuing to use existing multiple access methods while this rulemaking is pending. Petition of Spacenet, Inc. for a Declaratory Ruling that Section 25.134 of the Commission's Rules Permits VSAT Remote Stations in the Fixed Satellite Service to Use Network Access Schemes that Allow Statistically Infrequent Overlapping Transmissions of Short Duration, or, in the Alternative, For Rulemaking to Amend that Section, RM-9864, Order, DA 00-2664 (Int'l Bur., released Dec. 7, 2000) (*Spacenet Order*), at para. 5.

62 The rule recommended by Spacenet would require the probability P of k stations transmitting, for k greater than 1, to be below the limit defined $P[k] = (0.38^k/k!)*e^{(-0.38)}$. Spacenet Petition at 9. Hughes also recommended addressing issues raised by the Aloha multiple access technique. Hughes Comments in Response to *2000 Biennial Review Staff Report* at 4.

63 Spacenet Petition at 7.

64 Spacenet Petition at 6 n.7.

65 Hughes Comments at 4-5.

interference.[66] In response to Spacenet's petition for declaratory ruling, ALOHA Networks, Inc. claimed that Spacenet erred by basing its calculations on a "Poisson" probability function rather than a binomial probability function. The Bureau did not reach this issue in its Order.[67] Because we do not base our proposed rule revision directly on Spacenet's probability calculations, we need not determine at this time whether a Poisson or binomial distribution is preferable for the Aloha technique. For reasons explained in Appendix E, however, we find that use of the Poisson distribution is reasonable.

55. Instead of seeking comment on Spacenet's or Hughes's proposals, we invite comment on a slightly different proposal. We propose revising Sections 25.134(a) and 25.212(d) to include the following language: "The maximum transmitter power spectral density of a digital modulated carrier into any GSO FSS earth station antenna shall not exceed -14.0 - 10log(N) dB(W/4 kHz)." Section 25.134(a) would also specify different values of "N" for systems using FDMA, TDMA, CDMA, or Aloha multiple access techniques. This proposal is substantially similar to the rules we adopted for blanket licensing in the Ka-band in the *18 GHz Order*.[68] We explain how we derived this equation, and our proposals for the "N" values for each multiple access technique, in Appendix E.

56. We observe that our proposal would require Aloha earth stations to reduce the power spectral density emitted by as much as 3 dB from the existing limits specified in Section 25.134(a).[69] We tentatively find that this reduction in power would minimize the interference to adjacent satellite networks to an acceptable level during the collision period of a typical Aloha operation and, at the same time, would provide a technically viable service. In the conservative case of protecting adjacent satellite networks from unacceptable interference beyond the present limits, the reduction in the power spectral density level should be at least 5 to 6 dB to accommodate the low probability that more than two earth stations' transmissions will collide. (Five to six dB represents a collision of 3 to 4 simultaneous transmissions in a typical Aloha network.)[70] A 5 to 6 dB reduction in earth station power density, however, may not be practicable to provide a viable service for users situated in high rain regions such as the lower East Coast and the Gulf States. In high rain regions, a reduction of 5 to 6 dB in a VSAT satellite link budget could reduce the availability of the service to an unacceptable level, in particular for Internet service.

57. We further observe that, until recently, we permitted VSAT networks only in the Ku-band. We are considering expanding our VSAT rules to the C-band in the *FWCC/Onsat NPRM*. Here, we tentatively conclude that we should extend the multiple access rules to C-band VSAT networks, called CSAT networks in the *FWCC/Onsat NPRM*, in the event that we adopt such rules in this instant proceeding. We further invite comment from all interested parties on whether the proposed rules would need any revision to become applicable to CSAT systems, and if so, the type of revisions that would be

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66 *Spacenet Order* at para. 10.

67 *Spacenet Order* at para. 13-14.

68 *See* 47 C.F.R. §25.138(a), *adopted in* Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite Service Use, Report and Order, IB Docket No. 98-172, FCC 00-212 (released June 22, 2000) (*18 GHz Order*) (*petition for review pending*).

69 *See* Appendix E.

70 *See Spacenet Order* at App. A.

appropriate.[71] Finally, we invite comment on revising the Ka-band blanket license rules to incorporate requirements for the Aloha access technique.

C. Multiple Hub Stations

58. The Commission's staff has received a number of informal inquiries concerning the installation and operation of more than one hub station under a single VSAT network blanket license. One use of a second hub station could be as a backup to the primary hub station. In this configuration, the secondary hub station would only be used intermittently. In a second configuration, used to provide Internet service, multiple hub stations would be used for the distribution of network traffic to various traffic switching and control centers. In this configuration, numerous hub stations would be located in several cities throughout the United States and would all be in simultaneous operation. The total network traffic load to and from the VSAT remote units would be balanced across all of these hub stations.

59. Given all these beneficial uses for multiple-hub VSAT networks, we have always considered applications for licenses for such networks. Accordingly, we propose revising Section 25.134 to permit multiple hub stations under a single VSAT network license. Given our experience with multiple hub station systems, we believe that it is appropriate to expand the scope of our licensing provisions. We seek comment on this proposal.

D. Temporary Fixed VSAT Stations

60. Some confusion exists concerning whether temporary fixed earth stations can be licensed under a VSAT network blanket license. We tentatively conclude that there is no technical reason to prohibit such licensing of temporary fixed facilities either as a hub or as a remote unit in the conventional Ku-band, which is not shared with terrestrial services. Accordingly, we invite comment on revising Section 25.277 to clarify the conditions under which we should consider licensing a temporary fixed VSAT network.

61. First, we tentatively conclude that we should grant temporary-fixed VSAT applications only in the conventional Ku-band at this time. The conventional Ku-band does not raise the same potentially complex coordination issues as operations in the C-band. In addition, we do not yet allow VSATs of any kind in the C-band. We have proposed, however, licensing C-band VSAT networks in the *FWCC/Onsat NPRM*.[72] Second, we propose requiring applicants to specify in their applications that they are seeking authority to use a temporary fixed earth station as part of a VSAT network.[73] Finally, we invite comment on extending the requirements for VSAT hubs currently in our rules, such as the Section 25.134 hub EIRP limit of 78.3 dBW,[74] to temporary fixed VSAT hubs.

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[71] In the *FWCC/Onsat NPRM*, we sought comment on revisions to Section 25.134 separate from the revisions we propose here. It is confusing to try to include the proposed revisions in the *FWCC/Onsat NPRM* in our proposed rules in this proceeding. Accordingly, in Appendix B to this Notice, we state our rule revisions we propose in this proceeding as revisions to the current Section 25.134.

[72] *FWCC/Onsat NPRM* at paras. 84-96.

[73] For example, a VSAT network consisting of one fixed hub station, one temporary fixed hub station, one 1.2 meter fixed remote variant, and one 1.2 meter temporary fixed remote variant should be reported as four separate sites on Schedule B of Form 312. Even if the same make and model of antenna and transmitter equipment are used in fixed and temporary fixed variants within the VSAT network, each variant should be reported as a separate site.

[74] *See* 47 C.F.R. § 25.134(a), (b).

62. We also invite comment on our decision not to adopt rules for temporary fixed VSAT earth stations in the C-band at this time. Parties advocating rules for such VSAT stations should propose specific rule revisions, and should explain exactly how operators can be expected not to cause harmful interference to services sharing the frequency bands. Should there be a specific procedure to follow similar to the one suggested in the *FWCC/Onsat NPRM*?[75]

E. Non-US Licensed Satellites and International VSAT Networks

63. Section 25.115(c) limits the service provided by the Ku-band VSAT network communicating with U.S.-licensed or non-U.S.-licensed satellites to domestic service.[76] Subsequently, in the *DISCO I Order*, we adopted a policy to permit all U.S.-licensed fixed satellite systems to offer both domestic and international services.[77] In the *DISCO II Order*, we further amended our policy to allow non U.S.-licensed satellites to provide domestic and international services in the United States.[78]

64. We, therefore, propose revising Section 25.115(c) to allow applicants to apply for a license for Ku-band VSAT networks for both domestic and international services to access both U.S.-licensed and non-U.S.-licensed satellites. This would make the Ku-band VSAT rules consistent with the policy established in *DISCO I* and *DISCO II*. We also propose applying the power limitation and licensing procedure for VSAT networks set forth in Section 25.134 to VSAT network applications for international service to and from the United States. Finally, we propose issuing licenses only for those VSAT facilities located in the United States.[79] VSAT network facilities in other nations would be required to comply with the licensing requirements, if any, of the nations where they are located. We invite comment on these proposals.

F. VSAT Licenses for Organizations with Multiple Members

65. We seek comment on the feasibility of providing VSAT-style blanket licensing of other earth station networks. For example, would it be feasible to license systems such as the Alaska Bush[80] network, or the National Public Radio (NPR)[81] network under a blanket license? Both of these networks operate in

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[75] *FWCC/Onsat NPRM* at para. 66.

[76] 47 C.F.R. § 25.115(c).

[77] Amendment to the Commission's Regulatory Policies Governing Domestic Fixed Satellites and Separate International Satellite Systems, Report and Order, IB Docket No. 95-41, 11 FCC Rcd 2429 (1996) (*DISCO I*). International service is service to or from points in the United States to or from points outside of the United States.

[78] Amendment of the Commission's Regulatory Policies to Allow Non-U.S. Licensed Satellites Providing Domestic and International Service in the United States, Report and Order, IB Docket No. 96-111, 12 FCC Rcd 24094 (1997) (*DISCO II*).

[79] We use the definition of "United States" in Section 3(51) of the Communications Act, 47 U.S.C. § 153(51), which includes U.S. territories.

[80] The Alaska Bush network is a large network of technically similar earth stations that provide digital telephony to many remote villages in Alaska.

