

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

In the Matter of)	
)	
Amendment of Part 101 of the Commission's)	
Rules to Facilitate the Use of Microwave for)	
Wireless Backhaul and Other Uses and to Provide)	WT Docket No. 10-153
Additional Flexibility to Broadcast Auxiliary)	
Service and Operational Fixed Microwave)	
Licensees)	
)	
Petition for Rulemaking filed by Fixed Wireless)	
Communications Coalition to Amend Part 101 of)	
the Commission's Rules to Authorize 60 and)	RM-11602
80 MHz Channels in Certain Bands for Broadband)	
Communications)	
)	

**SECOND REPORT AND ORDER, SECOND FURTHER NOTICE OF PROPOSED
RULEMAKING, SECOND NOTICE OF INQUIRY, ORDER ON RECONSIDERATION, AND
MEMORANDUM OPINION AND ORDER**

Adopted: August 3, 2012

Released: August 3, 2012

By the Commission: Chairman Genachowski and Commissioners McDowell, Clyburn, Rosenworcel and
Pai issuing separate statements.

Comment Date: [30 days after publication in the Federal Register]

Reply Comment Date: [45 days after publication in the Federal Register]

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I. INTRODUCTION

1. In this order, we take further steps to remove regulatory barriers and lower costs for the wireless microwave backhaul facilities that are important components of many mobile wireless networks. Broadband is indispensable to our digital economy, and wireless technology is an increasingly important

source of broadband connectivity. Microwave backhaul facilities are often used to transmit data between cell sites, or between cell sites and network backbones. Service providers' use of microwave links as an alternative to traditional copper circuits and fiber optic links has been increasing.¹ Microwave is a particularly important high-capacity backhaul solution in certain rural and remote locations.

2. In this *Second Report and Order, Second Further Notice of Proposed Rulemaking, Second Notice of Inquiry, Order on Reconsideration, and Memorandum Opinion and Order*, we continue our efforts to increase flexibility in the use of microwave services licensed under our Part 101 rules. The steps we take will remove regulatory barriers that today limit the use of spectrum for wireless backhaul and other point-to-point and point-to-multipoint communications. We also take actions that will reduce costs of deploying wireless backhaul in rural areas. By enabling more flexible and cost-effective microwave services, the Commission can help foster deployment of broadband infrastructure across America.

II. EXECUTIVE SUMMARY

3. In this *Second Report and Order, Second Further Notice of Proposed Rulemaking Second Notice of Inquiry, Order on Reconsideration, and Memorandum Opinion and Order*, we remove regulatory barriers to make better use of Fixed Service (FS) spectrum and provide additional flexibility to enable FS licensees to reduce operational costs and facilitate the use of wireless backhaul in rural areas. We also seek comment on additional ways to increase the flexibility, capacity, and cost-effectiveness of the microwave bands, while protecting incumbent licensees in these bands. Specifically, we take the following actions:

Second Report and Order:

- *Allowing Smaller Antennas in Certain Part 101 Antenna Standards:* The Part 101 rules establish directional antenna standards designed to maximize the use of microwave spectrum while avoiding interference between operators. Based on the record received in response to the *FNPRM*, we liberalize our rules to allow smaller antennas in the 6, 18, and 23 GHz bands without materially increasing interference.
- *Updating Efficiency Standards:* We update our efficiency standards to specify those rates in terms of bits/second/Hertz rather than outdated specifications from the circuit-switched era. We also define payload capacity in our Part 101 rules to account for Internet protocol radio systems. These actions will eliminate outdated regulations and ensure that our regulations take into account modern technologies.
- *Rural Efficiency Standards Policy:* We adopt a rural flexibility policy with respect to our efficiency standards using the Commission's waiver process in order to facilitate the use of microwave backhaul in rural areas by allowing substantial cost savings in deployment.
- *Allowing Wider Channels in 6 and 11 GHz Bands:* We allow microwave operators to create higher capacity links by licensing 60 and 80 megahertz channels in the 6 and 11 GHz microwave bands, respectively. Authorizing wider channels will allow FS operators to achieve faster data rates.

¹ In 2005, 8.7 percent of backhaul traffic was sent by fixed wireless. See *15th CMRS Competition Report* at 182 ¶ 320. By 2009, that figure increased to 12.3 percent. *Id.*

- *Revising Waiver Standard for Coordination with Satellite Uses:* To prevent interference to geostationary satellites, the Commission's Rules require microwave stations that point near the geostationary arc to obtain a waiver. We revise the rule to limit the circumstances where a waiver is necessary by conforming our rule to International Telecommunications Union (ITU) regulations. This change will eliminate unnecessary waiver filings without endangering satellite systems.

Second Further Notice of Proposed Rulemaking:

- *Allow Smaller Antennas in 13 GHz Band:* We seek comment on allowing smaller antennas in the 13 GHz Band in order to realize the same benefits that smaller antennas will offer in the 6, 18, and 23 GHz bands.
- *Revising Antenna Rules for 11 GHz Band:* We seek comment on revising the circumstances under which licensees in the 11 GHz band can reduce power in order to avoid having to upgrade their antennas. We also propose to amend our rules to ensure that applicants do not specify more power than they need.
- *Allowing Intermediate Antenna Upgrades:* Currently, if a licensee must upgrade its antenna in order to resolve an interference problem, it must upgrade to an antenna meeting the higher Category A standards contained in our rules. We propose to allow licensees to make lesser upgrades (*i.e.*, to an antenna that does not meet Category A standards) if the lesser upgrade would resolve the interference.

Second Notice of Inquiry:

- *Additional Changes to Antenna Standards:* We seek comment on making additional changes to our antenna standards to reflect advances in technology, accommodate non-parabolic antennas, and harmonize our standards with international standards.

Order on Reconsideration:

- *Affirm Existing Rules and Policies:* We affirm the rules and policies adopted in the *Wireless Backhaul Report and Order, Further Notice of Proposed Rulemaking, and Memorandum Opinion and Order (Wireless Backhaul R&O, FNPRM, and MO&O)*² and largely deny petitions for reconsideration of that order.

² See Amendment of Part 101 of the Commission's Rules to Facilitate the Use of Microwave for Wireless Backhaul and Other Uses and to Provide Additional Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave Licensees, *et al.*, WT Docket No. 10-153, *et al.*, *Report and Order, Further Notice of Proposed Rulemaking and Memorandum Opinion and Order*, 26 FCC Rcd 11614 (2011). When referring specifically to the *Report and Order* portion of the document, we will refer to the *R&O*. When referring specifically to the *Further Notice of Proposed Rulemaking* portion of the document, we will refer to the *FNPRM*. When referring specifically to the *Memorandum Opinion and Order* portion of the document, we will refer to the *MO&O*.

III. BACKGROUND

4. The Commission has licensed spectrum for microwave uses for most of its history.³ In 1996, the Commission consolidated its rules for most microwave point-to-point and point-to-multipoint services into a new Part 101 of the Commission's Rules.⁴ The Commission's licensing regime for these two services requires frequency coordination and the filing of an application for each microwave link or path containing detailed information concerning the proposed operation.⁵

5. In general, spectrum below 13 GHz is preferred for long-link backhaul because signals can overcome the rain fading effects that limit transmission distances at higher frequencies. Over time, a considerable amount of spectrum in this range that had been designated for microwave use has been redesignated for mobile wireless services.⁶ Bands above 13 GHz are being increasingly used for short distance backhaul in urbanized areas.⁷ Microwave operations have an extensive history of sharing spectrum with other services.⁸ On August 5, 2010, the Commission commenced this proceeding "to remove regulatory barriers to the use of spectrum for wireless backhaul and other point-to-point and point-to-multipoint communications."⁹

6. On August 9, 2011, the Commission made additional spectrum available for Fixed Service (FS) use and provided additional flexibility to enable FS licensees to reduce operational costs, facilitating the use of wireless backhaul in rural areas.¹⁰ Specifically, in the *R&O*, the Commission allowed FS to share the 6875-7125 MHz and 12700-13150 MHz bands currently used by the Broadcast Auxiliary Service (BAS) and the Cable Television Relay Service (CARS).¹¹ In addition, the Commission eliminated the "final link" rule that prohibits broadcasters from using FS stations as the final radiofrequency (RF) link in the chain of distribution of program material to broadcast stations.¹² The

³ For an extensive discussion of issues the Commission faced in allotting microwave spectrum, see *Allocation of Frequencies in the Bands Above 890 Mc.*, Docket No. 11866, *Report and Order*, 27 FCC 359 (1959).

⁴ *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*, WT Docket No. 94-148, *Report and Order*, 11 FCC Rcd 13449 (1996).

⁵ See 47 C.F.R. §§ 101.21(f), 101.103.

⁶ See 47 C.F.R. §§ 101.69-101.81, 101.83-101.97. Bands formerly used by microwave include the 1850-1990 MHz, 2110-2150 MHz, 2160-2200 MHz and 18.58-19.3 GHz band bands.

⁷ For example, Clearwire Corporation uses thousands of links in the 18 and 23 GHz bands with 50 megahertz channels to provide backhaul for its WiMAX network. Comments of Clearwire Corporation to Further Notice of Proposed Rulemaking (filed Oct. 4, 2011) (Clearwire Comments) at 5.

⁸ For a chart showing FS bands and the services that share spectrum with FS, see Amendment of Part 101 of the Commission's Rules to Facilitate the Use of Microwave for Wireless Backhaul and Other Uses and to Provide Additional Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave Licensees, *et al.*, WT Docket No. 10-153, *et al.*, *Notice of Proposed Rulemaking and Notice of Inquiry*, 25 FCC Rcd 11246, 11253 (2010) (*Wireless Backhaul NPRM/NOI*). When referring specifically to the *Notice of Proposed Rulemaking* portion of the document, we will refer to the *NPRM*. When referring specifically to the *Notice of Inquiry* portion of the document, we will refer to the *NOI*.

⁹ *Wireless Backhaul NPRM/NOI*.

¹⁰ *Wireless Backhaul R&O/FNPRM/MO&O*.

¹¹ *R&O*, 26 FCC Rcd at 11623-11630 ¶¶ 16-34.

¹² *R&O*, 26 FCC Rcd at 11631 ¶¶ 37-38.

Commission also modified the Part 101 minimum payload capacity rule to allow temporary operations below the minimum capacity under certain circumstances, enabling FS links – in particular long links in rural areas – to maintain critical communications during periods of fading.¹³

7. In the companion *FNPRM*, the Commission sought comment on additional proposals to remove regulatory barriers and facilitate backhaul deployment. Specifically, the Commission sought comment on (1) allowing smaller antennas in the 6, 18, and 23 GHz bands without materially increasing interference;¹⁴ (2) exempting licensees in non-congested areas from the efficiency standards and allowing other licensees to seek relief from these standards;¹⁵ (3) allowing microwave operators to create higher capacity links by licensing 60 and 80 megahertz channels in the 6 and 11 GHz microwave bands, respectively;¹⁶ (4) revising our rule that requires microwave stations that point near the geostationary arc to obtain a waiver to conform our rule to International Telecommunications Union (ITU) regulations;¹⁷ and (5) modifying the definition of payload capacity in our Part 101 rules to account for Internet protocol radio systems.¹⁸

8. Additionally, four parties filed petitions for reconsideration of the *R&O* and/or *MO&O*: Engineers for the Integrity of Broadcast Auxiliary Services Spectrum (EIBASS),¹⁹ the Fixed Wireless Communications Coalition (FWCC),²⁰ Motorola Solutions, Inc./Cambium Networks (Cambium),²¹ and Wireless Communications Association International, Inc. (WCAI).²² Comments on the *FNPRM* were due October 4, 2011, and reply comments were due October 25, 2011.²³

¹³ *R&O*, 26 FCC Rcd at 11633-11637 ¶¶ 44-53.

¹⁴ *FNPRM*, 26 FCC Rcd at 11645-11647 ¶¶ 73-78.

¹⁵ *FNPRM*, 26 FCC Rcd at 11648-11649 ¶¶ 82-85.

¹⁶ *FNPRM*, 26 FCC Rcd at 11651 ¶¶ 89-92.

¹⁷ *FNPRM*, 26 FCC Rcd at 11652-11653 ¶ 95.

¹⁸ *FNPRM*, 26 FCC Rcd at 11654 ¶ 98.

¹⁹ EIBASS Comments to Further Notice of Proposed Rulemaking and Petition for Partial Reconsideration (filed Sep. 27, 2011) (EIBASS Petition).

²⁰ Petition for Reconsideration of the Fixed Wireless Communications Coalition (filed Oct. 27, 2011) (FWCC Petition).

²¹ Petition for Partial Reconsideration of Motorola Solutions, Inc. (filed Oct. 27, 2011) (Cambium Petition). The petition was filed in the name of Motorola Solutions, Inc. On October 31, 2011, Motorola sold the relevant business to Vector Capital, which operates the business under the name Cambium Networks. Cambium Petition at 1 n.1.

²² Wireless Communications Association International, Inc. (filed Oct. 27, 2011) (WCAI Petition). A list of petitioners and responsive pleadings is attached as Attachment E.

²³ See Facilitating the Use of Microwave for Wireless Backhaul and Other Uses and Providing Additional Flexibility To Broadcast Auxiliary Service and Operational Fixed Microwave Licensees; *Proposed Rule*, 76 FR 59614 (Sep. 27, 2011). A list of commenters is attached as Attachment F.

IV. SECOND REPORT AND ORDER

A. Smaller Antennas in the 6, 18, and 23 GHz Bands

1. Background

9. Section 101.115(b) of the Commission's Rules establishes directional antenna standards designed to maximize the use of microwave spectrum while avoiding interference between operators.²⁴ 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).²⁵ 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.²⁶ 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.²⁷ The Commission adopts antenna specifications based on the technical sophistication of the communications equipment and the needs of the various users of the band at the time.²⁸ Indeed, the Commission adopted similar technical specifications that effectively limited the size of antennas used in other bands.²⁹ Periodically, the Commission has since reconsidered some of those antenna specifications in light of the technological evolution of communications equipment.³⁰

10. In the *FNPRM*, the Commission sought comment on modifying the antenna standards set forth in the Commission's Rules to permit the use of smaller antennas in the 5925-6875 MHz band (6 GHz band), 17700-18820 MHz and 18920-19700 MHz bands (18 GHz band), and 21200-23600 MHz band (23 GHz band).³¹ For each band, the Commission proposed standards based on suggestions from

²⁴ 47 C.F.R. § 101.115(b).

²⁵ See 47 C.F.R. § 101.115(b).

²⁶ See 47 C.F.R. § 101.115(c).

²⁷ We may herein refer to those antennas that comply with the Category A standard as Category A antennas and those antennas that do not comply with the Category A standard as Category B antennas.

²⁸ See 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, *Report and Order*, 22 FCC Rcd 17153, 17156 ¶ 3 (2007) (*11 GHz R&O*); 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).

²⁹ See, e.g., *11 GHz R&O*, 22 FCC Rcd at 17156 ¶ 3; 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).

³⁰ See, e.g. *11 GHz R&O* (adopting rules allowing smaller antennas in the 11 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, 15073-15073 ¶¶ 74-77 (2002) (adopting rules allowing smaller antennas for 10 GHz and 23 GHz bands); 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).

³¹ *FNPRM*, 26 FCC Rcd at 11645 ¶ 73.

Comsearch in response to the *NOI*. Specifically, in the 6 GHz band, the Commission sought comment on antenna standards that would permit the use of 3-foot antennas,³² in 18 GHz, standards that would allow one-foot antennas,³³ and in the 23 GHz band, eight-inch antennas.³⁴ The Commission noted that for each of those bands, it was proposing changes only to the standards for Category B antennas.³⁵

11. The Commission asked that parties specifically discuss each standard in offering further comments on the proposed modifications.³⁶ It sought comment on whether the proposed amendments would facilitate the efficient use of those bands by affording FS licensees the flexibility to install smaller antennas in those bands while appropriately protecting other users in the bands from interference.³⁷ Because smaller, lower-gain antennas result in more radiofrequency energy being transmitted in the side lobes off the main point-to-point link, the Commission asked whether the use of smaller antennas pursuant to the proposed modifications will adversely affect other users in the specific bands by increasing the risk of interference.³⁸ The Commission asked proponents of allowing smaller antennas to provide specific information quantifying how much money licensees could save in antenna, tower-siting, and deployment costs if the Commission authorized the use of smaller antennas.³⁹

12. Commenting parties strongly support the deployment of smaller antennas at 6, 18 and 23 GHz.⁴⁰ They contend that relaxing antenna standards to permit the use of smaller antennas in the 6 GHz, 18 GHz, and 23 GHz bands will reduce costs, stimulate investment in the industry, and increase the number of available microwave dishes on sites.⁴¹ Commenters believe the proposed amendments would facilitate the efficient use of those bands by affording FS licensees the flexibility to install smaller antennas in those bands while appropriately protecting other users in the bands from interference.⁴²

³² *FNPRM*, 26 FCC Rcd at 11646 ¶ 75.

³³ *Id.*

³⁴ *Id.*

³⁵ *Id.*

³⁶ *FNPRM*, 26 FCC Rcd at 11646 ¶ 76.

³⁷ *Id.*

³⁸ *FNPRM*, 26 FCC Rcd at 11646 ¶ 77.

³⁹ *Id.*

⁴⁰ Clearwire Comments at 2, 6-8; Reply Comments of Clearwire Corporation to Further Notice of Proposed Rulemaking (filed Oct. 25, 2011) (Clearwire Reply Comments) at 1-2, Comments of Comsearch (filed Oct. 4, 2011) (Comsearch Comments) at 1-7, Comments of FiberTower Corporation (filed Oct. 4, 2011) (FiberTower Comments) at 2-4; Comments of the Fixed Wireless Communications Coalition (filed Oct. 4, 2011) (FWCC Comments) at 3-5, Reply Comments of the Fixed Wireless Communications Coalition (filed Oct. 25, 2011) (FWCC Reply Comments) at 2-3; Comments of MetroPCS Communications Inc. (filed Oct. 4, 2011) (MetroPCS Comments) at 4-6; Comments of PCIA – The Wireless Infrastructure Association (filed Oct. 4, 2011) (PCIA Comments) at 2-3; Reply Comments of United States Cellular Corporation (filed Oct. 25, 2011) (U.S. Cellular Reply Comments) at 2-3; Comments of the Wireless Internet Service Providers Association (filed Oct. 25, 2011) (WISPA Reply Comments) at 2-3.

⁴¹ *See, e.g.*, Clearwire Comments at 6-8; Clearwire Reply Comments at 1-2; Comsearch Comments at 1-7; FiberTower Comments at 2-4; FWCC Comments at 3-5; FWCC Reply Comments at 2-4; MetroPCS Comments at 4; PCIA Comments at 2-3; U.S. Cellular Reply Comments at 2-3; WISPA Comments at 2-3.

⁴² *See* Clearwire Comments at 7; PCIA Comments at 4; U.S. Cellular Reply Comments at 2-3. EIBASS notes that “smaller sized microwave antennas do not have increased risk of interference; they have increased risk of precluding (continued....)”

Although it acknowledges that, “smaller antennas have a greater potential for interference due to their broader front radiation pattern, as well as more side and back radiation.”⁴³ FWCC asserts that other users are protected from interference because the proposed amendments will only be permitted in areas where congestion is not a problem.⁴⁴ U.S. Cellular asserts that the record in this proceeding shows how interference caused by the use of smaller antennas may be mitigated and, overall, demonstrates that it is possible to capture the benefits of permitting smaller antennas while preventing interference to other users.⁴⁵

13. Comsearch proposes two variations to the rules proposed in the *FNPRM*. First, Comsearch argues that the proposed standards should be adopted in addition to the existing Category B standard, instead of replacing the existing Category B standard,⁴⁶ because certain existing antennas would not be able to meet certain aspects of the proposed requirements (*e.g.*, front-to-back ratio).⁴⁷ Comsearch thus proposes that the Commission redesignate the existing Category B standard as Category B1 and adopt new standards as Category B2.⁴⁸ FWCC concurs with Comsearch on this issue.⁴⁹ Second, Comsearch proposes a power limit of 65 dBm Equivalent Isotropically Radiated Power (EIRP) on antennas that do not conform to Category A standards, in order to protect against increased interference potential and maintain spectrum efficiency.⁵⁰ FWCC concurs with Comsearch’s suggested modifications.⁵¹

14. For its part, FWCC suggests that the Commission slightly loosen the proposed antenna standards for the 18 GHz band.⁵² Comsearch agrees with this adjustment.⁵³

15. Commenting parties identify several types of cost savings that smaller antennas can offer. For example, FWCC states that the cost savings for installing a 2-foot antenna instead of a 6-foot antenna could range from \$1,575 to \$2,070.⁵⁴ Commenting parties note that smaller antennas are less expensive

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later-in-time stations from being able to be added. “In other words, relaxed microwave antenna performance is a spectrum efficiency issue, not an interference issue.” EIBASS Petition at 5.

⁴³ FWCC Comments at 4.

⁴⁴ FWCC Comments at 4. FWCC further notes that, if interference does occur, or is predicted for a new path, the rules should require an upgrade from Category B to A within a set time period. *Id.*

⁴⁵ U.S. Cellular Reply Comments at 2-3.

⁴⁶ Comsearch Comments at 2.

⁴⁷ Comsearch Comments at 2.

⁴⁸ Comsearch Comments at 2.

⁴⁹ FWCC Reply Comments at 2.

⁵⁰ Comsearch Comments at 3; FWCC Reply Comments at 2.

⁵¹ FWCC Reply Comments at 2.

⁵² FWCC Comments at 4. Specifically, FWCC proposes that the Commission establish 55 dB as the minimum radiation suppression at both 100°-140° and 140°- 180° (rather than 57 dB and 59 dB, respectively).

⁵³ *See* Letter from Christopher R. Hardy, Vice President, Comsearch to Marlene H. Dortch, Secretary, Federal Communications Commission (filed Mar. 7, 2012) (Comsearch March 7 *ex parte*) at 2.

