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

In the Matter of	)	
	)	
Amendment of Part 101 of the Commission's Rules to Modify Antenna Requirements for the 10.7 – 11.7 GHz Band	)	WT Docket No. 07-54 RM-11043
	)	
NEXTLINK WIRELESS, INC.	)	
	)	
FIRST AVENUE NETWORKS, INC.	)	
	)	
TELECOM TRANSPORT MANAGEMENT, INC.	)	
	)	
CONTERRA ULTRA BROADBAND, LLC	)	
	)	
Petitions for Waiver of Sections 101.103 and 101.115 of the Commission's Rules for the Use of Smaller Antennas in the 10.7-11.7 GHz Band	)	
	)	

REPORT AND ORDER

Adopted: September 7, 2007 **Released: September 10, 2007**

By the Commission: Commissioners Adelstein, Tate and McDowell issuing separate statements.

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I. INTRODUCTION

1. In this *Report and Order*[1], we adopt amendments to Section 101.115 of the Commission's Rules[2] to permit the installation of smaller antennas by Fixed Service (FS) operators in the 10.7 – 11.7 GHz (11 GHz) band. We also amend Section 101.115 of the Commission's Rules to require any FS licensee that deploys a smaller antenna that does not comply with performance standard A in the 11 GHz band to ensure that the introduction of such an antenna into the 11 GHz band does not cause any more interference to other licensees and applicants in the band than an antenna meeting the Category A standard. We find that these modifications would serve the public interest by facilitating the efficient use of the 11 GHz band while protecting other users in the band from interference. Because our adoption of the subject rules permits FS licensees to deploy smaller antennas without seeking waivers,[3] we also dismiss as moot pending requests for waiver to allow the use of smaller antennas in the 11 GHz band.[4]

II. BACKGROUND

A. The 11 GHz Band and Related Part 101 Rules

2. The 11 GHz band is allocated within the United States on a co-primary basis to the Fixed Services (FS), licensed under Part 101 of the Commission's Rules,[5] and to the Fixed

[1] Amendment of Part 101 of the Commission's Rules to Modify Antenna Requirements for the 10.7 – 11.7 GHz Band, WT Docket No. 07-54, *Notice of Proposed Rulemaking*, 22 FCC Rcd 6057 (2007) (*NPRM*); Amendment of Part 101 of the Commission's Rules to Modify Antenna Requirements for the 10.7 – 11.7 GHz Band, 72 Fed. Reg. 20404 (Apr. 25, 2007).

[2] *See* 47 C.F.R. § 101.115.

[3] On October 22, 2004, FiberTower requested a waiver of the same technical parameters in 47 C.F.R. §§ 101.103, 101.115 that are the subject of the instant rulemaking proceeding. *See* Wireless Telecommunications Bureau Seeks Comment on FiberTower, Inc. Request for Waiver of Sections 101.103 and 101.115 of the Commission's Rules to Permit the Use of 0.61 Meter Antennas in the 10.7 – 11.7 GHz Band, *Public Notice*, 20 FCC Rcd 1383 (WTB 2005). On March 6, 2006, the Bureau granted FiberTower's waiver request, subject to certain conditions and the result of this proceeding. FiberTower, Inc., *Order*, 21 FCC Rcd 6386 (WTB 2006) (*FiberTower Waiver Order*).

[4] *See* Petition for Waiver of Nextlink Wireless, Inc. (filed Aug. 4, 2006) (Nextlink Waiver Request), Petition for Waiver filed by First Avenue Networks, Inc. (filed Aug. 10, 2006) (FAN Waiver Request), Petition for Waiver and Expedited Action filed by Telecom Transport Management, Inc. (filed Sep. 8, 2006) (TTM Waiver Request), Petition for Expedited Waiver Pending Rulemaking, Conterra Ultra Broadband, LLC (filed Jan. 22, 2007) (Conterra Waiver Request).

[5] 47 C.F.R. Part 101.

Satellite Service (FSS), licensed under Part 25 of the Commission's Rules.[6] Specifically, in the United States, the 11 GHz band is used by the FS for Local Television Transmission Service (LTTS), Private Operational Fixed Point-to-Point Microwave, and Common Carrier Fixed Point-to-Point Microwave operations. Although the 11 GHz band is allocated internationally for FSS on a primary basis, the use of the FSS downlink band at 11 GHz is limited within the United States to international systems, *i.e.*, other than domestic systems.[7] The Commission explained that the "domestic allocation was less than the international allocation . . . because we are constrained by the need to protect substantial incumbent operations and licensees . . ."[8] To date, the domestic use of the 11 GHz band by the FSS has therefore been limited.[9]

3. Section 101.115(b) of the Commission's Rules[10] establishes directional antenna standards designed to maximize the use of microwave spectrum, including the 11 GHz band, while avoiding interference between operators.[11] More specifically, the Commission's Rules set forth certain requirements, specifications, and conditions pursuant to which FS stations may use antennas that comply with either the more stringent performance standard in Category A (also known as Standard A) or the less stringent performance standard in Category B (also known as Standard B).[12] In general, the Commission's Rules require a Category B user to upgrade if the antenna causes interference problems that would be resolved by the use of a Category A

[6] 47 C.F.R. Part 25. The 11 GHz band is used for geostationary satellite (GSO) operations, and the 10.7 – 10.95 GHz and 11.2 – 11.45 GHz portion of the spectrum is designated as a "planned band" under Appendix 30B of the International Telecommunications Union (ITU) rules. This means that, for this segment of the band, each country is assigned frequencies at certain orbital locations in the geostationary orbital arc.

[7] *See* 47 C.F.R. § 2.106 NG104 (stating that "[t]he use of the bands 10.7-11.7 GHz (space to Earth)...by the fixed satellite service in the geostationary-satellite orbit shall be limited to international systems, *i.e.*, other than domestic systems").

[8] *See, e.g.*, Establishment of Policies and Service Rules for the Non-Geostationary Satellite Orbit, Fixed Satellite Service in the Ku-Band, IB Docket No. 01-96, *Notice of Proposed Rulemaking*, 16 FCC Rcd 9680, 9684 ¶ 10 (2001).

[9] *See, e.g., id.* at 9694 ¶ 45 (explaining that the Commission restricted NGSO FSS earth station usage in frequency spectrum bands shared with terrestrial operations "to avoid ubiquitous deployment of NGSO FSS earth stations in shared bands, thereby allowing the continued use and growth of terrestrial operations in those bands."); Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range, ET Docket No. 98-206, RM-9147, *First Report and Order and Further Notice of Proposed Rulemaking*, 16 FCC Rcd 10084 (2000) (noting that the Commission sought to ensure that NGSO FSS operations do not cause unacceptable interference to existing users and do not unduly constrain future growth of incumbent services); Inquiry Relative to Preparation for a General World Administrative Radio Conference of the International Telecommunications Union to Consider Revision of the International Radio Regulations, Docket No. 20271, *Report and Order*, 70 FCC 2d 1193, ¶¶ 189-191 (1978) (expressing concern that the 11 GHz band is shared quite extensively with terrestrial services in the United States, envisioning that the number of fixed-satellite earth stations would be limited to about half a dozen stations, located in places far from population centers, so as not to restrict unduly the further development of terrestrial services, and explicitly rejecting allowing the bi-directional use of the 11 GHz band by the FSS because it "would severely restrict the development of the terrestrial fixed service, especially the utilization of digital techniques."); Amendment of Part 2 of the Commission's Rules to Conform, to the Extent Practicable, with the Geneva Radio Regulations, as Revised by the Space Warc, Geneva, 1971, Docket No. 19547, *Report and Order*, 39 FCC 2d 959 (1973) (expressing intent to protect microwave use of the 11 GHz band).

[10] 47 C.F.R. § 101.115(b).

[11] 47 C.F.R. § 101.115(b).

[12] *See* 47 C.F.R. § 101.115(b)-(d).

antenna.[13] The rule on its face does not mandate a specific size of antenna. Rather, it specifies certain technical parameters – maximum beamwidth, minimum antenna gain, and minimum radiation suppression – that, depending on the state of technology at any point in time, directly affect the size of a compliant antenna[14] that may be deployed in the 11 GHz band. When the Commission adopted the instant antenna specifications, the parameters were based on the technical sophistication of the communications equipment and the needs of the various users of the band at the time.[15] Indeed, the Commission adopted similar technical specifications that effectively limited the size of antennas used in other bands,[16] including those used by satellite.[17] However, the Commission has since reconsidered some of those antenna specifications in light of the technological evolution of communications equipment.[18]

4. Section 101.103 of the Commission's Rules[19] establishes coordination procedures and interference standards applicable to the operation of FS antennas in the 11 GHz band. In establishing a new Part 101 of the Commission's Rules for the relocated common carrier and private operational fixed microwave users, the Commission adopted the Part 21 coordination procedures and the Part 94 interference standards.[20] The coordination procedures and interference standards set forth in Section 101.103 of the Commission's Rules are consistent with the industry standards developed by the Telecommunications Industry Association (TIA).

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[13] *See* 47 C.F.R. § 101.115(c).

[14] We may herein refer to those antennas that comply with the Category A standard as either compliant antennas or Category A antennas and those antennas that do not comply with the Category A standard as non-compliant antennas or Category B antennas.

[15] The Commission adopted the technical standards in 47 C.F.R. § 101.115(b) that govern the use of FS antennas in the 11 GHz band in 1996 when consolidating the rules for the common carrier and private operational fixed (POFS) microwave services that were previously contained in Parts 21 and 94, respectively, of the Commission's Rules to create a new Part 101. *See* Reorganization and Revision of Parts 1, 2, 21, and 94 of the Rules to Establish a New Part 101 Governing Terrestrial Microwave Fixed Radio Services, *Report and Order*, WT Docket No. 94-148, 11 FCC Rcd 13449 (1996). The Commission declined to consider significant changes to the proposed rule at that time because commenting parties did not sufficiently address the issue in the record. *See id.* at 13474-13475 ¶¶ 67-71; *see also* Reorganization and Revision of Parts 1, 2, 21, and 94 of the Rules to Establish a New Part 101 Governing Terrestrial Microwave Fixed Radio Services, *Notice of Proposed Rule Making*, WT Docket No. 94-148, FCC 94-314, 10 FCC Rcd 2508, 2515 ¶ 19 (1994) (*Part 101 NPRM*).

[16] *See, e.g.*, Reorganization and Revision of Parts 1, 2, 21, and 94 of the Rules to Establish a New Part 101 Governing Terrestrial Microwave Fixed Radio Services, *Memorandum Opinion and Order and Notice of Proposed Rulemaking*, WT Docket 94-148, 15 FCC Rcd 3129 (2000) (*Part 101 MO&O and NPRM*) (seeking comment on permitting smaller antennas in the 10 GHz band).

[17] *See, e.g.*, Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the KU-Band Frequency Range, ET Docket No. 98-206, *Second Memorandum Opinion and Order*, 18 FCC Rcd 10084 (2003).

[18] *See, e.g.* Amendment of Part 101 of the Commission's Rules to Streamline Processing of Microwave Applications in the Wireless Telecommunications Services, WT Docket 00-19, *Report and Order*, 17 FCC Rcd 15040 (2002) (*2002 Part 101 R&O*) (adopting smaller antennas for 10 GHz band); Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz / 3700-4200 MHz Band and 14.0-14.5 GHz / 11.7-12.2 GHz Bands, IB Docket No. 02-10, *Report and Order*, 20 FCC Rcd 674 (2005) (*ESV R&O*).

[19] 47 C.F.R. § 101.103.

[20] *See Part 101 NPRM*, 10 FCC Rcd at 2514 ¶ 16 (*citing* Redevelopment of Spectrum to Encourage Innovation in the Use of New Technologies, ET Docket No. 92-9, *Second Report and Order*, 8 FCC Rcd 6495 (1993)).

B. FiberTower Petition for Rulemaking

5. On July 14, 2004, FiberTower, Inc. filed a petition for rulemaking proposing amendments to the technical parameters in Section 101.115 of the Commission's Rules.[21] Specifically, FiberTower proposed changes to those parameters that would permit the use of FS antennas with reduced mainbeam gain, increased beamwidth, and modified sidelobe suppression in the 11 GHz band.[22] The proposed rules would effectively permit the use of 0.61 meter antennas as an optional alternative to larger antennas that comply with the existing technical parameters for FS in the 11 GHz band.[23] The FiberTower Petition also proposed amendments to Section 101.103 of the Commission's Rules[24] to protect other users in the 11 GHz band from experiencing any greater interference from a FS licensee's use of a 0.61 meter antenna than would be experienced if the FS licensee were using a Category A compliant antenna.[25]

6. The FiberTower Petition was placed on public notice for comment on July 23, 2004.[26] The Commission received five comments, two reply comments, and a number of *ex parte* filings in response to the *Public Notice*.[27] In addition, Alcatel prepared and submitted a "White Paper Report on Proposed Changes to Small Antenna Standards in the 11 GHz Band" with "some simplified interference path calculations" to show the minimal impact of deploying 0.61 meter antennas in the 11 GHz band.[28] Specifically, according to Alcatel, the path calculations "show that the optional alternative Category A antenna ("New A") is comparable to production models of four-foot antennas having a gain of 40.4 dBi and meeting current Category A specifications for off-axis radiation suppression."[29] Alcatel therefore concluded that "deployment of the New A antenna is expected to have minimal impact on other users of the 11 GHz band because the off-axis gain performance of the New A antenna is comparable to current Category A antennas."[30]

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[21] FiberTower, Inc., Petition for Rulemaking (filed July 14, 2004) (FiberTower Petition). FiberTower, Inc. subsequently merged with First Avenue Networks and is now operating as FiberTower Corp. (FiberTower).

[22] *See* FiberTower Petition, Appendix, Table 1.

[23] *See* 47 C.F.R. § 101.115(b).

[24] 47 C.F.R. § 101.103.

[25] *See* FiberTower Reply Comments at 4-5.

[26] Consumer & Governmental Affairs Bureau Reference Information Center Petition for Rulemaking Filed, *Public Notice*, Report No. 2666 (July 23, 2004) (*Public Notice*).

[27] *See* Alcatel, Comments (filed Aug. 23, 2004); Comsearch, Comments (filed Aug. 23, 2004); Fixed Wireless Communications Coalition, Comments (filed Aug. 23, 2004); NextWeb, Inc., Comments (filed Aug. 12, 2004); Satellite Industry Association, Opposition (filed Aug. 23, 2004); Alcatel, Reply Comments (filed Sept. 7, 2004); FiberTower, Inc., Reply Comments (filed Sept. 7, 2004); Harris Corporation, *Ex Parte* Comments (filed July 25, 2005); Dragonwave, Inc. *Ex Parte* Comments (filed Nov. 14, 2005); Letter from Michael E. McCormick, Program Manager, Cingular Wireless, to Magalie Salas, Secretary, FCC (filed Jan. 12, 2005; dated Dec. 15, 2004).