[81] The National Public Radio (NPR) network is a large network of technically similar earth stations that provide for the collection and distribution of broadcast quality analog audio programming. The individual earth

the C-band with each earth station being individually licensed. Both of these networks were also licensed long before the advent of our VSAT licensing policies. If similar networks were installed today, they could be licensed under a single blanket license, either as a VSAT or CSAT[82] network. In bands shared with terrestrial services such as the conventional C-band, we could implement the notification procedure proposed in the *FWCC/Onsat NPRM*.[83] We also note that we recently adopted blanket-licensing rules for the Ka-band.[84]

66. From a technical standpoint, we do not see any difficulties with this approach. It appears that such networks could be operated exactly the same as other VSAT networks in operation today or proposed in the *FWCC/Onsat NPRM*. From a regulatory or legal standpoint, however, this approach would be feasible only if we could place responsibility for complying with Commission rules on the umbrella organization holding the blanket license rather than individual members of the organization. With respect to these legal issues, we note that we have recently adopted similar rules for Guard Band Managers, who were licensed to lease spectrum in the 700 MHz band to terrestrial wireless operators.[85] We seek general comment, therefore, on the feasibility of this approach from all potentially affected parties.

VI. EARTH STATION FILING FORMS

A. Streamlined Earth Station Filing Form

67. Before 1996, the Commission used several different forms, designed for several different kinds of earth station and space station authorizations. In the *1996 Streamlining Order*, the Commission replaced most of those forms with a single form, known as Form 312.[86]

68. We propose adopting a new, streamlined version of our Form 312, attached as Appendix D to this Notice, that would enable applicants to complete routine earth station applications[87] more easily than the current Form 312. We would retain the current Form 312 for non-routine earth station applications and all space station applications. Recently, the International Bureau (Bureau) released a public notice announcing the adoption of an "auto-grant" procedure for certain routine C-band and Ku-band earth station applications.[88] In that public notice, the Bureau explained that, based on its experience with C-band and

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stations operating in the network are licensed to the various radio stations and universities that comprise the NPR network.

[82] Onsat requested authority to license a VSAT network to operate in the C-band. In the *FWCC/Onsat NPRM*, we called such networks "CSAT" networks to distinguish them from existing VSAT operations in the Ku-band. *FWCC/Onsat NPRM* at para. 13.

[83] *FWCC/Onsat NPRM* at para. 66.

[84] *See* 47 C.F.R. § 25.138; *18 GHz Order* at paras. 87-88.

[85] Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules, Second Report and Order, WT Docket No. 99-168, 15 FCC Rcd 5299 (2000).

[86] *1996 Streamlining Order*, 11 FCC Rcd at 21598 (para. 40).

[87] By "routine," we mean consistent with all the 2° spacing standards in Part 25. We discussed "routine" earth stations in more detail in Section III.A. above.

[88] Commission Launches Earth Station Streamlining Initiative, Public Notice, DA 99-1259 (released June 25, 1999) (*Ku-Band Auto-grant Public Notice*); Commission Launches C-Band Earth Station Streamlining Initiative, Public Notice, DA 00-2761 (released Dec. 7, 2000) (*C-Band Auto-grant Public Notice*).

Ku-band operations over the past 20 years, earth stations operating in those bands will not cause harmful interference to other authorized terrestrial and satellite systems if those earth stations meet certain criteria. The criteria include: (i) operating only in the C-band and Ku-band, (ii) operating within the power limits specified in the Commission's rules, and (iii) using antennas that comply with Section 25.209 of the Commission's rules.[89] Pursuant to the "auto-grant" policy, earth station applications meeting these criteria are granted automatically after the comment period, assuming that no oppositions have been filed.[90]

69. If the applicant could answer "yes" to all the questions on the first two pages of the proposed new Form 312, it would be eligible for the auto-grant process. All of the earth station technical information needed for the auto-grant process is requested on the third and fourth page of the form. The proposed new Form 312 is only four pages long. This new form is much shorter than the current ten-page form, including Schedules A and B. The streamlined Form 312 should substantially reduce the amount of time required for applicants to complete and should expedite the process of determining whether an application qualifies for the auto-grant process. We envision the new form to be an optional, easier form available for the convenience of routine earth station license applicants. The current Form 312 would still be available for non-routine earth station license applications. We invite comment on whether we should continue to accept the current FCC Form 312 for routine earth station applications, or whether the current Form 312 should be phased out for routine earth station applications after a particular date.

70. We invite comment on whether we should adopt a streamlined Form 312 for routine earth stations eligible for the auto-grant process. We propose to implement this short form application process for routine earth stations operating in the conventional C- and Ku-band frequencies in an effort to further streamline our auto-grant processes.[91] We also invite comment on the particular form proposed in Appendix D. We seek comment on whether there are any questions that we can eliminate or add on the first two pages. We also seek comment on whether there are any technical information requirements we should add or remove on page two of the new Form 312. We note that if we do not collect the technical information in the current Form 312, it may require commercial frequency coordinators to collect more information as part of private coordinations. We tentatively conclude that having private coordinators collect more information will make coordination easier and more efficient by enabling private coordinators to collect the information directly from the applicants, eliminating the intermediate step of filing that information with the Commission. We seek comment on this tentative conclusion. We further invite commenters to estimate the reduction in burden that will result if we adopt a streamlined Form 312. Finally, we invite comment on allowing applicants to request licenses to use bands other than the conventional C- and Ku-band frequencies, such as the Ka-band.[92]

B. Renaming Form 701 and Form 405

71. Currently, the Commission accepts several forms that relate to satellite network authorizations. These include FCC Form 701 (Application for Additional Time to Construct), FCC Form 405 (Application for Renewal of Radio Station License in Specified Services) and FCC Form 312 (Authorization of New

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[89] 47 C.F.R. §§ 25.134, 211, 212 (power level rules, 47 C.F.R. § 25.209 (antenna rules); *Ku-Band Auto-grant Public Notice*; *C-Band Auto-grant Public Notice.*

[90] *Ku-Band Auto-grant Public Notice*; *C-Band Auto-grant Public Notice.*

[91] *Ku-Band Auto-grant Public Notice*; *C-Band Auto-grant Public Notice.*

[92] For purposes of this Notice, the Ka-band is 19.7-20.2 GHz and 27.5-30.0 GHz.

Stations). We propose renaming these forms to make clear that they relate to satellite authorizations. Specifically, we propose to rename FCC Form 701 as Form 312-M, to signify milestone extension requests, and to rename FCC Form 405 as Form 312-R, to signify renewal requests. We do not propose eliminating Forms 405 and 701 because they are not used exclusively for earth station applications. Rather, we propose creating forms identical to Forms 405 and 701 except for their names. We believe that this proposal will reduce current regulatory and administrative burdens by clarifying the form needed for different earth station requests.

C. Form 312, Schedule S, Space Station Technical Data Form

72. FCC Form 312 is the filing form used for filing both space and earth station applications. With earth station applications, both administrative and technical data that is then entered into the IBFS computerized licensing database. The information in IBFS provides Commission staff and the public with substantial query and reporting capability. Queries and reports can be generated based on parameters such as earth station location, antenna size, and power level, to name a few. We do not presently have the same capability with respect to space station applications.

73. Space station applications are often voluminous collections of text, tables, and graphics related to legal, financial, and technical aspects of the satellite system. Only the Main Form of Form 312 is used with respect to space station applications to capture a limited amount of administrative data for our licensing database. The Main Form is used for earth station applications, but, in addition, Form 312, Schedule B, is used to collect technical data for earth station applications. Substantially complete FCC Form 312 applications are an important factor in the ability to file earth station applications in electronic form. We do not currently have a schedule for space station applications, however, that enables the Commission to collect any technical data from space station applicants in a uniform format that would facilitate developing a database like we have for earth station applications.

74. With the rapid growth of the satellite industry, we are now receiving approximately 125 to 175 space station applications each year.[93] Without computerized tracking of proposed and licensed space station technical parameters, we cannot quickly respond to basic queries concerning the spectrum usage and coverage of particular U.S.-licensed satellites.

75. Accordingly, we propose to adopt a new space station technical data form for Form 312, Schedule S. Schedule S is comparable to the earth station Schedule B, but requests much of the information required in space station applications by Section 25.114. Schedule S organizes many of the existing data requirements into a standard format that can be captured in our licensing database. It will also assist in the process toward complete electronic filing for the satellite industry. Space station applicants would continue to provide the remaining information required by Section 25.114 in narrative form because it seems easier for space station applicants to allow flexibility in provision of that information. Our proposed Schedule S appears as Appendix C to this *Notice*. We invite comment on our proposed Schedule S. In particular, we seek comment on whether any of the information in Schedule S should continue to be provided in narrative form, or whether any other information requirements in Section 25.114 should be included in Schedule S. Finally, in the event we adopt Schedule S in some form, we propose revising Section 25.114 accordingly.[94]

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[93] We receive about 175 space station applications in years with processing rounds, and about 125 in other years.

[94] Because Schedule S may be revised before it is adopted, we do not set forth specific proposals for revising Section 25.114 in Appendix B.

D. Electronic Filing

1. Mandatory Electronic Filing for Routine Earth Station License Applications

76. We propose accepting only electronically filed applications for routine C-band, and routine Ku-band applications (*i.e.*, those applications that are processed by the C-band and Ku-band auto-grant process) after June 1, 2002. If these applications were filed electronically, their processing could become totally automated, eliminating delays associated with manual processing. We also propose to require electronic filing of applications for assignments and transfers. Such applications would be requested by the registrant via an Internet request form and automatically printed. Our experience has shown that electronically filed applications are processed in about half the time of paper applications. This approach will be less burdensome on Commission staff and result in services to consumers being delivered more quickly.