⁵⁴ FWCC Comments at 3 (stating the estimated price difference between installing a 2-foot antenna and a 6-foot antenna would be \$1,575 (for the main antenna up to 100 ft. center line), \$1,800 (for the main antenna up to 101-200 (continued....))

to install because they weigh less, raise fewer concerns about wind loading, and require less costly structural modifications to towers.⁵⁵ Clearwire, for example, explains that the diameter of the antennas can have a significant impact on the structural analysis and stability of the tower and larger antennas increase deployment cost and require major structural modifications to the tower to install them.⁵⁶ According to MetroPCS, the costs for these studies and resulting structural improvements can run into the tens of thousands, if not hundreds of thousands, of dollars.⁵⁷ MetroPCS states, “Given that a system may comprise tens of thousands of sites, elimination of only a small percentage of site improvements could result in tens of millions of dollars saved.”⁵⁸ MetroPCS contends that reduced antenna sizes will decrease wind loading, and smaller dishes may not require engineering studies at all.⁵⁹

16. Commenting parties also highlight the cost savings to maintain a smaller antenna over the lifetime of the link.⁶⁰ PCIA explains that the cost of leasing space on wireless infrastructure for wireless backhaul antennas can be reduced with smaller antennas because the cost of the lease, in general, is based on the size and loading of the antennas and because a reduction in the size and load of the antenna will proportionately decrease the cost of leasing space on a wireless facility.⁶¹ MetroPCS specifically notes, as an example, that “the cost of a microwave dish antenna is approximately \$100 per foot per month. Thus, even if the revised rule allows for a reduction of just one foot, the annual savings would be \$1,200, and the savings over a ten year period would be \$12,000.”⁶² In addition to the cost savings to install and maintain a smaller antenna, commenting parties agree that smaller antennas also will allow for installation at a wider variety of sites that may otherwise be incapable of supporting larger dishes, such as rooftops and electrical transmission towers.⁶³

17. FiberTower states that additional savings occur in the entire logistical chain, which may include, and is not limited, to storage of spares on-site and in local, regional and national warehouses and in engineering and network services preparation and staging sites; storage and inventory of spares in operations and maintenance vehicles; the number of workers and the size and weight of cranes and other equipment that may be necessary to hoist, deploy, reconfigure, or decommission equipment; use and
(Continued from previous page) _____
ft. center line), \$2,025 (for the main antenna up to 201-300 ft. center line) and \$2,070 (for the main antenna up to 201-300 ft. center line)).

⁵⁵ See Clearwire Comments at 6-7; FiberTower Comments at 3; MetroPCS Comments at 4; WISPA Comments at 2-3.

⁵⁶ Clearwire Comments at 6; *see also* MetroPCS Comments at 5.

⁵⁷ MetroPCS Comments at 5.

⁵⁸ MetroPCS Comments at 5.

⁵⁹ MetroPCS Comments at 5.

⁶⁰ FWCC Comments at 3.

⁶¹ PCIA Comments at 2-3; *see also* FiberTower Comments at 3, WISPA Comments at 2-3.

⁶² MetroPCS Comments at 5; *see also* Reply Comments of Wireless Strategies, Inc. Regarding the Notice of Inquiry Review of Part 101 Antenna Standards WT Docket No. 10-153 (filed Oct. 5, 2011) (WSI Comments) at 1 (stating that the smallest Category A antenna size for a 6 GHz point-to-point link would have a diameter of six feet and that, with a typical site lease charge of \$100 per foot of antenna diameter, the antenna site lease charges alone would be \$1,200 per month).

⁶³ Clearwire Comments at 6; MetroPCS Comments at 5. Indeed, some commenting parties note that smaller antennas will allow existing towers to support a greater number of antennas without requiring additional structural modifications to the towers. Clearwire Comments at 6; MetroPCS Comments at 5-6.

storage and deployment of lighter mounting systems to complement the smaller antennas; cost of materials needed to build and package the equipment; and cost of shipping equipment between all the manufacturing, testing, warehousing, staging, vehicle, and usage sites.⁶⁴

2. Discussion

18. We adopt, with minor variations, the *FNPRM*'s proposal to allow smaller antennas in the 6, 18, and 23 GHz bands. The record demonstrates that smaller antennas can be accommodated without materially increasing the interference risk to other licensees. Clearwire cites "technology advancements and more sophisticated band sharing techniques" as developments that would allow us to loosen the Category B antenna standards without an increased risk of interference.⁶⁵ Furthermore, as noted above, a variety of operators who use microwave support the proposed standards. Under our rules, if smaller antennas would cause an interference conflict with another applicant or licensee, the applicant proposing the smaller antenna must upgrade its antenna.⁶⁶ Allowing smaller antennas will facilitate wireless backhaul deployments in two ways. As discussed in greater detail below, smaller antennas allow significant cost savings because they are cheaper to manufacture, install, and maintain. Smaller antennas also allow existing towers to accommodate more antennas and allow installations at sites that would not otherwise be able to accommodate larger antennas. Indeed, there could be instances where allowing the use of smaller antennas may be critical in allowing the use of wireless backhaul by broadband operators.

19. We adopt Comsearch's proposal to implement the proposed standards as Category B2 and keep the existing standards as Category B1, allowing applicants to choose between those standards. That approach will maximize flexibility for applicants and allow existing licensees to keep their antennas. We also adopt FWCC's and Comsearch's proposal to slightly loosen the proposed antenna standards for the 18 GHz band. No party argued that the revised standards would raise any interference concerns in any of the relevant bands.

20. We do not adopt Comsearch's proposal to adopt a power limit on licensees using smaller antennas. Adopting a power limit may artificially limit path length because path length is directly related to the EIRP. A particular path will require operation at the same EIRP whether the operator uses a Category A antenna or a Category B antenna. When EIRP is equivalent, a Category B antenna will radiate more energy in the side lobes than a Category A antenna. In areas where another operator is not in proximity, for example, rural and other uncongested areas, the extra side lobe radiation will not cause any additional interference. In those areas, a licensee can use a smaller and cheaper antenna without harming other FS operators. If we were to restrict power across the board, there may be instances where operators may not be able to realize the full benefits of smaller antennas. We find that our existing rules are sufficient to protect against the potential for increased side lobe radiation. If interference occurs, the rules require the licensee to upgrade its antenna if the upgrade would mitigate the interference.⁶⁷

21. We find that permitting smaller antennas in the 6, 18 and 23 GHz bands will benefit operators and consumers alike and that these benefits outweigh any potential costs. Our actions today will enable these spectrum bands to be used more intensively for wireless backhaul, public safety, and other critical uses. Even for a single link, which consists of two transmitters and two antennas, the cost

⁶⁴ FiberTower Comments at 3.

⁶⁵ Clearwire Comments at 6.

⁶⁶ See 47 C.F.R. § 101.115(c).

⁶⁷ See 47 C.F.R. § 101.115(c).

savings from allowing smaller antennas can be substantial. Savings in installation costs for the link would likely be over \$2,000 for two antennas.⁶⁸ MetroPCS estimates that if a smaller antenna eliminates the need for wind loading studies or structural changes to a tower, the cost savings could run “into the tens of thousands, if not hundreds of thousands, of dollars.”⁶⁹ There would also be savings in operational costs. For example, if an operator using a 6 GHz link is able to use 3-foot antennas instead of 6-foot antennas, its site rental costs could decrease by \$7,200 each year.⁷⁰ There are also additional cost savings noted by FiberTower and others. When those cost savings are multiplied by the thousands of links that are authorized in the 6 GHz band each year,⁷¹ even if a relatively small percentage of authorized links could use smaller antennas, there could be many instances where operators could recognize cost savings. While the cost savings in the 18 and 23 GHz bands would be smaller, since there is less difference in the size of antennas, there would still be cost savings. On the other hand, there is some risk that a carrier taking advantage of these new rules may have to upgrade to a Category A antenna later. We believe that in many cases, this potential cost will be discovered and avoided in the coordination process. We also note that licensees are not required to use smaller antennas.

B. Updating Efficiency Standards

1. Background

22. To promote efficient frequency use for various channel sizes in certain Part 101 frequency bands, Section 101.141(a)(3) of the Commission’s rules requires FS operators to establish minimum payload capacities (in terms of megabits per second) and minimum traffic loading payloads (as a percentage of payload capacity).⁷² That rule lists a “minimum payload capacity” for various nominal channel bandwidths.⁷³ The term “payload capacity” is not defined. The same rule also defines “typical utilization” of the required payload capacity for each channel bandwidth as multiples of the number of voice circuits a channel can accommodate.⁷⁴

23. The *FNPRM* sought comment on changes to modernize the payload capacity rule, particularly on a proposal made by Comsearch to de-emphasize the legacy voice-based data rates and instead emphasize a consistent efficiency requirement in terms of bits-per-second-per-Hertz (“bps/Hz”).⁷⁵ Comsearch also asked the Commission to define “payload capacity” as “the bit rate available for transmission of data over a radiocommunication system, excluding overhead data generated by the

⁶⁸ See FWCC Comments at 3. We note that FWCC provides installation cost savings for a change from 6 foot antennas to 2 foot antennas. We presume that the savings for 3 foot antennas would be somewhat less.

⁶⁹ See Metro PCS Comments at 5.

⁷⁰ FWCC, Metro PCS and WSI note each foot increase in the size of the antenna typically increases site rental costs by \$100 each month. See FWCC Comments at 3 n.6; Metro PCS Comments at 5; WSI Comments at 1. A change from 6 foot antennas to 3 foot antennas would decrease the site rental costs by 2 antennas X 3 feet X \$100/month X 12 months = \$7,200 a year.

⁷¹ For example, according to the Wireless Telecommunications Bureau’s Universal Licensing System, over 9,000 applications for new or modified stations, involving more than 30,000 paths in the 6 GHz band were filed in 2011.

⁷² 47 C.F.R. § 101.141(a)(3).

⁷³ 47 C.F.R. § 101.141(a)(3), Table.

⁷⁴ 47 C.F.R. § 101.141(a)(3), Table.

⁷⁵ *FNPRM*, 26 FCC Rcd at 11653 ¶ 96.

system.”⁷⁶ Comsearch argued that, while the examples based on voice-based data rates were typical when the rule was written, they are becoming outdated as systems support other interfaces such as the Internet Protocol.⁷⁷ Comsearch also argued that the rule should be changed because the bandwidth efficiency requirements vary (from 2.46 to 4.47 bps/Hz) based on channel bandwidth, rather than having a uniform requirement for all channel bandwidths.⁷⁸ Comsearch asked the Commission to obtain input from equipment manufacturers and other interested parties to develop an appropriate efficiency rate in terms of bits-per-second-per-Hertz.⁷⁹

24. The *FNPRM* asked whether the Commission should adopt Comsearch’s definition of payload capacity, adopt an alternative definition or leave the term undefined.⁸⁰ The *FNPRM* asked commenters to identify advantages and disadvantages to defining the efficiency requirement in terms of bits-per-second-per-Hertz or in terms of some other metric.⁸¹ It sought input on an appropriate benchmark value to use in the event the agency decided to define the efficiency requirement in terms of bits-per-second-per-Hertz.⁸² The Commission further inquired whether the value should be the same across all frequency bands and across urban as well as rural areas.⁸³ It also asked for comments on whether there is any need to consider how the definition should be applied to legacy systems, *i.e.*, whether there would be a need to grandfather equipment that is currently installed or equipment that is currently on the market.⁸⁴

25. FWCC had originally recommended adoption of the efficiency requirements using bits/second/Hertz values adopted by Industry Canada, with appropriate adjustments for bands where Canada does not have FS services.⁸⁵ Comsearch supported those standards.⁸⁶ FWCC subsequently proposed an adjustment that would continue to express the standards based on bits/second/Hertz but tighten the standards for certain channel bandwidths in the 11 GHz and 13 GHz bands.⁸⁷

⁷⁶ *FNPRM*, 26 FCC Rcd at 11653 ¶ 96.

⁷⁷ *FNPRM*, 26 FCC Rcd at 11653 ¶ 96.

⁷⁸ *FNPRM*, 26 FCC Rcd at 11653 ¶ 97.

⁷⁹ *FNPRM*, 26 FCC Rcd at 11653-11654 ¶ 97.

⁸⁰ *FNPRM*, 26 FCC Rcd at 11654 ¶ 98.

⁸¹ *FNPRM*, 26 FCC Rcd at 11654 ¶ 98.

⁸² *FNPRM*, 26 FCC Rcd at 11654 ¶ 98.

⁸³ *FNPRM*, 26 FCC Rcd at 11654 ¶ 98.

⁸⁴ *FNPRM*, 26 FCC Rcd at 11654 ¶ 98.

⁸⁵ FWCC Comments at 8-9, *citing* Industry Canada Standard Radio System Plans accessible on Industry Canada’s web site at http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf06130.html. FWCC proposed a standard of 2.4 bits/second/Hertz if the channel bandwidth is less than or equal to 5 megahertz. For channel bandwidths greater than 5 megahertz, FWCC originally proposed a standard of 4.4 bits/second/Hertz for the 4 GHz, 6 GHz, 7 GHz, and 10 GHz bands, and 3.0 bits/second/Hertz for channels greater than 5 megahertz for the 11 and 13 GHz bands. FWCC Comments at 9.

⁸⁶ Comsearch Reply Comments at 3.

⁸⁷ FWCC June 29 *Ex Parte* at 2. Specifically, FWCC proposed applying the 4.4 bits/second/Hertz standard for channels between 5 and 20 megahertz wide in the 11 and 13 GHz band, while applying the previously proposed 3.0 bits/second/Hertz standard for channels greater than 20 megahertz wide. *Id.* For frequencies above 13 GHz, FWCC proposes maintaining the existing 1 bit/second/Hertz requirement of 47 C.F.R. § 101.141(a)(1). *Id.*

2. Discussion

26. We adopt the definition of payload capacity proposed in the *FNPRM* and replace our existing payload capacity requirements with updated standards based on bits-per-second-per-Hertz values. In addition, in response to concerns raised by Clearwire, we update our definition of “loading” for purposes of the payload capacity rule to ensure that FS facilities are effectively used while ensuring that operators can use modern configurations. Our actions today replace outdated regulations with updated regulations that take into account modern technologies.

27. First, we convert the current voice-circuit based efficiency standards to bit/second/Hertz standards using standards recently proposed by FWCC.⁸⁸ Commenters generally support the idea of replacing our existing payload capacity requirements with efficiency requirement expressed in terms of bits-per-second-per-Hertz.⁸⁹ We have reviewed the most recent standards proposed by FWCC, and find that they closely approximate what our current rules require and are otherwise appropriate.⁹⁰ This action will allow our payload capacity requirements to reflect modern technologies. Furthermore, if we allow new channel bandwidths in microwave bands, a bit/second/Hertz standard will automatically accommodate new channel bandwidths.

28. FWCC and Comsearch support the proposed definition of payload capacity as consistent with industry practice.⁹¹ We adopt the proposed definition because it is useful to define that term in our rules and the proposed definition is appropriate.⁹²

29. A second and related issue is the definition of “throughput” for purposes of the efficiency standards. The definition is important because FS operators use a variety of network configurations, and using an unnecessarily restrictive definition of throughput can prevent operators from using some of those network configurations. We consider two proposals offered by commenters and adopt an approach that meets both of their objectives.

30. Clearwire supports the idea of adjusting the minimum payload requirements to account for the increased capacity that would be available with wider bandwidth channels.⁹³ It expresses concern, however, that simply establishing a bits/second/Hertz standard may not be appropriate for modern network topologies.⁹⁴ Clearwire uses an Ethernet-based microwave mesh that relies on a ring topology to provide 99.999 percent network availability by providing redundant link diversity from every cell site

⁸⁸ Letter from Mitchell Lazarus, counsel for Comsearch and the Fixed Wireless Communications Coalition to Marlene H. Dortch, Secretary, Federal Communications Coalition (filed Jun. 21, 2012) (Comsearch/FWCC June 21 *Ex Parte*)

⁸⁹ FWCC Comments at 9; Comsearch Reply Comments at 3; Clearwire Comments at 10. FWCC proposed a standard of 2.4 bits/second/Hertz if the channel bandwidth is less than or equal to 5 megahertz. For channel bandwidths greater than 5 megahertz, FWCC originally proposed a standard of 4.4 bits/second/Hertz for the 4 GHz, 6 GHz, 7 GHz, and 10 GHz bands, and 3.0 bits/second/Hertz for channels greater than 5 megahertz for the 11 and 13 GHz bands. FWCC Comments at 9.

⁹⁰ See FWCC June 29 *Ex Parte* at 3.

⁹¹ Comsearch Comments at 10; FWCC Comments at 8; June 29 *ex parte* at 2.

⁹² FWCC Comments at 9.

⁹³ Clearwire Comments at 10.

⁹⁴ Clearwire Reply Comments at 3-4.

location.⁹⁵ Normally, a ring is split in half with traffic travelling clockwise on one half and counterclockwise on the other half.⁹⁶ If a radio fails on a link, the traffic is aggregated and re-routed around the failed/downed link.⁹⁷ Because each link must be designed to carry enough data to accommodate failures elsewhere in the system, the links must be designed to be less than fully loaded during normal operation. Clearwire proposes that the Commission require applicants to designate each of its links with respect to its generic network topology.⁹⁸ For example, a link would be certified as either a ring, mesh, or other resilient network path (links), or as a linear (nonresilient) network topology path.⁹⁹ If the link were part of a ring, mesh, or other resilient network topology, the applicant would have to identify the link as either a “traffic bearing link” or a “management/resiliency link.”¹⁰⁰ Under Clearwire’s proposal, “management/resiliency links” would be exempt from the efficiency standards, while other links would have to comply with the applicable standards.¹⁰¹

31. FWCC recommends a different approach. FWCC asks that we drop the voice circuit designations in Sections 101.141(a)(6) and 101.141(a)(7) of the Commission’s rules, which define “loading” for purposes of existing rules, and replace them with a new Section 101.141(a)(6) to read as follows: “[d]igital systems using bandwidths of 10 megahertz or larger will be considered 50% loaded when at least 50% of their total payload capacity is being used.”¹⁰²

32. We believe the objectives behind the Clearwire and FWCC proposals can be met through a simpler approach. Therefore, we update our existing traffic loading requirements, which are not expressed in terms of actual data throughput but in terms of the capacities of multiplexers attached to the transmitters. The definition we adopt today will ensure the efficient use of spectrum while allowing operators to use network configurations with redundant links in order to maintain continuity of service if a link fails. While we update our definition to take into account current technologies, the definition we adopt uses an approach that is consistent with our current rule.

33. Section 101.141(a)(6) of the Commission’s rules states in part that “[a] DS-1 channel is being used when it has been connected to a DS-0/DS-1 multiplexer.”¹⁰³ Defining loading solely in terms of use of capacity, as proposed by FWCC, could be problematic for systems such as Clearwire’s backhaul systems with built in redundancy. On the other hand, we believe Clearwire’s proposal to require designations on links would be overly burdensome, particularly for licensees with thousands of links, and is unnecessary. If we apply our existing practice, Clearwire’s “management/resiliency” links could be in compliance with the efficiency standards.

⁹⁵ Clearwire Comments at 4-5.

⁹⁶ Clearwire Reply Comments at 4.

⁹⁷ Clearwire Reply Comments at 4.

⁹⁸ See Letter from Cathleen A. Massey, VP Regulatory Affairs & Public Policy, and Christiaan Segura, Regulatory Counsel, Clearwire Corporation to Marlene H. Dortch, Secretary, Federal Communications Commission (filed Jun. 19, 2012) (Clearwire June 19 *Ex Parte*) at 2.

⁹⁹ Clearwire June 19 *Ex Parte* at 2.

¹⁰⁰ Clearwire June 19 *Ex Parte* at 2.

¹⁰¹ Clearwire June 19 *Ex Parte* at 3.

¹⁰² See FWCC Comments at 9.

¹⁰³ See 47 C.F.R. § 101.141(a)(6).

34. We also believe that any revised definition of traffic loading should address the distinction between the rate at which Internet Protocol (IP) data reaches an FS link via a landline connection, which typically includes a substantial amount of overhead data, and the data that ends up being transmitted via FS, which is often stripped of most overhead data. IP traffic carries a significant amount of overhead data to facilitate the movement of data packets across the Internet, which is designed to accommodate alternate routing and, particularly under Internet Protocol version 6, traffic prioritization and enhanced security mechanisms.¹⁰⁴ Much of that data can safely be stripped out by the time a message reaches an FS link because FS links are typically deployed at the edges of the Internet, near the destinations of messages, and are engineered to high reliability standards. As Comsearch states, IP radio systems use header compression techniques to delete repetitive bits of data before they are transmitted over the airwaves.¹⁰⁵

35. To harmonize the proposals and respond to concerns expressed by Comsearch, FWCC, Clearwire and other commenters, we replace subsections 101.141(a)(6)-(7) with the following new subsection 101.141(a)(6), to read as follows:

Digital systems using bandwidths of 10 MHz or larger will be considered 50 percent loaded when at least 50 percent of their total capacity is being used. For purposes of this subsection, a Fixed Service channel is being used if it is attached to a communications system that is capable of providing data to it at a rate that is sufficient to occupy at least 50 percent of the payload capacity of the Fixed Service channel, after header compression is applied.

This definition should ensure that FS systems will be designed to carry the amount of data that is likely to be transmitted over them after IP radio systems remove extraneous header data, to the extent licensees use transmission systems that remove such data. It should also accommodate the needs of operators that deploy FS links in ring topologies, where excess capacity is needed to ensure network reliability.

C. Rural Microwave Flexibility Policy

1. Background

36. In the *FNPRM*, the Commission sought comment on exempting licensees from complying with the efficiency standards if the environment was sufficiently noncongested to allow the use of antennas meeting performance Standard B.¹⁰⁶ The Commission noted that Sprint Nextel Corporation, Cielo Networks, and Aviat Networks contended that providing relief from efficiency standards in rural areas could reduce the costs of deployments and allow for more microwave backhaul in rural areas.¹⁰⁷ The Commission suggested that relaxing efficiency standards might substantially increase possible path lengths and thereby dramatically improve the business case for deploying microwave backhaul facilities in certain rural areas.¹⁰⁸ The Commission noted that general relief may not be appropriate in congested areas because lowering efficiency standards could result in inefficient use of

¹⁰⁴ See Internet Protocol Version 6 Specification at <http://tools.ietf.org/html/rfc2460> (downloaded on May 25, 2012).