[28] *See* Alcatel Comments, Exhibit A. Alcatel submitted a revised *White Paper* with its reply comments. *See* Alcatel Reply Comments, Exhibit A (*White Paper*). We herein refer to the revised study as the *White Paper*. We also note that, in the present proceeding, Alcatel-Lucent resubmitted the *White Paper* with its comments filed on May 25, 2007. *See* Alcatel-Lucent Comments, Appendix A (filed May 25, 2007).

[29] Alcatel Petition for Rulemaking Comments at 2.

[30] Alcatel Petition for Rulemaking Comments at 2.

7. The Satellite Industry Association (SIA) was the only commenting party to oppose the rule changes proposed by FiberTower in response to the *Public Notice*.[31] SIA believed that the proposed rules would have a significant adverse effect on the satellite industry's access to spectrum for earth station operations, which could impair FSS operators' ability to operate in the band if domestic FSS operation in the band were permitted.[32] Although SIA conceded that FSS use of 11 GHz band, to date, has been limited,[33] it contended that the band is vital for expansion purposes.[34] SIA therefore asked that the Commission not consider any changes to the 11 GHz rules that would adversely affect existing FSS operations or create new obstacles to future FSS deployment.[35] SIA contended that an earth station operator could face a situation in which it experiences harmful interference as a result of the aggregate effect of several nearby FS antennas, even if each antenna standing alone would not create a problem.[36] SIA also argued that the size of the equipment and the technical characteristics of the 0.61 meter antenna made it more difficult to point accurately, which could subject other users in the band to higher levels of interference than otherwise predicted at the coordination stage.[37]

C. Notice of Proposed Rulemaking

8. On March 27, 2007, we released a *Notice of Proposed Rulemaking* in WT Docket No. 07-54[38] seeking comment on the FiberTower Petition and whether modifying the Commission's Part 101 Rules to permit the installation of 0.61 meter antennas for FS use in the 11 GHz band would serve the public interest by facilitating the efficient use of the 11 GHz band while protecting other users in the band from interference due to the use of 0.61 meter antennas. In the *NPRM*, we concluded that the public interest would be served by initiating a proceeding to consider modifying the Commission's Rules to permit the installation of 0.61 meter antennas in the 11 GHz band and sought comment on the rule changes proposed in the FiberTower Petition.[39] We found it appropriate to review the technical specifications for the 11 GHz band at this time because the technical specifications that limit the size of FS antennas in the 11 GHz band predate

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[31] Opposition of the Satellite Industry Association (filed Aug. 23, 2004) (SIA Comments). Although SIA has not filed additional comments in response to the *NPRM*, other members of the satellite industry have repeated arguments first raised by SIA at the petition for rulemaking stage. Accordingly, we discuss the SIA Comments briefly here to ensure a more fully developed record in this proceeding and place the comments later submitted by other members of the satellite industry in context.

[32] SIA Comments at 8.

[33] SIA cited, as the primary reason for the limited use of band, the Commission's strict interpretation of 47 C.F.R. § 2.106, note NG 104 (specifying that satellite use of the 10.7-11.7 GHz band is limited to international systems). SIA Comments at 3-4.

[34] SIA Comments at 3.

[35] SIA Comments at 8. SIA stated that the 11 GHz band "is used for downlink transmissions originating 22,300 miles from the earth's surface that can only be received using sensitive FSS earth stations. Because of that sensitivity, . . . FSS Earth stations are extremely vulnerable to the increased interference that could be caused by deployment of smaller FS antennas." SIA Comments at 5.

[36] SIA Comments at 7.

[37] SIA Comments at 7.

[38] *NPRM*.

[39] *NPRM*, 22 FCC Rcd at 6067 ¶ 17.

the development of more technically sophisticated communications equipment.[40] In this respect, we noted that the Commission has reconsidered similar technical specifications that effectively limited the size of antennas used in other bands, including those used by satellite,[41] in light of the technological evolution of communications equipment since those specifications were first adopted.[42] The Commission also sought comment on whether these changes will facilitate a range of fixed microwave applications – including those that support third generation mobile services – that are not currently being accommodated in the 11 GHz band under the existing rules governing use of the band.[43]

9. We recognized that the proposed use of smaller, lower-gain antennas would result in more radiofrequency energy being transmitted in directions away from the actual point-to-point link.[44] We sought to ensure that any proposed changes to the Commission's Rules appropriately protect other users in the band from interference due to the operation of 0.61 meter antennas.[45] We therefore sought comment on the issue of whether allowing smaller antennas in the 11 GHz band would adversely affect other users in the band.[46] We specifically invited comment on the Alcatel *White Paper*; which suggested that the impact of smaller antennas would be minimal; the rules proposed by FiberTower to mitigate or obviate interference concerns; and Comsearch's proposal to consider a power or EIRP tradeoff.[47] We also sought comment on two specific concerns raised by SIA: aggregate interference (*i.e.*, a situation in which an earth station operator experiences harmful interference as the result of the aggregate interference of several nearby FS stations, even if each antenna standing alone would not create a problem),[48] and pointing error (interference caused by the failure to accurately point the FS antenna towards the receive antenna).[49] Finally, we sought comment on FiberTower's proposed amendments to the coordination requirements in Section 101.103 of the Commission's Rules to protect other users in the 11 GHz band from experiencing any greater interference from the use of a 0.61 meter antenna than would be experienced by the use of a 1.22 meter antenna.[50] We asked whether these amendments strike the appropriate balance between efficient spectrum use and interference

[40] *NPRM*, 22 FCC Rcd at 6068 ¶ 19. The Commission explained that antenna standards exist for the purpose of promoting the use of the most discriminating equipment to facilitate the introduction of new transmission paths. *See id.* at 6068 n.82.

[41] *NPRM*, 22 FCC Rcd at 6068 ¶ 19. *See, e.g.*, Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range, ET Docket No. 98-206, *Second Memorandum Opinion and Order*, 18 FCC Rcd 10084 (2003); *ESV R&O*.

[42] *NPRM*, 22 FCC Rcd at 6068 ¶ 19. *See, e.g., Part 101 MO&O and NPRM* (seeking comment on permitting smaller antennas in the 10 GHz band); *2002 Part 101 R&O* (adopting smaller antennas for the 10 GHz band).

[43] *NPRM*, 22 FCC Rcd at 6067 ¶ 17.

[44] *NPRM*, 22 FCC Rcd at 6069 ¶ 20.

[45] *NPRM*, 22 FCC Rcd at 6069 ¶ 20.

[46] *NPRM*, 22 FCC Rcd at 6069 ¶ 21.

[47] *NPRM*, 22 FCC Rcd at 6069 ¶ 21.

[48] *NPRM*, 22 FCC Rcd at 6069 ¶¶ 22-23.

[49] *NPRM*, 22 FCC Rcd at 6070 ¶¶ 24-25.

[50] *NPRM*, 22 FCC Rcd at 6070 ¶ 26.

protection in the 11 GHz band and whether FiberTower's proposed amendments were sufficient to address potential interference concerns, or were unnecessary limitations on flexibility.[51]

10. Initial comments were due May 25, 2007, and reply comments were due on or before June 11, 2007.[52] The Commission received ten comments and seven reply comments in response to the *NPRM*.[53] We discuss the issues presented in the *NPRM* and the comments received below.

III. DISCUSSION

A. Need for Rule Changes

11. *Background.* The Fixed Wireless Communications Coalition (FWCC), Comsearch, Conterra Ultra Broadband, LLC (Conterra), Alcatel-Lucent, Telecom Transport Management, Inc. (TTM), FiberTower Corporation (FiberTower), and Ericsson, Inc. (Ericsson) filed comments supporting the amendment of the Commission's Rules to permit the use of 0.61 meter FS antennas in the 11 GHz band.[54] A number of commenting parties emphasize that 0.61 meter antennas cost less to manufacture and distribute, are less expensive to install because they weigh less and need less structural support, and cost less to maintain because they are less subject to wind load and other destructive forces.[55] In addition, proponents of the rule change

[51] *NPRM*, 22 FCC Rcd at 6070 ¶ 26.

[52] Amendment of Part 101 of the Commission's Rules to Modify Antenna Requirements for the 10.7 – 11.7 GHz Band, 72 Fed. Reg. 20404 (Apr. 25, 2007). On June 8, 2007, the Broadband Division of the Wireless Telecommunications Bureau granted an unopposed extension of time for the filing of reply comments, thereby extending the deadline for filing reply comments from June 11, 2007 to June 21, 2007. Amendment of Part 101 of the Commission's Rules to Modify Antenna Requirements for the 10.7 – 11.7 GHz Band, WT Docket No. 07-54, *Order*, 22 FCC Rcd 10335 (WTB BD 2007).

[53] Fixed Wireless Communications Coalition, Comments (filed May, 25, 2007) (FWCC Comments); Mobile Satellite Ventures Subsidiary LLC, Comments (filed May, 25, 2007) (MSV Comments); Comsearch, Comments (filed May, 25, 2007) (Comsearch Comments); Conterra Ultra Broadband, LLC, Comments (filed May, 25, 2007) (Conterra Comments); Union Telephone Company, Comments (filed May 25, 2007) (Union Comments); Alcatel-Lucent, Comments (filed May 25, 2007) (Alcatel-Lucent Comments); Telecom Transport Management, Inc., Comments (filed May 25, 2007) (TTM Comments); FiberTower Corporation, Comments (filed May 25, 2007) (FiberTower Comments); Intelsat, Ltd., Comments (filed May 25, 2007) (Intelsat Comments); Ericsson, Inc., Comments (filed May 25, 2007) (Ericsson); Telecom Transport Management, Inc., Reply Comments (filed June 21, 2007) (TTM Reply Comments); FiberTower Corporation, Reply Comments (filed June 21, 2007) (FiberTower Reply Comments); Intelsat, Ltd., Reply Comments (filed June 21, 2007) (Intelsat Reply Comments); Ericsson, Inc., Reply Comments (filed June 21, 2007) (Ericsson Reply Comments); Eutelsat America Corp, Reply Comments (filed June 21, 2007) (Eutelsat Reply Comments); Loral Skynet Corporation, Reply Comments (filed June 21, 2007) (Skynet Reply Comments); Mobile Satellite Ventures Subsidiary LLC, Reply Comments (filed June 21, 2007) (MSV Reply Comments).

[54] *See generally* Alcatel-Lucent Comments; Comsearch Comments; Conterra Comments; Ericsson Comments; Ericsson Reply Comments; FiberTower Comments; FiberTower Reply Comments; FWCC Comments; Comsearch Comments. In addition, Mobile Satellite Ventures Subsidiary LLC (MSV) stated that it "does not oppose the proposed rule change to permit the use of smaller antennas in the 11 GHz band if the Commission also adopts the proposed changes to Section 101.103 of the Commission's Rules requiring operators of smaller terrestrial microwave antennas to coordinate with existing FSS users of the band, such as MSV, as if the microwave operators were using a 1.22 meter antenna." MSV Comments at 3.

[55] *See, e.g.*, FiberTower Comments at 1; FWCC Comments at 4-5; Alcatel-Lucent Comments at 3 (noting that a 0.61 meter antenna has one-third the wind loading of a 1.22 meter antenna, thereby allowing for the use of 0.61 meter antennas on tower structures that are not strong enough to withstand the load of a 1.22 meter antenna).

contend that the modest weight of small antennas makes them practical for installation at sites incapable of supporting large dishes, including many rooftops, electrical transmission towers, water towers, monopoles and other radio towers.[56] Proponents also state that 0.61 meter antennas raise fewer aesthetic objections, thereby permitting easier compliance with local zoning and homeowner association rules and generating fewer objections.[57]

12. Alcatel-Lucent, Comsearch, Conterra, Ericsson, FiberTower, and TTM agree that allowing 0.61 meter antennas will improve spectrum efficiency by making better use of the underutilized 11 GHz band.[58] Ericsson argues that the Commission's Rules have effectively limited the use of the 11 GHz band to suburban and rural areas and that revising Part 101, as proposed, will promote a more efficient utilization of the 11 GHz band in metropolitan and urban areas.[59] Alcatel-Lucent and Conterra contend that the Commission's experience in allowing smaller antennas in the 10 GHz band demonstrates that permitting smaller antennas in the 11 GHz band would result in greater use of the 11 GHz band.[60] Specifically, Alcatel-Lucent notes that, as a result of the Commission's decision in 2002 to permit the use of smaller antennas in the 10 GHz band, the number of smaller antennas in the 10 GHz band has increased at a rate 217% faster than the number of 1.22 meter or larger antennas deployed in the years following the rule modification.[61] A number of commenting parties specifically emphasize the need for the Commission to provide FS licensees with additional flexibility in the use of their spectrum because the Commission has reallocated FS spectrum to other services in recent years or because the new spectrum available to FS is congested or suitable only for short-range applications.[62]

13. Commenters supporting the rule changes also argue that allowing the use of 0.61 meter antennas in the 11 GHz band will invite licensees to provide innovative services. For example, TTM and FWCC state that the 11 GHz band is critical spectrum for the provision of microwave backhaul and that the need for additional backhaul capabilities will expand dramatically with the onset of advanced wireless services.[63] Ericsson contends that current T1

[56] *See, e.g.*, FiberTower Comments at 1; Conterra Comments at 10 (*citing FiberTower Waiver Order*, 21 FCC Rcd at 6393 ¶ 13).

[57] *See, e.g.*, FiberTower Comments at 1-2; Ericsson Comments at 2.

[58] Alcatel-Lucent Comments at 1-2; Comsearch Comments at 1; Conterra Comments at 8; Ericsson Comments at 2; FiberTower Comments at 2; TTM Comments at 3.

[59] Ericsson Comments at 2.

[60] Alcatel-Lucent Comments at 2-3; Conterra Comments at 2.

[61] Alcatel-Lucent Comments at 2-3. Alcatel-Lucent relies on data in the Commission's Universal Licensing Service (ULS) database.