2. Electronically Filed Petitions to Deny or Comments

77. In any automated licensing system, we must have timely notification of any objections or concerns with a particular application. Consequently, we propose to create an Internet filing form that would be used to accept electronically filed petitions to deny or comments. The petitioner or commenter would supply identifying information such as the file number, complete the descriptive information about the petition, and any attachments (in an appropriate graphical format) to the electronic copy of the petition. The International Bureau Filing System (IBFS) database would then be automatically updated with this information. We seek comment from the industry on this proposal as well as other areas where the Commission could automate its satellite earth station licensing process.

VII. MISCELLANEOUS

A. Earth Station License Modification Requirements

78. In the *1996 Streamlining Order*, the Commission adopted Section 25.118, permitting earth station operators to make certain "minor" modifications to their licenses without prior Commission authorization.[95] An applicant is required only to notify the Commission within 30 days of a minor modification of operations.[96] In some cases, applicants have expressed confusion regarding whether their planned modification is a major or minor modification, particularly with respect to Sections 25.117(b) and 25.118(c)(5). Section 25.117(b) states that the addition of a new antenna, identical in all ways to an existing antenna, is a minor modification, not requiring prior authorization from the Commission. On the other hand, Section 25.118(c)(5) says that the addition of a new antenna is not a minor modification, but does not state explicitly that identical equipment is excluded from this provision.[97]

79. Accordingly, we propose revising Sections 25.117 and 25.118 to clarify the distinction between major and minor modifications. Specifically, our proposed Section 25.118(a) lists the types of modifications permitted without prior authorization, but that require the earth station operator to notify the

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[95] *1996 Streamlining Order*, 11 FCC Rcd at 21594 (para. 32).

[96] *1996 Streamlining Order*, 11 FCC Rcd at 21594 (para. 32).

[97] *See 1996 Streamlining Order*, 11 FCC Rcd at 21595 (para. 34) (explaining that Section 25.118(c)(5) does not apply to replacement equipment identical to existing equipment).

Commission within 30 days. Section 25.118(b) lists the types of modifications permitted without notification or prior authorization from the Commission, including modifications currently incorporated in Section 25.117.[98] Our proposed Section 25.117 would define "major modifications" as all modifications not specifically identified in Section 25.118.

80. We do not intend the reorganization of Sections 25.117 and 25.118 to reclassify any modifications, or to change the requirements for major and minor modifications.[99] We will, however, consider substantive revisions. First, the current Section 25.117(a)(1) states that a license modification is not required if a U.S.-licensed fixed satellite seeks to access another U.S.-licensed fixed satellite if the parties have completed consultations pursuant to Article XIV(d) of the INTELSAT Agreement. INTELSAT is in the process of transforming from an intergovernmental organization to a private company. The INTELSAT Agreement currently in force will be amended when the privatization process is complete, and many Articles, including Article XIV(d), will be deleted. In addition, the ORBIT Act requires INTELSAT to conduct technical coordination "under International Telecommunication Union procedures and not under Article XIV(d) of the INTELSAT Agreement."[100] Accordingly, we invite comment on eliminating the reference to Article XIV(d) of the INTELSAT Agreement.

81. In addition, we propose eliminating Section 25.117(a)(2). The Commission adopted that rule in 1991 to streamline review of "transborder" service, between the United States and Canada or Mexico.[101] Our transborder policy has been subsumed by our *DISCO I Order*, which permits all U.S.-licensed fixed satellite systems to offer both domestic and international services.[102] Therefore, it appears that Section 25.117(a)(2) is no longer necessary, and we propose eliminating it.

B. Radiation Hazards from Co-located Antennas

82. We invite comment on revising Section 25.117 to make clear to earth station operators that they must comply with the Commission's radiofrequency (RF) radiation limits. The National Environmental Policy Act of 1969 (NEPA) requires agencies of the Federal Government to evaluate the effects of their actions on the quality of the human environment.[103] To satisfy in part its responsibilities under NEPA, the Commission has adopted Maximum Permissible Exposure (MPE) limits RF radiation

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98 *See* 47 C.F.R. §§ 25.117(a)(1), (a)(2), (b).

99 In particular, our proposed revisions to Sections 25.117 and 25.118 do not affect the requirement to complete coordination prior to filing a modification application. Section 25.203(c) requires earth station applicants planning to operate in bands that are shared with terrestrial operators to complete coordination prior to filing any application, including modification applications.

100 *See* Section 622 of the Satellite Act, as amended by the ORBIT Act, 47 U.S.C. § 763a. Congress recently amended the Satellite Communications Act of 1962, 47 U.S.C. §§ 701 *et seq.* (Satellite Act) by adopting the Open-Market Reorganization for the Betterment of International Telecommunications Act, Pub. L. No. 106-180, 114 Stat. 48 (2000), *to be codified at* 47 U.S.C. § 761 *et seq.* (ORBIT Act). The ORBIT Act adds Title VI to the Satellite Act, entitled "Communications Competition and Privatization."

101 Amendment of Part 25 of the Commission's Rules and Regulations to Reduce Alien Interference Between Fixed-Satellites at Reduced Orbital Spacings and to Revise Application Processing Procedures for Satellite Communications Services, First Report and Order, CC Docket No. 86-496, 6 FCC Rcd 2806, 2811 (paras. 33-34) (1991).

102 *DISCO I Order*, 11 FCC Rcd 2429.

103 National Environmental Policy Act of 1969, 42 U.S.C. § 4321 *et seq.*

emitted by Commission-regulated transmitters and facilities.[104] Currently, Section 1.1307(b)(3)(i) requires applicants proposing additional transmitters, facilities, or modifications to submit an environmental assessment if the resulting emissions causes the power density in a geographic area to exceed five percent of the RF exposure limits specified in the Commission's rules.[105]

83. Part 25 explicitly directs earth station applicants' attention to the RF emission rules when applying for an earth station license[106] and when seeking authority to amend a pending license application.[107] The RF requirements applicable to earth station operators seeking a license modification, however, are left implicit. To remove any possible confusion surrounding RF requirements regarding modifications, we propose amending Section 25.117 to cross-reference the RF rules explicitly, including, but not limited to, modifications to add transmitters at a particular site.

C. Construction Authorization

84. In 1996, the Commission eliminated the requirement that space station operators and earth station operators obtain authorization prior to beginning construction of their stations.[108] The rule revisions adopted in 1996 to implement this decision are potentially confusing. Section 25.113(a) states that construction authorization is required in all cases except those listed in Section 25.113(b). Then, Section 25.113(b) lists all possible cases, thereby mooting Section 25.113(a). We propose simplifying Section 25.113 to state explicitly that prior authorization for construction is not required. We do not anticipate that this revision will have any substantive change, but rather will merely clarify current requirements.

D. Satellite Control Responsibilities to Resolve Harmful Interference

85. Section 25.274 sets forth procedures for resolving harmful interference. In cases where an earth station receives interference, and determines that the source is not a terrestrial operator or another earth station communicating with the satellite system with which it is communicating, Section 25.274(c) directs the earth station operator to contact the control center of the satellite system.[109] Section 25.274(g) states that "a representative of the earth station suffering undue interference" has the responsibility to contact the control center for satellite system suspected of causing the interference.[110] If Section 25.274(g) is not read in conjunction with Section 25.274(c), it may appear that earth station operators suffering

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[104] *See* 47 C.F.R. § 1.1310. *See also* Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, Report and Order, ET Docket No. 93-62, 11 FCC Rcd 15123 (1996); Second Memorandum Opinion and Order, 12 FCC Rcd 13494 (1997).

[105] 47 C.F.R. § 1.1307(b)(3)(i). For the information required in an environmental assessment, see Section 1.1311 of the Commission's rules, 47 C.F.R. § 1.1311. For the RF radiation exposure limits, see Section 1.1310 of the Commission's rules, 47 C.F.R. § 1.1310.

[106] *See* 47 C.F.R. § 25.113(b).

[107] *See* 47 C.F.R. § 25.116(b)(2).

[108] *1996 Streamlining Order*, 11 FCC Rcd at 21583-85 (paras. 6-9) (space station construction); 21590-91 (para. 23) (earth station construction).

[109] 47 C.F.R. § 25.274(c).

[110] 47 C.F.R. § 25.274(g).

interference must contact the control center for satellite system suspected of causing the interference directly.[111] Such a requirement would be burdensome. While satellite operators have little incentive to cooperate with earth station operators using competing satellite systems, satellite operators have more incentive to cooperate with each other. This is because satellite operators must maintain a good working relationship with each other to resolve coordination issues that come up from time to time. Accordingly, we seek comment on revising Section 25.274(g) to clarify that earth station operators are permitted to contact the control centers for the satellite systems with which they communicate in cases of harmful interference, and to rely on the satellite system operators to contact the control centers of the potentially interfering satellite systems and resolve the interference.

E. Extension of Power Limits to Other FSS Bands

86. Currently, Sections 25.211 and 25.212 establish power limits for the conventional C-band and Ku-band.[112] Other FSS bands are not explicitly included or excluded from the scope of these rules.[113] Our staff often incorporates the power limits in Sections 25.211 and 25.212 into the earth station authorizations it grants for use of those other FSS bands. The lack of explicit power limits, however, often creates a procedural hurdle that impedes the processing of applications for authority in those other bands. To streamline the processing of earth station applications to use these other FSS frequency bands, we propose amending Sections 25.211 and 25.212 to state explicitly that the Commission may apply the power limits in those sections to the extent that power limits have not been established elsewhere in Part 25. We invite comment on this proposal from all potentially affected parties.

F. Elimination of Outdated Rules

87. Part 25 includes a number of satellite service rules that have become obsolete. We seek comment on the following tentative conclusions. First, we tentatively conclude that we should revise Section 25.144(a) as shown in Appendix B. Section 25.144 includes the licensing provisions for the 2.3 GHz satellite digital audio radio service (DARS). When the Commission adopted rules for the DARS license auctions, it listed the four applicants eligible to participate in the auction in Section 25.144(a).[114] Now that the auction has been completed, we tentatively conclude that it is no longer necessary to memorialize the auction participants in our rules.