¹⁰⁵ See *FNPRM*, 26 FCC Rcd at 11653 ¶ 96.

¹⁰⁶ *FNPRM*, 26 FCC Rcd at 11648-11649 ¶¶ 82-85.

¹⁰⁷ *FNPRM*, 26 FCC Rcd at 11648 ¶ 82.

¹⁰⁸ *FNPRM*, 26 FCC Rcd at 11648 ¶ 82.

spectrum.¹⁰⁹ In congested areas requiring use of antennas meeting performance Standard A, the Commission sought comment on allowing applicants to obtain relief from the efficiency standards if they show that: (1) the efficiency standards prevent the deployment of the requested link for economic or technical reasons; (2) the applicant does not have any reasonable alternatives (*e.g.*, use of different frequency bands, use of fiber); and (3) relaxing the efficiency standards would result in tangible and specific public interest benefits.¹¹⁰

2. Discussion

37. We adopt a new policy, the Rural Microwave Flexibility Policy, designed to provide operators relief, through our waiver process, from the efficiency standards that may not be necessary in noncongested rural areas. Granting licensees in noncongested areas relief from these efficiency standards can facilitate the use of microwave backhaul in rural areas by allowing substantial cost savings in deployment. Indeed, granting relief from the efficiency standards could allow the use of microwave in areas where such use would not be economically feasible under the current rules. In adopting this policy, we take into consideration concerns raised by commenters and institute a series of criteria to ensure that relief is appropriately tailored. If experience with this Policy suggests that a rule change is warranted in the future, we will reconsider that possibility at the appropriate time.

38. Exempting licensees from the efficiency standards in noncongested areas can reduce the cost of deploying microwave backhaul facilities and substantially increase possible path lengths, thereby spurring deployment of broadband in rural areas. The benefits of relaxing efficiency standards in rural areas could be considerable. For example, in 2010, Sprint, FiberTower, and the Rural Telecommunications Group estimated the cost of deploying and operating a 6 GHz link covering 100 miles and requiring four different relay towers would be over \$3 million.¹¹¹ Additionally, FWCC has demonstrated that allowing a 6 GHz licensee to vary its modulation between 256 Quadrature Amplitude Modulation (a throughput of 208 Mbps) and Quadrature Phase Shift Keying (a throughput of 45 Mbps, about one-fifth of the throughput of 256 QAM) could extend the usable length of a link from 24.56 kilometers to 66.45 kilometers, because the lower throughput allows the operator to maintain reliability over a longer distance.¹¹²

39. An increase in usable path length would allow some operators to replace multiple paths with single paths. For each intermediate relay station that could be eliminated, the operator would save the cost of a transmitter, antenna, and site rental for that relay site. If one uses the \$3 million cost estimate provided by Sprint, FiberTower, and the Rural Telecommunications Group, and assumes that each station contributes equally to the overall cost of the link (two end stations and four intermediate relay stations), the cost of each intermediate relay station would be approximately \$500,000. A review of our licensing data shows that there are over 22,000 stations in the 6 GHz and 11 GHz bands that currently use Category B antennas that would potentially be eligible for such relief. Moreover, there may be many

¹⁰⁹ *FNPRM*, 26 FCC Rcd at 11648 ¶ 83.

¹¹⁰ *FNPRM*, 26 FCC Rcd at 11649 ¶ 84.

¹¹¹ See *ex parte* presentation of Sprint Nextel Corporation, FiberTower Corporation, and Rural Telecommunications Group, Inc., ET Docket No. 04-186 (filed Aug. 24, 2010) at 20.

¹¹² See Letter from Mitchell Lazarus and Christine E. Goepp, counsel for the Fixed Wireless Communications Coalition to Marlene H. Dortch, Secretary, Federal Communications Coalition (filed Apr. 29, 2011) (*FWCC April 29 Ex Parte*) at Appendix. By way of comparison, under the updated efficiency standards we adopt today, the minimum required throughput for a 30 megahertz channel in the 6 GHz band in a congested area will be 132 Mbps.

more sites where microwave service is not yet deployed because of the prohibitive cost of multiple hops. In these cases, a more flexible policy could spur increased broadband “middle mile” deployment.

40. Even if an intermediate relay station cannot be eliminated, providing relief from the minimum payload capacity rule can result in cost savings. Allowing use of lower data rates could allow licensees to use less expensive transmitters and lower power, both of which would result in cost savings. Under the revised minimum capacity requirements that we are adopting in this order, for example, a transmitter operating with a bandwidth of five megahertz in congested areas must have a minimum capacity of 22 megabits per second (Mbps/s). By looking to publicly available sources of equipment pricing, it appears that an operator could realize significant cost savings.¹¹³

41. Several commenters express concerns about the proposal in the *FNPRM* for an exemption from the efficiency standards. Comsearch believes that the Commission’s actions in allowing use of adaptive modulation and allowing the use of smaller antennas in microwave bands provide sufficient cost savings such that relief from the efficiency standards would be unnecessary.¹¹⁴ FWCC believes that granting relief from the efficiency standards could “lock in” inefficient usage if an area subsequently becomes congested.¹¹⁵ Comsearch and FWCC believe that basing relief from the efficiency standards on the use of a Category B antenna could provide operators with incentives to use less efficient Category B antennas and lower capacity radio equipment and may punish applicants who have other reasons for using Category A antennas.¹¹⁶ As an alternative, Comsearch and FWCC propose granting relief from the traffic loading requirements in noncongested areas.¹¹⁷ FiberTower and US Cellular also support granting relief from the traffic loading requirements.¹¹⁸ FWCC also proposes a set of conditions for areas eligible for relaxed rural efficiency rules.¹¹⁹ These conditions are designed to ensure that such deployments do not occur in areas that may become congested, thereby protecting against the “lock in” problem.

42. We recognize commenters’ concerns about the impact of providing relief from efficiency standards in rural areas, but we find there is a better approach than the alternatives presented. FWCC and

¹¹³ For example, Alcatel-Lucent charges Federal agencies \$23,121 for 32 dBm transceivers capable of meeting that requirement. U.S. General Services Administration, GSA Advantage search engine web page at www.gsaadvantage.gov (“GSA Price List”) (downloaded on May 29, 2012) (price for Alcatel-Lucent MDR-8708E-24-32-NS Microwave radio, Ethernet, 7/8 GHz Frequency Band (7125-8500 MHz), 16 DS1, Transmit Power 32 dBm, Non-Standby). DS1 is 1.544 Mbit/s. By contrast, five megahertz transmitters in uncongested areas that qualify for waivers will be required to have minimum capacities of 5 Mbps/s. A 15 dBm transceiver capable of meeting that requirement, and potentially capable of transmitting a clear signal over the same distances because of the reduced data rate, would cost only \$12,907, saving the operator more than \$10,000, or 44 percent compared with the higher capacity transceiver. GSA Price List (price for Alcatel-Lucent MDR-8508-4-15-NS Microwave radio 7/8 GHz Frequency Band (7125-8500 MHz) 4 DS1 Transmit Power 15 dBm Non-Standby).

¹¹⁴ Comsearch Comments at 8.

¹¹⁵ FWCC Comments at 5-6.

¹¹⁶ Comsearch Comments at 7. *See also* Letter from Mitchell Lazarus, counsel for Comsearch and the Fixed Wireless Communications Coalition to Marlene H. Dortch, Secretary, Federal Communications Commission (filed Jun. 21, 2012) (Comsearch/FWCC June 21 *Ex Parte*) at 2.

¹¹⁷ FWCC Comments at 5-6; Reply Comments of Comsearch (filed Oct. 25, 2011) (Comsearch Reply Comments) at 3-4.

¹¹⁸ FiberTower Comments at 4; US Cellular Reply Comments at 3.

¹¹⁹ Letter from Mitchell Lazarus, Counsel for the Fixed Wireless Communications Coalition to Marlene H. Dortch, Secretary, Federal Communications Commission (filed Jun. 19, 2012) at 2-4.

Comsearch are concerned that providing relief from the minimum payload capacity requirements will provide incentives for licensees to use Category B antennas, which can increase interference. We do not agree with FWCC and Comsearch that allowing adaptive modulation and smaller antennas can be a substitute for relief from efficiency standards, because granting appropriate relief from the efficiency standards can result in much greater cost savings in rural areas. We disagree with those commenters who suggest that granting relief from the traffic loading standards would be an adequate substitute for granting relief from the minimum payload capacity requirements.¹²⁰ If we merely provided relief from the traffic loading requirements, FS operators would have to build links that were fully capable of meeting the minimum payload capacity requirements. Denying permission to reduce payload capacities in such areas would all but eliminate any cost savings that would otherwise be made possible by reducing loading percentages alone, because most of the savings associated with granting relief from the efficiency standards would result from reduced up front equipment costs, as opposed to operating costs.¹²¹

43. Given the concerns presented in the record, we opt to implement our proposal as a policy, listing specific criteria under which we will favorably consider waivers of the efficiency standards, as opposed to a blanket rule exempting licensees from those criteria. This approach responds to the concerns raised by Comsearch and FWCC. More specifically, the policy will not “lock in” inefficient usage because licensees will be required to upgrade facilities to use Category A antennas and comply with the efficiency standards if needed to accommodate new FS applicants (or to avoid interference). Furthermore, the criteria we establish will ensure that relief is limited to areas where the use of lower capacity radio equipment will be appropriate. This policy will provide a meaningful opportunity for relief for rural operators. Adopting relief as waiver policy will allow us to consider individual circumstances and to gain more information on when relief from the efficiency standards would be appropriate. As we gain more experience with such waiver filings, we may consider refining the criteria or codifying the policy as a Commission rule.

44. Specifically, we adopt a Rural Microwave Flexibility Policy and direct the Wireless Telecommunications Bureau (“Bureau”) to favorably consider waivers of the payload capacity requirements if the applicants demonstrate compliance with the following criteria:

- The interference environment would allow the applicant to use a less stringent Category B antenna (although the applicant could choose to use a higher performance Category A antenna);
- The applicant specifically acknowledges its duty to upgrade to a Category A antenna and come into compliance with the applicable efficiency standard if necessary to resolve an interference conflict with a current or future microwave link pursuant to § 101.115(c);
- The applicant uses equipment that is capable of readily being upgraded to comply with the applicable payload capacity requirement, and provide a certification in its application that its equipment complies with this requirement;
- Each end of the link is located in a rural area (county or equivalent having population density of 100 persons per square mile or less);
- Each end of the link is in a county with a low density of links in the 4, 6, 11, 18, and 23 GHz bands. We delegate authority to the Wireless Telecommunications Bureau to determine an appropriate measure of link density in a given county;
- Neither end of the link is contained within a recognized antenna farm; and

¹²⁰ See FWCC Comments at 5-6; Comsearch Reply Comments at 3-4; FiberTower Comments at 4; US Cellular Reply Comments at 3.

¹²¹ See ¶¶ 39-40, *supra*.

- The applicant describes its proposed service and explains how relief from the efficiency standards will facilitate providing that service (*e.g.*, by eliminating the need for an intermediate hop) as well as the steps needed to come into compliance should an interference conflict emerge.

By establishing our Rural Microwave Flexibility Policy, we do not intend to restrict licensees' ability to obtain such relief under Sections 1.925 and 1.3 of our rules. We direct the Bureau to carefully consider requests for waiver of the efficiency standards filed under the general waiver standard, consistent with the Commission's duty to take a "hard look" at applications for waiver¹²² and consider all relevant factors when determining if a grant of relief is warranted.¹²³ The Bureau should not reject a waiver showing under the general waiver standard merely because the applicant has not shown all of the factors listed above. We would anticipate that as an applicant demonstrated compliance with more of the factors listed above, that an applicant would be more likely to have made the requisite showing in support of a waiver. We also direct the Bureau to consider other factors in support of a waiver request, if appropriate.

45. We agree with Comsearch and FWCC that licensees who could use Category B antennas but choose to use Category A antennas should not be foreclosed from seeking waiver relief under the waiver policy we establish today because of their voluntary decision to use a higher performance antenna. Accordingly, we clarify that licensees who could use Category B antennas are eligible for relief from the minimum payload capacity requirements, even if they choose to use a Category A antenna, so long as they meet all of the criteria specified in the Rural Microwave Flexibility Policy we adopt today.

46. Our action today will likely provide major benefits to FS operators in rural areas. Providing relief from the efficiency standards may allow longer path links, which can eliminate the need for intermediate relay stations. As noted above, the cost of operating an intermediate relay station can be up to \$500,000. Furthermore, providing relief from efficiency standards can also allow the use of less expensive transmitters and lower power. In theory, there are two types of costs that could result from today's action. First, a licensee who took advantage of the relief today could later be required to upgrade and comply with the efficiency standards. Second, the presence of a lower efficiency system using a Category B antenna could make it more difficult for other operators to share the spectrum in the same area. Under our rules, however, the decision to use a Category B antenna is voluntary, and existing operators must upgrade their antennas to Category A antennas if necessary to resolve interference conflicts. Accordingly, we anticipate that any costs will be outweighed by the benefits of our action.

D. Allowing Wider Channels in 6 GHz and 11 GHz Bands

1. Background

47. The *FNPRM* invited comments on FWCC's request that the Commission allow FS operators to combine adjacent channels in the 5925-6425 MHz (Lower 6 GHz band) and 10700-11700 MHz band (11 GHz band), respectively, to form 60 and 80 megahertz wide channels,¹²⁴ where the maximum authorized channel bandwidths at present are 30 and 40 megahertz, respectively.¹²⁵ The

¹²² *FPC v. Texaco, Inc.*, 377 U.S. 33, 39 (1964).

¹²³ *Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 416 (1971).

¹²⁴ See *FNPRM*, 26 FCC Rcd at 11649-11651 ¶¶ 86-92, *citing* Petition for Rulemaking, Fixed Wireless Communications Coalition, RM-11602 (filed May 14, 2010) (FWCC Petition).

¹²⁵ See 47 C.F.R. § 101.109(c), Table.

FNPRM acknowledged that the proposal had the potential to allow backhaul operators to handle more capacity and offer faster data rates but noted that the record on this issue was otherwise quite limited.¹²⁶

48. Initially, the *FNPRM* invited commenters to provide data on the anticipated demand for wider channels in these bands in different geographies, noting that the Lower 6 GHz band is increasingly congested to the extent that, in some locations, it can be impossible to coordinate even a 30 megahertz link in that band.¹²⁷ The *FNPRM* inquired whether the proposed rule change would primarily benefit rural areas, or whether there might also be sufficient capacity to support use of wider channels in more urbanized areas.¹²⁸

49. The *FNPRM* acknowledged FWCC's claims that allowing wider channels would result in a number of benefits, including lower costs, improved reliability, elimination of intermodulation issues, and increased spectrum utilization,¹²⁹ and asked supporters of the proposal to provide specific data corroborating and quantifying the cost savings and other benefits claimed by FWCC.¹³⁰ It also sought comment on any conditions that should limit the ability to seek such wider channels, as well as concerns that combining adjacent links could unnecessarily deplete the spectrum and possibly encourage speculative licensing.¹³¹ The *FNPRM* also sought comment on how the Commission should adjust minimum payload requirements to account for the increased capacity that would be available with wider bandwidth channels, should the Commission permit wider bandwidth channels.¹³²

50. Commenters generally support FWCC's proposal, primarily on the ground that smart phones and other mobile devices are generating increased data demands for cellular backhaul.¹³³ Comsearch and US Cellular advise proceeding cautiously because the conventional approach to assigning channels of 30 megahertz bandwidth in the 6 GHz band and of 30 or 40 megahertz in the 11 GHz band has been to follow an adjacent-channel alternating-polarization ("ACAP") plan.¹³⁴ Comsearch states that this kind of cross-polarization is worth up to a 35 dB reduction in interference when compared with the amount of interference that a signal on the same polarization would cause.¹³⁵ If we allow 60 or 80 megahertz channels to be assigned on a single license, it becomes harder to maintain the ACAP licensing plan, particularly when the wider channels are overlaid on existing 30 or 40 megahertz channels.

¹²⁶ *FNPRM*, 26 FCC Rcd at 11651 ¶ 89.

¹²⁷ *FNPRM*, 26 FCC Rcd at 11651, ¶ 90, *citing* Amendment of Part 101 of the Commission's Rules to accommodate 30 Megahertz Channels in the 6525-6875 MHz Band, WT Docket No. 09-114, *Report and Order*, 25 FCC Rcd 7760, 7761 ¶ 4 (2010).

¹²⁸ *FNPRM*, 26 FCC Rcd at 11651 ¶ 90.

¹²⁹ *FNPRM*, 26 FCC Rcd at 11651 ¶ 91, *citing* FWCC Petition for Rulemaking at 3.

¹³⁰ *FNPRM*, 26 FCC Rcd at 11651 ¶ 91.

¹³¹ *FNPRM*, 26 FCC Rcd 11651 ¶ 91.

¹³² *FNPRM*, 26 FCC Rcd 11651 ¶ 92.

¹³³ *See* Clearwire Comments at 8-10; Comsearch Reply Comments at 4; FiberTower Comments at 4-5, FWCC Comments at 6-7, MetroPCS Comments at 7.

¹³⁴ Comsearch Comments at 9; US Cellular Reply Comments at 4.

¹³⁵ Comsearch Comments at 9. FWCC disagrees with Comsearch's argument that combined channels could not benefit from cross polarization. It says that an 80 megahertz channel made up of two 40 megahertz channels, at whatever polarization, still allows either of two 40 MHz channels, or even another combined 80 megahertz channel, to be coordinated nearby at the opposite polarization. FWCC Reply Comments at 4-5.

Ultimately, however, in light of the potential cost savings, Comsearch supports allowing wider channels in the 6 and 11 GHz bands “subject to appropriate safeguards.”¹³⁶

51. In response to FWCC’s petition for rulemaking, NSMA suggested that the Commission should consider: (1) “requiring a showing of necessity and availability for applications planning use of more than one or two 60/80 MHz wide channels on any one path”;¹³⁷ (2) designating certain slots as “preferred” slots for wider bandwidth channels (*e.g.*, starting at one of the band edges, so all licensees would first attempt use of these channels on the same frequencies);¹³⁸ (3) adjusting the minimum payload requirements to account for the higher capacity capabilities of the wider bandwidth channels;¹³⁹ and (4) adopting methods to better assure high utilization with more tightly drawn regulations.¹⁴⁰ The *FNPRM* sought comment on NSMA’s suggestion.¹⁴¹

2. Discussion

52. We find that allowing 60 megahertz and 80 megahertz channels in the 6 GHz and 11 GHz bands, respectively, would serve the public interest by allowing backhaul operators to handle more capacity and offer faster data rates. In light of the explosive growth in demand for broadband services, we believe it is important to provide operators with the capability to offer faster services wherever possible. Allowing wider channels can also result in more efficient spectrum utilization.

53. The only concern, which was raised by Comsearch and US Cellular, was whether wider channels would be consistent with assigning channels using ACAP. Neither of those parties opposes allowing wider channels, however, so long as appropriate safeguards are instituted against warehousing and inefficient use of spectrum. Commenting parties support the conditions suggested by NSMA. After reviewing the conditions, we will adopt NSMA’s suggestion that wideband channels be assigned by preference to the highest available channels in the relevant bands, except where such a choice would impede the efficiency of local frequency coordination efforts. We also adopt today a broader revision of our payload efficiency rules to apply uniform bits-per-second-per-Hertz requirements across multiple bands and bandwidths.¹⁴² Together, we believe those actions will ensure that the 6 and 11 GHz bands are used efficiently while allowing licensees to benefit from wider channels.

54. Commenters did not offer specific data on the amount of benefits or costs associated with allowing wider channels. We note, however, that the decision to use wider channels is voluntary and must be coordinated with other applicants and licensees. Under those circumstances, there are not likely to be any costs that could result from allowing wider channels. We also find positive benefits to providers in being able to handle additional capacity with faster data rates and to allow for more efficient spectrum utilization. Accordingly, we conclude that the potential benefits of wider channels would outweigh any potential costs.

¹³⁶ Comsearch Reply Comments at 4.

¹³⁷ Comments of the National Spectrum Management Association, RM-11602 (filed Jul. 6, 2010) (NSMA RM-11602 Comments) at 3.

¹³⁸ NSMA RM-11602 Comments at 3.

¹³⁹ NSMA RM-11602 Comments at 3-4.

¹⁴⁰ NSMA RM-11602 Comments at 4.

¹⁴¹ *FNPRM*, 26 FCC Rcd at 11651 ¶ 91.

¹⁴² See Section IV.B, *supra*.

E. Geostationary Orbital Intersections

1. Background

55. To protect receivers on geostationary satellites from the potential for interference from FS transmitters, Section 101.145 of the Commission's Rules requires a waiver filing for: (1) FS transmitters in the 2655-2690 MHz¹⁴³ and 5925-7075 MHz bands with an antenna aimed within 2° of the geostationary arc; and (2) FS transmitters in the 12700-13250 MHz range with an antenna aimed within 1.5° of the geostationary arc.¹⁴⁴ To be approved, a waiver request must show, among other factors, that the transmitter EIRP is below listed limits.¹⁴⁵ In contrast, Article 21 of the ITU Radio Regulations places the 2° restriction on the pointing azimuth of antennas of FS transmitters in the 1-10 GHz band only if the EIRP is greater than 35 dBW, and the 1.5° restriction on the azimuth of antennas in the 10-15 GHz band only if the EIRP is greater than 45 dBW.¹⁴⁶

56. The *FNPRM* sought comment on a Comsearch proposal to amend Section 101.145 of the Commission's Rules to require a waiver filing for FS facilities pointing near the geostationary arc only if the EIRP is greater than the values listed in the ITU Radio Regulations.¹⁴⁷ Comsearch contends that the existing, more restrictive requirement in Section 101.145 primarily protects satellites located over Europe, Africa, or the Atlantic or Pacific Oceans.¹⁴⁸ Comsearch further believes that, because the ITU has determined that FS transmitters with EIRPs below the values listed in Article 21 are unlikely to cause interference to geostationary satellites, amending the Commission's Rules would improve the administrative efficiency of licensing FS links for backhaul without any corresponding harm.¹⁴⁹

2. Discussion

57. We adopt the proposal to require that a waiver filing be necessary for FS facilities pointing near the geostationary arc only if the FS station's EIRP is greater than the values listed in the ITU Radio Regulations. As noted in the *FNPRM*, this action can facilitate microwave deployments by allowing affected licensees to deploy more quickly, explaining that the Commission's rules provide many applicants with conditional authority to begin service immediately, without waiting for final approval from the Commission, once they complete frequency coordination, with the stipulation that they must take their stations down if the Commission later rejects their applications.¹⁵⁰ The change will harmonize the Commission's regulations with international regulations, and as explained further below, can apparently do so without creating any increased risk of interference to satellite services.¹⁵¹

¹⁴³ The 2655-2690 MHz band is currently allotted to the Broadband Radio Service and Educational Broadband Service. See 47 C.F.R. § 27.5(i). Accordingly, the Commission will not accept any new FS applications in that band.