[62] *See* Alcatel-Lucent Comments at 3; Conterra Comments at 8-9; Ericsson Comments at 3; FWCC Comments at 2-4. For example, Ericsson states that the propagation characteristics of the 11 GHz band make it very suitable for building high capacity, high availability transmission networks, noting that there is low rain attenuation in the band compared with higher frequency bands. Ericsson Comments at 3. Ericsson further notes that the limited bandwidth in the 10 GHz band does not allow for the high capacity transmission possible in the 11 GHz band. *See id.* Conterra emphasizes that that FS licensees have a special need for flexibility in the use of the 11 GHz band, as the new spectrum available to FS is only suitable for short-range applications. Conterra Comments at 8-9. In addition, Alcatel-Lucent further notes that the 11 GHz band offers 1000 megahertz of spectrum and the next band in which both large RF channels and 0.61 meter antennas are permitted is the 18 GHz band, which only provides 840 megahertz of spectrum for Part 101 applications. Alcatel-Lucent Comments at 3.

[63] TTM Comments at 3; FWCC Comments at 3-4.

capacity (wireline or fiber optic cable) is insufficient to sustain increasing backhaul demands,[64] and the FWCC notes that competitive local exchange carriers (CLECs) that will no longer be able to economically employ unbundled network elements (UNEs) provided by incumbent local exchange carriers (ILECs) will increasingly turn to fixed wireless providers to transport traffic.[65] Ericsson and Conterra also argue that more efficient microwave solutions, in comparison to the more costly installation of 1.22 meter antennas or laying fiber optic cable, offer a timely and cost effective way to address interim transport needs because they can be deployed rapidly.[66] According to TTM, these efficiency gains will be reflected in lower prices, more products, and more ubiquitous services available to consumers of both wireless backhaul services and wireless voice and data services.[67]

14. FiberTower and Comsearch both note that, since the filing of the rulemaking petition, at least two manufacturers have introduced antennas that comply with Section 101.115 of the Commission's Rules even though they are smaller than 1.22 meters, measuring approximately three feet in size.[68] FiberTower contends that these new antennas do not eliminate the need for a rule change because three-foot antennas are costlier, heavier, and more difficult to install than 0.61 meter antennas and often aesthetically objectionable and subject to zoning prohibitions.[69]

15. Intelsat, Ltd. (Intelsat), Eutelsat America Corp. (Eutelsat), and Union Telephone Company (Union) oppose the adoption of the proposed amendment to permit the use of 0.61 meter antennas in the 11 GHz band for FS. According to Intelsat, commenting parties in this proceeding have failed to demonstrate that there is a need for additional FS operations in the 11 GHz band and that harmful interference can be avoided.[70] Intelsat maintains that it is incumbent upon proponents of a rule change to demonstrate that the proposal will not adversely affect the public interest by causing harmful interference to existing, licensed services.[71] Union states that it has serious concerns about the ability of the 11 GHz band to accommodate the multitude of new installations anticipated by FiberTower and other proponents, as well as the traditional operations at 11 GHz that are critical to high capacity, long path lengths, particularly in rural areas.[72] Union fears that opening access to the 11 GHz band for "last mile" connections with inexpensive and less efficient antennas could deplete the wider bandwidth channels needed to serve remote locations where fiber optic facilities cannot be economically deployed or where

[64] Ericsson Comments at 3.

[65] FWCC Comments at 3-4.

[66] Ericsson Comments at 3.

[67] TTM Comments at 4.

[68] FiberTower Comments at 2 n.2.

[69] FiberTower Comments at 2.

[70] Intelsat Reply Comments at 3-4; Intelsat Comments at 5 (noting stating that FiberTower failed to meet its burden because it only offered conclusory statements and no hard engineering analysis); Eutelsat Reply Comments at 4 (stating that the proponents of the rule changes failed to offer specific data to demonstrate that the proposed rule changes will not cause significant interference to other users in the 11 GHz band).

[71] Intelsat Comments at 5.

[72] Union Comments at 3.

rights-of-way for fiber cannot be obtained due to federal government or tribal land use restrictions.[73]

16. FiberTower and TTM disagree with Union.[74] FiberTower argues that rural areas generally present insufficient demand for 11 GHz spectrum to trigger a shortage, regardless of the antenna sizes permitted.[75] TTM contends it makes little sense to conclude that, with smaller antennas, there will be widespread capacity constraints in the 11 GHz band in rural areas.[76] Moreover, TTM notes that the proposed rule amendment contains a coordination requirement that would hold other users harmless from the use of smaller antennas.[77]

17. *Discussion.* Based on the record in this proceeding, we find that allowing licensees the flexibility of using 0.61 meter antennas in the 11 GHz band serves the public interest because the lower costs and enhanced benefits associated with 0.61 meter antennas will result in a more efficient use of the 11 GHz band without harming existing users. Technology has evolved since the Commission adopted the current antenna specifications for the 11 GHz band, and actions taken by the Commission in other FS and mobile bands have increased the need for greater flexibility for FS in the 11 GHz band. Antenna standards exist for the purpose of promoting the use of the most discriminating equipment to facilitate the introduction of new transmission paths.[78] As noted in the *NPRM,* the Commission has reconsidered similar technical specifications that effectively limited the size of antennas used in other bands, including those used by satellite,[79] in light of the technological evolution of communications equipment since those specifications were first adopted.[80] Accordingly, we find our action in amending the antenna specifications in the 11 GHz band to be consistent with our actions taken in other bands, including the 10 GHz band.[81]

18. We disagree with Intelsat and Eutelsat that proponents of the rule change have failed to demonstrate that there is a need for additional FS operations in the 11 GHz band and that harmful interference can be avoided.[82] We find that commenting parties have presented us with a strong record demonstrating that the proposed rule affords FS users the flexibility necessary to more fully and efficiently utilize the 11 GHz band by deploying 0.61 meter antennas, thereby facilitating a range of fixed microwave applications, including backhaul and more innovative and emerging wireless services. The FS has a special need for flexibility in the use of their spectrum because the Commission has reallocated FS spectrum to other services in

[73] Union Comments at 3.

[74] FiberTower Reply Comments at 3-4; TTM Reply Comments at 3.

[75] FiberTower Reply Comments at 3.

[76] TTM Reply Comments at 3.

[77] TTM Reply Comments at 3.

[78] *NPRM*, 22 FCC Rcd at 6068 n.82.

[79] *See NPRM*, 22 FCC Rcd at 6068 ¶ 19.

[80] *See NPRM*, 22 FCC Rcd at 6068 ¶ 19.

[81] *See ESV R&O ; 2002 Part 101 R&O.*

[82] *See* Intelsat Reply Comments at 3-4; Intelsat Comments at 5; Eutelsat Reply Comments at 4.

recent years and because the new spectrum available to FS is most suitable for short-range applications.

19. Union's concern that the use of smaller antennas would limit the availability of 11 GHz spectrum in rural areas is unfounded. As FiberTower points out, Union has not shown that there is a spectrum shortage in Union's service area. Furthermore, we have no basis to conclude that allowing small antennas will substantially increase demand for 11 GHz spectrum in Union's rural service area. We anticipate that most small antennas will be used for shorter links in urban or suburban areas. Furthermore, it is not in the public interest to make less efficient use of the spectrum solely for the convenience of one licensee. We note that no other existing 11 GHz FS licensee has expressed Union's concern.

B. Intelsat's Band Segmentation Proposal

20. *Background.* Intelsat and Loral Skynet Corporation (Skynet) contend that 0.61 meter antennas should not be allowed in the 11 GHz band unless the band is segmented because 0.61 meter antennas are likely to cause harmful interference into FSS operations due to proliferation and increased pointing errors.[83] Although Intelsat concedes that communications equipment has evolved since Section 101.115(b) of the Commission's Rules was first adopted, Intelsat believes that the increased demand for Ku-band capacity and the subsequent dwindling of unused band capacity is of equal or greater significance and has placed increased pressure on the 11 GHz band for FSS expansion capacity.[84] Intelsat contends that the utility of the 11 GHz band for FSS is severely constrained by the "international only" restrictions of NG104[85] and by the non-interference conditions imposed by the Commission on domestic FSS services that have been permitted in the band on a waiver basis.[86] Intelsat asserts that the segmentation of the 11 GHz band between FS and FSS will address all of the changed circumstances – both terrestrial-related and satellite-related – that have occurred.[87] Specifically, Intelsat proposes allocating 500 MHz of the spectrum in the 11 GHz band for FSS purposes and 500 MHz for FS purposes.[88] Intelsat and Skynet believe that the segmentation of the band would allow each service to use its 500 megahertz more efficiently and without posing a risk of interference to the other service.[89] Skynet states that implementation of the Intelsat proposal would represent "a win/win situation" for FS and FSS operators and their respective customers.[90]

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[83] Intelsat Reply Comments at 2; Skynet Reply Comments at 3.

[84] Intelsat Comments at 6.

[85] *See* 47 C.F.R. § 2.106 NG104 (stating that "[t]he use of the bands 10.7-11.7 GHz (space to Earth)...by the fixed satellite service in the geostationary-satellite orbit shall be limited to international systems, *i.e.*, other than domestic systems").

[86] Intelsat Comments at 6.

[87] Intelsat Comments at 6.

[88] Intelsat Comments at 7. Intelsat suggests that, with an exception for gateway earth stations, the "unplanned" portion of the 11 GHz band, at 10.95-11.2 GHz and 11.45-11.7 GHz, be dedicated to FSS uses and the "planned," Appendix 30B portion of the 11 GHz band at 10.7-10.95 GHz and 11.2-11.45 GHz be dedicated to FS users. *Id.*

[89] Intelsat Comments at 7; Skynet Reply Comments at 3.

[90] Skynet Reply Comments at 4.

21. Intelsat's band segmentation proposal was strongly opposed by a number of commenting parties that filed reply comments, including two other satellite operators.[91] FiberTower, TTM, and Eutelsat contend that Intelsat's band segmentation proposal goes far beyond the scope of this proceeding.[92] Specifically, FiberTower states that Intelsat's proposal fails all tests under the Administrative Procedure Act relating to notice and comment.[93] TTM argues that "as a matter of law, Intelsat's proposal is beyond the scope of the *Notice* and must be rejected."[94] Eutelsat contends that this proceeding is not the proper forum in which to determine such a sweeping proposal, "particularly when no information has been put forth to assist the Commission in its decisionmaking."[95] Eutelsat contends that Intelsat's band segmentation proposal is a radically different solution for avoiding interference between FS and FSS operators and has been offered by Intelsat without any study of its implications.[96]

22. TTM contends that the Commission "must deny Intelsat's *quid pro quo* offer that smaller FS antennas may be allowed in the 11 GHz band only if FSS operations gain a new, unlimited domestic allocation at 11 GHz *and* exclusive use to half of the 11 GHz band (*i.e.* 500 MHz)."[97] TTM notes that the Commission has often made clear that the restriction in the FSS 11 GHz allocation to international systems was to limit the expansion of FSS in the 11 GHz band and protect the future use of the band for FS.[98] In addition, TTM emphasizes that the FS allocation in the 11 GHz band is of great importance due to the Commission's decisions to relocate FS operations out of other bands and therefore should be promoted, not curtailed.[99]

23. In addition, two satellite operators – Eutelsat and MSV – strongly oppose the band segmentation proposal. Specifically, Eutelsat contends that "[t]he current portion of the spectrum that is designated as a planned band internationally is an important asset for the satellite industry and it is the United States' competitive interests to continue to preserve it."[100] Eutelsat emphasizes that the proposed band segmentation would "effectively vitiate any future use of the United States' international 'planned' band asset . . . [and] preempt the ability of international operators . . . from offering competitive services in the U.S. market in this band which they have developed in other regions."[101] According to Eutelsat, the segmentation of the

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[91] FiberTower Reply Comments at 5; TTM Reply Comments at 6; Eutelsat Reply Comments at 5-6; MSV Reply Comments at 8.

[92] FiberTower Reply Comments at 5; TTM Reply Comments at 6; Eutelsat Reply Comments at 6.

[93] FiberTower Reply Comments at 5 (*citing* 5 U.S.C. Sec. 553; *American Medical Ass'n v. Reno*, 57 F.3d 1129, 1132 (D.C. Cir. 1995); *Connecticut Light and Power Co. v. Nuclear Regulatory Comm'n*, 673 F.2d 525, 530 (D.C. Cir. 1982) (*Conn. Light and Power*), *cert. denied*, 459 U.S. 835 (1982); *Home Box Office, Inc. v. FCC*, 567 F.2d 9, 55 (D.C. Cir. 1977), *cert. denied*, 434 U.S. 829 (1977)).

[94] TTM Reply Comments at 6.

[95] Eutelsat Reply Comments at 6.

[96] Eutelsat Reply Comments at 5-6.

[97] TTM Reply Comments at 5.

[98] TTM Reply Comments at 5-6.

[99] TTM Reply Comments at 6.

[100] Eutelsat Reply Comments at 2.

[101] Eutelsat Reply Comments at 6.

11 GHz band would not provide an easy solution the interference issue and would, instead, "completely devalue the 10.7 – 10.95 GHz and 11.2 – 11.45 GHz portion of the spectrum for satellite services and, as a result, directly hurt satellite competition within the United States."[102] MSV notes that "Intelsat's proposed band segmentation plan would require all new FS licensees to be limited to half of the 11 GHz band and, as a result, would put substantial pressure on new FS deployments in markets where MSV operates feederlink earth stations."[103]

24. *Discussion.* We reject Intelsat's proposed plan to segment the 11 GHz band by allocating 500 megahertz of spectrum to FS and 500 megahertz of spectrum to FSS. We agree with FiberTower, TTM, and Eutelsat that the proposal exceeds the scope of this proceeding. The Administrative Procedures Act (APA) requires an agency to provide notice of a proposed rule, an opportunity for comment, and a statement of the basis and purpose of the final rule adopted.[104] The relationship between the proposed regulation and the final rule determines the adequacy of notice.[105] An agency's final rule must be a "logical outgrowth" of its notice of proposed rulemaking.[106] A determination as to whether the "logical outgrowth" test is satisfied depends on whether the affected party "should have anticipated" the agency's final course in light of the initial notice.[107] In this instance, there was no notice in the *NPRM* that the proposed rule could result in a reallocation of the entire 11 GHz band, thereby affecting all FS and FSS users in the band. Indeed, the rulemaking was initiated to facilitate the efficient use of the 11 GHz band by affording FS licensees the flexibility to install smaller antennas in the 11 GHz band.[108] Licensees and applicants – whether FS or FSS – that had little interest in or concern about the use of smaller antennas in the 11 GHz band would have no notice that they may be forced to relocate elsewhere in a band that the *NPRM* had characterized as underutilized. Accordingly, any consideration of the Intelsat band segmentation proposal in this proceeding would deny affected parties an opportunity for meaningful and informed comment.[109]

25. In any event, we also find that there is no record to support such an action in this proceeding. We agree with Eutelsat that the band segmentation proposal is a radically different solution for avoiding interference between FS and FSS operators and has been offered by Intelsat

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[102] Eutelsat Reply Comments at 6.