88. Second, we tentatively conclude that we can eliminate Section 25.141 of our rules, governing applications for licenses to provide radio-determination satellite service (RDSS). RDSS systems are designed to determine the location of radio transmitters for the purpose of tracking cargo or other items. Shortly after the Commission adopted RDSS rules in 1986,[115] parties began to develop Mobile-Satellite

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111 *See* Weinhouse Letter at 3-4.

112 47 C.F.R. §§ 25.211, 25.212.

113 One example of such a frequency band is the 10.95-11.2 GHz band.

114 The auction was limited to four applicants because they were the only applicants to file their applications by the "cut-off" date. *See* Establishment of Rules and Policies for the Digital Audio Radio Service in the 2310-2360 MHz Band, Report and Order, Memorandum Opinion and Order and Further Notice of Proposed Rulemaking, IB Docket No. 95-91, GEN Docket No. 90-357, RM No. 8610, 12 FCC Rcd 5754, 5812 (para. 143) (1997).

115 Amendment to the Commission's Rules to Allocate Spectrum for, and to Establish Other Rules and Policies Pertaining to, a Radiodetermination Satellite Service, Second Report and Order, Gen. Docket No. 84-689, 104 FCC 2d 650 (1986).

Service (MSS) systems capable of providing voice and data services in addition to RDSS.[116] Accordingly, in 1994, the RDSS spectrum was reallocated to the MSS.[117] In addition, no licensee ever implemented a dedicated RDSS system, and the last remaining licensee declared bankruptcy in 1991.[118] Therefore, we tentatively conclude that Section 25.141 is no longer necessary, and that elimination of these rules is in the public interest.

89. Third, we propose eliminating Part 25, Subpart H. Subpart H was adopted to implement Section 304 of the Communications Satellite Act of 1962 (Satellite Act),[119] which governs ownership of Comsat. The ORBIT Act eliminates Section 304 of the Satellite Act.[120] Thus, we tentatively conclude that Subpart H of the Commission's rules is no longer necessary, and we seek comment on this conclusion.

G. General Part 25 Modifications

90. We also consider here a number of miscellaneous revisions to Part 25. For example, we propose updating the current address of Federal Communication Commission in Sections 25.110(a) and 25.110(b). In addition, we propose adding several definitions for terms that appear in Part 25 to Section 25.201. We seek comment on eliminating references to the INTELSAT Agreement and INMARSAT Convention in Section 25.111(b). Rather than list all the proposed corrections to cross-references and similar revisions, we illustrate the proposed revisions in Appendix B. We invite comment on these proposals to make general changes to Part 25.

VIII. CONCLUSION

91. We invite comment on our proposals and tentative conclusions. We also invite commenters to make additional proposals and suggestions for streamlining our rules. Finally, commenters are encouraged to comment on the effects our proposals might have on the time it takes for them to comply with our filing requirements.

IX. PROCEDURAL MATTERS

92. ***Initial Regulatory Flexibility Analysis.*** Appendix G to this document contains the analysis required by the Regulatory Flexibility Act of 1980, 5 U.S.C. § 603.

93. ***Paperwork Reduction Act.*** This NPRM contains proposed new and modified information collections. As part of its continuing effort to reduce paperwork burdens, we invite the general public and the Office of Management and Budget (OMB) to take this opportunity to comment on the information

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[116] Amendment of Section 2.106 of the Commission's Rules to Allocate the 1610-1626.5 MHz and the 2483.5-2500 MHz Bands for Use by the Mobile-Satellite Service, Including Non-geostationary Satellites, RM-7771, Report and Order, 9 FCC Rcd 536, 538-39 (paras. 17-18) (1993) (*RDSS Reallocation Order*).

[117] *RDSS Reallocation Order*, 9 FCC Rcd at 536 (para. 1).

[118] *See* Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands, Report and Order, CC Docket No. 92-166, 9 FCC Rcd 5936, 5948 n.37 (1994).

[119] 47 U.S.C. § 734. *See also* 47 C.F.R. § 25.501 (scope of Subpart H).

[120] *See* Section 645(1) of the Satellite Act, as amended by the ORBIT Act, 47 U.S.C. § 765d(1).

collections contained in this NPRM, as required by the Paperwork Reduction Act of 1995, Public Law 104-13. Public and agency comments are due at the same time as other comments on this NPRM; OMB comments are due 105 days from date of publication of this NPRM in the Federal Register. Comments should address: (a) whether the proposed collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility; (b) the accuracy of the Commission's burden estimates; (c) ways to enhance the quality, utility, and clarity of the information collected; and (d) ways to minimize the burden of the collection of information on the respondents, including the use of automated collection techniques or other forms of information technology.

94. ***Ex Parte Presentations.*** This is a permit-but-disclose rulemaking proceeding. *Ex parte* presentations are permitted, provided they are disclosed as provided in Sections 1.1202, 1.1203, and 1.1206(a) of the Commission's Rules, 47 C.F.R. Sections 1.1202, 1.1203, and 1.1206(a).

95. ***Comment.*** Pursuant to Sections 1.415 and 1.419 of the Commission's Rules, 47 C.F.R. Sections 1.415 and 1.419, interested parties may file comments on or before 75 days following publication in the Federal Register, and reply comments on or before 105 days following publication in the Federal Register. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS) or by paper copies. *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 Fed. Reg. 24,121 (1998).

96. Comments filed through the ECFS can be sent as an electronic file via the Internet to <http://www.fcc.gov/e-file/ecfs.html>. Generally, only one copy of an electronic submission must be filed. If multiple docket or rulemaking numbers appear in the caption of this proceeding, however, commenters must transmit one electronic copy of the comments to each docket or rulemaking number referenced in the caption. In completing the transmittal screen, commenters should include their full name, Postal Service mailing address, and the applicable docket or rulemaking number. Parties may also submit an electronic comment by Internet e-mail. To obtain filing instructions for e-mail comments, commenters should send an e-mail to ecfs@fcc.gov, and should include the following words in the body of the message, "get form <your e-mail address." A sample form and directions will be sent in reply.

97. Parties who choose to file by paper must file an original and four copies of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, commenters must submit two additional copies for each additional docket or rulemaking number. All filings must be sent to the Commission's Secretary, Magalie Roman Salas, Office of the Secretary, Federal Communications Commission, The Portals, 445 Twelfth Street, S.W., Room TW-A325, Washington, D.C. 20554.

98. Parties who choose to file by paper should also submit their comments on diskette. These diskettes should be submitted to: Commission's Secretary, Magalie Roman Salas, Office of the Secretary, Federal Communications Commission, The Portals, 445 Twelfth Street, S.W., Room TW-A325, Washington, D.C. 20554. Such a submission should be on a 3.5-inch diskette formatted in an IBM compatible format using Word for Windows or compatible software. The diskette should be accompanied by a cover letter and should be submitted in "read only" mode. The diskette should be clearly labeled with the commenter's name, the docket number of this proceeding, type of pleading (comment or reply comment), date of submission, and the name of the electronic file on the diskette. The label should also include the following phrase "Disk Copy - Not an Original." Each diskette should contain only one party's pleading, preferably in a single electronic file. In addition, commenters must send diskette copies to the Commission's copy contractor, International Transcription Service, Inc., 1231 20th Street, N.W., Washington, D.C. 20037.

99. Written comments by the public on the proposed new and modified information collections are due on or before 75 days following publication in the Federal Register. Written comments must be submitted by the Office of Management and Budget (OMB) on the proposed new and modified information collections on or before 105 days after date of publication in the Federal Register. In addition to filing comments with the Secretary, a copy of any comments on the information collection(s) contained herein should be submitted to Judy Boley, Federal Communications Commission, Room 1-C804, 445 12th Street, SW, Washington, DC 20554, or via the Internet to jboley@fcc.gov and to Edward Springer, OMB Desk Officer, Room 10236 NEOB, 725 17th Street, N.W., Washington, DC 20503 or via the Internet to edward.springer@omb.eop.gov.

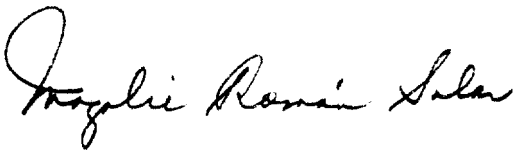
100. ***Additional Information.*** For general information concerning this rulemaking proceeding, contact Steven Spaeth, International Bureau, at (202) 418-1539, International Bureau; Federal Communications Commission, Washington, DC 20554.

X. ORDERING CLAUSES

101. Accordingly, IT IS ORDERED, pursuant to Sections 4(i), 7(a), 11, 303(c), 303(f), 303(g), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 157(a), 161, 303(c), 303(f), 303(g), 303(r), that this Notice of Proposed Rulemaking is hereby ADOPTED.

102. IT IS FURTHER ORDERED that the Commission's Consumer Information Bureau, Reference Information Center, SHALL SEND a copy of this Notice of Proposed Rulemaking, including the Initial Regulatory Flexibility Analysis, to the Chief, Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION



Magalie Roman Salas
Secretary

Appendix A

Antenna Patterns

In this NPRM, we propose two approaches for streamlining our review of earth station applications seeking authority to use non-routine antennas: (1) power reduction, or (2) submission of affidavits. Under our proposal, earth station applicants would be allowed to pursue either or both approaches. The applicant would be required, however, to lower its power to obtain an ALSAT earth station license with authority to conduct transmit/receive or transmit-only operations. The applicant would also be required to submit the affidavits discussed in the text of this Notice from satellite operators to obtain protection from receiving interference from adjacent satellite systems.

This power reduction requirement, if adopted, would effectively establish a new lower limit on antenna size (3.2 meters for C-band and 1.0 meters for Ku-band) that can be licensed for transmit and receive operations and still be two-degree-compliant. The power reduction would also effectively establish a new lower limit on antenna size (2.0 meters at C-band and 0.85 meters at Ku-band) that can be licensed for transmit operations only. The calculations supporting these diameter conclusions are set forth below.