¹⁴⁴ See 47 C.F.R. § 101.145.

¹⁴⁵ See 47 C.F.R. § 101.145(b), (c).

¹⁴⁶ ITU Radio Regulations, Article 21.

¹⁴⁷ *FNPRM*, 26 FCC Rcd at 11652-11653 ¶¶ 93-95.

¹⁴⁸ *FNPRM*, 26 FCC Rcd at 11652 ¶ 94.

¹⁴⁹ *FNPRM*, 26 FCC Rcd at 11652 ¶ 94.

¹⁵⁰ *FNPRM*, 26 FCC Rcd at 11652 ¶ 95.

¹⁵¹ *FNPRM*, 26 FCC Rcd at 11652-11653 ¶ 95.

That rule change will limit the circumstances in which applicants will have to go through the burden and expense of filing waiver requests and the associated waiver fee.

58. We do not change the requirement that FS facilities protect previously authorized satellite facilities. Nor do we limit the right of satellite licensees to file petitions to deny or informal objections against FS facilities that they believe would cause interference to their facilities. The only change from the viewpoint of satellite providers is that FS operators proposing power below the limits contained in ITU regulations will now be able to operate pursuant to conditional authority. We are unaware of any instance in the last five years where a satellite licensee has filed an objection with the Commission against an FS application seeking a waiver under Section 101.145 of the Commission's rules. Under those circumstances, it appears that the risk to satellite licensees appears to be minimal. Furthermore, under our rules, conditional authority can be modified or cancelled at any time.¹⁵² We direct the Wireless Telecommunications Bureau to examine closely any objections filed by satellite providers and to cancel conditional authority if there appears to be a substantial risk of interference to satellite operations.

59. Sirius XM Radio, Inc. (Sirius XM) is the only commenter to oppose the proposed change. Sirius XM operates feeder links in the 7025-7075 MHz band to uplink its digital radio transmissions to its satellites.¹⁵³ It also has telemetry, tracking and control links in that band.¹⁵⁴ Sirius XM expresses concern that, even if no single FS transmitter were to interfere with one of its satellites under the proposed rule change, several FS transmitters together might do so.¹⁵⁵ On that basis, Sirius XM urges the Commission to establish a numeric limit on the aggregate amount of interference that FS transmitters impinge upon the geostationary satellite arc.¹⁵⁶ In reply, Comsearch provides a detailed technical analysis demonstrating that it would be extremely rare for terrestrial microwave antennas in this country to be directed towards either of Sirius XM's satellite positions.¹⁵⁷

60. TIA Bulletin 10-F is incorporated by reference in our primary interference protection rule, Section 101.105 of the Commission's rules.¹⁵⁸ That bulletin explains that only in very unusual circumstances is it necessary to perform the type of aggregate interference analysis requested by Sirius XM.¹⁵⁹ Comsearch's showing that there are currently only three microwave antennas in this country

¹⁵² See 47 C.F.R. § 101.31(b)(3).

¹⁵³ Comments of Sirius XM Radio, Inc. (filed Oct. 4, 2011) (Sirius XM Comments) at 2.

¹⁵⁴ Sirius XM Comments at 2-3.

¹⁵⁵ Reply Comments of Sirius XM Radio, Inc. (filed Oct. 25, 2011) (Sirius XM Radio Reply Comments) at 3-4.

¹⁵⁶ Sirius XM Radio Reply Comments at 3-4.

¹⁵⁷ Comsearch maintains that, within the contiguous 48 states of the continental U.S., a terrestrial microwave antenna would have to be using an elevation angle of at least 20° to be directed toward a Sirius satellite. Comsearch Reply Comments at 5-7. Comsearch provides a detailed analysis showing that, as of September 2010, there were only three antennas (out of over 70,000 antennas) that would be located within two degrees of the geostationary arc and that are aimed within 2 degrees of the Sirius XM satellites. See Letter from Christopher R. Hardy, Vice President, Comsearch to Marlene H. Dortch, Secretary, Federal Communications Commission (filed Mar. 19, 2012) (Comsearch March 19 *ex parte*) at 2-3. Furthermore, Comsearch estimates that because each individual link would have a power of less than 35 dBW EIRP, at least 63 transmitters would have to be directed towards a Sirius XM satellite to increase the noise into the satellites by 1 dB. Comsearch March 19 *ex parte* at 3. Sirius XM did not respond to that analysis.

¹⁵⁸ See 47 C.F.R. § 101.105.

¹⁵⁹ Telecommunications Standards Bulletin 10-F at 2-8, § 2.5.2.

pointed toward one of Sirius XM's satellites demonstrates that the aggregate incremental effect of such multiple exposures is likely to be quite low. While the Commission is prepared to consider showings based on aggregate interference in appropriate circumstances,¹⁶⁰ we decline to adopt Sirius XM's proposal at this time.

61. We find that reducing the circumstances under which FS operators must seek waivers when pointing towards the geostationary arc will produce substantial benefits. Each private FS applicant must pay an application fee of \$180 when seeking a waiver.¹⁶¹ In 2011, we granted 275 applications requesting a waiver of Section 101.145 of the Commission's rules where the EIRP was below the limits contained in the ITU Radio Regulations and the applicant had to pay a waiver fee. The total application costs associated with those waivers would be \$49,500. Furthermore, each applicant must prepare a waiver exhibit at additional expense. Furthermore, every time a waiver is requested, the applicant cannot commence service until the waiver and applications are granted. While the cost of such delays cannot be quantified based on this record, it is apparent that such delays may be costly to FS providers and their customers. On the other hand, we find that the potential for increased interference or other costs would be minimal from this action. Accordingly, we find that the benefits of today's actions outweigh the costs.

V. SECOND FURTHER NOTICE OF PROPOSED RULEMAKING

62. In this *Second Further Notice of Proposed Rulemaking*, we continue our efforts to improve and modernize our rules and increase the flexibility of our Part 101 rules to promote wireless backhaul. We seek more detailed comment on specific proposals made by parties to allow use of smaller antennas and wider channels in other Part 101 microwave bands. We also seek comment on a proposal to revise our rules to change our treatment of smaller antennas in the 10.7-11.7 GHz band (11 GHz band).

63. We ask that commenters take into account only those costs and benefits that directly result from the implementation of the particular rule or proposal, including any potential requirement or potential alternative requirement. Commenters should identify the various costs and benefits associated with a particular proposal. Further, to the extent possible, commenters should provide specific data and information, such as actual or estimated dollar figures for each specific cost or benefit addressed, including a description of how the data or information was calculated or obtained, and any supporting documentation or other evidentiary support.

A. Smaller Antennas in the 13 GHz Band

1. Background

64. Comsearch asks that the Commission modify its antenna standards for the 13 GHz band to allow the use of 2 foot antennas under Category B.¹⁶² Comsearch states that a 2.5 foot antenna can satisfy the Standard A suppression requirements, but that 2 foot antennas do not meet the Standard B suppression requirements because the suppression criteria are too tight from 5 to 15 degrees.¹⁶³ Comsearch states that 2 foot antennas are commonly used in the 11 GHz band under Standard B, and it

¹⁶⁰ See *11 GHz R&O*, 22 FCC Rcd at 17177 ¶ 49 (directing FS applicants in the 11 GHz band "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.")

¹⁶¹ See 47 C.F.R. § 1.1102.

¹⁶² Comsearch Comments at 4.

¹⁶³ Comsearch Comments at 4.

anticipates that similar usage would be desirable in the 13 GHz band.¹⁶⁴ Comsearch believes using 2 foot antennas should not be a significant interference concern because paths would be limited to rural areas outside of BAS TV pickup service areas.¹⁶⁵ Comsearch proposes specific antenna standards.¹⁶⁶

2. Discussion

65. We seek comment on modifying our antenna standards to allow use of 2 foot antennas in the 13 GHz band under Category B as proposed by Comsearch. As noted above with respect to the 6, 18, and 23 GHz bands, smaller antennas have a variety of benefits, including savings in purchasing, installing, and renting space for such antennas.¹⁶⁷ We recognize that the proposed use of smaller, lower-gain antennas will result in more radiofrequency energy being transmitted in the side lobes off the main point-to-point link.¹⁶⁸ We therefore wish to ensure that any proposed changes to the Commission's Rules appropriately protect other users in the bands from interference due to the operation of these smaller antennas. We seek comment on whether the use of smaller antennas pursuant to the proposed modifications will adversely affect other users in the specific bands by increasing the risk of interference. If so, do the potential benefits of using smaller antennas outweigh the potential risks of interference? We also seek comment on the relative costs and benefits of allowing smaller antennas in the 13 GHz band. Can the benefits be calculated in the same manner as we calculated the benefits of smaller antennas in the 6, 18, and 23 GHz bands?

B. 11 GHz Antenna Rules

1. Background

66. In 2007, the Commission amended its antenna specifications for the 11 GHz band to allow smaller antennas in that band.¹⁶⁹ In response to a question raised by Comsearch about interference protection, the Commission stated:

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. 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.¹⁷⁰

¹⁶⁴ Comsearch Comments at 4.

¹⁶⁵ Comsearch Comments at 4.

¹⁶⁶ See Comsearch March 7 *ex parte* at 3.

¹⁶⁷ See Section IV.A, *supra*.

¹⁶⁸ See *FNPRM*, 26 FCC Rcd at 11646 ¶ 77.

¹⁶⁹ See *11 GHz R&O*.

¹⁷⁰ *11 GHz R&O*, 22 FCC Rcd at 17182 ¶ 62. The Commission provided the following example: "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 (continued....)"

This concept was codified in Section 101.115(f) of the Commission's rules.¹⁷¹

67. Comsearch argues that allowing a licensee to reduce its EIRP from the maximum allowed by the rule negates the intent of the rule and does not provide proper interference protection.¹⁷² According to Comsearch, most 11 GHz links operate with far less power than the maximum authorized under the rules.¹⁷³ Comsearch argues that if a link using a Category B antenna is operating significantly below the maximum power authorized under our rules, it will not have to modify the link because its power is already below the power radiated using a Category A antenna with maximum power.¹⁷⁴ Comsearch asks that Section 101.115(f) of the Commission's rules be modified to replace the phrase "and operating with the maximum EIRP allowed by the rules" with "and operating with the authorized EIRP."¹⁷⁵

68. FWCC generally supports Comsearch's request for relief.¹⁷⁶ FWCC is concerned, however, that Comsearch's proposed rule change would give applicants incentives to apply for more power they need in case a later applicant raises an interference concern.¹⁷⁷ FWCC offers two proposals for addressing that concern. FWCC's first proposal is to add language to Section 101.115(f) limiting the circumstances under which a licensee could reduce EIRP without changing to a Category A antenna.¹⁷⁸ Alternatively, FWCC proposes to amend Section 101.113 of the Commission's rules to clarify that a licensee may not hold an authorization for substantially more power than it actually needs.¹⁷⁹

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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." *Id.* at 17162 n.250.

¹⁷¹ 47 C.F.R. § 101.115(f).

¹⁷² Comsearch Comments at 4-5.

¹⁷³ Comsearch Comments at 5.

¹⁷⁴ Comsearch Comments at 5.

¹⁷⁵ Comsearch Comments at 7.

¹⁷⁶ FWCC Reply Comments at 2.

¹⁷⁷ Letter from Mitchell Lazarus, Counsel for the Fixed Wireless Communications Coalition to Marlene H. Dortch, Secretary, Federal Communications Commission (filed Mar. 9, 2012) (FWCC March 9 *Ex Parte*) at 3.

¹⁷⁸ FWCC March 9 *Ex Parte* at 3. Specifically, FWCC would change the third sentence of Section 101.115(f) to read as follows (added language in bold, deletions struck through): "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 **authorized EIRP; however, a fixed station licensee may reduce its EIRP pursuant to this paragraph only once during the station's operating life; and if the licensee would have to reduce its EIRP to a level that is less than 3 dB below its authorized EIRP in order to resolve the predicted interference, then the licensee must substitute an antenna meeting performance standard A.** ~~maximum EIRP allowed by the rules.~~"

¹⁷⁹ FWCC March 9 *Ex Parte* at 4. FWCC proposes the following changes to the first sentence of Section 101.113(a) (added language in bold): "On any authorized frequency, the average power **requested in an application for authorization and** delivered to an antenna in this service must be the minimum amount of power necessary to carry out the communications desired, **except as provided in paragraph (b).**" FWCC also proposes changes to Section 101.113(b), which governs transmitters using Automatic Transmitter Power Control: "The **maximum** power of transmitters that use Automatic Transmitter Power Control (ATPC) **and the power of non-ATPC transmitters** shall not exceed, **and** the power input or output specified in the instrument of station authorization. The power of non-ATPC transmitters shall be maintained as near as practicable to, the power input or output specified in the (continued....)

2. Discussion

69. We seek comment on amending Sections 101.103 and 101.115(f) of the Commission's rules to address the concerns raised by Comsearch and FWCC. We note that theoretically, the existing rules could allow licensees using lower EIRP to avoid having to change antennas to correct interference problems. At the same time, Section 101.115(f) has been in effect for several years, and we are unaware of instances where this rule has led to interference disputes or precluded the placement of links in an area. We ask proponents of this change to provide examples of instances where the existing rules have led to interference problems or precluded other users from using 11 GHz spectrum within a given area. We also ask commenters to provide specific data on the costs and benefits associated with this proposed rule change.

70. If rule changes are appropriate, we tentatively conclude that the best method of resolving the issue would be to change the term "maximum EIRP" to "authorized EIRP" and making the changes to Section 101.113 proposed by FWCC. The term "authorized EIRP" is subjective since applicants select the power at which they propose to operate. Absent some additional limitations in the rule, we agree with FWCC that merely inserting the term "authorized EIRP" into Section 101.115(f) would give applicants incentive to propose excessive power. Of the two alternatives offered by FWCC, it appears that the proposed changes to Section 101.113 would maximize licensee flexibility to resolve interference issues while clearly stating that applicants must request the minimum power necessary. We seek comment on this tentative conclusion, and any associated benefits or costs of this proposal.

C. Antenna Upgrades

1. Background

71. In general, the Commission's Rules require a Category B user to upgrade to a Category A antenna if the antenna causes interference problems that would be resolved by the use of a Category A antenna.¹⁸⁰ Wireless Strategies, Inc. (WSI) suggests that in the 6 GHz and 11 GHz bands, applicants and licensees be allowed to operate any antenna, including an antenna that does not meet the less demanding Category B standard.¹⁸¹ WSI also proposes that if the applicant or licensee could resolve an interference issue by upgrading to a lesser antenna that does not meet Category A standards, the applicant or licensee would be allowed to use that lesser antenna.¹⁸² WSI claims that its proposed change "would allow designers and users of FS microwave to minimize the cost and make it easier to comply with local zoning and homeowner association rules and ensure that the use of antennas not meeting Category A requirements does not increase the potential for harmful interference."¹⁸³ Proxim Wireless Corporation and Global Spectrum Advisors LLC support WSI's proposal.¹⁸⁴

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instrument of station authorization. **A licensee that reduces power in order to resolve interference pursuant to Section 101.115(f) must update its license to reflect the reduced power level.**"

¹⁸⁰ See 47 C.F.R. § 101.115(c).

¹⁸¹ WSI Comments at 2.

¹⁸² WSI Comments at 2.

¹⁸³ WSI Comments at 2.

¹⁸⁴ See Letter from Dave Dobson, Director of Systems Engineering, Proxim Wireless Corporation to Marlene H. Dortch, Secretary, Federal Communications Commission (filed Mar. 16, 2012); *Ex Parte* Reply Comments of Global Spectrum Advisors LLC (filed Nov. 16, 2011).

72. Comsearch, EIBASS, FWCC, and NSMA oppose WSI's proposal. Opponents express concern that WSI's proposed rule change would preclude future applicants from sharing the same spectrum in a given area.¹⁸⁵ Comsearch expresses concern that "WSI apparently seeks to direct as much power as it can in all directions and only reduce EIRP towards stations where there is a specific conflict."¹⁸⁶ FWCC argues that WSI's proposal is too vague and would likely to lead to disputes among users in the coordination process.¹⁸⁷ FWCC and NSMA also argue that while a licensee would have a duty to upgrade, incumbents may be reluctant or unwilling to upgrade because of the costs involved (including possible site relocations if the existing site could not accommodate a larger antenna).¹⁸⁸ FWCC also argues that the current rules provide coordinators with certainty in planning because they know an antenna's minimum characteristics.¹⁸⁹

2. Discussion

73. We see some merit in the idea of allowing intermediate upgrades if a licensee can resolve an interference issue by upgrading from one Category B antenna to another Category B antenna with better performance characteristics, that still does not meet Category A standard. There may be instances where an applicant or licensee could resolve an interference issue or conflict by upgrading to an antenna that does not meet Category A standards but would resolve the interference problem. An intermediate upgrade may allow a licensee to maintain operations from an existing site or reduce costs to the point where operation remains economically feasible. Furthermore, while FWCC and NSMA are correct that licensees may be reluctant to upgrade antennas, the current rules impose a duty to upgrade to a Category A antenna. The proposed change would give licensees additional flexibility by giving them another option to resolve interference issues. Under our proposal, a licensee proposing to make an intermediate upgrade would assume the risk that the intermediate upgrade would not resolve the interference issue and would be required to make a further upgrade to a Category A antenna if the intermediate upgrade failed to resolve the issue or if a Category A antenna was needed to accommodate another link.

74. Accordingly, we seek comment on allowing licensees and applicants to resolve an interference issue by upgrading from one Category B antenna to another Category B antenna with better performance characteristics, but that still does not meet Category A standard. We ask proponents of this proposal to identify specific instances where such intermediate upgrades could facilitate wireless backhaul deployment. Opponents should identify specific harms that they believe would result from allowing intermediate upgrades, keeping in mind that an applicant or licensee who sought to make an intermediate upgrade would be required to make a further upgrade to a Category A antenna if necessary. While WSI makes its proposal with respect to the 6 and 11 GHz bands, we seek comment on allowing intermediate upgrades in all Part 101 bands. We also seek specific, quantitative information on the benefits and costs of our proposal.

¹⁸⁵ See EIBASS Ex Parte Response To January 31, 2012, WSI Ex Parte Filing (filed Feb. 15, 2012) (EIBASS February 15 *Ex Parte*) at 1-2; Letter from Kenneth G. Ryan, President, National Spectrum Management Association to Marlene H. Dortch, Secretary, Federal Communications Commission (filed Jan. 23, 2012) (NSMA *Ex Parte*).

¹⁸⁶ Comsearch Reply Comments at 2.

¹⁸⁷ FWCC Reply Comments at 2-3.

¹⁸⁸ Letter from Mitchell Lazarus, Counsel for the Fixed Wireless Communications Coalition to Marlene H. Dortch, Secretary, Federal Communications Commission (filed Dec. 30, 2011) (FWCC December 30 *Ex Parte*) at 3-4; NSMA *Ex Parte* at 2.

¹⁸⁹ FWCC December 30 *Ex Parte* at 4-5.

75. To the extent WSI proposes to allow the use of antennas that do not meet Category B standards, such a change would not result in the efficient use of spectrum. Eliminating the minimum Category B standards would allow licensees to deploy inefficient antennas that would radiate excessive radiofrequency energy away from the desired path of communication. That change would result in an increased potential for interference and make it more difficult for other licensees to share spectrum. The Category B standards have been in existence for many years, and WSI has not argued that it is burdensome for licensees to meet the Category B standards. We therefore reject the concept of allowing antennas that do not meet Category B standards.

VI. NOTICE OF INQUIRY – ADDITIONAL CHANGES TO ANTENNA STANDARDS

76. Several parties argue that the Commission should institute a comprehensive review of its Part 101 antenna standards. Comsearch notes that it has been many years since the antenna standards have undergone a comprehensive review.¹⁹⁰ Comsearch asks the Commission “to revise the standards to make them reflect the proper current balance of manufacturing capabilities, spectral efficiency, and cost.”¹⁹¹ It points to standards recently adopted by the European Telecommunications Standards Institute (ETSI), which require significantly greater suppression of the far sidelobes and significantly greater front-to-back ratio.¹⁹² Comsearch argues that manufacturers follow the ETSI standards and that it would therefore be reasonable to tighten the Commission’s requirements to meet those standards.¹⁹³ Comsearch also asks the Commission to: (1) change the rules to use breakpoints connected by straight line segments rather than the ranges at a constant suppression level that lead to a “stairstep” pattern; (2) introduce standards for suppression of cross-polarized signals; and (3) tighten the Category A and B antenna standards as much as possible consistent with the anticipated size and cost of antennas.¹⁹⁴ FWCC concurs with Comsearch’s ideas.¹⁹⁵ Clearwire and FWCC also ask that the Commission adopt standards for antenna configurations other than the traditional parabolic design.¹⁹⁶ Clearwire argues that manufacturers are developing next generation antennas that will introduce a greater array of options for deploying wireless backhaul in an efficient and cost effective manner.¹⁹⁷ It asks that the Commission’s rules accommodate such non-parabolic antennas.¹⁹⁸

77. We believe it would be appropriate to seek input on whether a comprehensive review of our antenna standards is appropriate and what changes would be appropriate as part of that review. We ask commenters to offer specific proposals and rule language so that the Commission and parties can evaluate the proposals and offer meaningful comment. We ask whether we can tighten our antenna standards while still allowing the affordable deployment of wireless backhaul facilities. Are the ETSI standards a useful benchmark for changing our standards? Are there factors unique to the United States market that justify different standards? Does the fact that many microwave bands are shared with other

¹⁹⁰ Comsearch Comments at 2.