[103] MSV Reply Comments at 8. MSV notes that, unlike Intelsat, which operates its earth stations in several bands, MSV is only authorized to operate its feeder link earth stations in the 11 and 13 GHz bands. *Id.* MSV explains that it cannot shift to the portion of the 11 GHz band that Intelsat is promoting for satellite-only use as its current satellites are already operational and its new satellites are under construction. *Id.* MSV therefore contends that Intelsat's proposal would exacerbate the potential for interference to MSV at the expense of its customers, including many public safety and government users. *Id.*

[104] *See* 5 U.S.C. §§ 553(b)-(c).

[105] *See, e.g., Shell Oil Co. v. EPA*, 950 F.2d 741, 747 (D.C. Cir. 1991) (*Shell Oil*).

[106] *See Covad Communications Co. v. FCC*, 450 F.3d 528, 548 (D.C. Cir. 2006) (*Covad*); *Shell Oil*, 950 F.2d at 750-51 (stating that the difference between the proposed regulation and the final rule will not invalidate the notice so long as the final rule is a "logical outgrowth" of the proposed rule).

[107] *See, e.g., Covad*, 450 F.3d at 548; *Small Refiner Lead Phase-Down Task Force v. EPA*, 705 F.2d 506, 548-49 (D.C. Cir. 1983).

[108] *See NPRM*, 22 FCC Rcd at 6058 ¶ 1.

[109] *See, e.g., Conn. Light and Power*, 673 F.2d at 530.

without any study of its implications.[110] Furthermore, the Commission has explained that "the domestic use of the 11 GHz band by the FSS has been limited, to date, because the Commission has sought to protect the use and expansion of terrestrial microwave services within the band."[111] The Commission has also designated the 11 GHz band as one of the relocation bands for emerging technologies.[112] The Commission emphasized in the *NPRM* that the Commission's Rules explicitly limit satellite use of the 11 GHz band to international systems.[113] Moreover, the Commission reiterated that the intent and effect in adopting footnote NG104 was to limit the expansion of FSS in the 11 GHz band and protect the future use of the band for FS.[114] Under those circumstances, we find no support for denying FS operators access to half of the 11 GHz band. Moreover, Intelsat has failed to support its claims that there is a need for 11 GHz domestic FSS use. We therefore reject Intelsat's proposal.

C. Antenna Standards

26. *Background.* The changes to 101.115(c) of the Commission's Rules proposed in the *NPRM* are as follows:

	Category	Maximum beam-width to 3 dB pts	Minimum antenna Gain (dBi)	Minimum radiation suppression to angle in degrees From centerline of main beam in decibels						
				5° to 10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° to 180°
Current Standard	A	2.2	38	25	29	33	36	42	55	55
	B	2.2	38	20	24	28	32	35	36	36
Proposed Alternative Standard	A	3.5	33.5	18	24	28	32	35	55	55
	B	3.5	33.5	17	24	28	32	35	40	45

According to FiberTower, when it originally filed its petition for rulemaking in this proceeding, 11 GHz antennas that were compliant with existing Section 101.115 of the Commission's Rules were all at least 1.22 meters in size.[115] However, FiberTower notes that at least two manufacturers have since introduced Section 101.115 complaint antennas that are smaller than 1.22 meters.[116] FiberTower argues that the rule as adopted should exclude antennas smaller than 1.22 meters that comply with Section 101.115 standards from the special coordination obligations of proposed Section 101.103(j), while continuing to impose those obligations on

[110] Eutelsat Reply Comments at 5-6.

[111] *NPRM*, 22 FCC Rcd at 6067-6068 ¶18.

[112] *See* Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies, ET Docket No. 92-9, *Second Report and Order*, 8 FCC Rcd 6495, 6496 ¶¶ 1-2 (1993).

[113] *NPRM*, 22 FCC Rcd at 6068 ¶18.

[114] *See NPRM*, 22 FCC Rcd at 6068 ¶18 (internal citations omitted).

[115] FiberTower Comments at 2.

[116] FiberTower Comments at 2. According to FiberTower, the antennas in question have diameters of 97 cm and 86 cm. *Id.* at 2 n. 2.

smaller antennas that do not comply.[117] In addition, FiberTower proposes language retaining and designating the present standard as Class 1 while identifying the less stringent smaller antenna standards as Class 2.[118] The proposal would require those antennas that do not comply with Class 1 to protect those that do (as well as earth stations), and also to comply with the standards for Class 2.[119] The specific standards FiberTower proposes are:[120]

	Category	Maximum beam-width to 3 dB pts	Minimum antenna Gain (dBi)	Front/ back ratio (dB)	Minimum radiation suppression to angle in degrees From centerline of main beam in decibels						
					5° to 10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° to 180°
10,700-11,700 (Class 1)	A	2.2	38	55	25	29	33	36	42	55	55
	B	2.2	38	36	20	24	28	32	35	36	36
10,700-11,700 (Class 2)	A	3.5	33.5	55	18	24	28	32	35	55	55
	B	3.5	33.5	45	17	24	28	32	35	40	45

27. Comsearch expresses concern that, under the *NPRM* proposals, a licensee of a Category A small antenna could be compelled to accept interference into or to fix interference from that antenna, whereas under the existing requirements of Section 101.115(c) of the Commission's Rules, these are essentially Category B obligations.[121] Comsearch believes that the rules, as proposed, are confusing because they impose antenna obligations or limitations on users in both Sections 101.115(c) and 101.103(j).[122] Comsearch contends that a simpler and less confusing approach would be to modify the Standard B pattern for the 11 GHz band so that small antennas would qualify and make no other changes.[123] According to Comsearch, with the existing language in Section 101.115(c) of the Commission's Rules in place, it is unnecessary to add the coordination obligations expressed in the proposed Section 101.103(j) because they are understood.[124] Comsearch also is concerned that, while the usage of small antennas involves traditional 11 GHz transmitter power levels of approximately a quarter of a watt or less, the proposed rules would allow high power transmitters to be connected to small antennas to increase link range.[125] Comsearch recommends an EIRP limitation to compel licensees to use

[117] FiberTower Comments at 2.

[118] FiberTower Comments at 3.

[119] FiberTower Comments at 3 and Appendix.

[120] FiberTower Comments, Appendix.

[121] Comsearch Comments at 2-3.

[122] Comsearch Comments at 3.

[123] Comsearch Comments at 3.

[124] Comsearch Comments at 3.

[125] Comsearch Comments at 4.

larger antennas for longer links rather than increasing the transmitter power of the smaller antennas.[126] Comsearch proposes that the Category A pattern requirements of Section 101.115(c) be left unchanged, and that the following language be added to Section 101.115(b):

> For the band 10,700-11,700 MHz, a station using an antenna that meets neither the maximum beamwidth to 3 dB points requirement nor the minimum antenna gain requirement of Standard A shall not be licensed for EIRP greater than 30 dBW (60 dBm).[127]

28. Ericsson believes that Comsearch's proposal is misguided and undercuts the purpose of allowing smaller antennas to be used in metropolitan areas.[128] Ericsson argues that Comsearch's proposal ignores the fact that modern smaller antennas perform much better than the Category B standard, particularly with respect to radiation suppression outside the main beam.[129] Ericsson also notes that since Category B antennas can be used in areas that are not frequency congested, Comsearch's proposal would effectively exclude the use of smaller antennas in metropolitan areas, where they are most needed.[130]

29. Union proposes that if the Commission decides to allow the use of smaller antennas as proposed, the rules should retain the technical specifications applicable to 1.22 meter antennas.[131] Union notes that the proposed Section 101.103(j) specifies a "1.22 meter antenna" as the benchmark to evaluate interference cases without providing the technical parameters or characteristics of such an antenna.[132] Union recommends that Section 101.115(b)(2) of the Commission's Rules retain the relevant bandwidth, antenna gain, and sidelobe suppression characteristics currently associated with a 1.22 meter antenna so that applicants and licensees will have specific values by which interference predictions may be calculated.[133]

30. *Discussion.* Parties commenting on the issue generally agree that smaller antennas should be allowed in the 11 GHz band, but they differ on how to change the rules to accommodate smaller antennas. FiberTower proposes to establish two different classes of antenna standards, with both classes containing Category A and Category B standards, as well as an addition to Section 101.103 of the Commission's Rules to define the obligations of licensees using non-compliant antennas.[134] In contrast, Comsearch proposes treating all smaller antennas that do not meet Category A standards as Category B antennas and making no changes to Section 101.103 of the Commission's Rules.[135]

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[126] Comsearch Comments at 4.

[127] Comsearch Comments at 5.

[128] Ericsson Reply Comments at 5-6.

[129] Ericsson Reply Comments at 5.

[130] Ericsson Reply Comments at 6.

[131] Union Comments at 4.

[132] Union Comments at 4.

[133] Union Comments at 4.

[134] FiberTower Comments at 3 and Appendix.

[135] Comsearch Comments at 3-4.

31. We share Comsearch's concern that FiberTower's proposed rule changes are overly complicated, and we believe that there is merit in Comsearch's proposal to treat smaller antennas that do not comply with Category A standards as Category B antennas for purposes of the rules. Furthermore, we also agree with Union and do not believe it is necessary to make any changes to the Category A standards for the 11 GHz band to allow the use of 0.61 meter antennas. We do not see any benefit in FiberTower's proposal to have two different sets of Category A standards and two different sets of Category B standards. No party argues that the Category A standard currently in our rules for the 11 GHz band is inadequate or overly burdensome. All the parties advocate keeping the existing Category A standards in the rule in some fashion. To the extent a smaller antenna complies with the existing Category A standards, it can be used without special obligations. Accordingly, we will make no change to the existing Category A standards.

32. We agree with Ericsson, however, that Comsearch's proposal fails to take into account the fact that under our existing rules, Category B antennas can only be used in areas not subject to frequency congestion. The record demonstrates that the greatest need for smaller antennas is in metropolitan areas subject to frequency congestion. We believe that the need can be accommodated by treating smaller antennas that do not comply with Category A standards as Category B antennas, by adopting a special provision allowing the use of Category B antennas in all areas with slightly reduced parameters, subject to special requirements that will be discussed below. Such an approach will allow licensees maximum flexibility, while clearly defining the rights and obligations of licensees using smaller antennas not meeting the Category A standards, and thereby ensuring that existing licensees are protected.

33. We will revise the Category B standards for the 11 GHz band as proposed in the *NPRM*. With the exception of FiberTower's proposal to have two classes of standards, no party proposed an alternative Category B standard. No party to this proceeding raised an issue concerning the specific technical standards proposed in the *NPRM*.

34. Finally, we reject Comsearch's proposal to impose an EIRP limitation on facilities using Category B antennas.[136] Generally, we agree with Comsearch that larger antennas will be more appropriate for longer links. There may be situations, however, where an operator has no alternative to using a smaller antenna for a longer link. If the operator can successfully coordinate its proposed operation with existing licensees, we see no reason to prohibit such operation. Conversely, if a long link with a smaller antenna would cause interference to an existing licensee, the existing licensee can object during the coordination process. In addition, the Commission saw no reason for a special EIRP limitation for smaller antennas in the adjacent 10 GHz band.

D. Interference Issues

1. General

35. *Background.* The proponents of allowing smaller antennas in the 11 GHz band agree that smaller antennas would not materially increase the risk of interference to other users in the band. Alcatel-Lucent states that FiberTower's proposed amendments to Section 101.103 of the Rules, which would require an FS licensee to limit predicted interference from a 0.61 meter antenna to a level no higher than that which would be expected to be caused by the use of a 1.22 meter antenna, are sufficient to address the heightened interference concerns cited by opposing

[136] *See* Comsearch Comments at 5.

parties.[137] Alcatel-Lucent believes that current industry practices and the Commission's rules are sufficient to ensure that interference concerns are addressed and remedied in a timely fashion in those instances where a smaller antenna causes more interference than would otherwise be caused by a Category A antenna.[138] Comsearch agrees that allowing FS operators to use smaller antennas would enhance the efficient use of the 11 GHz band and contends that smaller antennas may be allowed in such a way as to protect other users from interference.[139] Conterra argues that the proposed rules address any interference issues that may arise from the use of smaller antennas in the 11 GHz band.[140]

36. Ericsson argues that, due to the improved performance and technical characteristics of smaller antennas, their use in the 11 GHz band will not materially increase the risk of interference to other operators licensed in the band, particularly FSS operators.[141] Ericsson states that the similar performance of smaller antennas to larger antennas can be seen by comparing the front to back ratios of smaller and larger antennas for angles 100° to 180° off the main beam.[142] By way of example, Ericsson notes that the front-to-back ratio for the proposed 0.61 meter antennas is actually equal to that of the current Category A antennas.[143] For the proposed Category B antennas, Ericsson notes that there is a 9 dB improvement in suppression over current Category B antennas.[144] Ericsson acknowledges that although smaller antennas have larger beamwidths, which theoretically increases the risk of interference, smaller antennas will actually pose only a negligible risk of interference, if any, for several reasons.[145] First, interference levels depend on the effective isotropic radiated power (EIRP), which is a combination of the gain of an antenna and the transmitter power, irrespective of main lobe gain or side lobe gain.[146] Thus, at the same transmitter power, larger antennas have higher gain than smaller antennas, thus posing a higher risk for interference.[147] Second, when smaller antennas are used, the hop distance traditionally used for 1.2 meter antennas deployed in 11 GHz is shortened because (i) the lower gain of smaller antennas means that signals from smaller antennas do not travel as far (even when operated at the same transmit power as larger antennas) and (ii) it is not possible to increase the EIRP with smaller antennas to create longer hop links as may be done with larger antennas because of heat dissipation and spurious emissions considerations.[148] Ericsson notes that shorter hops are suitable for deployment in metropolitan

[137] Alcatel-Lucent Comments at 4.

[138] Alcatel-Lucent Comments at 5.

[139] Comsearch Comments at 1.

[140] Conterra Comments at 10-11.

[141] Ericsson Comments at 4.

[142] Ericsson Comments at 4.

[143] Ericsson Comments at 4-5.

[144] Ericsson Comments at 5.

[145] Ericsson Comments at 5.