Theoretical Antenna Patterns: The directional nature of the antennas used by fixed satellite earth stations is the main factor that makes it possible to reuse the same frequency band at each satellite spread out across the geostationary satellite orbit. If earth station antennas were not highly directional (i.e. omnidirectional), only one or, at most, two geostationary satellites could serve the same service area in each frequency band.[1] Thus, the earth station antenna and its radiation pattern are of great importance in achieving and maintaining 2° orbital spacing assignments.

Large parabolic reflector antennas[2] commonly used at microwave frequencies exhibit a radiation pattern consisting of a main lobe on the axis of the antenna and a series of sidelobes that generally decrease in amplitude when moving farther away from the main lobe. The radiation pattern produced by any particular antenna depends upon a number of factors. These include frequency, surface smoothness of the reflector, the shape and edge taper of the illumination function, and the amount of aperture blockage present.

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[1] With omnidirectional earth station antennas, a second satellite in a particular frequency band could only be accomplished through polarization isolation. One satellite would be horizontally polarized while the second satellite would be vertically polarized.

[2] Large in terms of wavelength. Typical earth station antennas licensed today have D/λ (diameter to wavelength) ratios on the order of 50 or larger. A 1.2 meter antenna at 14.0 GHz has a D/λ = 56.0 and at 11.7 GHz it has a D/λ = 46.8. A 4.5 meter antenna at 5925 MHz has a D/λ = 88.9 and at 3700 MHz it has a D/λ = 55.5. Smaller antennas that we propose to make routine, have smaller D/λ ratios. A 3.2 meter antenna at 3700 MHz has a D/λ = 39.5 and a 2.0 meter antenna at 5925 MHz has a D/λ = 39.5. A 1.0 meter antenna at 11.7 GHz has a D/λ = 39.0 and a 0.85 meter antenna at 14.0 GHz has a D/λ = 39.67.

As discussed in the body of this NPRM, we recognize that strict compliance with the §25.209(a) antenna standard in the range of 1° to 2° off-axis is not necessary in order for earth station antennas to successfully operate in a uniform 2° spacing environment. What is important is the gain of the antenna's sidelobes toward the adjacent satellites. For uniform 2° orbital spacing, the range of primary interest is the 2° - 9° off-axis portion of the antenna radiation pattern. C-band antennas smaller than 4.5 meters and Ku-band antennas smaller than 1.2 meter can readily meet the §25.209(a) antenna standard at off-axis angles of 2° and greater.

In certain instances, very small antennas where the main lobe of the radiation pattern extends beyond 2° off-axis can successfully operate in a uniform 2° spacing environment. Such small antennas, however, have limitations placed upon them to mitigate potential interference to and from adjacent satellite operations. When the main lobe of these antennas extends out to and beyond 2° off-axis, these earth station systems must reduce their power levels and use robust modulation schemes to compensate for the reduced power.

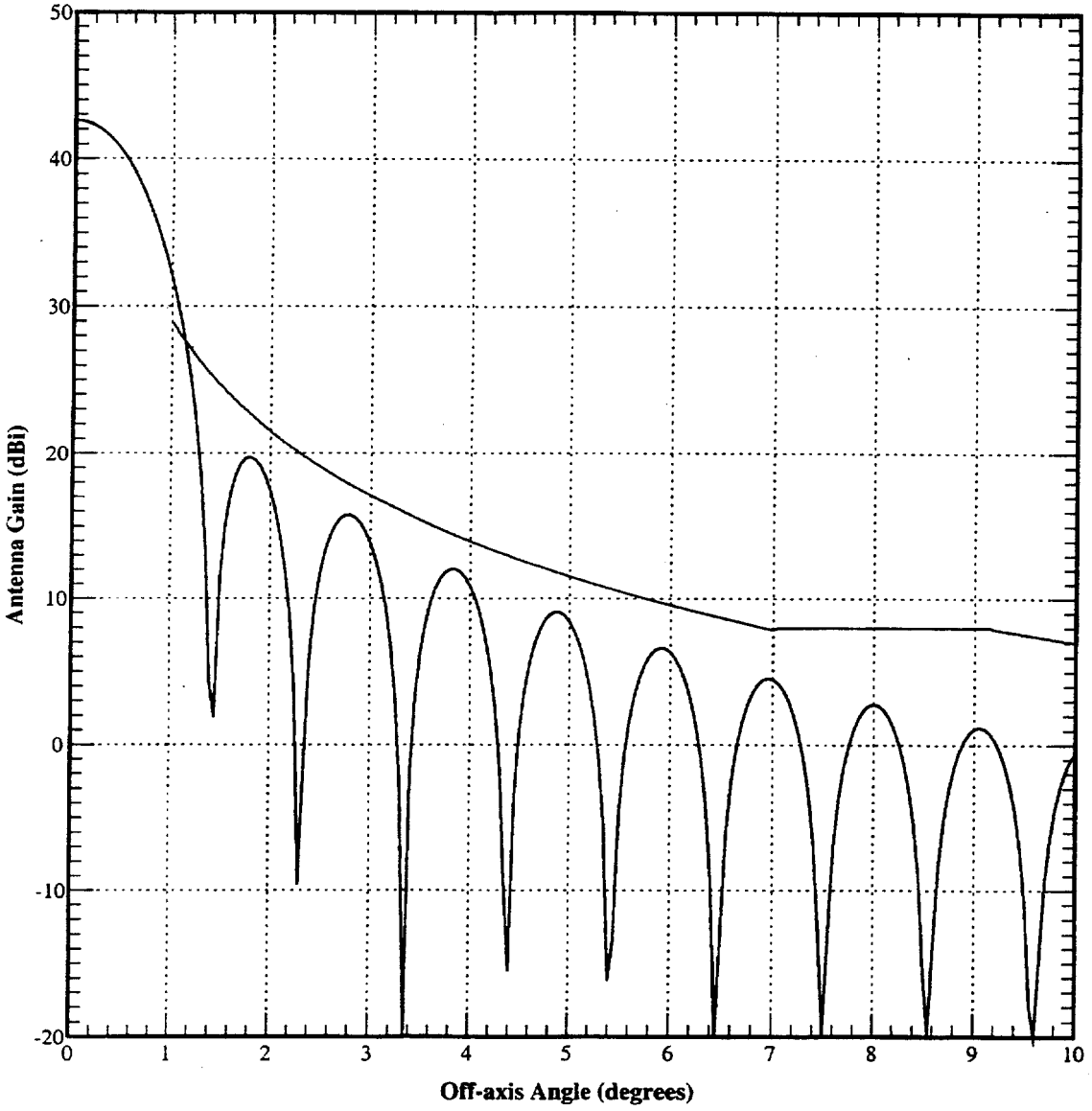
Our proposed rule changes in Section 25.209 are based upon the licensing of non-conforming antennas that are still large enough to have their main lobes entirely contained within the ±2.0° off-axis range. We are certain that antennas of a particular diameter or larger can satisfactorily operate in a uniform 2° spacing environment. In our proposals for Section 25.209, we select the smallest diameter antenna where the first null of its radiation pattern falls within the ±2° off-axis point. We chose this point to allow for a certain degree of antenna pointing error and other degradations such as station keeping tolerance.

The angular location of the first null of an antenna radiation pattern, as well as the angular width of the antenna's main lobe depend upon a number of antenna design parameters. For illustrative purposes, we have computed a number of theoretical antenna radiation patterns for various antenna diameters and frequencies. These patterns are given in figures 1-12 along with the §25.209(a) antenna standard superimposed on the pattern. In all of these figures, we assume a cosine illumination function, a 3.0 dB edge taper, and no aperture blockage. These computed radiation patterns were generated using a slightly modified version of an accepted Fortran subroutine.[3] The antenna diameter was adjusted until the first null between the main lobe and the first sidelobe fell within +/- 2° off-axis. For these theoretical patterns, the following results.

Frequency (MHz)	Diameter (meters)
3700	3.2
5925	2.0
11700	1.0
14000	0.85

[3] W.A. Kissick, D.N. Rebol, "A Program Description of 'Orbit-Prints': Contours of Power Density at the Geostationary Orbit", U.S. Department of Commerce, Office of Telecommunications, OT Report 77-126, June, 1977. The "CIR" subroutine was modified to allow variable taper Cosine^N illumination functions. This subroutine computes the gain as the surface integral of the illumination function. A numerical integration is carried out on a polynomial approximation to the Bessel function.