¹⁹¹ Comsearch Comments at 2.

¹⁹² Comsearch Comments at 2.

¹⁹³ Comsearch Comments at 3.

¹⁹⁴ Comsearch Comments at 3.

¹⁹⁵ FWCC Reply Comments at 2.

¹⁹⁶ Clearwire Comments at 8; FWCC Reply Comments at 2.

¹⁹⁷ Clearwire Comments at 8.

¹⁹⁸ Clearwire Comments at 8.

services affect the appropriate standards? Would changing the standards allow these bands to be used for new and innovative standards? We seek comment on these and other related questions, including any associated costs and benefits.

78. We also seek comment on Comsearch's more specific suggestions. It appears that we would have to replace the existing table in Section 101.115 of the Commission's rules with some other means of indicating the appropriate suppression levels. What would be the best means of implementing such a change in our rules? What changes to our rules would be necessary to take into account cross-polarized signals? What would be the costs and benefits of any such rule changes?

79. We note that our rules do not mandate the use of parabolic antennas. Instead, our rules specify certain technical parameters – maximum beamwidth, minimum antenna gain, and minimum radiation suppression – that limit the interference potential. We ask Clearwire, FWCC and others to explain what rule changes would be necessary in order to accommodate non-parabolic antennas. What effect would such changes have on other licensees? Is it possible to establish rules that would include all the possible types of microwave antennas? We seek comment on these questions and related issues, including potential costs and benefits of any rule changes.

80. Finally, we note that our definition of a congested area, for the purpose of requiring antennas to meet Category A standards, is based in part on a 1976 public notice that was last republished in 1983.¹⁹⁹ We seek comment on how we should update or change our standards for defining a congested area. Should we attempt to develop an updated list of congested areas, rely exclusively on location-specific interference analyses, or should we use some other paradigm for determining what areas require the use of Category A antennas? What would be the costs and benefits of other paradigms?

81. By issuing this notice of inquiry, we intend to start a broad discussion of our microwave antenna standards. We invite commenters to raise additional questions and ideas. We also encourage a broad range of affected parties to comment, including current licensees, equipment manufacturers, operators who are interested in using microwave facilities, licensees who share spectrum with microwave operators, frequency coordinators, and other interested parties. We ask that commenters take into account only those costs and benefits that directly result from the implementation of the particular proposals. Commenters should identify the various costs and benefits associated with a particular proposal. Further, to the extent possible, commenters should provide specific data and information, such as actual or estimated dollar figures for each specific cost or benefit addressed, including a description of how the data or information was calculated or obtained, and any supporting documentation or other evidentiary support.

VII. ORDER ON RECONSIDERATION

82. A number of parties sought reconsideration of the *R&O* adopted in August 2011. In this *Order on Reconsideration*, we address those requests, and deny reconsideration for the most part.

¹⁹⁹ See Private Microwave Congested Areas, *Public Notice* (PRB Jun. 22, 1983).

A. Making 6875-7125 MHz and 12700-13150 MHz Available for Part 101 FS Operations

1. Allowing FS Operations in Areas Where BAS Operates on Adjacent Channels

a. Background

83. In the *R&O*, the Commission authorized FS use of the 6875-7125 MHz and 12700-13150 MHz bands in areas where television pickup licenses are not authorized in those bands.²⁰⁰ The Commission prohibited FS paths from crossing the service areas of TV pickup authorizations in order to avoid interference.²⁰¹ FWCC asks the Commission to limit the exclusion of FS from vacant 13 GHz channels in areas served by BAS and CARS to co-channel operations.²⁰² In other words, under FWCC's proposal, FS could be licensed in areas where BAS and CARS have operations so long as the FS operations are not on the same channels as any licensed BAS or CARS stations. FWCC says that a check of the Commission's licensing database shows that allowing FS on vacant channels in geographic areas where BAS or CARS stations operate on other channels would increase the potential Fixed Service population coverage to about 120 million, compared to the 35-42 million population coverage possible under the current rules.²⁰³ FWCC also contends that it is unnecessary to prohibit adjacent channel FS operations in order to accommodate BAS or CARS growth because there is little demand for new 13 GHz BAS/CARS facilities, 50 megahertz of spectrum remains exclusively available nationwide for BAS/CARS use, and new technologies are being developed that would support electronic newsgathering by other means.²⁰⁴

84. The National Association of Broadcasters (NAB) and the Society of Broadcast Engineers, Inc. (SBE) contend that the "introduction of new wireless backhaul operations would be incompatible with effective, unpredictable itinerant newsgathering and news reporting, and it would disserve the public if ENG services at the scene of breaking news were undermined by interference concerns caused by the presence of nearby wireless backhaul operations."²⁰⁵ NAB and SBE are also concerned that it would not be feasible to mix the formal coordination process used by FS applicants with the more informal coordination process used by broadcasters, because FS applicants do not have the same incentives as broadcasters to accommodate the needs of TV pick-up operations.²⁰⁶

b. Discussion

85. We decline to adopt FWCC's proposal to permit FS operations in channels adjacent to BAS/CARS operations at this time, for three reasons. First, as a technical matter, microwave signals that are being transmitted on adjacent channels can interfere with each other under some circumstances and,

²⁰⁰ *R&O*, 26 FCC Rcd at 11625 ¶ 22.

²⁰¹ *R&O*, 26 FCC Rcd at 11625 ¶ 23.

²⁰² FWCC Petition at 3-5.

²⁰³ FWCC Petition at 4.

²⁰⁴ FWCC Petition at 4-5.

²⁰⁵ Opposition of the National Association of Broadcasters and the Society of Broadcast Engineers, Inc. (filed Dec. 16, 2011) (NAB/SBE Opposition) at 6-7.

²⁰⁶ NAB/SBE Opposition at 7.

for that reason, require frequency coordination. That is why the Commission's rules require short-term BAS operators to give prior notification to other licensees whether they are proposing to operate on the same channels or on adjacent channels.²⁰⁷ Our rules contain limits on emissions outside of the authorized channel into adjacent channels, but they do not eliminate out of band emissions entirely.²⁰⁸

86. Second, as discussed in the *R&O*, BAS operators are motivated to coordinate spectrum with each other rapidly and cooperatively because they engage in similar activities, such as covering breaking news events, and share a common motivation to ensure that spectrum continues to be made available for such activities on short notice.²⁰⁹ Allowing FS applicants into areas where BAS is authorized would necessitate a more formal coordination process, which we do not believe is compatible with the dynamic and rapidly changing nature of electronic newsgathering (ENG) operations.

87. Finally, Section 74.24 of the Commission's rules allows BAS licensees to engage in short-term operations on unlicensed BAS channels for as many as 720 hours annually per frequency.²¹⁰ Therefore, in some locations, BAS operators could be making extensive short-term use of unlicensed BAS channels in the geographic areas where they have BAS licenses for other channels. Allowing FS operations to use these frequencies could result in interference and disruption to these operations. There is no evidence in the record indicating that the benefits of this proposal would outweigh the costs associated with the potential for increased interference. We therefore decline to modify the *R&O*'s conclusion that Part 101 FS applicants will be eligible to seek licenses in the 6875-7125 MHz and 12700-13150 MHz bands only outside the geographic areas where BAS and CARS stations are licensed.

2. Protection Criteria for BAS Stations

a. Background

88. In comments filed during an earlier phase of this proceeding, EIBASS asked the Commission to prohibit newcomer Private Operational Fixed Service (POFS) stations in the 7 and 13 GHz bands from degrading the noise threshold of any existing electronic newsgathering-receive only (ENG-RO) site by more than 0.5 dB, citing as precedent the Commission's decision to apply that standard to Department of Defense uplinks when determining whether or not they are providing adequate protection to ENG-RO sites in the 2 GHz band.²¹¹ The *R&O* acknowledged that EIBASS's proposal might be an appropriate standard for evaluating a proposed FS facility but declined to adopt it as a rule, explaining that, in lieu of mandating specific interference criteria in our rules, we expect applicants and licensees to work out interference issues in the frequency coordination process.²¹² In a petition for partial reconsideration of the *R&O*, EIBASS now reiterates its request, arguing that a vague frequency

²⁰⁷ See, e.g., 47 C.F.R. § 74.24(g).

²⁰⁸ 47 C.F.R. § 74.637.

²⁰⁹ *R&O*, 26 FCC Rcd at 11627 ¶ 27.

²¹⁰ 47 C.F.R. § 74.24.

²¹¹ Comments of EIBASS (filed Oct. 25, 2010) at 4, citing Amendment of Part 2 of the Commission's Rules to Allocate Spectrum to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Systems, *et al.*, ET Docket No. 00-258, *et al.*, *Seventh Report and Order*, 19 FCC Rcd 21350, 21364-21365 n.63 (2004) (*AWS 7th R&O*).

²¹² *R&O*, 26 FCC Rcd at 11626 ¶ 25.

coordination benchmark does neither the incumbent nor the newcomer any favor, because of the uncertainty it generates.²¹³

b. Discussion

89. EIBASS's proposal is unnecessary because we are upholding the Commission's prior decision to prohibit the paths of FS stations operating in the 7 and 13 GHz bands from crossing the service areas of TV pickup authorizations.²¹⁴ The practical criteria that we follow in decisions of this kind are set forth in the Telecommunications Industry Association's Telecommunications Systems Bulletin 10-F ("TSB 10-F"), which is incorporated by reference in Section 101.105 of the Commission's rules.²¹⁵ TSB 10-F acknowledges that it might be theoretically advantageous to place limits on total noise degradation to existing stations but explains that only in very unusual circumstances does a system designer need an overall assessment of interference noise from all sources.²¹⁶

90. In the *AWS 7th R&O*, the Commission addressed the potential for interference to ENG-RO sites from earth stations at 11 sites that support military space operations, also known as tracking, telemetry, and commanding (or "TT&C") uplinks.²¹⁷ Preventing interference when TT&C uplinks are involved is particularly challenging because, as the Commission noted, TT&C stations spend relatively little time pointing their antennas in any particular direction, *i.e.*, they can be called upon to point in any of many different directions at any particular time, or, for that matter, to be in continuous motion while communicating with spacecraft.²¹⁸ By contrast, the transmission paths of Part 101 FS stations are fixed. That makes it possible for FS applicants to provide licensees and other applicants with detailed notifications that include proposed transmission azimuths, among other technical parameters, and to allow the other affected parties 30 days to respond.²¹⁹ Although our rules provide for the Commission to resolve any differences that the parties are unable to resolve by reasoned discussions with each other,²²⁰ it is hardly ever necessary for the Commission to intervene in the frequency coordination process among parties that are subject to our Part 101 coordination procedures.²²¹ The chances that the affected parties would reach an impasse seem particularly remote under these circumstances, where FS paths are barred from crossing any of the geographic areas where ENG-RO stations are licensed. Further, there is no evidence in the record that EIBASS's proposal would reduce the costs associated with the coordination process. For those reasons, we remain confident that the existing frequency coordination procedures will ensure that Part 101 FS operators will not interfere with ENG-RO operations in the 6875-7125 MHz and 12700-13150 MHz bands. We therefore decline to adopt EIBASS's proposal.

²¹³ EIBASS Petition at 2.

²¹⁴ See *R&O*, 26 FCC Rcd at 11625 ¶ 23 and ¶¶ 85-86, *supra*.

²¹⁵ See 47 C.F.R. § 101.105(c).

²¹⁶ TSB 10-F at 2-8, § 2.5.2.

²¹⁷ *AWS 7th R&O*, 19 FCC Rcd at 21351 ¶ 3.

²¹⁸ *AWS 7th R&O*, 19 FCC Rcd at 21364-21365 n. 63.

²¹⁹ See 47 C.F.R. § 101.103(d).

²²⁰ 47 C.F.R. § 101.103(a).

²²¹ See 47 C.F.R. § 101.103.

3. Efficiency Standards for 13 GHz Band

a. Background

91. FWCC notes that the *R&O* did not specify a minimum throughput for the 13 GHz frequencies newly authorized for Fixed Service use.²²² FWCC recommends that we set the same throughput requirements for 13 GHz as apply to the 11 GHz band, and that we augment those requirements to include capacity and loading requirements for transmitters using channel bandwidths of 12.5 megahertz.²²³

b. Discussion

92. Section 101.141(a)(3) of our Rules applies minimum payload capacities to digital microwave transmitters operating in the 11 GHz band, depending upon their bandwidths.²²⁴ We agree with FWCC that the same standards should be applied to the 13 GHz band. Our decision above adopting the proposal in the *FNPRM* to apply uniform bits-per-second-per-Hertz requirements to all frequencies between 10,550 MHz and 13,150 MHz includes the frequencies in FWCC's request, and thus renders the request moot.²²⁵

4. Allowing 50 Megahertz Channels in the 7 GHz Band

a. Background

93. The *R&O* retained the 25 megahertz bandwidth limit that presently applies to the 7 GHz band because of the limited amount of spectrum available in that band, but it raised the maximum permissible bandwidth in the 13 GHz band to 50 megahertz.²²⁶ Cambium Networks (Cambium) urges that we also allow the 7 GHz band to accommodate 50 megahertz bandwidths.²²⁷ The NAB and SBE oppose this proposal on the ground that it would reduce the number of available channels for new ENG use.²²⁸ Cambium counters the broadcasters' concern by citing the *R&O*'s observation that BAS and CARS operations have not been expanding geographically in recent years, with only one new BAS TV pickup license granted in the 7 GHz and 13 GHz bands in the past two years.²²⁹

b. Discussion

94. We deny the Cambium Petition because the benefits of allowing 50 megahertz channels in the 7 GHz band appear to be quite limited and because operators needing wider channels have alternatives. If we allowed 50 megahertz channels in the 7 GHz band, there would only be two channel

²²² FWCC Petition at 2.

²²³ FWCC Petition at 2.

²²⁴ 47 C.F.R. § 101.141(a)(3).

²²⁵ See Section IV.B **Error! Reference source not found.**, *supra*.

²²⁶ *R&O*, 26 FCC Rcd at 11627-11628 ¶¶ 29-30.

²²⁷ Cambium Petition at 2-5.

²²⁸ NAB and SBE Opposition at 3-5.

²²⁹ *R&O*, 26 FCC Rcd 11614, 11629, ¶ 32.

pairs available in the 7 GHz band.²³⁰ Allowing 50 megahertz channels could limit the availability of FS spectrum for other operators who need narrower channels. Furthermore, operators who need 50 megahertz or wider channels have alternative options available. Today, we are allowing 60 megahertz channels in the 6 GHz band and 80 megahertz channels in the 11 GHz band.²³¹ For shorter paths, 50 megahertz channels are available in the 18 GHz and 23 GHz bands.²³² Under those circumstances, we believe the better use of the 7 GHz band would be to accommodate narrower band operations. We therefore deny the Cambium Petition.²³³

B. Elimination of the Final Link Rule

1. Background

95. The “final link rule” prohibited broadcasters from using Part 101 stations as the final radiofrequency (RF) link in the chain of distribution of program material to broadcast stations.²³⁴ Concurrent with the Commission’s decision to allow FS to share in the 7 and 13 GHz BAS and CARS bands, the *R&O* eliminated the final link rule.²³⁵ In doing so, the Commission noted that FS licensees were not objecting to elimination of the rule so long as FS were granted access to BAS and CARS spectrum in the 7 and 13 GHz bands.²³⁶

96. In a petition for reconsideration, FWCC argues that the final link rule should only be eliminated in areas where the Fixed Service can use the 7 or 13 GHz bands.²³⁷ FWCC argues that a key rationale for the change was “sharing of spectrum the other way” – i.e., a *quid pro quo* for opening the 7 and 13 GHz BAS/CARS bands for use by Part 101 FS operators – but that excluding FS operators from geographic areas where BAS and CARS operations are licensed leaves FS with very limited access to

²³⁰ The 7 GHz band includes 250 megahertz of spectrum (6875-7125 MHz). Because we have reserved two 25 megahertz channels for BAS use, only 200 megahertz of spectrum is available. Since each channel pair requires 100 megahertz, only two channel pairs can be accommodated.

²³¹ See Section IV.D, *supra*.

²³² See 47 C.F.R. §§ 101.147 (i), (o).

²³³ We disagree with NAB and SBE, however, that allowing 50 megahertz channels would adversely affect the availability of spectrum for ENG use. As discussed above, we are retaining the *R&O*’s decision not to allow FS operators in the 7 and 13 GHz bands to locate their paths within the service areas of TV pickup stations that have been licensed on any channels in those bands. See Section VII.A1, *supra*. Moreover, to accommodate TV pickup stations covering events that occur outside the license areas of local BAS and CARS operations, the *R&O* reserved two nationwide 25-megahertz channels for BAS and CARS in the 7 GHz band and two nationwide 25-megahertz channels in the 13 GHz band. *R&O*, 26 FCC Rcd at 11627 ¶ 28. The *R&O* also provides FS operators with newly authorized access to 650 megahertz of spectrum in more than half of the nation’s land mass, but there has been no discernible demand for TV pickup licenses in those areas. *Id.* Even so, the *R&O* reserves 100 megahertz of spectrum to accommodate any such demand if it should materialize. Under these circumstances, it is difficult to envisage any circumstance where FS operations in the 7 GHz band could constrain the number of channels that broadcasters might seek and obtain for electronic newsgathering.

²³⁴ The final link rule was codified at 47 C.F.R. § 101.603(a)(7).

²³⁵ *R&O*, 26 FCC Rcd at 11630-11631 ¶¶ 35-38.

²³⁶ *R&O*, 26 FCC Rcd at 11631 ¶ 37.

²³⁷ FWCC Petition at 5.

those bands.²³⁸ The NAB and SBE oppose FWCC's petition, arguing that the convergence of digital video with digital data transmission has eliminated any technological reasons for broadcasters to maintain facilities to carry program material to transmitter sites that are separate from microwave transmission systems that handle other kinds of data.²³⁹ Reinstating the final link rule would therefore result in a duplication of facilities that would otherwise be unnecessary, they contend.²⁴⁰

2. Discussion

97. In the *R&O*, the Commission found that there would be significant benefits and no costs to eliminating the final link rule.²⁴¹ It noted that no commenter had identified any cognizable harm that would result from eliminating the rule and concluded that, with increasing adoption of digital technologies, the final link rule had become an outdated regulation that imposed unnecessary, duplicative costs on broadcasters.²⁴² That conclusion is consistent with one of the fundamental purposes of this proceeding: removing regulatory barriers that limit the use of spectrum for wireless backhaul and other point-to-point and point-to-multipoint communications.

98. The Commission's action maximized the ability of both FS operators and broadcasters to use the 7 and 13 GHz bands. While it is true that the Commission did not make those bands available for FS use everywhere, that decision was based on the fact that fixed links and ENG operations are different and difficult to coordinate with each other. That is why the Commission decided to allow Part 101 FS operators to use the 7 and 13 GHz bands only in geographic areas where there are no incumbent licensed TV pick-up operations.²⁴³ Despite that constraint, however, the Commission was able to open most of the 7 and 13 GHz bands to FS over more than half of the nation's land mass where 10 percent of the population lives.²⁴⁴ In contrast, there is no technical reason why broadcasters, cable operators and Part 101 FS operators cannot share the same spectrum when transmitting microwave signals between fixed locations.

99. The Commission's actions maximized the amount of spectrum available to both FS licensees and broadcasters. Furthermore, FWCC does not allege any harm from eliminating the final link rule; and therefore, the Commission's conclusion that there would be significant benefits and no costs to eliminate the final link rule remains unchanged. As the National Spectrum Management Association (NSMA) has observed, there is no reason to believe that there is a pent-up demand for extensive use of FS bands by broadcasters for last link applications.²⁴⁵ Whatever the precise amount of demand from broadcasters turns out to be, we agree with NSMA that it should be possible to accommodate any

²³⁸ FWCC Petition at 5.

²³⁹ NAB and SBE Opposition at 8-9.

²⁴⁰ NAB and SBE Opposition at 9.

²⁴¹ *R&O*, 26 FCC Rcd at 11631 ¶ 38.

²⁴² *R&O*, 26 FCC Rcd at 11631 ¶ 38.

²⁴³ *R&O*, 26 FCC Rcd at 11625 ¶ 23.

²⁴⁴ *R&O*, 26 FCC Rcd at 11627 ¶ 28.

²⁴⁵ Comments of the National Spectrum Management Association (filed Oct. 25, 2010) (NSMA Comments on NPRM) at 5.

incremental use of the affected bands in the general flow of expected FS deployments.²⁴⁶ We therefore deny FWCC's Petition on this issue.

C. Upper Microwave Substantial Service Policies

1. Background

100. In reply comments to the *NOI*, NSMA argued that in determining whether 24 GHz, 39 GHz, and Local Multipoint Distribution Service (LMDS) licensees have offered substantial service, the Commission fails to positively consider "basic and important steps that lead to successful band utilization."²⁴⁷ It gives the following examples of such activity: (1) spending significant resources producing Requests for Proposals (RFPs) to develop equipment in its band; (2) utilizing the Secondary Markets rules to offer spectrum leases throughout the license area; (3) submitting proposals to carrier, government, or enterprise customers that rely on utilizing the wide-area license; and/or (4) building several links, but not yet meeting the safe harbor criterion (typically four links per million of population).²⁴⁸ NSMA asked the Commission to "track and credit" such activities.²⁴⁹

101. The Commission rejected NSMA's request in the *MO&O*.²⁵⁰ The Commission concluded that NSMA's arguments ignored one of the Commission's overriding purposes of buildout requirements: providing "a clear and expeditious accounting of spectrum use by licensees to ensure that service is indeed being provided to the public."²⁵¹ It approved the Wireless Telecommunications Bureau rejection of substantial service showings based on preparatory activities of the type described by NSMA where there is no actual service being provided to the public.²⁵² It noted that safe harbors are merely one means of demonstrating substantial service, and that given an appropriate showing, a level of service that does not meet a safe harbor may still constitute substantial service.²⁵³ It also emphasized that all substantial service showings that do not meet an established safe harbor would be evaluated on a case-by-case basis.²⁵⁴

102. In a petition for reconsideration of the *MO&O*, the Wireless Communications Association International, Inc. (WCAI) challenges the Commission's decision to address that issue in this

²⁴⁶ See NSMA Comments on NPRM at 6.