[146] Ericsson Comments at 5.

[147] Ericsson Comments at 5.

[148] Ericsson Comments at 5-6.

and urban environments because antennas are typically deployed on rooftops and high buildings that effectively screen antenna locations and actually decrease the risk of interference.[149]

37. Ericsson further maintains that the delta in the signal angle associated with a 0.61 meter antenna compared with that associated with a 1.2 meter antenna is so small that the risk of increased interference from smaller antennas is extremely low, particularly given the lower gain of such antennas.[150] According to Ericsson, the main lobe's 3 dB points only extend 0.76 degrees more at each side of the pointing direction for a 0.61 meter antenna than those of a 1.22 meter antenna.[151] In addition, Ericsson contends that, because sidelobe suppression is related to the main beam gain, the gain difference between 0.61 meter and 1.22 meter antennas of about 6 dB will proactively level out the difference in absolute EIRP between the current antenna standards and the proposed new values.[152] Ericsson concludes, therefore, that based on the technical performance characteristics of smaller antennas, the increased risk of interference caused by the proposed rule change is truly minimal.[153]

38. TTM supports the Commission's tentative conclusion that the shared nature of the 11 GHz band in no way prevents the Commission from enacting the proposed rule changes while protecting incumbent users from interference.[154] TTM believes that there is little real world risk of increased interference from the use of 0.61 meter antennas, citing the *White Paper* submitted by Alcatel.[155] In addition, TTM notes that its own analysis shows that the gain of the proposed Category A antenna with a minimum main axis gain of 33.5 dBi is actually less for angles under 5 degrees, between 10 and 30 degrees, and above 100 degrees when compared with the present off-axis gain of a 1.22 meter antenna with 40.4 dBi main axis gain for the same input power.[156] TTM contends that the far-field power spectral density of the 0.61 meter antenna will be less for those angles than a 1.22 meter antenna with the current Category A radiation suppression values.[157] For the two angular ranges where the off-axis gain of the two-foot antenna is larger than the four-foot antenna, TTM notes that the difference is only 0.1 dB.[158] TTM states that averaging the far-field power spectral density over the -180 to 180 degree range for the proposed Category A antenna for a 33.5 dBi main axis gain shows that the 0.62 meter antenna actually produces a smaller value than the 1.22 meter antenna averaged over the same range with a 40.4 dBi main axis gain and the current category specification.[159]

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[149] Ericsson Comments at 6.

[150] Ericsson Comments at 6.

[151] Ericsson Comments at 6.

[152] Ericsson Comments at 6.

[153] Ericsson Comments at 7.

[154] TTM Comments at 4.

[155] TTM Comments at 5 (*citing White Paper*); *see also* TTM Reply Comments at 5.

[156] TTM Comments at 5.

[157] TTM Comments at 5.

[158] TTM Comments at 5

[159] TTM Comments at 5.

39. Conterra contends that the Commission's decision to allow the use of smaller antennas in the 10 GHz band[160] has not caused any complaints of interference, and none should be expected in the 11 GHz band.[161] In addition, Conterra notes that the Bureau's experience in allowing FiberTower to install 0.61 meter antennas in the 11 GHz band[162] indicates that there is little risk, if any, of interference from such installations.[163]

40. Parties opposing the rule changes argue that proponents have failed to meet their burden of demonstrating that interference will not occur. Eutelsat contends that the burden from the use of smaller antennas in the 11 GHz band should remain solely on those employing such antennas.[164] Eutelsat contends that the proponents of the rule changes failed to offer specific data to demonstrate that the proposed rule changes will not cause significant interference to other users in the 11 GHz band.[165] Eutelsat also argues that existing and future operators in the 11 GHz band should be protected and treated in a non-adverse manner to ensure their continued use and development of this band.[166]

41. Discussion. Although we specifically discuss the issues of aggregate interference and interference due to pointing error separately below, we generally conclude that allowing smaller antennas in the 11 GHz band will not harm existing users. Any applicant proposing the use of a smaller antenna will need to coordinate its proposed facilities with existing users, and existing users retain their full rights to raise objections in the coordination process.[167] Moreover, we note that the Alcatel *White Paper* and Ericsson's comments contain specific analyses showing that the use of smaller antennas is not likely to cause materially more interference than current antennas. Although we specifically sought comment on the Alcatel *White Paper* in the *NPRM*, none of the opponents of allowing smaller antennas in the 11 GHz band addressed the *White Paper* or attempted to rebut its showings. Furthermore, none of the opponents offered any engineering analysis to show that there would be any material risk of increased interference. Indeed, a few commenting parties emphasize that, at certain angles, smaller antennas appear to offer superior interference protection than larger antennas.[168] We now turn to the specific concerns raised by SIA – aggregate interference and pointing error.

2. Aggregate Interference

42. *Background.* Intelsat argues that the Commission's rules for the 11 GHz band are designed to limit deployment of FS and FSS stations in the band.[169] Intelsat states that the

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[160] *See 10 GHz R&O.*

[161] Conterra Comments at 2.

[162] Conterra Comments at 11 (*citing FiberTower Waiver Order*).

[163] Conterra Comments at 4.

[164] Eutelsat Reply Comments at 5.

[165] *See, e.g.*, Eutelsat Reply Comments at 4.

[166] Eutelsat Reply Comments at 5.

[167] *See* 47 C.F.R. § 101.103(d).

[168] *See* Ericsson Comments at 7 (smaller antennas offer 6 dB more interference protection at angles from 100 to 180 degrees relative to the main beam axis); TTM Comments at 4-5; Alcatel-Lucent Comments, *White Paper* at 1-4.

[169] Intelsat Comments at 2-3.

proposed rule change implicates serious interference issues because it could greatly increase the number of antennas operating near 11 GHz earth stations.[170] Intelsat contends that FiberTower did not take into account the problem of aggregate interference in filing its rulemaking petition.[171] Intelsat maintains that it is incumbent upon proponents of a rule change to demonstrate that the proposal will not adversely affect the public interest by causing harmful interference to existing, licensed services.[172] Moreover, Intelsat maintains that commenting parties in this proceeding have failed to demonstrate that there is a need for additional FS operations in the 11 GHz band and that harmful interference can be avoided.[173] Intelsat argues that, absent a substantive technical showing that demonstrates conclusively that the aggregate interference and pointing error issues have been resolved, FiberTower's proposal should not be adopted unless the 11 GHz band is segmented as proposed by Intelsat.[174]

43. Eutelsat is concerned that the much greater anticipated number of smaller FS antennas that will operate in the 11 GHz band pursuant to the proposed rules will inevitably increase the likelihood of interference into other users of the band, including FSS operators.[175] Eutelsat also suggests that the Commission "keep this docket open for a reasonable period to enable it to monitor whether the companion rule change proves effective, in practice."[176] In the alternative, Eutelsat proposes that the Commission "reserve the possibility of reinstating some limitation on the number or density of FS operators using the smaller antennas."[177]

44. Ericsson contends that "concerns about aggregate interference raised by Intelsat are unfounded and demonstrate why no specific changes to Part 101.103 are needed."[178] Ericsson notes that any deployment of dense microwave networks requires careful coordination, which is one of the primary reasons Section 101.103 of the Commission's Rules exists, and that operators regularly and readily use different frequency channels to facilitate intra-FS coexistence without harmful interference.[179] Ericsson contends that, in practice, the closer a group of FS antennas is to a FSS antenna, the greater the likelihood that they will use different frequencies.[180] Because FS operators would follow established coordination procedures if they were permitted to deploy smaller antennas, Ericsson concludes that "there is less likelihood, not more, of aggregate interference problems resulting from smaller antennas."[181]

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[170] Intelsat Comments at 3.

[171] Intelsat Comments at 4.

[172] Intelsat Comments at 5.

[173] Intelsat Reply Comments at 3-4; Intelsat Comments at 5 (noting stating that FiberTower failed to meet it burden because it only offered conclusory statements and no hard engineering analysis).

[174] Intelsat Comments at 5.

[175] Eutelsat Reply Comments at 4-5.

[176] Eutelsat Reply Comments at 5.

[177] Eutelsat Reply Comments at 5.

[178] Ericsson Reply Comments at 3.

[179] Ericsson Reply Comments at 3.

[180] Ericsson Reply Comments at 3.

[181] Ericsson Reply Comments at 3-4.

45. Comsearch contends that aggregate interference should not pose a significant problem if the Commission permits the use of smaller antennas in the 11 GHz band.[182] Comsearch notes that its proposal to limit EIRP levels for stations with small antennas would provide further assurance.[183] FiberTower also agrees with and adopts the view of Comsearch with respect to the prospect of aggregate interference.[184] TTM contends that Intelsat fails to offer any data or analysis to substantiate its claim of aggregate interference.[185] TTM notes that the record shows that the likelihood of such interference is minimal.[186]

46. MSV identified a more specific concern about the effect of aggregate interference on its next generation, geostationary orbit (GSO) Mobile Satellite Service (MSS) gateway earth stations authorized for feeder link[187] operations in the 11 GHz band.[188] MSV emphasized that, due to recent efforts to identify sites for its new feeder link earth stations, it is increasingly concerned that its feeder link operations will be subject to unacceptable and harmful interference from the proliferation of new microwave operations expected as the result of any change in the rules.[189] Therefore, MSV initially proposed in its reply comments that the Commission amend its rules to adopt new interference protection standards to specifically address and resolve potential interference problems between new microwave licensees in the 11 GHz band and the limited number of FSS licensees authorized to use the band for feeder link operations for GSO MSS systems.[190] Terrestar Networks, Inc. (Terrestar), another similarly situated MSS licensee, subsequently filed an *ex parte* letter supporting MSV's proposal.[191] The FWCC and FiberTower filed *ex parte* letters opposing any "extraordinary protection" of the MSS feeder link earth stations in the 11 GHz band.[192]

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[182] Comsearch Comments at 5.

[183] Comsearch Comments at 5.

[184] FiberTower Reply Comments at 4.

[185] TTM Reply Comments at 5.

[186] TTM Reply Comments at 5 (*quoting* Comsearch Comments at 5) ("In an environment of various FS path directions and highly directional antennas, multiple interference signals of approximately the same power level are not likely to occur and thus aggregation of interference is seldom a problem.").

[187] Whereas an MSS service link is the transmission path between the MSS satellite and a customer's Mobile Earth Terminal (MET), feeder links are the radio links that transmit a user's messages in both directions between the system's satellites and its gateway earth station(s) that connect the MSS network with the public switched telephone network.

[188] MSV Reply Comments at 1.

[189] MSV Reply Comments at 1.

[190] MSV Reply Comments at 6. Specifically, the original MSV proposal would have permitted the unlimited licensing of new 11 GHz microwave facilities, whether large or small, in all areas except those very few close to an MSS feeder link earth station. *See id.*

[191] Letter from Alexandra M. Field, Senior Vice President for Regulatory Affairs, Terrestar Networks, Inc., to Marlene H. Dortch, Secretary, FCC (dated Jul. 31, 2007).

[192] *See* Letter from Mitchell Lazarus, Esq., Fletcher, Heald, and Hildreth, P.L.C., to Marlene H. Dortch, Secretary, FCC (dated Aug. 29, 2007); Letter from Dennis J. Guill, Chief Technical Officer, Wireless Transmission Division, North America, Alcatel-Lucent Technologies, to Marlene H. Dortch, Secretary, FCC (dated Aug. 31, 2007).

47. In an *ex parte* letter dated August 30, 2007, MSV stated that adequate protection could be afforded to its feeder link operations in the 11 GHz band "if the FCC makes a finding that aggregate interference to MSS gateways is a legitimate concern and that it requires all applicants for new or modified Fixed Service facilities in the band to carefully coordinate their operations with any licensed gateway operations so as to avoid such interference."[193] MSV believes that the "[s]tatement of these principles should be sufficient to limit or prevent future disputes and prevent potential interference to incumbent licensees by new operators, without having a significant adverse effect on the deployment of new microwave facilities."[194] Terrestar, in an *ex parte* letter filed on August 30, 2007, concurred with MSV, noting that "MSV's compromise proposal strikes a proper balance between Fixed Service needs for efficient use of the 10.7-11.7 GHz spectrum and MSS needs for operating in an environment that is free from objectionable interference."[195] In addition, FWCC and FiberTower filed *ex parte* letters stating that they have no objections to the Commission including a statement of policy substantially similar to the language quoted above from the MSV August 30th Letter.[196]

48. *Discussion.* We agree with Ericsson, Comsearch, and other parties that Intelsat's and Eutelsat's concerns regarding aggregate interference do not provide a basis for prohibiting the use of smaller antennas in the 11 GHz band. As described by Intelsat and Eutelsat, aggregate interference is a phenomenon that could occur in any situation where a large number of FS links surround an FSS station, regardless of whether the FS stations were using large or small antennas.[197] Intelsat's and Eutelsat's primary concern appears to be that allowing the use of smaller antennas in the 11 GHz band will result in increased FS use of the band and increase the possibility that aggregate interference will occur. As we have noted, however, the Commission has limited the expansion of FSS in the 11 GHz band in order to protect the future use of the band for FS.[198] From a spectrum policy perspective, we view rule changes that would allow greater FS use of the 11 GHz band as beneficial to the public interest, so long as existing users would not be harmed. Furthermore, Intelsat and Eutelsat have failed to provide any engineering analysis or record evidence to support their contentions. We agree with Ericsson that existing coordination procedures – including the right of existing users to raise objections in the coordination process, as well as the practice of using different frequency channels, should be sufficient to protect existing FS and FSS operators.

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[193] Letter from Jennifer A. Manner, Esq., Vice President, Regulatory Affairs, Mobile Satellite Ventures, L.P., to Marlene H. Dortch, Secretary, FCC (dated Aug. 30, 2007) (MSV August 30th Letter).

[194] *Id.* at 1.

[195] Letter from Douglas I. Brandon, Vice President for Regulatory Affairs, Terrestar Networks, Inc., to Marlene H. Dortch, Secretary, FCC (dated Aug. 30, 2007) (Terrestar August 30th Letter).

[196] *See* Letter from Mitchell Lazarus, Esq., Fletcher, Heald, and Hildreth, P.L.C., to Marlene H. Dortch, Secretary, FCC (dated Sep. 4, 2007); Letter from Dennis J. Guill, Chief Technical Officer, Wireless Transmission Division, North America, Alcatel-Lucent Technologies, to Marlene H. Dortch, Secretary, FCC (dated Sep. 5, 2007).

[197] Intelsat Comments at 3; Eutelsat Reply Comment at 4-5.