Figure 1: Theoretical Antenna Pattern

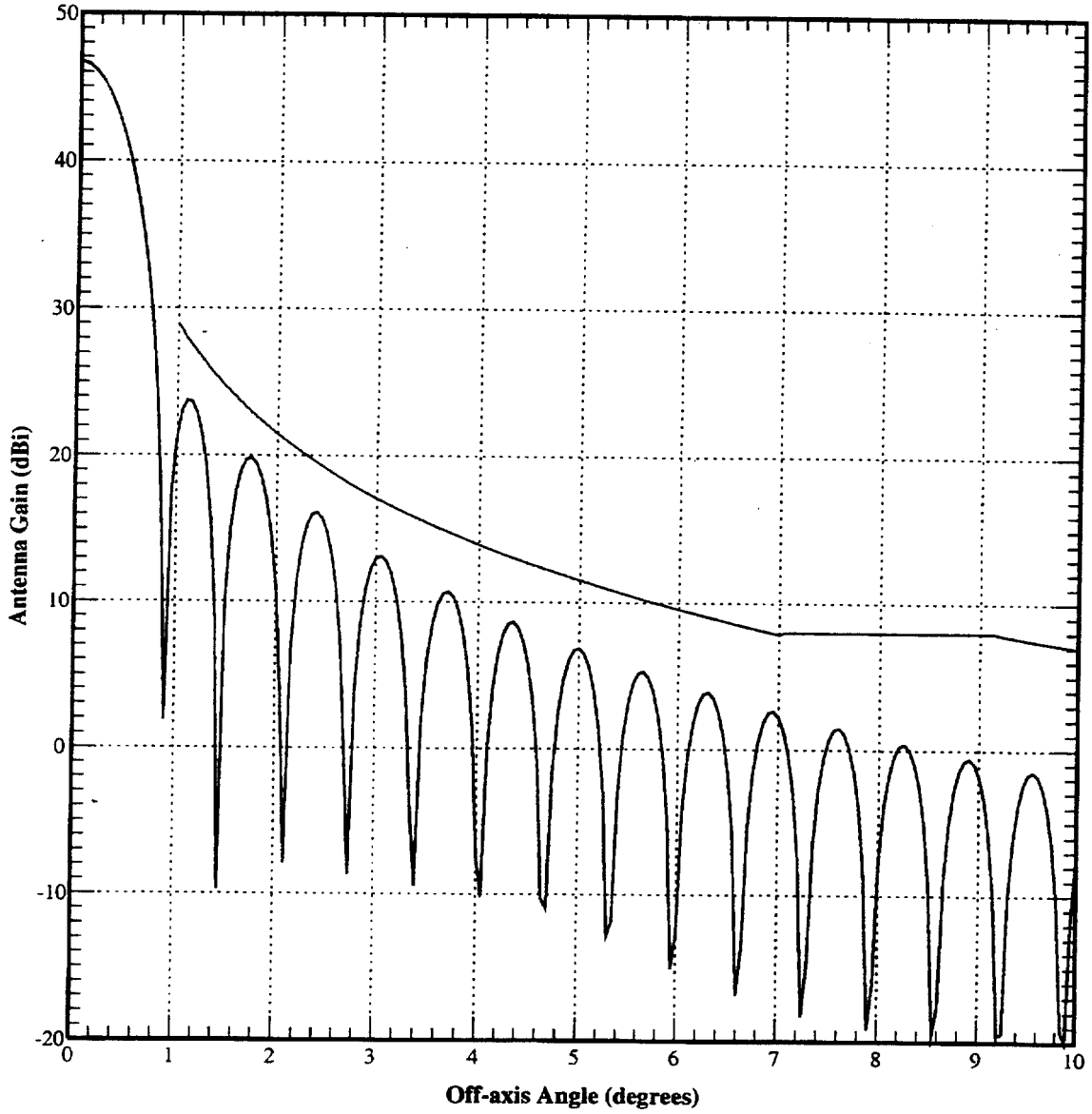


Theoretical Circular Aperture Antenna Pattern

Diameter = 4.500 Meter
Frequency = 3.700 GHz
Diameter/Wavelength Ratio = 55.500
COSINE Illumination
3.00 dB Edge Taper
0.00 % Aperture Blockage
Maximum Antenna Gain = 42.610 dBi
Antenna Efficiency = 60.0%

Also plotted is FCC Sec. 25.209(a)(1) antenna standard

Figure 2: Theoretical Antenna Pattern

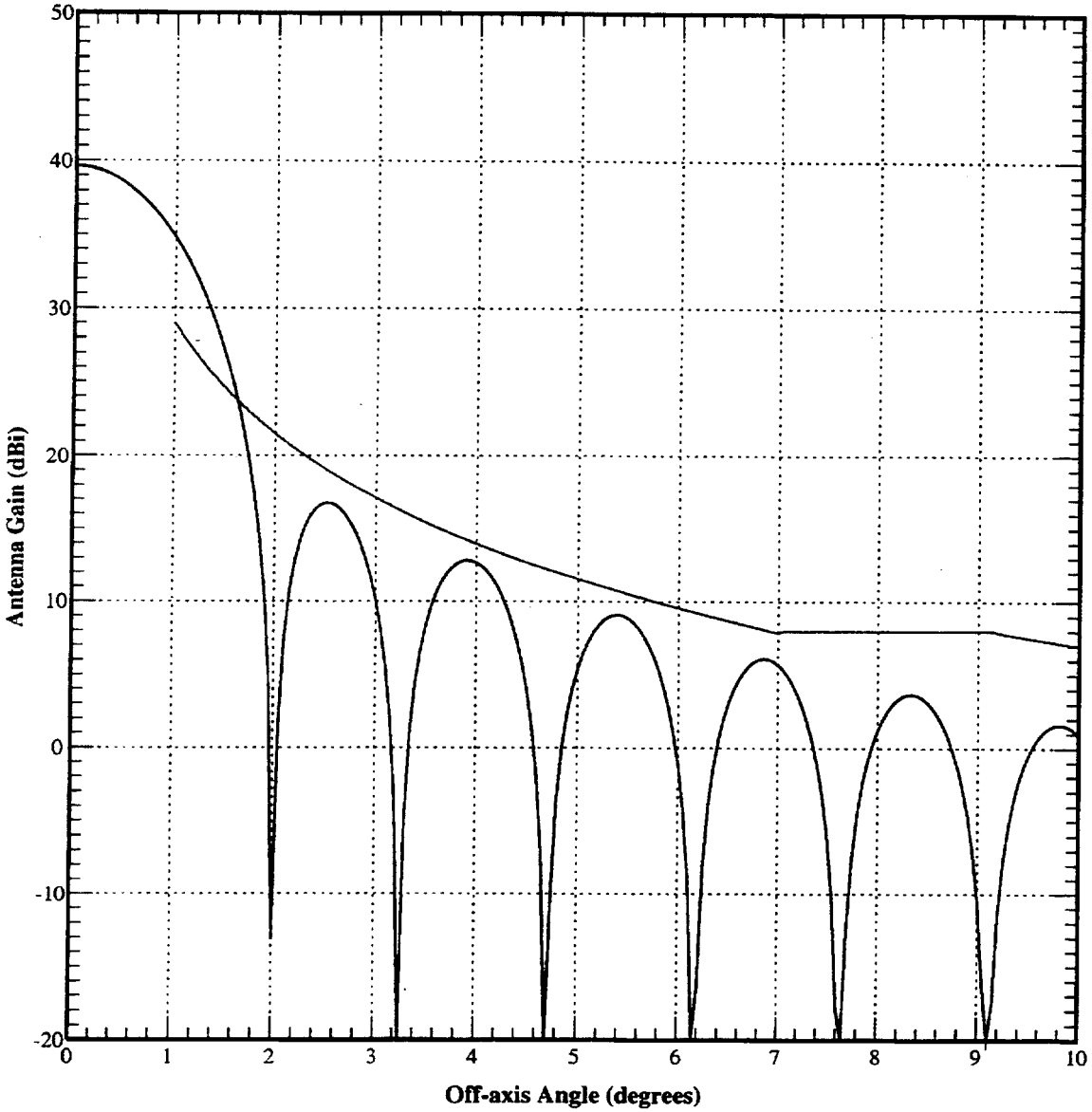


Theoretical Circular Aperture Antenna Pattern

Diameter = 4.500 Meter
Frequency = 5.925 GHz
Diameter/Wavelength Ratio = 88.875
COSINE Illumination
3.00 dB Edge Taper
0.00 % Aperture Blockage
Maximum Antenna Gain = 46.700 dBi
Antenna Efficiency = 60.0%