²⁴⁷ Reply Comments of the National Spectrum Management Association (filed Nov. 22, 2010) (NSMA Reply Comments) at 12.

²⁴⁸ NSMA Reply Comments at 13.

²⁴⁹ NSMA Reply Comments at 14.

²⁵⁰ *MO&O*, 26 FCC Rcd at 11661 ¶ 114.

²⁵¹ *Id.*, citing Amendment of the Commission's Rules Regarding the 37.0 – 38.6 GHz and 38.6 – 40 GHz Bands, *Report and Order and Second Notice of Proposed Rulemaking*, ET Docket No. 95-183, 12 FCC Rcd 18600, 18623 ¶ 42 (1997) (*39 GHz R&O*); *Renewal of Licenses to Provide Microwave Service in the 38.6-40.0 GHz Band, Memorandum Opinion and Order*, 17 FCC Rcd 4404, 4407 ¶ 11 (WTB PSPWD 2002) (*39 GHz Renewal Order*).

²⁵² *MO&O*, 26 FCC Rcd at 11661 ¶ 114, citing IDT Spectrum, LLC, *Order on Reconsideration and Memorandum Opinion and Order*, 23 FCC Rcd 12005, 12013-12016 ¶¶ 19-23 (WTB 2008).

²⁵³ *MO&O*, 26 FCC Rcd at 11661 ¶ 114.

²⁵⁴ *Id.*

proceeding.²⁵⁵ WCAI argues that the Commission's consideration of this issue violates the Administrative Procedure Act because the issue was not raised in the *NPRM*.²⁵⁶ WCAI believes substantial service rules and policies relating to wireless backhaul should be addressed in the broader proceeding seeking to harmonize renewal standards for wireless radio services (WT Docket No. 10-112) that is currently pending.²⁵⁷

103. WCAI argues that standards currently applicable to fixed point-to-point services, which require a certain number of links based on population, do not in fact promote service to the public because it requires operators to either build uneconomic links in the absence of demand for backhaul services or lose their licenses.²⁵⁸ According to WCAI, the standards create "substantial investor uncertainty about the amount of capital required to preserve a license in the millimeter wave bands."²⁵⁹ WCAI asks the Commission to adopt an "offer-based" standard that would "require only that an area-wide millimeter wave band licensee offer FP2P service or spectrum leases on commercially reasonable terms and conditions to commercial or government fixed or mobile telephony/broadband service providers or to the licensee's internal network planners."²⁶⁰ FWCC and Mary J. Kuiken support WCAI's Petition.²⁶¹

2. Discussion

104. WCAI has filed its substantial service proposal for wireless backhaul in WT Docket No. 10-112 and we will consider it in that proceeding, consistent with WCAI's request.²⁶² The *Memorandum Opinion and Order* merely explained the Commission's decision not to initiate a rulemaking to address NSMA's substantial service proposal that NSMA presented in reply comments filed in response to the *NOI*,²⁶³ and thus did not violate the notice-and-comment requirements of the APA, which are applicable to rulemaking proceedings,²⁶⁴ or prejudice our consideration of substantial service issues in WT Docket No. 10-112. The Commission's decision to dispose of NSMA's request also was appropriate because many LMDS and 39 GHz licensees were facing a June 1, 2012 deadline for providing substantial service.²⁶⁵

²⁵⁵ WCAI Petition.

²⁵⁶ WCAI Petition at 2.

²⁵⁷ WCAI Petition at 2-3.

²⁵⁸ WCAI Petition at 5.

²⁵⁹ *Id.*

²⁶⁰ WCAI Petition at 6.

²⁶¹ See Comments in Support of Petition for Reconsideration, Fixed Wireless Communications Coalition (filed Dec. 16, 2011); Comment in Support of Mary Kuiken Stormo (filed Dec. 16, 2011).

²⁶² See WCAI Petition at 1-2, 7.

²⁶³ See *MO&O*, 26 FCC Rcd at 11660-61 ¶¶ 99, 113-14.

²⁶⁴ See 5 U.S.C. § 553.

²⁶⁵ See ART Licensing Corporation, *Order on Reconsideration and Memorandum Opinion and Order*, 23 FCC Rcd 14116 (WTB 2008) (granting FiberTower Corporation an extension until June 1, 2012 to demonstrate substantial service for its 39 GHz licenses); IDT Spectrum, LLC, *Order on Reconsideration and Memorandum Opinion and Order*, 23 FCC Rcd 12005 (WTB 2008) (granting an extension until June 1, 2012 for IDT's 39 GHz licenses); Applications filed by Licensees in the Local Multipoint Distribution Service (LMDS) Seeking Waivers of Section 101.1011 of the Commission's Rules and Extensions of Time to Construct and Demonstrate Substantial Service, *Memorandum Opinion and Order*, 23 FCC Rcd 5894 (WTB 2008) (granting multiple LMDS licensees an extension until June 1, 2012 to demonstrate substantial service).

The Commission's response to NSMA's petition thus restated the applicable rules and policies in advance of that deadline and allowed licensees to plan accordingly. In explaining its decision, we note that the *MO&O* accurately stated the Commission's current policy, and we direct the Bureau to apply that policy to the June 1, 2012 substantial service filings made by LMDS and 39 GHz licensees. We also agree with the observation in the *MO&O* that any substantial service standard must provide "a clear and expeditious accounting of spectrum use by licensees to ensure that service is indeed being provided to the public."²⁶⁶ Our action today is without prejudice to subsequent consideration of these issues in WT Docket No. 10-112.

VIII. MEMORANDUM OPINION AND ORDER

105. In this *MO&O*, we address various other proposals and issues that we believe are best considered in other contexts or do not require Commission consideration and therefore will not be considered in this proceeding at this time.

106. FWCC asks that the Commission authorize smaller antennas in the 71-76 and 81-86 GHz bands.²⁶⁷ We decline to initiate a rulemaking because we do not believe that FWCC has provided sufficient information to justify further action at this time in the context of this proceeding. The current antenna specifications for those bands were adopted after a detailed discussion of the tradeoffs involved.²⁶⁸ FWCC has not provided sufficient information to demonstrate that smaller antennas could be allowed without increasing interference. Our action today is without prejudice to consideration of a more detailed submission on this issue.

107. EIBASS, which supports the *R&O*'s requirement that BAS licensees in the 7 and 13 GHz bands register their fixed receive sites, asks various questions about the effective date and other aspects of the requirement.²⁶⁹ Staff from the Bureau has met with broadcasters to discuss implementation of that requirement.²⁷⁰ We do not see the need for Commission intervention at this time, but we direct the Bureau to continue working with broadcasters on implementing the registration requirement.

108. Comsearch and FWCC ask the Commission to streamline application processing when applicants intend to use adaptive modulation by allowing adaptive modulation frequencies to be filed as a single row, as opposed to requiring each combination of modulation, capacity, bandwidth, and transmitter

²⁶⁶ *MO&O*, 26 FCC Rcd at 11661 ¶ 114, citing *39 GHz R&O*, 12 FCC Rcd at 18623 ¶ 42; see also *id.* at 18625 ¶ 46 ("This approach will permit flexibility in system design and market development, while ensuring that service is being provided to the public."); *id.* at 18626 ¶ 46 ("This revised performance standard should ensure that meaningful service will be provided without unduly restricting service offerings."); *id.* at 18625 ¶ 47 ("[A]pplying a similar performance requirement to all licensees at the license renewal point will help establish a level playing field without compromising the goals of ensuring efficient spectrum use and expeditious provision of service to the public."); *39 GHz Renewal Order*, 17 FCC Rcd at 4407 ¶ 11 ("The Commission's overarching purpose behind adopting the substantial service standard for renewal was to ensure that the spectrum was being used to provide service to the public.").

²⁶⁷ FWCC Comments at 4-5.

²⁶⁸ See *Allocations and Service Rules for the 71-76 GHz, 81-86 GHz, and 92-95 GHz Bands*, WT Docket No. 02-146, *Memorandum Opinion and Order*, 20 FCC Rcd 4889, 4904-4906 ¶¶ 32-34 (2005).

²⁶⁹ EIBASS Petition at 3-5.

²⁷⁰ See Letter from Dane E. Ericksen and Richard A. Rudman, Engineers for the Integrity of Broadcast Auxiliary Services Spectrum to Marlene H. Dortch, Secretary, Federal Communications Commission (filed May 24, 2012).

power to be licensed individually.²⁷¹ No rule change is required to implement this change, and Bureau staff has started the process of modifying the Universal Licensing System to allow this change.

109. Comsearch and FWCC ask that the Commission eliminate the provision in the rules that allows operation of low power, limited coverage systems in the 23 GHz band because the rules are allegedly unnecessary and allow the use of inefficient antennas.²⁷² According to Comsearch, that provision was used in the past for low cost analog video systems for purposes such as surveillance.²⁷³ Comsearch describes such systems as “outmoded” and claims to be unaware of any current usage of such systems.²⁷⁴ The frequencies in question are particularly important and most used in the 23 GHz band because they are available for conditional authority under Section 101.31(b) of the Commission’s rules.²⁷⁵ Clearwire also asks the Commission to allow licensees to aggregate channels in the 18 GHz and 23 GHz bands to allow 80 megahertz, 100 megahertz, 120 megahertz, or 150 megahertz channels.²⁷⁶

110. We believe these requests should be considered together with other filings relating to the 23 GHz band and therefore defer consideration of them. FWCC has filed a petition for reconsideration of the Commission’s order authorizing conditional authority for additional channels in the 23 GHz band which raises the issue of authorizing low power systems on those additional channels.²⁷⁷ FWCC has also filed a petition for rulemaking asking that conditional authority be authorized throughout the 23 GHz band and seeking changes to the mechanism for coordinating operation with the National Telecommunications and Information Administration (NTIA).²⁷⁸ In light of the common issues raised by each of those pleadings, we believe those requests should be considered together, in consultation with NTIA. We therefore defer consideration of these requests.

111. We recognize that there are other pending matters and proceedings relating to wireless backhaul that are not addressed in this item. Those matters and proceedings include: (1) A petition for rulemaking asking that the 7125-8500 MHz band be allocated for non-federal use and allotted for FS use,²⁷⁹ (2) a request made in this proceeding to revise the Commission’s policy of allowing a satellite earth station to coordinate for the full 360-degree azimuth range of the earth station even when it is communicating with only one satellite in a limited segment of the band,²⁸⁰ and (3) a petition for

²⁷¹ Comsearch Comments at 11-12; FWCC Reply Comments at 6.

²⁷² Comsearch Comments at 12; FWCC Reply Comments at 7. *See* 47 C.F.R. § 101.147(s)(8).

²⁷³ Comsearch Comments at 12.

²⁷⁴ Comsearch Comments at 12.

²⁷⁵ Comsearch Comments at 12.

²⁷⁶ Clearwire Comments at 9.

²⁷⁷ Petition for Reconsideration, Fixed Wireless Communications Coalition, WT Docket No. 09-114 (filed Aug. 18, 2010). *See* Amendment of Part 101 of the Commission’s Rules to Accommodate 30 Megahertz Channels in the 6525-6875 MHz Band, WT Docket No. 09-114, *Report and Order*, 25 FCC Rcd 7760 (2010).

²⁷⁸ *See Petition for Rulemaking of the Fixed Wireless Communications Coalition Petition to Amend Part 101 of the Commission’s Rules for Automated Government Frequency Coordination and Conditional Licensing in the 23 GHz Fixed Service Band*, RM-11610 (filed Jul. 26, 2010).

²⁷⁹ *See Petition for Rulemaking of the Fixed Wireless Communications Coalition In the Matter of Amendment of Parts 2 and 101 of the Commission’s Rules to Provide for Federal and Non-Federal Sharing in the 7125-8500 MHz Band*, RM-11605 (filed Mar. 16, 2010).

²⁸⁰ Comments of AT&T, Inc. (filed Oct. 25, 2010) at 14-15; Comments of the Fixed Wireless Communications Coalition (filed Oct. 25, 2010) at 15-16; Reply Comments of EIBASS (filed Nov. 22, 2010) at 9-10.

rulemaking asking that the Commission establish service rules for FS use in the 42-42.5 GHz band.²⁸¹ We defer consideration of these issues and will address them separately or in future orders in this proceeding.

IX. PROCEDURAL MATTERS

A. *Ex Parte* Rules – Permit-But-Disclose

112. The proceeding shall be treated as a “permit-but-disclose” proceeding in accordance with the Commission’s *ex parte* rules.²⁸² Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within two business days after the presentation (unless a different deadline applicable to the Sunshine period applies). Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentation must (1) list all persons attending or otherwise participating in the meeting at which the *ex parte* presentation was made, and (2) summarize all data presented and arguments made during the presentation. If the presentation consisted in whole or in part of the presentation of data or arguments already reflected in the presenter’s written comments, memoranda or other filings in the proceeding, the presenter may provide citations to such data or arguments in his or her prior comments, memoranda, or other filings (specifying the relevant page and/or paragraph numbers where such data or arguments can be found) in lieu of summarizing them in the memorandum. Documents shown or given to Commission staff during *ex parte* meetings are deemed to be written *ex parte* presentations and must be filed consistent with rule 1.1206(b). In proceedings governed by rule 1.49(f) or for which the Commission has made available a method of electronic filing, written *ex parte* presentations and memoranda summarizing oral *ex parte* presentations, and all attachments thereto, must be filed through the electronic comment filing system available for that proceeding, and must be filed in their native format (*e.g.*, .doc, .xml, .ppt, searchable .pdf). Participants in this proceeding should familiarize themselves with the Commission’s *ex parte* rules.

B. Comment Period and Procedures

113. Pursuant to sections 1.415 and 1.419 of the Commission’s rules, 47 CFR §§ 1.415, 1.419, interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. Comments may be filed using the Commission’s Electronic Comment Filing System (ECFS). *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

- Electronic Filers: Comments may be filed electronically using the Internet by accessing the ECFS: <http://fjallfoss.fcc.gov/ecfs2/>.
- Paper Filers: Parties who choose to file by paper must file an original and one copy of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number.

Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission’s Secretary, Office of the Secretary, Federal Communications Commission.

²⁸¹ See *Petition for Rulemaking of the Fixed Wireless Communications Coalition In the Matter of Service Rules for the Fixed Service in the 41.0-42.5 GHz Band*, RM-11664 (filed May 9, 2012).

²⁸² 47 C.F.R. §§ 1.1200 *et seq.*

- All hand-delivered or messenger-delivered paper filings for the Commission’s Secretary must be delivered to FCC Headquarters at 445 12th St., SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes and boxes must be disposed of before entering the building.
- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743.
- U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554.

People with Disabilities: To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an e-mail to fcc504@fcc.gov or call the Consumer & Governmental Affairs Bureau at 202-418-0530 (voice), 202-418-0432 (tty).

C. Final Regulatory Flexibility Analysis of the Report and Order

114. The Regulatory Flexibility Act (RFA)²⁸³ requires that an agency prepare a regulatory flexibility analysis for notice and comment rulemakings, unless the agency certifies that “the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities.”²⁸⁴ Accordingly, we have prepared a Final Regulatory Flexibility Analysis concerning the possible impact of the rule changes contained in the *Report and Order* on small entities. The Final Regulatory Flexibility Analysis is set forth in Appendix B.

D. Initial Regulatory Flexibility Analysis

115. As required by the Regulatory Flexibility Act of 1980 (RFA),²⁸⁵ the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on small entities of the policies and rules proposed in the *Further Notice of Proposed Rulemaking*. The analysis is found in Appendix D. We request written public comment on the analysis. Comments must be filed in accordance with the same deadlines as comments filed in response to the *FNRP* and must have a separate and distinct heading designating them as responses to the IRFA. The Commission’s Consumer and Governmental Affairs Bureau, Reference Information Center, will send a copy of this *BRS/EBS 5th FNPRM*, including the IRFA, to the Chief Counsel for Advocacy of the Small Business Administration.

E. Paperwork Reduction Analysis

116. This document contains an information collection requirement subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13. It will be submitted to the Office of Management and Budget (OMB) for review under Section 3507 of the PRA. Prior to submission to OMB, the Commission will publish a notice in the Federal Register seeking public comment on the modified information collection requirement. In addition, that notice will also seek comment on how the Commission might

²⁸³ See 5 U.S.C. § 601–612. The RFA 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).

²⁸⁴ 5 U.S.C. § 605(b).

²⁸⁵ See 5 U.S.C. § 603.

“further reduce the information collection burden for small business concerns with fewer than 25 employees” pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, see 44 U.S.C. 3506(c)(4). The information collection contained in this order will not go into effect until OMB approves the collection. We will publish a notice in the Federal Register announcing the effective date of the information collection.

F. Further Information

117. For further information, contact John Schauble of the Wireless Telecommunications Bureau, Broadband Division, at 202-418-0797 or John.Schauble@fcc.gov.

X. ORDERING CLAUSES

118. Accordingly, IT IS ORDERED, pursuant to Sections 1, 2, 4(i), 7, 201, 301, 302, 303, 307, 308, 309, 310, 319, 324, 332, 333 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 152, 154(i), 157, 201, 301, 302, 303, 307, 308, 309, 310, 319, 324, 332, and 333, and Section 706 of the Telecommunications Act of 1996, as amended, 47 U.S.C. § 1302, that this *Second Report and Order* is hereby ADOPTED.

119. IT IS FURTHER ORDERED that the rules adopted herein WILL BECOME EFFECTIVE 30 days after the date of publication in the *Federal Register*. IT IS FURTHER ORDERED that the Rural Microwave Flexibility Policy, which contains new information collection requirements that require approval by the Office of Management and Budget (OMB) under the Paperwork Reduction Act (PRA), WILL BECOME EFFECTIVE after the Commission publishes a notice in the *Federal Register* announcing such approval and the relevant effective date.

120. IT IS FURTHER ORDERED, pursuant to Sections 1, 2, 4(i), 7, 201, 301, 302, 303, 307, 308, 309, 310, 319, 324, 332, and 333 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 152, 154(i), 157, 201, 301, 302, 303, 307, 308, 309, 310, 319, 324, 332, and 333, and Section 706 of the Telecommunications Act of 1996, as amended, 47 U.S.C. § 1302, that this *Second Further Notice of Proposed Rulemaking* is hereby ADOPTED and that comment is sought on these proposals.

121. IT IS FURTHER ORDERED, pursuant to Sections 1, 2, 4(i), 7, 201, 301, 302, 303, 307, 308, 309, 310, 319, 324, 332, and 333 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 152, 154(i), 157, 201, 301, 302, 303, 307, 308, 309, 310, 319, 324, 332, and 333, and Section 706 of the Telecommunications Act of 1996, as amended, 47 U.S.C. § 1302, that this *Second Notice of Inquiry* is hereby ADOPTED.

122. IT IS FURTHER ORDERED, pursuant to Sections 1, 2, 4(i), 7, 201, 301, 302, 303, 307, 308, 309, 310, 319, 324, 332, and 333 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 152, 154(i), 157, 201, 301, 302, 303, 307, 308, 309, 310, 319, 324, 332, and 333, and Section 706 of the Telecommunications Act of 1996, as amended, 47 U.S.C. § 1302, that this *Memorandum Opinion and Order* is hereby ADOPTED.

123. IT IS FURTHER ORDERED, pursuant to Sections 1, 2, 4(i), 7, 201, 301, 302, 303, 307, 308, 309, 310, 319, 324, 332, 333, and 405 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 152, 154(i), 157, 201, 301, 302, 303, 307, 308, 309, 310, 319, 324, 332, 333, and 405, and Section 706 of the Telecommunications Act of 1996, as amended, 47 U.S.C. § 1302, that this *Order on Reconsideration* is hereby ADOPTED.

124. IT IS FURTHER ORDERED that the Commission SHALL SEND a copy of this *Report and Order* to Congress and the Government Accountability Office pursuant to the Congressional Review Act, *see* 5 U.S.C. 801(a)(1)(A).

125. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this *Second Report and Order, Second Further Notice of Proposed Rulemaking, Second Notice of Inquiry, Order on Reconsideration, and Memorandum Opinion and Order*, including the Final Regulatory Flexibility Analysis and the Initial 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

For the reasons discussed in the preamble, the Federal Communications Commission hereby amends 47 CFR part 101 as follows:

PART 101 – FIXED MICROWAVE SERVICES

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

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. Amend § 101.3 by adding the definition “Payload Capacity” to read as follows:

§ 101.3 Definitions.

* * * * *

Payload Capacity. The bit rate available for transmission of data over a radiocommunication system, excluding overhead data generated by the system.

* * * * *

3. Amend § 101.109(c), in the table by revising the entries “5,925 to 6,425” and “10,700 to 11,700” to read as follows:

§ 101.109 Bandwidth.

* * * * *

(c) * * *

Frequency Band (MHz)	Maximum Authorized Bandwidth
***	****
5,925 to 6,425	60 MHz ¹
***	****
10,700 to 11,700	80 MHz ¹

Frequency Band (MHz)	Maximum Authorized Bandwidth
***	****
***	****

* * * * *

4. Amend § 101.115 by revising paragraph (b) introductory text and the table in paragraph (b)(2) to read as follows:

§ 101.115 Directional antennas.