[198] *See* 47 C.F.R. § 2.106 NG104 (stating that "[t]he use of the bands 10.7-11.7 GHz (space to Earth)...by the fixed satellite service in the geostationary-satellite orbit shall be limited to international systems, *i.e.*, other than domestic systems"). The Commission has found that the original intent of this footnote was to protect future FS growth by limiting the wide proliferation of FSS earth stations. *See, e.g., ESV R&O*, 20 FCC Rcd at 710-11 ¶ 86; *see also* Service Rules and Procedures to Govern the Use of Aeronautical Mobile Satellite Service Earth Stations in Frequency Bands Allocated to the Fixed Satellite Service, IB Docket No. 05-20, *Notice of Proposed Rulemaking*, 20 FCC Rcd 2906, 2916-17 ¶ 18 (2005) (same).

49. We understand the concerns raised by GSO MSS operators over the effect of aggregate interference to MSS feeder link earth stations in the 11 GHz band. We expect all FS applicants for new or modified facilities[199] in the 11 GHz band to carefully coordinate their operations with the authorized feeder link operations of any licensed GSO MSS gateway earth station in the 11 GHz band so as to avoid harmful aggregate interference. Specifically, we expect FS applicants to consider the possibility of aggregate interference in determining whether they must coordinate with the authorized feeder link operations of any licensed GSO MSS gateway earth station in the 11 GHz band. If an MSS licensee raises aggregate interference concerns in the coordination process, we expect the licensee and the FS applicant to work to resolve those concerns in the coordination process.[200] If issues relating to aggregate interference are brought to the Commission's attention, either in a statement submitted with an application or in a timely petition, we will carefully consider such issues.

3. Pointing Error

50. *Background.* Intelsat argues that pointing error is a more substantial problem for smaller antennas.[201] Although Intelsat agrees that it is in the interest of FS users to achieve the best antenna alignment possible, Intelsat contends that "most methods used for aligning antennas rely on maximizing the received signal. Because smaller antennas will have flatter gain patterns, they will necessarily be more difficult to align accurately."[202] Skynet concurs with Intelsat that the Commission must also address "pointing error."[203] Eutelsat shares the concerns expressed by the Satellite Industry Association in its comments in RM-11043 that the proposed rule change implicates significant pointing error issues that have not been adequately addressed by the proponents of the proposed rule changes.[204]

51. Comsearch states that it is not concerned that small antennas would increase the risk of interference as a result of antenna pointing error because (1) FS users are able to align the antennas properly with existing procedures; (2) FS users want to align the antennas properly for path performance reasons; (3) the magnitude of the maximum error introduced into the interference calculations would be about the same with smaller antennas versus antennas meeting present standards; and (4) any actual interference could be fixed by re-aligning the offending antenna.[205] FiberTower also agrees with and adopts the view of Comsearch with respect to the prospect of aggregate interference and pointing errors.[206]

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[199] All major modifications to a license require prior coordination. *See* 47 C.F.R. § 101.103(d)(1).

[200] *See* 47 C.F.R. § 101.103(d)(2)(vii) ("All technical problems that come to light during coordination must be resolved unless a statement is included with the application to the effect that the applicant is unable or unwilling to resolve the conflict and briefly the reason therefor . . .")

[201] Intelsat Comments at 4.

[202] Intelsat Reply Comments at 5-6.

[203] Skynet Reply Comments at 2 (*citing* Intelsat Comments at 4).

[204] Eutelsat Reply Comments at 4.

[205] Comsearch Comments at 6.

[206] FiberTower Reply Comments at 5.

52. Alcatel-Lucent agrees that licensees have every incentive to ensure that their antennas are aimed correctly so as to avoid interference with other users in the band because pointing error degrades not only the service of adjacent licensees but also degrades the performance of the antenna operator's own end users.[207] Alcatel-Lucent states that an antenna that is professionally installed, properly pointed, and operated within the Commission's guidelines should not cause interference to adjacent licensees in the band.[208] To the degree that pointing error might cause interference with other licensees, Alcatel-Lucent contends that it is both feasible and in the best interest of both parties to resolve the interference quickly so as to maintain the desired level of service for customers.[209]

53. Ericsson argues that the procedures for both signal measurement and mechanical adjustments are the same for all antennas.[210] While minor pointing deviations can occur during mechanical adjustment, the likelihood and severity of such deviations are no greater with smaller antennas than with larger antennas.[211] Ericsson contends that smaller deviations are expected with smaller antennas than with larger antennas due to the smaller size, weight, and other characteristics of the antennas.[212] According to Ericsson, smaller antennas, in practice, can be easily and accurately aligned to within 0.3°-0.4°.[213] Ericsson states that tower crews installing smaller antennas have the skill and the incentive to carefully align the antennas to avoid pointing errors because a misaligned antenna will not meet the appropriate receive level and will not perform as anticipated.[214]

54. TTM does not believe that there is an increased risk of interference because of increased difficulty in aligning 0.61 meter antennas.[215] TTM argues that, in fact, the slightly wider main lobe of the 0.61 meter antenna will make initial alignment easier and could mitigate the possibility of aligning to a sidelobe.[216] TTM further argues that its engineering process provides the field alignment crew with predicted receiver signal levels for any given link to ensure that the antennas are properly aligned because it is clearly in its own interest to provide a high quality link of maximum availability.[217] TTM also contends that Intelsat fails to substantiate its concerns of increased interference due to pointing errors.[218] TTM states that any potential interference due to pointing error is limited and manageable.[219] TTM notes that

[207] Alcatel-Lucent Comments at 4.

[208] Alcatel-Lucent Comments at 4-5.

[209] Alcatel-Lucent Comments at 5.

[210] Ericsson Comments at 9.

[211] Ericsson Comments at 9.

[212] Ericsson Comments at 9.

[213] Ericsson Comments at 9.

[214] Ericsson Comments at 9.

[215] TTM Comments at 6.

[216] TTM Comments at 6.

[217] TTM Comments at 6.

[218] TTM Reply Comments at 5.

[219] TTM Reply Comments at 5.

microwave antennas are professionally installed to provide a high-quality link and avoid interference[220] and agrees with Alcatel-Lucent that FS licensees have every incentive to ensure their antennas are aimed correctly.[221] Moreover, TTM emphasizes that, in the unlikely event of pointing error, both parties will want to resolve the interference quickly to best serve their customers.[222]

55. *Discussion.* We conclude that the possibility of pointing error does not provide a basis for not allowing smaller antennas to be used in the 11 GHz band. FS licensees and equipment manufacturers have shown that they have a strong incentive to accurately point their antennas and routinely point antennas to a high degree of accuracy. The record demonstrates that there is no significant difference between antennas currently authorized under the Commission's Rules and smaller antennas in terms of the likelihood of pointing error. Furthermore, the parties state that they would work quickly to correct any pointing errors that do occur, and we expect all licensees to promptly remedy any errors that do exist. In addition, the parties opposing the rule changes have offered generalized concerns unsupported by data or analysis. We therefore conclude that interference concerns do not provide a basis for prohibiting the use of smaller antennas in the 11 GHz band.

E. Duties of Licensee Using Category B Antenna

56. *Background.* TTM, Skynet and MSV support the changes to the coordination rule proposed in the *NPRM*, *i.e.*, to require operators of smaller terrestrial microwave antennas to coordinate with existing users of the band, as if the microwave operators were using a 1.22 meter antenna.[223] TTM states that the proposed coordination rules strike the appropriate balance between efficient spectrum use and interference protection.[224] TTM argues that the proposed rules would hold other users harmless from the use of the new, smaller antennas.[225] TTM notes that the risk of mitigation is placed upon the user of the two-foot antenna, and the other user faces neither increased risk nor increased coordination burden.[226] MSV contends that limiting the ability of FS licensees to complain about interference from existing FSS operations and requiring FS operators to modify operations in response to complaints of interference should minimize disputes between FS and FSS operators.[227]

57. Ericsson argues that the use of smaller antennas in the 11 GHz band will not materially increase the risk of interference to other operators licensed in the band, particularly FSS operators.[228] Ericsson contends that, due to the improved performance and technical

[220] TTM Reply Comments at 5. As an example, TTM specifically notes that its engineering process provides field alignment crews with predicted receiver signal levels for any given link in order to ensure that the antennas are properly aligned. *Id*

[221] TTM Reply Comments at 5.

[222] TTM Reply Comments at 5.

[223] TTM Comments at 6; MSV Comments at 3; Skynet Reply Comments at 2 (*citing* MSV Comments at 3).

[224] TTM Comments at 6.

[225] TTM Comments at 6.

[226] TTM Comments at 6.

[227] MSV Comments at 3-4.

[228] Ericsson Comments at 4.

characteristics of smaller antennas, the old belief that the smaller the antenna, the greater the risk of interference, is no longer true.[229] Accordingly, Ericsson argues that additional coordination procedures are not necessary because smaller antennas do not substantially change the interference landscape and because the existing Commission rules sufficiently address the need to protect 11 GHz and adjacent licensees.[230] Moreover, Ericsson suggests that customized coordination procedures that apply only to FS and FSS are not in the public interest and may complicate administration of the band.[231]

58. Comsearch argues that it is unnecessary to add coordination obligations to the proposed Section 101.103(j) because frequency coordinators will continue to take the antenna performance level into account in the coordination process with the existing language in Section 101.115(c) of the Commission's Rules in place.[232] Comsearch explains that the existing Section 101.115(c) language would compel the user of a small antenna either to (i) accept interference into that antenna or fix the interference via an upgrade to Category A or (ii) fix interference from that antenna via an upgrade or by reducing the station's EIRP.[233] However, Comsearch states that the language in Section 101.115(c) is currently unclear as to whether reducing EIRP is an acceptable strategy to mitigate interference versus changing the antenna.[234] Comsearch therefore requests Commission clarification because small antenna users may not be able to install larger antennas in some cases.[235] According to Comsearch, a small antenna would now always be Category B, but the user would have the same rights and responsibilities as under the rules proposed in the *NPRM*.[236] Comsearch further argues that, if the Commission nevertheless decides to add Section 101.103(j) as proposed, the language still needs to be changed to eliminate reference to the antenna size of 1.22 meters as the threshold below which the user would have to fix or accept interference.[237] Comsearch contends that, because several manufacturers are now supplying antennas smaller than 1.22 meters that meet the present Category A standard, the obligations need to be based on pattern performance (*e.g.*, breakpoints) rather than antenna size.[238]

59. Intelsat contends that, if the Commission were to allow the use of smaller antennas in the 11 GHz band, the Commission should modify its proposed coordination rule because it does not address the power level that might be utilized by the smaller FS antennas when complying with the requirement to "reduce the predicted interference to levels no higher than would be predicted from antenna of 1.22 meters in diameter."[239] Intelsat emphasizes that

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[229] Ericsson Comments at 4.

[230] Ericsson Comments at 7-8; Ericsson Reply Comments at 1.

[231] Ericsson Reply Comments at 2.

[232] Comsearch Comments at 3.

[233] Comsearch Comments at 3.

[234] Comsearch Comments at 3-4.

[235] Comsearch Comments at 4.

[236] Comsearch Comments at 4.

[237] Comsearch Comments at 4.

[238] Comsearch Comments at 4.

[239] Intelsat Reply Comments at 2. Specifically, Intelsat notes that the proposed coordination rule states that an FS or FSS applicant that predicts received interference from a licensee or prior applicant using an antenna smaller than (continued....)

the "proposed rule does not specify whether the interference levels predicted from the use of an antenna of 1.22 meters are to be calculated using the power authorized for the 0.61 meter antenna or the power that would lead to the same EIRP as authorized for the 0.61 meter antenna."[240] Intelsat therefore argues that "there is nothing in the rule that ensures that operators of small antennas will not utilize higher power to compensate for their smaller main beam gain."[241] Accordingly, Intelsat proposes that, "if 0.61 meter FS antennas are to be allowed in any portion of the 11 GHz band without increasing single-entry interference as compared to that caused by 1.22 meter antennas," proposed Section 101.103(j)(2) should be modified to read as follows:

> A Fixed Service applicant attempting to frequency coordinate an antenna of 1.22 meters in diameter or larger, or an applicant for a Fixed Satellite Service earth station, that predicts received interference from a licensee or prior applicant using an antenna smaller than 1.22 meters in diameter, can require the licensee or prior applicant to reduce the predicted interference to levels no higher than would be predicted from antenna of 1.22 meters in diameter *producing the same on-axis EIRP as that of the 0.61 meter antenna under consideration.*"[242]

60. MSV notes that the existing rules do not specify a time for the resolution of interference complaints and urges the Commission to adopt rules to ensure the prompt resolution of interference complaints from FSS operators in those instances where the parties are unable to do so.[243] Specifically, MSV suggests that sixty to ninety days should provide a sufficient amount of time for the Commission to resolve such complaints.[244] FiberTower disagrees with MSV that the Commission should establish a sixty to ninety day window for the resolution of interference complaints from earth station operators.[245] According to FiberTower, occurrences of actual interference are exceedingly rare due to the conservative assumptions underlying coordination calculations. FiberTower notes that there is no reason to expect that the use of small antennas will add to the unusual cases in which coordination calculations underestimate actual interference.[246] Although FiberTower does not find a time limit on resolving complaints of measured interference in itself objectionable, FiberTower contends that MSV fails to present any data to justify the need.[247]

61. *Discussion.* While the parties talk of changes to "coordination rules," none of the parties propose any changes to the process by which proposed facilities are coordinated, and we see no reason to make such changes. We believe the actual issue is the rights and obligations of

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1.22 meters in diameter "can require the licensee or prior applicant to reduce the predicted interference to levels no higher than would be predicted from antenna of 1.22 meters in diameter." *Id.*

[240] Intelsat Reply Comments at 6.

[241] Intelsat Reply Comments at 6.

[242] Intelsat Reply Comments at 7-8 (emphasis in original).

[243] MSV Comments at 4.

[244] MSV Comments at 4.

[245] FiberTower Reply Comments at 4.

[246] FiberTower Reply Comments at 4.