Also plotted is FCC Sec. 25.209(a)(1) antenna standard

Figure 3: Theoretical Antenna Pattern

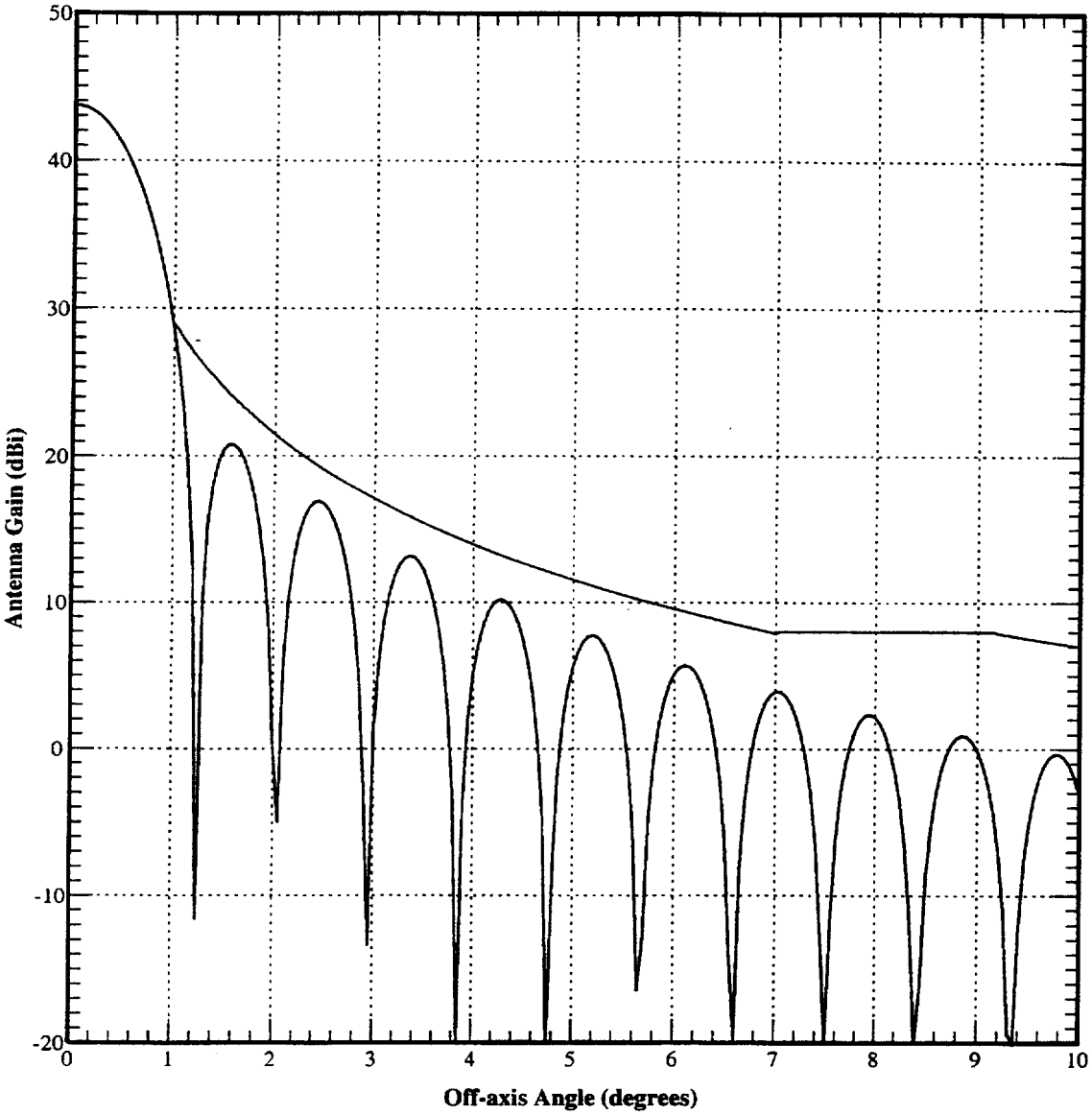


Theoretical Circular Aperture Antenna Pattern

Diameter = 3.200 Meter
Frequency = 3.700 GHz
Diameter/Wavelength Ratio = 39.467
COSINE Illumination
3.00 dB Edge Taper
0.00 % Aperture Blockage
Maximum Antenna Gain = 39.649 dBi
Antenna Efficiency = 60.0%

Also plotted is FCC Sec. 25.209(a)(1) antenna standard

Figure 4: Theoretical Antenna Pattern

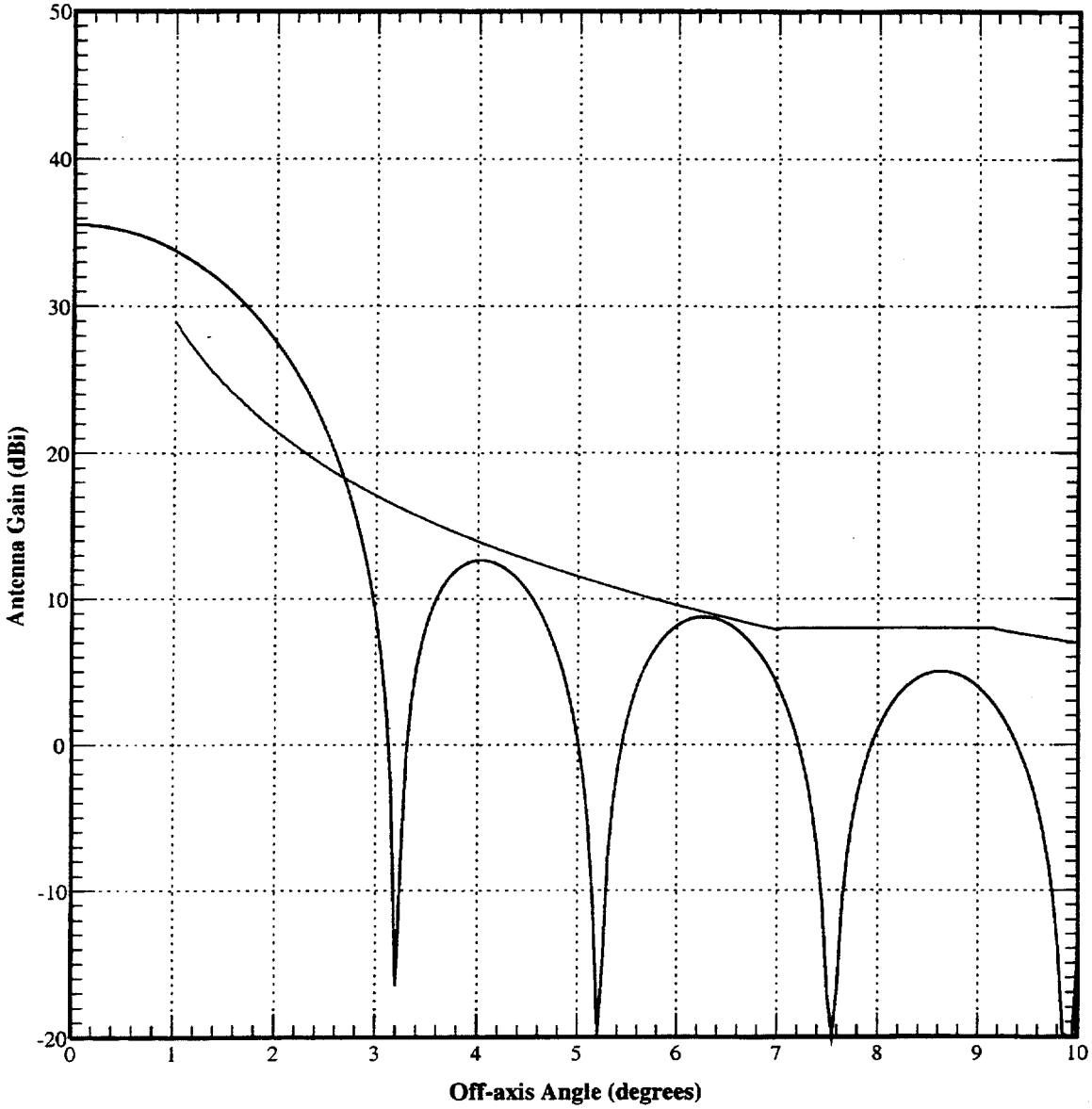


Theoretical Circular Aperture Antenna Pattern

Diameter = 3.200 Meter
Frequency = 5.925 GHz
Diameter/Wavelength Ratio = 63.200
COSINE Illumination
3.00 dB Edge Taper
0.00 % Aperture Blockage
Maximum Antenna Gain = 43.739 dBi
Antenna Efficiency = 60.0%

Also plotted is FCC Sec. 25.209(a)(1) antenna standard

Figure 5: Theoretical Antenna Pattern

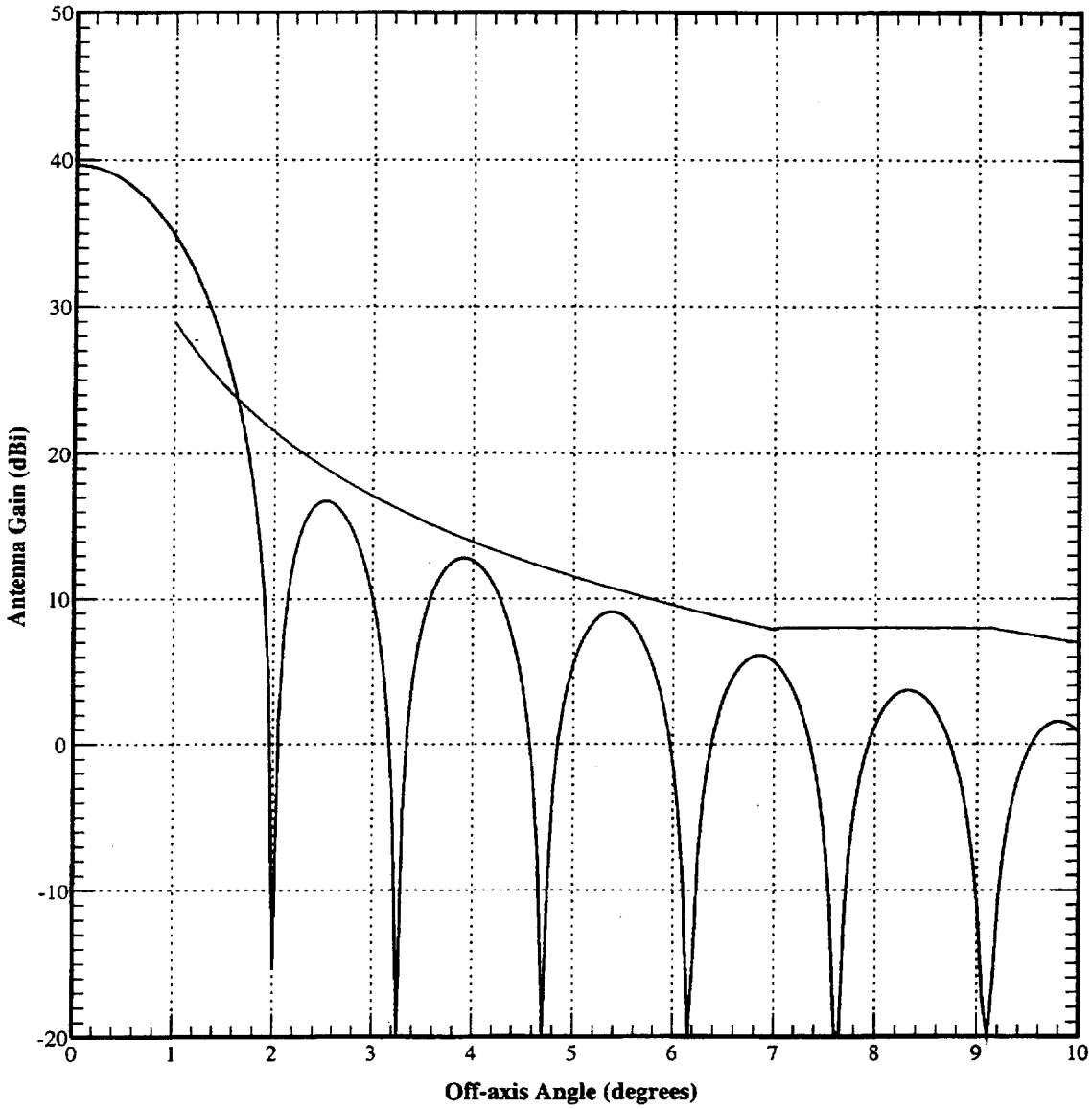


Theoretical Circular Aperture Antenna Pattern

Diameter = 2.000 Meter
Frequency = 3.700 GHz
Diameter/Wavelength Ratio = 24.667
COSINE Illumination
3.00 dB Edge Taper
0.00 % Aperture Blockage
Maximum Antenna Gain = 35.567 dBi
Antenna Efficiency = 60.0%