* * * * *

(b) Fixed stations (other than temporary fixed stations and DEMS nodal stations) operating at 932.5 MHz or higher must employ transmitting and receiving antennas (excluding second receiving antennas for operations such as space diversity) meeting the appropriate performance Standard A indicated below, except that in areas not subject to frequency congestion, antennas meeting performance Standard B may be used, subject to the requirements set forth in paragraph (d) of this section. For frequencies with a Standard B1 and a Standard B2, in order to comply with Standard B an antenna must fully meet either Standard B1 or Standard B2. Licensees shall comply with the antenna standards table shown in this paragraph in the following manner:

* * * * *

(2) * * *

Frequency	Category	Maximum beam-width to 3 dB points ¹ (included angle in degrees)	Minimum antenna Gain (dBi)	<i>Minimum radiation suppression to angle in degrees from centerline of main beam in decibels</i>						
				5° to 10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° to 180°
* * * * *										
5,925 to	A	2.2	38	25	29	33	36	42	55	55

6,425 ⁵	B1	2.2	38	21	25	29	32	35	39	45
	B2	4.1	32	15	20	23	28	29	60	60
* * * * *										
6,525 to 6,875 ⁵	A	2.2	38	25	29	33	36	42	55	55
	B1	2.2	38	21	25	29	32	35	39	45
	B2	4.1	32	15	20	23	28	29	60	60
6,875 to 7,075	A	2.2	38	25	29	33	36	42	55	55
	B1	2.2	38	21	25	29	32	35	39	45
	B2	4.1	32	15	20	23	28	29	60	60
* * * * *										
17,700 to 18,820	A	2.2	38	25	29	33	36	42	55	55
	B1	2.2	38	20	24	28	32	35	36	36
	B2	3.3	33.5	18	22	29	31	35	55	55
18,920 to 19,700 ¹⁰	A	2.2	38	25	29	33	36	42	55	55
	B1	2.2	38	20	24	28	32	35	36	36
	B2	3.3	33.5	18	22	29	31	35	55	55
21,200 to 23,600 ^{7,11}	A	3.3	33.5	18	26	26	33	33	55	55

	B1	3.3	33.5	17	24	24	29	29	40	50
	B2	4.5	30.5	14	19	22	24	29	52	52
* * * * *										

5. Amend § 101.141 by revising paragraphs (a)(3), (a)(6), and (a)(7) to read as follows:

§ 101.141 Microwave modulation.

(a) * * *

(3) Except as noted in paragraph (a)(7) of this section, the payload capacity of equipment shall meet the following minimum efficiency standards:

Frequency	Emission Bandwidth ≤ 5 MHz	Emission Bandwidth > 5 MHz and ≤ 20 MHz	Emission Bandwidth > 20 MHz
3,700 – 10,550 MHz	2.4 bits/second/Hertz	4.4 bits/second/Hertz	4.4 bits/second/Hertz
10,550 – 13,250 MHz	2.4 bits/second/Hertz	4.4 bits/second/Hertz	3.0 bits/second/Hertz

Traffic loading payload shall exceed 50 percent of payload capacity within 30 months of licensing. During anomalous signal fading, licensees subject to the capacity and loading requirements may adjust to a modulation specified in their authorization if such modulation is necessary to allow licensees to maintain communications, even if the modulation will not comply with the capacity and loading requirements specified in this paragraph. Links that must comply with the capacity and loading requirements that use equipment capable of adjusting modulation must be designed using generally accepted multipath fading and rain fading models to meet the specified capacity and loading requirements at least 99.95% of the time, in the aggregate of both directions in a two-way link.

* * * * *

(6) Digital systems using bandwidths of 10 MHz or larger will be considered 50 percent loaded when at least 50 percent of their total capacity is being used. For purposes of this subsection, a Fixed Service channel is being used if it is attached to a communications system that is capable of providing data to it at a rate that is sufficient to occupy at least 50 percent of the payload capacity of the Fixed Service channel, after header compression is applied.

(7) Equipment placed in service after June 1, 1997 and prior to **[insert effective date of rule]** may comply with the provisions of § 101.141(a)(3) in effect as of the date the equipment was placed in service.

6. Amend § 101.145 by revising paragraph (b) introductory text and paragraph (c) to read as follows:

§ 101.145 Interference to geo-stationary-satellites.

* * * * *

(b) 2655 to 2690 MHz and 5925 to 7075 MHz. No directional transmitting antenna utilized by a fixed station operating in these bands with EIRP greater than 35 dBW may be aimed within 2 degrees of the geostationary-satellite orbit, taking into account atmospheric refraction. However, exception may be made in unusual circumstances upon a showing that there is no reasonable alternative to the transmission path proposed. If there is no evidence that such exception would cause possible harmful interference to an authorized satellite system, said transmission path may be authorized on waiver basis where the maximum value of the equivalent isotropically radiated power (EIRP) does not exceed:

* * * * *

(c) 12.7 to 13.25 GHz. No directional transmitting antenna utilized by a fixed station operating in this band with EIRP greater than 45 dBW may be aimed within 1.5 degrees of the geostationary-satellite orbit, taking into account atmospheric refraction.

* * * * *

7. Amend § 101.147 by revising paragraph (i) introductory text, adding paragraph (i)(9), revising paragraph (o) introductory text, and adding paragraph (o)(8) to read as follows:

§ 101.147 Frequency assignments.

* * * * *

(i) 5,925 to 6,425 MHz. 60 MHz authorized bandwidth.

* * * * *

(9) 60 MHz bandwidth channels:¹

Transmit (receive) (MHz)	Receive (transmit) (MHz)
5964.97	6217.01
6024.27	6276.31
6083.57	6335.61
6142.87	6394.91

¹ The highest available channel should be selected, except where such a choice would impede the efficiency of local frequency coordination efforts.

* * * * *

(o) 10,700 to 11,700 MHz. 80 MHz authorized bandwidth.

* * * * *

(8) 80 MHz bandwidth channels:¹

Transmit (receive) (MHz)	Receive (transmit) (MHz)
10745	11235
10825	11315
10905	11395
10985	11475
11065	11555
11145	11635

¹ The highest available channel should normally be selected, except where such a choice would impede the efficiency of local frequency coordination efforts.

* * * * *

APPENDIX B

Final Regulatory Flexibility Analysis

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),¹ 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 Rulemaking (NPRM)*. No comments were filed addressing the IRFA. Because we amend the rules in this *Second Report and Order*, we have included this Final Regulatory Flexibility Analysis (FRFA). This present FRFA conforms to the RFA.²

A. Need for, and Objectives of, the Proposed Rules

2. In this *Second Report and Order*, we make four changes to our rules involving microwave stations. These changes are described in further detail below. First, we allow the use of smaller antennas in the 5925-6875 MHz band (6 GHz band), 17700-18300 MHz and 19300-19700 MHz bands (18 GHz band), and 21200-23600 MHz band (23 GHz band) fixed service (FS) bands. Second, we add a definition of “payload capacity” to our rules, and update our capacity and loading requirements to bits/second/Hertz standards reflect the increasing use of interfaces such as Internet Protocol. Third, we widen the permissible maximum channel size in the 5925-6425 GHz Band (Lower 6 GHz Band) (to allow 60 megahertz channels) and in the 10700-11700 MHz band (11 GHz Band) (to allow 80 megahertz channels) to allow faster data rates. Finally, we propose to revise the criteria under which microwave stations that are pointing in the direction of geostationary satellites must seek a waiver prior to operating to expedite service.

3. With respect to the first proposal, Section 101.115(b) of the Commission’s Rules establishes directional antenna standards designed to maximize the use of microwave spectrum while avoiding interference between operators. 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. Smaller antennas have several advantages. They 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. In addition, 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. Smaller antennas raise fewer aesthetic objections, thereby permitting easier compliance with local zoning and homeowner association rules and generating fewer objections. On the other hand, smaller antennas have increased potential to cause interference because smaller antennas result in more radiofrequency energy being transmitted in directions away from the actual point-to-point link. We conclude that we can allow smaller antennas in the 6, 18 and 23 GHz bands without producing harmful interference.

4. Second, we add a definition of “payload capacity” to our rules, and update our capacity and loading standards to take into account the increasing use of interfaces such as Internet Protocol. Currently, Section 101.141(a)(3) of the Commission’s Rules lists a “minimum payload capacity” for various nominal channel bandwidths. The same rule also defines “typical utilization” of the required

¹ 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).

² See 5 U.S.C. § 604.

payload capacity for each channel bandwidth as multiples of the number of voice circuits a channel can accommodate. These definitions are becoming outdated as systems support interfaces such as Internet Protocol. Accordingly, we update our rules to add a definition of payload capacity. We also revise our efficiency requirements to define those requirements in terms of bits-per-second-per-Hertz (“bps/Hz”) across all bands. Such changes could make our rules clearer and would be consistent with modern digital technologies.

5. Third, we allow the use of wider channels in the Lower 6 GHz Band and 11 GHz Band. Specifically, we allow 60 megahertz channels in the Lower 6 GHz Band and 80 megahertz channels in the 11 GHz Band. That action will allow backhaul operators to handle more capacity and offer faster data rates.

6. Finally, we amend Section 101.145 of the Commission’s Rules to limit the circumstances under which fixed service transmitters must obtain a waiver in order to point near the geostationary arc. Specifically, we propose to require a waiver only if the EIRP is greater than 35 dBW for the 5925-7075 MHz band and is greater than 45 dBW in the 12700-13250 MHz band. Limiting the circumstances where a waiver is necessary will be beneficial. Once the frequency coordination process is completed, the Commission’s rules provide many applicants with conditional authority to begin service immediately, without waiting for final approval from the Commission, and with the stipulation that they must take their stations down if the Commission later rejects their applications. Conditional authority is not available, however, to applicants that must request waivers of existing rules. Accordingly, limiting the circumstances under which a waiver is needed will allow more applicants to rapidly commence service. Furthermore, we conclude that such a change would be consistent with international regulations and can be made without any increased risk of interference to satellite services.

B. Legal Basis

7. The actions are authorized pursuant to sections 1, 2, 4(i), 7, 201, 301, 302, 303, 307, 308, 309, 310, 319, 324, 332, and 333 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 152, 154(i), 157, 201, 301, 302, 303, 307, 308, 309, 310, 319, 324, 332, and 333, and Section 706 of the Telecommunications Act of 1996, as amended, 47 U.S.C. § 1302.

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

8. 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 proposed rules and policies, if adopted.³ The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”⁴ In addition, the term “small business” has the same meaning as the term “small business concern” under the Small Business Act.⁵ A “small

³ 5 U.S.C. § 603(b)(3).

⁴ 5 U.S.C. § 601(6).

⁵ 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.”

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.⁶

9. *Small Businesses, Small Organizations, and Small Governmental Jurisdictions.* Our action may, over time, affect small entities that are not easily categorized at present. We therefore describe here, at the outset, three comprehensive, statutory small entity size standards.⁷ First, nationwide, there are a total of approximately 27.5 million small businesses, according to the SBA.⁸ In addition, a “small organization” is generally “any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.”⁹ Nationwide, as of 2007, there were approximately 1,621,315 small organizations.¹⁰ Finally, 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.”¹¹ Census Bureau data for 2011 indicate that there were 89,476 local governmental jurisdictions in the United States.¹² We estimate that, of this total, as many as 88,506 entities may qualify as “small governmental jurisdictions.”¹³ Thus, we estimate that most governmental jurisdictions are small.

10. *Wireless Telecommunications Carriers (except satellite).* The appropriate size standard under SBA rules is for the category Wired Telecommunications Carriers. Under that size standard, such a business is small if it has 1,500 or fewer employees.¹⁴ Census Bureau data for 2007, which now supersede data from the 2002 Census, show that there were 3,188 firms in this category that operated for the entire year. Of this total, 3,144 had employment of 999 or fewer, and 44 firms had employment of 1,000 employees or more. Thus under this category and the associated small business size standard, the Commission estimates that the majority of wireless telecommunications carriers (except satellite) are small entities that may be affected by our proposed action.¹⁵

⁶ 15 U.S.C. § 632.

⁷ See 5 U.S.C. §§ 601(3)–(6).

⁸ See SBA, Office of Advocacy, “Frequently Asked Questions,” web.sba.gov/faqs (last visited May 6, 2011; figures are from 2009).

⁹ 5 U.S.C. § 601(4).

¹⁰ INDEPENDENT SECTOR, *THE NEW NONPROFIT ALMANAC & DESK REFERENCE* (2010).

¹¹ 5 U.S.C. § 601(5).

¹² U.S. CENSUS BUREAU, *STATISTICAL ABSTRACT OF THE UNITED STATES: 2011*, Table 427 (2007)

¹³ The 2007 U.S. Census data for small governmental organizations are not presented based on the size of the population in each such organization. There were 89,476 small governmental organizations in 2007. If we assume that county, municipal, township, and school district organizations are more likely than larger governmental organizations to have populations of 50,000 or less, the total of these organizations is 52,125. If we make the same assumption about special districts and also assume that special districts are different from county, municipal, township, and school districts, in 2007 there were 37,381 special districts. Therefore, of the 89,476 small governmental organizations documented in 2007, as many as 89,506 may be considered small under the applicable standard. This data may overestimate the number of such organizations that has a population of 50,000 or less. U.S. CENSUS BUREAU, *STATISTICAL ABSTRACT OF THE UNITED STATES 2011*, Tables 427, 426 (Data cited therein are from 2007).

¹⁴ 13 C.F.R. § 121.201, NAICS code 517110.

¹⁵ See http://factfinder.census.gov/servlet/IBQTable?_bm=y&-fds_name=EC0700A1&-geo_id=&-skip=600&-ds_name=EC0751SSSZ5&-lang=en

11. *Fixed Microwave Services.* Microwave services include common carrier,¹⁶ private-operational fixed,¹⁷ and broadcast auxiliary radio services.¹⁸ At present, there are approximately 31,549 common carrier fixed licensees and 89,633 private and public safety operational-fixed licensees and broadcast auxiliary radio licensees in the microwave services. Microwave services include common carrier,¹⁹ private-operational fixed,²⁰ and broadcast auxiliary radio services.²¹ They also include the Local Multipoint Distribution Service (LMDS),²² the Digital Electronic Message Service (DEMS),²³ and the 24 GHz Service,²⁴ where licensees can choose between common carrier and non-common carrier status.²⁵ The Commission has not yet defined a small business with respect to microwave services. For purposes of the IRFA, the Commission will use the SBA's definition applicable to Wireless Telecommunications Carriers (except satellite)—i.e., an entity with no more than 1,500 persons is considered small.²⁶ For the category of Wireless Telecommunications Carriers (except Satellite), Census data for 2007, which supersede data contained in the 2002 Census, show that there were 1,383 firms that operated that year.²⁷ Of those 1,383, 1,368 had fewer than 100 employees, and 15 firms had more than 100 employees. Thus under this category and the associated small business size standard, the majority of firms can be considered small. The Commission notes that the number of firms does not necessarily track the number of licensees. The Commission estimates that virtually all of the Fixed Microwave licensees (excluding broadcast auxiliary licensees) would qualify as small entities under the SBA definition.

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

¹⁷ 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.

¹⁸ Auxiliary Microwave Service is governed by Part 74 and Part 78 of Title 47 of the Commission's Rules. Available to licensees of broadcast stations, cable operators, and to broadcast and cable network entities. 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 TV pickup and CARS pickup, which relay signals from a remote location back to the studio.

¹⁹ *See* 47 C.F.R. Part 101, Subparts C and I.

²⁰ *See* 47 C.F.R. Part 101, Subparts C and H.

²¹ Auxiliary Microwave Service is governed by Part 74 of Title 47 of the Commission's Rules. *See* 47 C.F.R. Part 74. 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.

²² *See* 47 C.F.R. Part 101, Subpart L.

²³ *See* 47 C.F.R. Part 101, Subpart G.

²⁴ *See id.*

²⁵ *See* 47 C.F.R. §§ 101.533, 101.1017.

²⁶ 13 C.F.R. § 121.201, NAICS code 517210.

²⁷ U.S. Census Bureau, 2007 Economic Census, Sector 51, 2007 NAICS code 517210 (rel. Oct. 20, 2009), http://factfinder.census.gov/servlet/IBQTable?_bm=y&-geo_id=&-fds_name=EC0700A1&-_skip=700&-ds_name=EC0751SSSZ5&-_lang=en.

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

12. This *Report and Order* adopts no new reporting or recordkeeping requirements.

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

13. 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.²⁸

14. The actions taken in the *Report and Order* would provide additional options to all licensees, including small entity licensees. Such actions will serve the public interest by allowing use of smaller antennas, allow the use of wider channels in the Lower 6 and 11 GHz bands, eliminate the need for unnecessary waivers, and update our minimum payload capacity rules to reflect current technology. The rules will therefore open up beneficial economic opportunities to a variety of spectrum users, including small businesses. Because the actions in the *Report and Order* will improve beneficial economic opportunities for all businesses, including small businesses, a detailed discussion of alternatives is not required.

15. With respect to the proposal to allow smaller antennas in the 6 GHz band, an alternative approach would be to establish technical criteria that would allow the use of 4-foot antennas, as opposed to the 3-foot antennas proposed. Such an approach would reduce the cost savings FS licensees could realize. We conclude that limiting relief to 4-foot antennas is unnecessary to reduce the potential for interference.

F. Federal Rules that May Duplicate, Overlap, or Conflict with the Proposed Rules

16. None.

G. Report to Congress

17. The Commission will send a copy of the *Report and Order*, including the FRFA, in a report to Congress pursuant to the Congressional Review Act.²⁹ In addition, the Commission will send a copy the *Report and Order*, including FRFA, to the Chief Counsel for Advocacy of the Small Business Administration. A copy of this *Report and Order* and FRFA (or summaries thereof) will be published in the Federal Register.³⁰

²⁸ 5 U.S.C. § 603(c).

²⁹ See 5 U.S.C. § 801(a)(1)(A). The Congressional Review Act is contained in Title II, § 251, of the CWAAA, see Pub. L. No. 104-121, Title II, § 251, 110 Stat. 868.

³⁰ See 5 U.S.C. § 604(b).

APPENDIX C

Proposed Rules

For the reasons discussed in the preamble, the Federal Communications Commission hereby proposes to amend 47 CFR part 101 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. Amend § 101.113 by revising paragraphs (a) and (b) to read as follows:

§ 101.113 Transmitter power limitations.

(a) On any authorized frequency, the average power requested in an application for authorization and delivered to an antenna in this service must be the minimum amount of power necessary to carry out the communications desired, except as provided in paragraph (b).

* * * * *

(b) The maximum power of transmitters that use Automatic Transmitter Power Control (ATPC) and the power of non-ATPC transmitters shall not exceed, and the power input or output specified in the instrument of station authorization. The power of non-ATPC transmitters shall be maintained as near as practicable to, the power input or output specified in the instrument of station authorization. A licensee that reduces power in order to resolve interference pursuant to Section 101.115(f) must update its license to reflect the reduced power level.

* * * * *

3. Amend § 101.115 by revising paragraph the table in paragraph (b)(2), paragraph (c), and paragraph (f) to read as follows:

§ 101.115 Directional antennas.

* * * * *

(b) * * *

(2) * * *

Frequency	Category	Maximum beam-width to 3 dB points ¹ (included angle in	Minimum antenna Gain (dBi)	<i>Minimum radiation suppression to angle in degrees from centerline of main beam in decibels</i>						
				5° to 10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° to 180°

		degrees)								
* * * * *										
12,200 to 13,250 ⁹	A	1.0	n/a	23	28	35	39	41	42	50
	B1	2.0	n/a	20	25	28	30	32	37	47
	B2	2.0	n/a	17	24	28	32	35	60	60
* * * * *										

(c) The Commission shall require the replacement of any antenna or periscope antenna system of a permanent fixed station operating at 932.5 MHz or higher that does not meet performance Standard A specified in paragraph (c) of this section, 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. Antenna performance is expected to meet the standards of paragraph (c) of this section for parallel polarization. A licensee may upgrade to an antenna not meeting performance standard A if such upgrade will resolve the interference. A licensee who chooses to upgrade to an antenna not meeting performance standard A will be required to upgrade to an antenna meeting performance standard A in the future if necessary to resolve a subsequent interference issue. For cases of potential interference, an antenna will not be considered to meet Standard A unless the parallel polarization performance for the discrimination angle involved meets the requirements, even if the cross-polarization performance controls the interference.

* * * * *

(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 authorized EIRP. 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 D

Initial Regulatory Flexibility Analysis

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),¹ the Commission has prepared this present 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 this *Second Further Notice of Proposed Rulemaking (2nd FNPRM)*. Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines specified in the *2nd FNPRM* for comments. The Commission will send a copy of this *NPRM*, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA).² In addition, the *2nd FNPRM* and IRFA (or summaries thereof) will be published in the Federal Register.³

A. Need for, and Objectives of, the Proposed Rules

2. In this *Second Further Notice of Proposed Rulemaking*, we propose five additional changes to our rules involving microwave stations. These changes are described in further detail below. First, we propose to allow the use of smaller antennas in the 12700-13150 MHz band (13 GHz band) fixed service (FS) band. Second, we seek comment on amending our rules for the 11 GHz band to clarify the rules concerning antenna upgrades. Finally, we propose to provide additional flexibility to licensees who must upgrade their antennas to resolve interference issues.

3. With respect to the first proposal, Section 101.115(b) of the Commission's Rules establishes directional antenna standards designed to maximize the use of microwave spectrum while avoiding interference between operators. 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. Smaller antennas have several advantages. They 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. In addition, 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. Smaller antennas raise fewer aesthetic objections, thereby permitting easier compliance with local zoning and homeowner association rules and generating fewer objections. On the other hand, smaller antennas have increased potential to cause interference because smaller antennas result in more radiofrequency energy being transmitted in directions away from the actual point-to-point link. We seek comment on whether we can allow smaller antennas in the 13 GHz band without producing harmful interference.

4. Second, we seek comment on amending our rules for the 11 GHz band to clarify the circumstances under which a licensee can reduce power to avoid having to upgrade its antenna and to make clear that that a licensee may not hold an authorization for substantially more power than it actually needs. Parties have expressed concern that our existing rules allow licensees using powers below the

¹ 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).

² See 5 U.S.C. § 603(a).

³ See 5 U.S.C. § 603(a).

maximum specified in the rules to avoid upgrading antennas and that the existing rules do not provide proper interference protection.

5. Finally, we propose to allow licensees to make intermediate antenna upgrades to resolve interference issues. Currently, a licensee using an antenna meeting Category B standards must upgrade to an antenna meeting Category A standards if an antenna upgrade is necessary to resolve an interference issue. Currently, under Section 101.115(c) of the Commission's rules, if an existing antenna is insufficient to resolve interference, the operator must upgrade to an antenna meeting performance standard A. There may be instances where an applicant or licensee could resolve an interference issue or conflict by upgrading to an antenna that does not meet Category A standards but would resolve the interference problem. An intermediate upgrade may allow a licensee to maintain operations from an existing site or reduce costs to the point where operation remains economic.