[247] FiberTower Reply Comments at 4.

licensees using antennas that do not meet Category A standards *vis-à-vis* other licensees and applicants. We note that we have already determined that antennas that do not meet Category A standards will be treated as Category B antennas and must meet that minimum new standard, but that such antennas may be placed anywhere where they may be successfully coordinated.[248]

62. Under the existing rules, a licensee using a Category B antenna must install a Category A antenna meeting Category A standards if necessary to resolve interference.[249] In response to Comsearch's question as to whether a licensee can resolve interference by reducing power, we will allow licensees to resolve interference by reducing EIRP. Specifically, a licensee using a smaller antenna may demonstrate equivalent protection by reducing its EIRP from the maximum by an amount equivalent to the difference between the minimum suppression of a Category A antenna and the suppression of the actual antenna being used, at the relevant angle to the objecting party.[250] This option will provide other licensees with protection equivalent to the use of a Category A antenna and provide licensees using smaller antennas with additional flexibility while ensuring that other licensees do not suffer interference.

63. With respect to future FS and FSS applicants, we will adopt similar rules that will place those applicants in a position no worse than if the station was using a Category A antenna. Specifically, if an existing station is using a noncompliant Category B antenna, an FS or FSS applicant predicts that its proposed facilities would receive interference from that station, and such interference would not occur if the existing station was using a Category A compliant antenna, the existing licensee must either replace its antenna with a Category A compliant antenna or reduce EIRP as described above. Except for the addition of the option to reduce EIRP, this requirement is the same requirement currently imposed on Category B licensees. While Ericsson argues that such a requirement is unnecessary because allowing smaller antennas will not harm other licensees, we note that the proposal to hold future applicants harmless from any incremental change caused by smaller antennas is supported both by proponents of smaller antennas and by parties that are concerned about interference from smaller antennas. If Ericsson is correct that allowing smaller antennas will not harm future applicants, licensees will not be burdened by this requirement because licensees will not have to modify their operations. We also adopt language stating that a licensee using a Category B antenna may not object to a prior coordination notice based on interference if the interference would not exist if the licensee used a Category A antenna. This rule is consistent with overall goal of ensuring that other applicants are licensees are not harmed by allowing licensees to use smaller antennas.

64. We reject Intelsat's proposal to place language in the rule referencing the on-axis EIRP of the station in question as unnecessary and unduly restrictive.[251] We believe FS licensees using smaller antennas should have the flexibility to adjust their EIRP in order to resolve

[248] *See* ¶ 32, *supra*.

[249] 47 C.F.R. § 101.115(c).

[250] For example, at an angle of 25 degrees off the main beam, a Category A antenna must have a minimum radiation suppression of 36 dB. If a station with a Category A antenna operating at the maximum EIRP allowed under the rules would radiate an EIRP of 19 dBW at an angle of 25 degrees, a station using a smaller Category B antenna may have a radiation suppression at that angle of 33 dB, meaning that it could operate with an EIRP 3 dB below the maximum and cause no more interference than the Category A antenna at the same angle.

[251] *See* Intelsat Reply Comments at 7-8.

interference concerns, so long as FS and FSS applicants are no worse off than they were if the licensee was using an antenna meeting Category A standards.

65. We also reject as unsupported MSV's proposal to establish a deadline for the resolution of interference complaints involving FS interference to FSS earth stations.[252] We have not mandated a specific deadline for resolving interference complaints in other point-to-point microwave bands, and the 11 GHz band does not have any unique characteristics that would justify a special rule for that band. In addition, MSV has not attempted to demonstrate that our existing rules are inadequate or that FS licensees are unwilling to resolve interference issues as they occur.

F. Pending Waiver Requests

66. *Background.* As noted above, FiberTower has received a waiver to use small antennas in the 11 GHz band.[253] In seeking the rulemaking, FiberTower conceded that it "must comply with the outcome" of this rulemaking proceeding.[254] Four entities other than FiberTower have pending waiver requests seeking permission to use smaller antennas in the 11 GHz band.[255] Like FiberTower, these petitioners argue that more intensive use of the 11 GHz band would increase efficiency[256] and allow the band to be used to provide various types of wireless broadband services.[257]

67. *Discussion.* We will dismiss the pending waiver requests as moot. The rules we have adopted today will provide the parties seeking a waiver with the opportunity to use smaller antennas in the 11 GHz band. We believe that any use of smaller antennas in this band should be pursuant to the rules we adopt today, as opposed to the various conditions proposed by the parties.

68. We will also terminate the waiver granted to FiberTower on the date the rules adopted herein become effective. To the extent FiberTower wishes to be authorized to use smaller antennas in the 11 GHz band after these rules become effective, it shall obtain such authorizations using the rules we adopt today. Any authorizations FiberTower received pursuant to the *FiberTower Waiver Order* shall be grandfathered, and FiberTower may continue to operate such facilities pursuant to the rules we adopt today.

IV. PROCEDURAL MATTERS

A. Final Regulatory Flexibility Analysis

69. The Regulatory Flexibility Act (RFA)[258] requires that an agency prepare a regulatory flexibility analysis for notice and comment rulemakings, unless the agency certifies

[252] *See* MSV Comments at 4.

[253] *See FiberTower Waiver Order.*

[254] *FiberTower Waiver Order*, 21 FCC Rcd at 6390 ¶ 8, *citing* FiberTower Waiver Request at 8.

[255] *See* Nextlink Waiver Request, FAN Waiver Request, TTM Waiver Request, Conterra Waiver Request.

[256] Nextlink Waiver Request at 8, FAN Waiver Request at 3, TTM Waiver Request at 7-8, Conterra Waiver Request at 7-8.

[257] Nextlink Waiver Request at 1-3, FAN Waiver Request at 1-2, TTM Waiver Request at 4-5, 7-8, Conterra Waiver Request at 6.

[258] *See* 5 U.S.C. § 601–612. The RFA has been amended by the Small Business Regulatory Enforcement Fairness (continued....)

that "the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities."[259] Accordingly, we have prepared a Final Regulatory Flexibility Analysis concerning the possible impact of the rule changes contained in this *Report and Order* on small entities. The Final Regulatory Flexibility Analysis is set forth in Appendix B.

B. Paperwork Reduction Analysis

70. This document contains no new or modified information collection requirements subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13.

C. Further Information

71. For further information concerning this rulemaking proceeding, contact Brian Wondrack, Broadband Division, Wireless Telecommunications Bureau, at (202) 418-0653, Federal Communications Commission, 445 12th Street, S.W., Washington, D.C. 20554; or via the Internet to Brian.Wondrack@fcc.gov.

V. ORDERING CLAUSES

72. Accordingly, Accordingly, IT IS ORDERED, pursuant to Sections 1, 2, 4(i), 7, 10, 201, 214, 301, 302, 303, 307, 308, 309, 310, 319, 324, 332, 333 and 706 of the Communications Act of 1934, 47 U.S.C. §§ 151, 152, 154(i), 157, 160, 201, 214, 301, 302, 303, 307, 308, 309, 310, 319, 324, 332, 333, and 706, that this *Report and Order* is hereby ADOPTED.

73. IT IS FURTHER ORDERED, pursuant to Section 4(i) of the Communications Act of 1934, 47 U.S.C. § 154(i), and Section 1.925 of the Commission's Rules, that the Petition for Waiver filed by Nextlink Wireless, Inc. on August 4, 2006, the Petition for Waiver filed by First Avenue Networks, Inc. on August 10, 2006, the Petition for Waiver and Expedited Action filed by Telecom Transport Management, Inc. on September 8, 2006, and the Petition for Expedited Waiver Pending Rulemaking filed by Conterra Ultra Broadband, LLC on January 22, 2007 ARE DISMISSED AS MOOT.

74. IT IS FURTHER ORDERED, pursuant to Section 4(i) of the Communications Act of 1934, 47 U.S.C. § 154(i), and Section 1.925 of the Commission's Rules, that the waiver granted to FiberTower Corporation in FiberTower, Inc., *Order*, 21 FCC Rcd 6386 (WTB 2006) IS TERMINATED on the date the rules adopted in this *Report and Order* become effective, with facilities authorized pursuant to the waiver being grandfathered.

(...continued from previous page)
Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[259] 5 U.S.C. § 605(b).

75. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this *Report and Order*, including the Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A

Final Rules

Part 101 of Title 47 of the Code of Federal Regulations is amended as follows:

PART 101 – FIXED MICROWAVE SERVICES

1. The authority citation for part 101 continues to read as follows:

Authority: 47 U.S.C. 154, 303.

2. Section 101.115 is amended by revising an entry "10,700 to 11,700[5]" to the table following paragraph (b)(2), redesignating paragraph (f) as paragraph (g), and adding a new paragraph (f) to read as follows:

§ 101.115 Directional antennas.

(b) ***

(2) ***

Frequency (MHz)	Category	Maximum beam-width to 3 dB pts	Minimum antenna Gain (dBi)	Minimum radiation suppression to angle in degrees from centerline of main beam in decibels						
				5° to 10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° To 180°
*******										
10,700-11,700[5]	A	2.2	38	25	29	33	36	42	55	55
	B	3.5	33.5	17	24	28	32	35	40	45
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(f) In the 10,700-11,700 MHz band, a fixed station may employ transmitting and receiving antennas meeting performance standard B in any area. If a Fixed Service or Fixed Satellite Service licensee or applicant makes a showing that it is likely to receive interference from such fixed station and that such interference would not exist if the fixed station used an antenna

meeting performance standard A, the fixed station licensee must modify its use. Specifically, the fixed station licensee must either substitute an antenna meeting performance standard A or operate its system with an EIRP reduced so as not to radiate, in the direction of the other licensee, an EIRP in excess of that which would be radiated by a station using a Category A antenna and operating with the maximum EIRP allowed by the rules. A licensee or prior applicant using an antenna that does not meet performance Standard A may object to a prior coordination notice based on interference only if such interference would be predicted to exist if the licensee or prior applicant used an antenna meeting performance Standard A.

APPENDIX B

Final Regulatory Flexibility Analysis

As required by the Regulatory Flexibility Act of 1980, as amended (RFA),[260] we incorporated an Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on a substantial number of small entities by the policies and rules proposed in the *Notice of Proposed Rule Making* (*NPRM*) in WT Docket 07-54.[261] The Commission sought written public comment on the proposals in the *NPRM*, including comment on the IRFA. Because we amend the rules in this *Report and Order*, we have included this Final Regulatory Flexibility Analysis (FRFA). This present FRFA conforms to the RFA.[262]

A. Need for, and Objectives of, this *Report and Order*

In this *Report and Order*, we adopt amendments to Section 101.115 of the Commission's Rules[263] to permit the installation of smaller antennas by Fixed Service (FS) operators in the 10.7 – 11.7 GHz (11 GHz) band.[264] Section 101.115(b) of the Commission's Rules[265] establishes directional antenna standards designed to maximize the use of microwave spectrum, including the 11 GHz band, while avoiding interference between operators.[266] More specifically, the Commission's Rules set forth certain requirements, specifications, and conditions pursuant to which FS stations may use antennas that comply with either the more stringent performance standard in Category A (also known as Standard A) or the less stringent performance standard in Category B (also known as Standard B).[267] The rule on its face does not mandate a specific size of antenna. Rather, it specifies certain technical parameters – maximum beamwidth, minimum antenna gain, and minimum radiation suppression – that, depending on the state of technology at any point in time, directly affect the size of a compliant antenna that may be deployed in the 11 GHz band. The Commission found a demonstrated need in this proceeding to reconsider[268] and

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[260] *See* 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. § 601-612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996, (SBREFA) Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[261] Amendment of Part 101 of the Commission's Rules to Modify Antenna Requirements for the 10.7 – 11.7 GHz Band, WT Docket No. 07-54, *Notice of Proposed Rulemaking*, 22 FCC Rcd 6057 (2007) (*NPRM*).

[262] *See* 5 U.S.C. § 604.

[263] 47 C.F.R. § 101.115.

[264] 47 C.F.R. § 101.115.

[265] 47 C.F.R. § 101.115(b).

[266] 47 C.F.R. § 101.115(b).

[267] *See* 47 C.F.R. § 101.115(b)-(d). In general, the Commission's Rules require a Category B user to upgrade if the antenna causes interference problems that would be resolved by the use of a Category A antenna. *See* 47 C.F.R. § 101.115(c) ("The Commission shall require the replacement of any antenna . . . that does not meet performance Standard A . . ., at the expense of the licensee operating such antenna, upon a showing that said antenna causes or is likely to cause interference to (or receive interference from) any other authorized or applied for station whereas a higher performance antenna is not likely to involve such interference. . . ."). We may herein refer to those antennas that comply with the Category A standard as either compliant antennas or Category A complaint antennas and those antennas that do not comply with the Category A standard as non-compliant antennas.

[268] *See NPRM*, 22 FCC Rcd at 6067-6068 ¶¶ 17-19.

to modify[269] the antenna standards set forth in Section 101.115 of the Commission's Rules[270] because actions taken by the Commission in other bands have increased the need for greater flexibility for FS in the 11 GHz band; because technology has significantly evolved since the Commission last considered the antenna specifications for the 11 GHz band; and because the Commission has reconsidered similar technical specifications that effectively limited the size of antennas used in other bands, including those used by satellite,[271] in light of the technological evolution of communications equipment since those specifications were first adopted.[272]

In this *Report and Order*, we adopt amendments to Section 101.115 of the Commission's Rules[273] to revise the Category B standards for the 11 GHz band to permit, as proposed in the *NPRM*,[274] the use of FS antennas with reduced mainbeam gain, increased beamwidth, and modified sidelobe suppression. We conclude in this *Report and Order* that, by treating smaller antennas that do not comply with Category A standard as Category B antennas, the amended rules will afford licensees maximum flexibility in deploying FS antennas in the 11 GHz band. While licensees in the FS will now have additional options to deploy smaller antennas in the 11 GHz band that comply with the revised Category B standard, FS licensees also retain the discretion to maintain and continue to deploy Category A compliant antennas in the band. In this *Report and Order*, we also amend Section 101.115 of the Commission's Rules[275] to impose a duty on any FS licensee that deploys a smaller antenna in the 11 GHz band that does not comply with the Category A standard to ensure that the introduction of such antennas does not cause harmful interference to other licensees and applicants in the band. We find that the amendments we adopt in this *Report and Order* further the public interest and promote our goals of facilitating the efficient use of the 11 GHz band while also protecting other users in the band from interference.

B. Summary of Significant Issues Raised by Public Comments in Response to the *NPRM*

There were no comments filed that specifically addressed the rules and policies proposed in the IRFA.

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[269] *See Report and Order* at ¶ 33.

[270] 47 C.F.R. § 101.115.

[271] *See NPRM*, 22 FCC Rcd at 6068 ¶ 19 (*citing* Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the KU-Band Frequency Range, ET Docket No. 98-206, *Second Memorandum Opinion and Order*, 18 FCC Rcd 10084 (2003); Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz / 3700-4200 MHz Band and 14.0-14.5 GHz / 11.7-12.2 GHz Bands, IB Docket No. 02-10, *Report and Order*, 20 FCC Rcd 674 (2005)).