Also plotted is FCC Sec. 25.209(a)(1) antenna standard

Figure 6: Theoretical Antenna Pattern

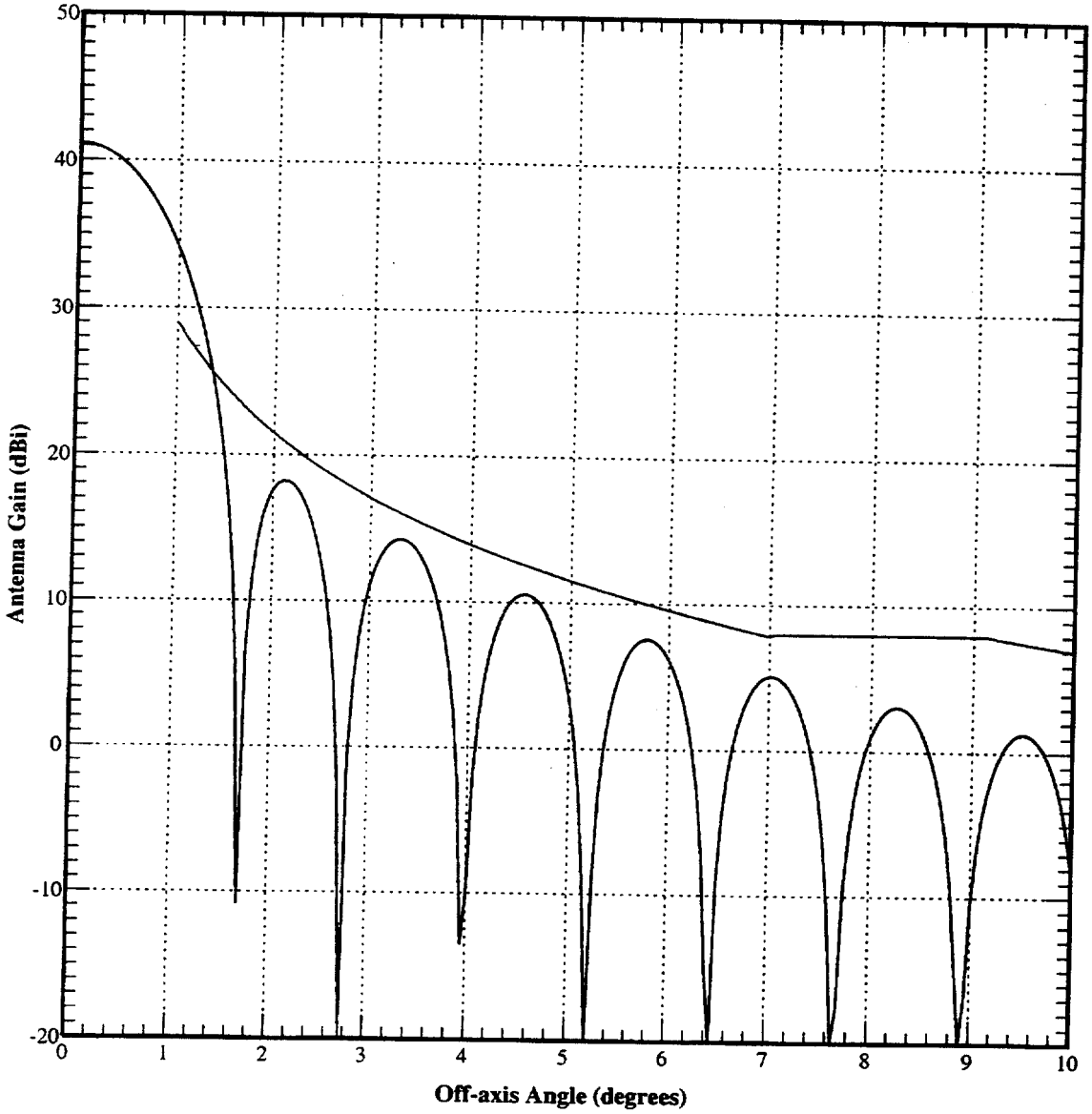


Theoretical Circular Aperture Antenna Pattern

Diameter = 2.000 Meter
Frequency = 5.925 GHz
Diameter/Wavelength Ratio = 39.500
COSINE Illumination
3.00 dB Edge Taper
0.00 % Aperture Blockage
Maximum Antenna Gain = 39.656 dBi
Antenna Efficiency = 60.0%

Also plotted is FCC Sec. 25.209(a)(1) antenna standard

Figure 7: Theoretical Antenna Pattern

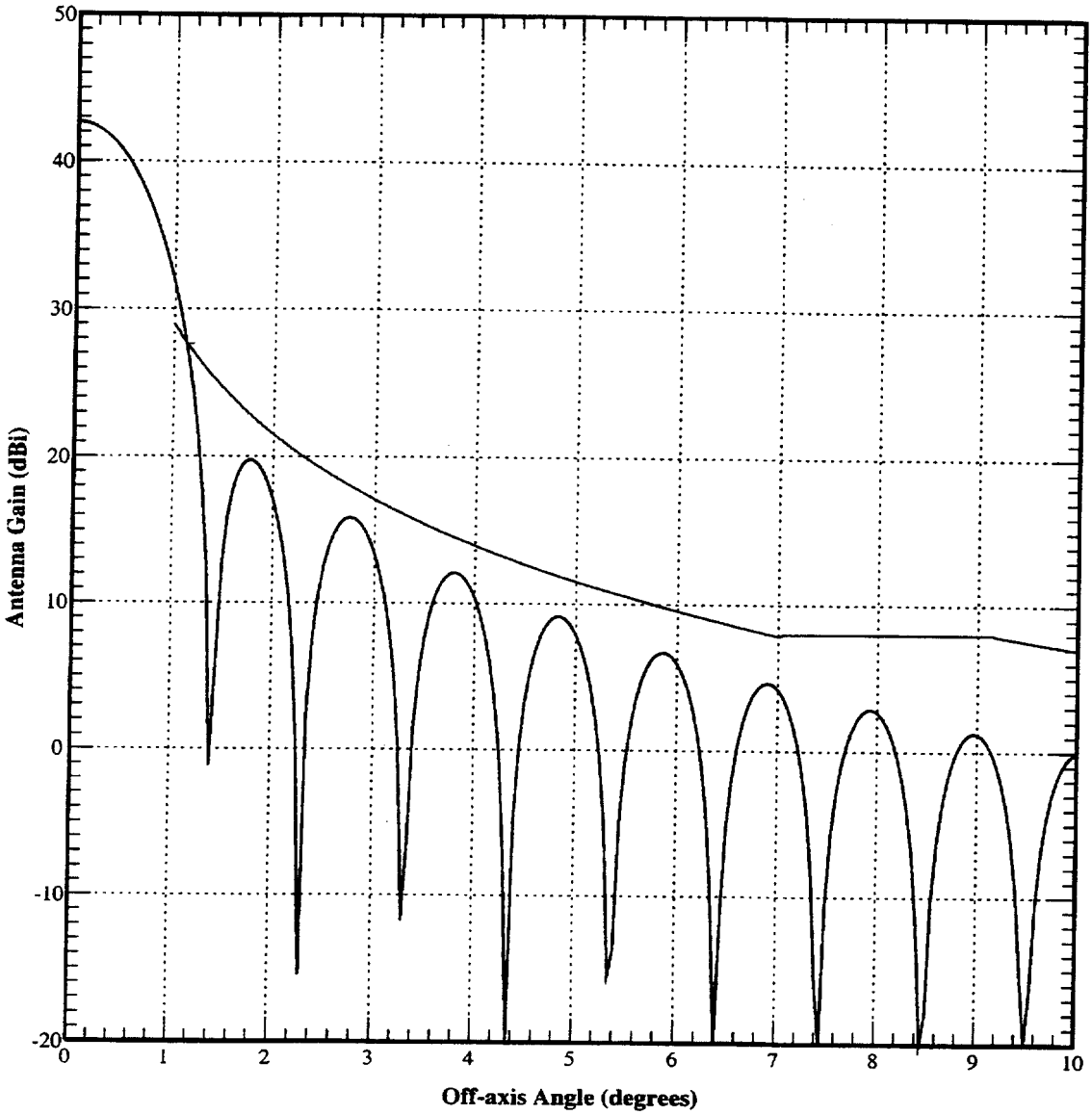


Theoretical Circular Aperture Antenna Pattern

Diameter = 1.200 Meter
Frequency = 11.700 GHz
Diameter/Wavelength Ratio = 46.800
COSINE Illumination
3.00 dB Edge Taper
0.00 % Aperture Blockage
Maximum Antenna Gain = 41.129 dBi
Antenna Efficiency = 60.0%

Also plotted is FCC Sec. 25.209(a)(1) antenna standard

Figure 8: Theoretical Antenna Pattern



Theoretical Circular Aperture Antenna Pattern

Diameter = 1.200 Meter
Frequency = 14.000 GHz
Diameter/Wavelength Ratio = 56.000
COSINE Illumination
3.00 dB Edge Taper
0.00 % Aperture Blockage
Maximum Antenna Gain = 42.688 dBi
Antenna Efficiency = 60.0%

Also plotted is FCC Sec. 25.209(a)(1) antenna standard