[272] *See NPRM*, 22 FCC Rcd at 6068 ¶ 19 (*citing* Reorganization and Revision of Parts 1, 2, 21, and 94 of the Rules to Establish a New Part 101 Governing Terrestrial Microwave Fixed Radio Services, *Memorandum Opinion and Order and Notice of Proposed Rulemaking*, WT Docket 94-148, 15 FCC Rcd 3129 (2000) (seeking comment on permitting smaller antennas in the 10 GHz band); Amendment of Part 101 of the Commission's Rules to Streamline Processing of Microwave Applications in the Wireless Telecommunications Services, WT Docket 00-19, *Report and Order*, 17 FCC Rcd 15040 (2002) (adopting smaller antennas for the 10 GHz band)).

[273] *See* 47 C.F.R. § 101.115.

[274] 47 C.F.R. § 101.115.

[275] *See* 47 C.F.R. § 101.115.

C. Description and Estimate of the Number of Small Entities To Which Rules Will Apply

The RFA directs agencies to provide a description of, and where feasible, an estimate of the number of small entities that may be affected by the rules adopted herein.[276] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[277] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[278] A "small business concern" is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.[279]

Nationwide, there are a total of approximately 22.4 million small businesses, according to SBA data.[280] A "small organization" is generally "any not-for-profit enterprise which is independently owned and operated and is not dominant in its field."[281] Nationwide, as of 2002, there were approximately 1.6 million small organizations.[282] The term "small governmental jurisdiction" is defined generally as "governments of cities, towns, townships, villages, school districts, or special districts, with a population of less than fifty thousand."[283] Census Bureau data for 2002 indicate that there were 87,525 local governmental jurisdictions in the United States.[284] We estimate that, of this total, 84,377 entities were "small governmental jurisdictions."[285] Thus, we estimate that most governmental jurisdictions are small.

Fixed Microwave Services. Microwave services include common carrier,[286] private-operational fixed,[287] and broadcast auxiliary radio services.[288] At present, there are

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[276] 5 U.S.C. § 604(a)(3).

[277] 5 U.S.C. § 601(6).

[278] 5 U.S.C. § 601(3) (incorporating by reference the definition of "small-business concern" in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register."

[279] 15 U.S.C. § 632.

[280] *See* SBA, Programs and Services, SBA Pamphlet No. CO-0028, at page 40 (July 2002).

[281] 5 U.S.C. § 601(4).

[282] Independent Sector, The New Nonprofit Almanac & Desk Reference (2002).

[283] 5 U.S.C. § 601(5).

[284] U.S. Census Bureau, Statistical Abstract of the United States: 2006, Section 8, page 272, Table 415.

[285] We assume that the villages, school districts, and special districts are small, and total 48,558. See U.S. Census Bureau, Statistical Abstract of the United States: 2006, section 8, page 273, Table 417. For 2002, Census Bureau data indicate that the total number of county, municipal, and township governments nationwide was 38,967, of which 35,819 were small. *Id.*

[286] 47 C.F.R. Part 101 *et seq.* (formerly, part 21 of the Commission's Rules) for common carrier fixed microwave services (except MDS).

approximately 36,708 common carrier fixed licensees and 59,291 private operational-fixed licensees and broadcast auxiliary radio licensees in the microwave services. The Commission has not yet defined a small business with respect to microwave services. For purposes of the FRFA, we will use the SBA's definition applicable to Cellular and other Wireless Telecommunications companies – *i.e.*, an entity with no more than 1,500 persons.[289] Census Bureau data for 2002 show that there were 1,397 firms in this category that operated for the entire year.[290] Of this total, 1,378 firms had employment of 999 or fewer employees, and 19 firms had employment of 1,000 employees or more.[291] Thus, under this size standard, the majority of firms can be considered small. We note that the number of firms does not necessarily track the number of licensees. We estimate that all of the Fixed Microwave licensees (excluding broadcast auxiliary licensees) would qualify as small entities under the SBA definition.

Satellite Telecommunications and Other Telecommunications. There is no small business size standard developed specifically for providers of international service. The appropriate size standards under SBA rules are for the two broad census categories of "Satellite Telecommunications" and "Other Telecommunications." Under both categories, such a business is small if it has $13.5 million or less in average annual receipts.[292]

The first category of Satellite Telecommunications "comprises establishments primarily engaged in providing point-to-point telecommunications services to other establishments in the telecommunications and broadcasting industries by forwarding and receiving communications signals via a system of satellites or reselling satellite telecommunications."[293] For this category, Census Bureau data for 2002 show that there were a total of 371 firms that operated for the entire year.[294] Of this total, 307 firms had annual receipts of under $10 million, and 26 firms had

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[287] Persons eligible under Parts 80 and 90 of the Commission's rules can use Private-Operational Fixed Microwave services. *See* 47 C.F.R. Parts 80 and 90. Stations in this service are called operational-fixed to distinguish them from common carrier and public fixed stations. Only the licensee may use the operational-fixed station, and only for communications related to the licensee's commercial, industrial, or safety operations.

[288] Auxiliary Microwave Service is governed by Part 74 of Title 47 of the Commission's Rules. *See* 47 C.F.R. Part 74 *et seq.* Available to licensees of broadcast stations and to broadcast and cable network entities, broadcast auxiliary microwave stations are used for relaying broadcast television signals from the studio to the transmitter, or between two points such as a main studio and an auxiliary studio. The service also includes mobile TV pickups, which relay signals from a remote location back to the studio.

[289] 13 C.F.R. § 121.201, NAICS code 517212.

[290] U.S. Census Bureau, 2002 Economic Census, Subject Series: Information, "Establishment and Firm Size (Including Legal Form of Organization," Table 5, NAICS code 517212 (issued Nov. 2005).

[291] *Id.* The census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with "1000 employees or more."

[292] 13 C.F.R. § 121.201, NAICS codes 517410 and 517910.

[293] U.S. Census Bureau, 2002 NAICS Definitions, "517410 Satellite Telecommunications"; http://www.census.gov/epcd/naics02/def/NDEF517.HTM.

[294] U.S. Census Bureau, 2002 Economic Census, Subject Series: Information, "Establishment and Firm Size (Including Legal Form of Organization)," Table 4, NAICS code 517410 (issued Nov. 2005).

receipts of $10 million to $24,999,999.[295] Consequently, we estimate that the majority of Satellite Telecommunications firms are small entities that might be affected by our action.

The second category of Other Telecommunications "comprises establishments primarily engaged in (1) providing specialized telecommunications applications, such as satellite tracking, communications telemetry, and radar station operations; or (2) providing satellite terminal stations and associated facilities operationally connected with one or more terrestrial communications systems and capable of transmitting telecommunications to or receiving telecommunications from satellite systems."[296] For this category, Census Bureau data for 2002 show that there were a total of 332 firms that operated for the entire year.[297] Of this total, 259 firms had annual receipts of under $10 million and 15 firms had annual receipts of $10 million to $24,999,999.[298] Consequently, we estimate that the majority of Other Telecommunications firms are small entities that might be affected by our action.

Space Stations (Geostationary). Commission records reveal that there are 15 space station licensees. We do not request nor collect annual revenue information, and thus are unable to estimate of the number of geostationary space stations that would constitute a small business under the SBA definition cited above, or apply any rules providing special consideration for Space Station (Geostationary) licensees that are small businesses.

Fixed Satellite Transmit/Receive Earth Stations. Currently there are approximately 3,390 operational fixed-satellite transmit/receive earth stations authorized for use in the C- and Ku-bands. The Commission does not request or collect annual revenue information, and thus is unable to estimate the number of earth stations that would constitute a small business under the SBA definition.

D. Description of Projected Reporting, Recordkeeping, and other Compliance Requirements

This *Report and Order* adopts no new reporting or recordkeeping requirements. This *Report and Order* adopts amendments to Part 101 of the Commission's Rules to afford FS licensees in the 11 GHz band with the flexibility to deploy smaller antennas that comply with the less stringent Category B standard or to maintain as well as continue to deploy antennas that comply with the more stringent Category A standard. The proposed amendments would apply equally to large and small entities and benefit all FS licensees by reducing the burden of seeking individual waivers to permit the use of smaller antennas in the 11 GHz band.

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[295] *Id.* An additional 38 firms had annual receipts of $25 million or more.

[296] U.S. Census Bureau, 2002 NAICS Definitions, "517910 Other Telecommunications"; http://www.census.gov/epcd/naics02/def/NDEF517.HTM.

[297] U.S. Census Bureau, 2002 Economic Census, Subject Series: Information, "Establishment and Firm Size (Including Legal Form of Organization)," Table 4, NAICS code 517910 (issued Nov. 2005).

[298] *Id.* An additional 14 firms had annual receipts of $25 million or more.

E. Steps taken to Minimize Significant Economic Impact on Small Entities, and Significant Alternatives Considered

The RFA requires an agency to describe any significant alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; (3) the use of performance rather than design standards; and (4) an exemption from coverage of the rule, or any part thereof for small entities.[299]

In this *Report and Order*, we adopt amendments to Section 101.115 of the Commission's Rules[300] to revise the Category B standard for the 11 GHz band to permit, as proposed in the *NPRM*,[301] the use of FS antennas with reduced mainbeam gain, increased beamwidth, and modified sidelobe suppression. Licensees in the FS will now have additional options to deploy smaller antennas in the 11 GHz band that comply with the revised Category B standard while retaining the discretion to maintain and continue to deploy antennas that comply with the more stringent Category A standard, which has not been modified in this *Report and Order*. Smaller antennas that comply with the revised Category B standard cost less to acquire, deploy, and maintain, thereby reducing the expenditure of capital and human resources otherwise necessary to deploy and maintain Category A compliant antennas. We conclude in this *Report and Order* that our action serves the public interest by facilitating the efficient use of the 11 GHz band. The deployment of smaller antennas that comply with the revised Category B standard could promote a wide range of fixed microwave applications that are not currently being provided for in the 11 GHz band for financial, aesthetic, and regulatory reasons. In addition, a number of the commenting parties in this proceeding identify themselves as small business entities and express their need to deploy smaller antennas in the 11GHz band in order to open up economic opportunities and to provide for a wide range of services, including, for example, the provision of backhaul services.

Report to Congress: The Commission will send a copy of the *Report and Order*, including this FRFA, in a report to be sent to Congress pursuant to the Congressional Review Act.[302] In addition, the Commission will send a copy of the *Report and Order*, including the FRFA, to the Chief Counsel for Advocacy of the SBA. A copy of the *Report and Order* and the FRFA (or summaries thereof) will also be published in the Federal Register.[303]

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[299] 5 U.S.C. § 603(c).

[300] *See* 47 C.F.R. § 101.115.

[301] 47 C.F.R. § 101.115.

[302] *See* 5 U.S.C. § 801(a)(1)(A).

[303] *See* 5 U.S.C. § 604(b).

STATEMENT OF COMMISSIONER JONATHAN S. ADELSTEIN

Amendment of Part 101 of the Commission's Rules to Modify Antenna Requirements for the 10.7 – 11.7 GHz Band; Nextlink Wireless, Inc.; First Avenue Networks, Inc.; Telecom Transport Management, Inc.; Conterra Ultra Broadband, LLC; WT Docket No. 07-54, RM-11043.

I am pleased to support this Report and Order providing for the use of smaller antennas by Fixed Service operators in the 11 GHz band. Granting the flexibility for carriers to utilize this available and evolving technology will allow for greater spectral and cost efficiencies. I have previously encouraged the use of smaller antennas in light of the benefits achieved from their use. In particular, our actions today should make it easier for the last-mile delivery of wireless broadband services to buildings that may currently be difficult or expensive to reach with antennas allowed under our prior rules. I am also pleased that the item endorses principles to address aggregate interference concerns in a manner that protects incumbent licensees while not disrupting the use and expansion of terrestrial microwave services in the band.

Technology in the wireless space moves too fast to be delayed by an unnecessarily long deliberation at the FCC. I am happy to support this item that moves our wireless broadband efforts forward.

STATEMENT OF COMMISSIONER DEBORAH TAYLOR TATE

Amendment of Part 101 of the Commission's Rules to Modify Antenna Requirements for the 10.7 – 11.7 GHz Band; Nextlink Wireless, Inc.; First Avenue Networks, Inc.; Telecom Transport Management, Inc.; Conterra Ultra Broadband, LLC; WT Docket No. 07-54, RM-11043.

This order provides the kind of useful regulatory relief that is too often overlooked in the good work of the Commission. In adopting this order, the Commission enables the use of smaller, two-foot antennas by Fixed Service (FS) licensees in the 10.7 – 11.7 GHz band, while confirming its commitment to avoid harmful interference to existing Fixed Satellite Service (FSS) licensees that also use the band. Fixed Service licensees will be able to offer service from locations that cannot or will not allow for larger antennas that were previously required as a result of the Commission's rules, thus enabling expansion in more areas and more potential entrants in the market. These licensees provide broadband services to schools and libraries and businesses, wireless backhaul to cellular carriers, and other services. As advances in technology surge ahead and the Commission continues to make more spectrum available to provide highly valued services, fixed services will be increasingly important in providing part of the backbone of this broadband infrastructure.

I am, therefore, pleased to support this item. I thank the Chairman for his leadership in getting this issue before the Commission, as well as the staff of the Wireless Bureau for their hard work on the item.

STATEMENT OF COMMISSIONER ROBERT M. McDOWELL

Amendment of Part 101 of the Commission's Rules to Modify Antenna Requirements for the 10.7 – 11.7 GHz Band; Nextlink Wireless, Inc.; First Avenue Networks, Inc.; Telecom Transport Management, Inc.; Conterra Ultra Broadband, LLC; WT Docket No. 07-54, RM-11043.

I am pleased that the Commission has moved quickly to approve the use of two-foot antennas in the 11 GHz Band. Our prompt action will enable the companies seeking relief, as well as others interested in entering the marketplace, to begin offering microwave backhaul service in the 11 GHz Band in areas where two-foot antennas are the most effective means of meeting customer needs. Furthermore, we have enabled these new entrants to compete with each other, as well as with landline backhaul providers, on an equal footing; thus increasing competition and lowering costs throughout the entire backhaul market. This is especially important as the consumer acceptance of 3G and 4G high speed data services increases the need for backhaul.

I thank the Chairman for expeditiously bringing this order forward, as well as the staff of the Wireless Bureau for their thoughtful and comprehensive analysis.