B. Legal Basis

6. The proposed action is authorized pursuant to sections 1, 2, 4(i), 7, 201, 301, 302, 303, 307, 308, 309, 310, 319, 324, 332, and 333 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 152, 154(i), 157, 201, 301, 302, 303, 307, 308, 309, 310, 319, 324, 332, and 333 and Section 706 of the Telecommunications Act of 1996, as amended, 47 U.S.C. § 1302.

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

7. 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 proposed rules and policies, if adopted.⁴ The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."⁵ In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.⁶ 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.⁷

8. *Small Businesses, Small Organizations, and Small Governmental Jurisdictions.* Our action may, over time, affect small entities that are not easily categorized at present. We therefore describe here, at the outset, three comprehensive, statutory small entity size standards.⁸ First, nationwide, there are a total of approximately 27.5 million small businesses, according to the SBA.⁹ In addition, a "small organization" is generally "any not-for-profit enterprise which is independently owned and

⁴ 5 U.S.C. § 603(b)(3).

⁵ 5 U.S.C. § 601(6).

⁶ 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."

⁷ 15 U.S.C. § 632.

⁸ See 5 U.S.C. §§ 601(3)–(6).

⁹ See SBA, Office of Advocacy, "Frequently Asked Questions," web.sba.gov/faqs (last visited May 6, 2011; figures are from 2009).

operated and is not dominant in its field.”¹⁰ Nationwide, as of 2007, there were approximately 1,621,315 small organizations.¹¹ Finally, 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.”¹² Census Bureau data for 2011 indicate that there were 89,476 local governmental jurisdictions in the United States.¹³ We estimate that, of this total, as many as 88,506 entities may qualify as “small governmental jurisdictions.”¹⁴ Thus, we estimate that most governmental jurisdictions are small.

9. *Wireless Telecommunications Carriers (except satellite).* The appropriate size standard under SBA rules is for the category Wired Telecommunications Carriers. Under that size standard, such a business is small if it has 1,500 or fewer employees.¹⁵ Census Bureau data for 2007, which now supersede data from the 2002 Census, show that there were 3,188 firms in this category that operated for the entire year. Of this total, 3,144 had employment of 999 or fewer, and 44 firms had employment of 1,000 employees or more. Thus under this category and the associated small business size standard, the Commission estimates that the majority of wireless telecommunications carriers(except satellite) are small entities that may be affected by our proposed action.¹⁶

10. *Fixed Microwave Services.* Microwave services include common carrier,¹⁷ private-operational fixed,¹⁸ and broadcast auxiliary radio services.¹⁹ At present, there are approximately 31,549

¹⁰ 5 U.S.C. § 601(4).

¹¹ INDEPENDENT SECTOR, THE NEW NONPROFIT ALMANAC & DESK REFERENCE (2010).

¹² 5 U.S.C. § 601(5).

¹³ U.S. CENSUS BUREAU, STATISTICAL ABSTRACT OF THE UNITED STATES: 2011, Table 427 (2007)

¹⁴ The 2007 U.S Census data for small governmental organizations are not presented based on the size of the population in each such organization. There were 89,476 small governmental organizations in 2007. If we assume that county, municipal, township, and school district organizations are more likely than larger governmental organizations to have populations of 50,000 or less, the total of these organizations is 52,125. If we make the same assumption about special districts and also assume that special districts are different from county, municipal, township, and school districts, in 2007 there were 37,381 special districts. Therefore, of the 89,476 small governmental organizations documented in 2007, as many as 89,506 may be considered small under the applicable standard. This data may overestimate the number of such organizations that has a population of 50,000 or less. U.S. CENSUS BUREAU, STATISTICAL ABSTRACT OF THE UNITED STATES 2011, Tables 427, 426 (Data cited therein are from 2007).

¹⁵ 13 C.F.R. § 121.201, NAICS code 517110.

¹⁶ See http://factfinder.census.gov/servlet/IBQTable?_bm=y&-fds_name=EC0700A1&-geo_id=&-skip=600&-ds_name=EC0751SSSZ5&-lang=en.

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

¹⁸ 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.

¹⁹ Auxiliary Microwave Service is governed by Part 74 and Part 78 of Title 47 of the Commission’s Rules. Available to licensees of broadcast stations, cable operators, and to broadcast and cable network entities. Auxiliary microwave stations are used for relaying broadcast television signals from the studio to the transmitter, or between (continued....)

common carrier fixed licensees and 89,633 private and public safety operational-fixed licensees and broadcast auxiliary radio licensees in the microwave services. Microwave services include common carrier,²⁰ private-operational fixed,²¹ and broadcast auxiliary radio services.²² They also include the Local Multipoint Distribution Service (LMDS),²³ the Digital Electronic Message Service (DEMS),²⁴ and the 24 GHz Service,²⁵ where licensees can choose between common carrier and non-common carrier status.²⁶ The Commission has not yet defined a small business with respect to microwave services. For purposes of the IRFA, the Commission will use the SBA's definition applicable to Wireless Telecommunications Carriers (except satellite)—i.e., an entity with no more than 1,500 persons is considered small.²⁷ For the category of Wireless Telecommunications Carriers (except Satellite), Census data for 2007, which supersede data contained in the 2002 Census, show that there were 1,383 firms that operated that year.²⁸ Of those 1,383, 1,368 had fewer than 100 employees, and 15 firms had more than 100 employees. Thus under this category and the associated small business size standard, the majority of firms can be considered small. The Commission notes that the number of firms does not necessarily track the number of licensees. The Commission estimates that virtually all of the Fixed Microwave licensees (excluding broadcast auxiliary licensees) would qualify as small entities under the SBA definition.

11. *Satellite Telecommunications and All Other Telecommunications.* Two economic census categories address the satellite industry. The first category has a small business size standard of \$15 million or less in average annual receipts, under SBA rules.²⁹ The second has a size standard of \$25 million or less in annual receipts.³⁰

12. The category of Satellite Telecommunications “comprises establishments primarily engaged in providing telecommunications services to other establishments in the telecommunications and broadcasting industries by forwarding and receiving communications signals via a system of satellites or

(Continued from previous page) _____

two points such as a main studio and an auxiliary studio. The service also includes TV pickup and CARS pickup, which relay signals from a remote location back to the studio.

²⁰ See 47 C.F.R. Part 101, Subparts C and I.

²¹ See 47 C.F.R. Part 101, Subparts C and H.

²² Auxiliary Microwave Service is governed by Part 74 of Title 47 of the Commission's Rules. See 47 C.F.R. Part 74. 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.

²³ See 47 C.F.R. Part 101, Subpart L.

²⁴ See 47 C.F.R. Part 101, Subpart G.

²⁵ See *id.*

²⁶ See 47 C.F.R. §§ 101.533, 101.1017.

²⁷ 13 C.F.R. § 121.201, NAICS code 517210.

²⁸ U.S. Census Bureau, 2007 Economic Census, Sector 51, 2007 NAICS code 517210 (rel. Oct. 20, 2009), http://factfinder.census.gov/servlet/IBQTable?_bm=y&-geo_id=&-fds_name=EC0700A1&-_skip=700&-ds_name=EC0751SSSZ5&-_lang=en.

²⁹ 13 C.F.R. § 121.201, North American Industry Classification System (“NAICS”) code 517410.

³⁰ 13 C.F.R. § 121.201, NAICS code 517919.

reselling satellite telecommunications.”³¹ Census Bureau data for 2007 show that 512 Satellite Telecommunications firms operated for that entire year.³² Of this total, 464 firms had annual receipts of under \$10 million, and 18 firms had receipts of \$10 million to \$24,999,999.³³ Consequently, the Commission estimates that the majority of Satellite Telecommunications firms are small entities that might be affected by our action.

13. The second category, *i.e.* “All Other Telecommunications” comprises “establishments primarily engaged in providing specialized telecommunications services, such as satellite tracking, communications telemetry, and radar station operation. This industry also includes establishments primarily engaged in providing satellite terminal stations and associated facilities connected with one or more terrestrial systems and capable of transmitting telecommunications to, and receiving telecommunications from, satellite systems. Establishments providing Internet services or voice over Internet protocol (VoIP) services via client-supplied telecommunications connections are also included in this industry.”³⁴ For this category, Census Bureau data for 2007 show that there were a total of 2,383 firms that operated for the entire year.³⁵ Of this total, 2,347 firms had annual receipts of under \$25 million and 12 firms had annual receipts of \$25 million to \$49,999,999.³⁶ Consequently, the Commission estimates that the majority of All Other Telecommunications firms are small entities that might be affected by our action.

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

14. This 2nd FNPRM proposes no new reporting or recordkeeping requirements.

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

15. 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.³⁷

³¹ U.S. Census Bureau, 2007 NAICS Definitions, “517410 Satellite Telecommunications.”

³² See http://factfinder.census.gov/servlet/IBQTable?_bm=y&-geo_id=&-_skip=900&-ds_name=EC0751SSSZ4&-_lang=en.

³³ See http://factfinder.census.gov/servlet/IBQTable?_bm=y&-geo_id=&-_skip=900&-ds_name=EC0751SSSZ4&-_lang=en

³⁴ <http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517919&search=2007%20NAICS%20Search>.

³⁵ http://factfinder.census.gov/servlet/IBQTable?_bm=y&-geo_id=&-_skip=900&-ds_name=EC0751SSSZ4&-_lang=en .

³⁶ http://factfinder.census.gov/servlet/IBQTable?_bm=y&-geo_id=&-_skip=900&-ds_name=EC0751SSSZ4&-_lang=en.

³⁷ 5 U.S.C. § 603(c).

16. The actions proposed in the 2nd *FNPRM* would provide additional options to all licensees, including small entity licensees. Such actions will serve the public interest by providing additional flexibility for broadcasters to use microwave spectrum. The rules will therefore open up beneficial economic opportunities to a variety of spectrum users, including small businesses. Because the actions proposed in the 2nd *FNPRM* will improve beneficial economic opportunities for all businesses, including small businesses, a detailed discussion of alternatives is not required.

17. Generally, the alternative approach would be to maintain the existing rules.

F. Federal Rules that May Duplicate, Overlap, or Conflict with the Proposed Rules

18. None.

APPENDIX E

List of Petitions for Reconsideration to *Wireless Backhaul R&O***Petitions for Reconsideration**

Engineers for the Integrity of Broadcast Auxiliary Service Spectrum (EIBASS)
Fixed Wireless Communications Coalition (FWCC)
Motorola Solutions, Inc./Cambium Networks (Cambium)
Wireless Communications Association International (WCAI)

Oppositions/Comments

FWCC
Mary J. Kuiken (Kuiken)
National Association of Broadcasters/Society of Broadcast Engineers, Inc. (NAB/SBE)

Replies

Cambium
FWCC

APPENDIX F

List of Commenters to *Wireless Backhaul FNPRM***Comments**

Clearwire Corporation (Clearwire)
Comsearch
FiberTower Corporation (FiberTower)
FWCC
MetroPCS Communications, Inc. (MetroPCS)
PCIA—The Wireless Infrastructure Association (PCIA)
Sirius XM Radio Inc. (Sirius XM)
Wireless Strategies, Inc. (WSI)
XO Communications, LLC (XO)

Reply Comments

Clearwire
Comsearch
EIBASS
FWCC
Sirius XM
United States Cellular Corporation (U.S. Cellular)
Wireless Internet Service Providers Association (WISPA)
WSI

Ex Parte

Clearwire
Comsearch
EIBASS
FWCC
Global Spectrum Advisors LLC (Global Spectrum Advisors)
National Spectrum Management Association (NSMA)
Proxim Wireless Corporation (David Dobson) (Proxim)
Sirius XM
WSI

**STATEMENT OF
CHAIRMAN JULIUS GENACHOWSKI**

Re: *Amendment of Part 101 of the Commission's Rules to Facilitate the Use of Microwave or Wireless Backhaul and Other Uses and to Provide Additional Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave Licensees; Petition for Rulemaking filed by Fixed Wireless Communications Coalition to Amend Part 101 of the Commission's Rules to Authorize 60 and 80 MHz Channels in Certain Bands for Broadband Communications, WT Docket No. 10-153, RM-11602*

Groundhog Day officially comes in February, but August is starting to have the feel of the Bill Murray classic at the Commission. For the third August open meeting in a row, we are addressing the issue of wireless backhaul and its important role in the broadband ecosystem.

Backhaul is the skeleton supporting broadband, and wireless backhaul is often a very efficient means of transmitting data among cell sites, or between cell sites and network backbones. Spectrum, in other words, can be an important part of the "middle mile" of broadband networks.

Wireless backhaul is essential to broadband deployment in rural areas in particular, where it may be the only practical high-capacity middle mile solution available.

Last year we modified rules to make additional spectrum available for wireless backhaul, and to provide additional flexibility for licensees to reduce operational costs.

The Commission's actions today will enable even more microwave wireless backhaul deployment in rural areas.

Among other things, today's item grants wireless backhaul providers the flexibility to use smaller antennas; updates the Commission's efficiency standards to reflect today's data-centric world; introduces a Microwave Rural Flexibility Policy; and permits higher capacity links, enabling faster data rates.

This item is a part of our Broadband Acceleration Initiative, focusing on ways to reduce barriers to broadband infrastructure deployment, to speed broadband build-out, and reduce costs to broadband providers, which can then pass those savings onto consumers.

The item also advances the Commission's regulatory reform agenda by removing regulatory barriers that today limit the use of spectrum for wireless backhaul and similar communications. These changes will have a near-term positive impact. For instance, with respect to the Microwave Rural Flexibility Policy, I expect that the Wireless Bureau will act on waiver applications within 90 days, absent extraordinary circumstances. This item removes other regulatory barriers even sooner, with no additional Commission action necessary.

Finally, the item furthers the Commission's spectrum agenda. By allowing more intensive use of microwave spectrum, we can further support broadband deployment, particularly in hard-to-reach rural areas, and enable consumers to reap the benefits that flow from broadband adoption.

The Commission's efforts to promote broadband and wireless backhaul do not end with this Order. Rather, we will continue to evaluate our rules, and the item includes several further inquiries and requests for comment, which we expect will continue our efforts to reduce barriers to broadband deployment.

Thank you to the bureau for your work on this item.

**STATEMENT OF
COMMISSIONER ROBERT M. McDOWELL**

Re: *Amendment of Part 101 of the Commission's Rules to Facilitate the Use of Microwave for Wireless Backhaul and Other Uses and to Provide Additional Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave Licensees, Petition for Rulemaking filed by Fixed Wireless Communications Coalition to Amend Part 101 of the Commission's Rules to Authorize 60 and 80 MHz Channels in Certain Bands for Broadband Communications, WT Docket No. 10-153, RM-11602*

Most consumers are unaware that their calls, texts and emails could not function without invisible, but critical “backhaul” components. Today, by partially getting out of the way to foster a healthier environment for the creation of cost efficiencies for the entities that build and operate networks, the Commission is taking another step to spur the construction of advanced broadband networks in both urban and rural areas. For instance, adopting more flexible rules that allow for the use of smaller antennas reduces the construction cost by over \$2000 for a single communications link. I am hopeful that wholesale and retail consumers alike will benefit from these savings.

Given their importance, I am pleased to approve our actions and I thank Chairman Genachowski for identifying and bringing to a vote this rule modernization. In addition to allowing the market to reclaim its freedom to build at lower cost, employing smaller antennas and making use of wider channels will permit creation of higher capacity links, which will be especially helpful to efforts to connect rural America to state-of-the-art broadband services. Likewise, we are updating our efficiency standards to incorporate a more practical approach for providers serving rural areas, which we hope will also boost cost savings and create greater economies of scale.

I look forward to learning about additional opportunities to pare back even more long-standing and outdated regulations through the notice of proposed rulemaking and notice of inquiry. Thank you to all of the interested parties that have informed our analysis. I also thank our talented and creative Wireless Telecommunications Bureau folks again, especially the unsung engineers, for your work in this area.

**STATEMENT OF
COMMISSIONER MIGNON L. CLYBURN**

Re: *Amendment of Part 101 of the Commission's Rules to Facilitate the Use of Microwave for Wireless Backhaul and Other Uses and to Provide Additional Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave Licensees, Petition for Rulemaking filed by Fixed Wireless Communications Coalition to Amend Part 101 of the Commission's Rules to Authorize 60 and 80 MHz Channels in Certain Bands for Broadband Communications, WT Docket No. 10-153, RM-11602*

I am pleased to see that the Bureau is continuing its reform of Part 101 rules, in order to facilitate more wireless service deployment. As we all know, backhaul transport is necessary to extend wireless service, but backhaul imposes significant costs on wireless carriers, especially in rural areas. As a consequence, carriers are increasing their reliance on fixed wireless service over microwave communications in order to reduce those costs. Between 2005 and 2009, the amount of backhaul traffic sent by fixed wireless increased from 8.7 percent, to 12.4 percent. So, rule changes that enable greater use of microwave communications, is great news for wireless customers.

Last summer, we adopted changes that could enable as much as 650 megahertz of spectrum, for backhaul transport, in rural areas. Today's amendment should also spur greater deployment of services, by substantially reducing operational costs to provide wireless backhaul. Permitting smaller antennas in the 6, 18, and 23 GHz bands, can allow the industry to realize significant cost savings, because smaller antennas are cheaper to manufacture, install, and maintain.

The evidence in the record shows, for example, that if an operator using a 6 GHz link is able to use 3-foot antennas instead of 6-foot antennas, site rental costs could decrease by \$7,200 each year. In addition, smaller antennas allow existing towers to accommodate more antennas, and allow installations at sites, that would not otherwise be able to accommodate larger antennas. Allowing 60 and 80 MHz channels, in the 6 and 11 GHz bands, could also result in a number of benefits including faster data service and more efficient use of spectrum.

I am also glad that the Commission is listening to industry and, as shown in the Notice of Inquiry, is embarking on a comprehensive review of its antenna standards. Since manufacturers are developing next generation antennas that will introduce a greater array of options for deploying wireless backhaul, the Commission should review its rules to see if any changes are necessary to facilitate deployment of these new antennas. I wish to thank John Leibovitz, Charles Oliver, and the staff of the Wireless Telecommunications Bureau, for presenting us with such an excellent item.

**STATEMENT OF
COMMISSIONER JESSICA ROSENWORCEL**

Re: *Amendment of Part 101 of the Commission's Rules to Facilitate the Use of Microwave for Wireless Backhaul and Other Uses and to Provide Additional Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave Licensees; Petition for Rulemaking filed by Fixed Wireless Communications Coalition to Amend Part 101 of the Commission's Rules to Authorize 60 and 80 MHz Channels in Certain Bands for Broadband Communications, WT Docket No. 10-153, RM-11602*

Backhaul is the lifeblood of so much of communications. It is the essential artery from the network edge to the network core. Traditionally, backhaul has been the province of copper circuits and fiber optic lines. But in a world gone wireless, microwave facilities are now often used to transmit data between cell sites and between cell sites and network backbones.

The steps we take today are technical. They update microwave backhaul efficiency standards, provide higher capacity channels, and allow use of smaller antennas. They also adopt policies that will lower barriers to entry in rural areas where laying new fiber for backhaul can be prohibitively expensive. But at their heart, these are rules that promote flexibility. In doing so, they strengthen the foundation of our wireless systems by creating new opportunities to manage the deluge of mobile data that is already beginning to rush over next-generation wireless networks.

Managing this flood will not be simple or easy. As demand for mobile data grows and the supply of unencumbered spectrum decreases, the pressure is on. We will look to the private sector to innovate and create new technologies that will multiply the capacity of our airwaves. We must also consider structured incentives to reward efficient spectrum use by federal authorities. But this agency, too, needs to be quick and agile. Moving ahead like we do here is a small but critical part of reducing the cost of deployment and growing our wireless infrastructure. To build on efforts like this, I believe it also would be prudent to provide a timeline for upcoming wireless auctions. I look forward to working with my colleagues at the agency to make this happen.

**STATEMENT OF
COMMISSIONER AJIT PAI**

Re: *Amendment of Part 101 of the Commission's Rules to Facilitate the Use of Microwave for Wireless Backhaul and Other Uses and to Provide Additional Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave Licensees; Petition for Rulemaking filed by Fixed Wireless Communications Coalition to Amend Part 101 of the Commission's Rules to Authorize 60 and 80 MHz Channels in Certain Bands for Broadband Communications, WT Docket No. 10-153, RM-11602*

In my view, two of the FCC's top priorities should be removing regulatory barriers to infrastructure investment and broadening the stock of spectrum available for commercial broadband use. Much attention obviously is focused on some of the more high-profile proceedings addressing these objectives, such as reform of the Universal Service Fund and implementation of our new incentive auction authority. But we should not overlook steps that we can take to loosen regulatory bottlenecks in other important areas.

Backhaul presents one such opportunity; it is a critical step in the transmission of communications signals. For instance, it does little if any good for a customer with a mobile device to have a strong connection with a nearby tower, or for her wireless network to have a comprehensive nationwide footprint, if the communications link between the tower and her network is clogged, constrained or non-existent. Wireless backhaul in particular can be a vital network component in areas where wireline infrastructure, such as fiber or copper, is difficult or prohibitively expensive to deploy. Facilitating greater use of wireless backhaul thus can enable infrastructure investment and help address our pressing spectrum needs.

I am therefore pleased to support today's item, which continues reform of our Part 101 rules addressing microwave services. The actions taken in this item extend the Commission's efforts to make it easier and more economical to deploy microwave backhaul to meet consumers' growing demand for mobile services.

There are plenty of well-considered reforms in this item, but I am particularly optimistic about our decision to adopt a Rural Microwave Flexibility Policy. This policy will provide licensees the opportunity to obtain a waiver from existing efficiency standards in uncongested rural areas. These waivers will allow licensees to utilize longer links and fewer intermediate relay stations in these areas, yielding significant savings and making it more cost-effective for providers to deploy infrastructure. For example, the cost of a single intermediate relay station can be \$500,000. I would especially like to thank the Chairman for setting forth the expectation that the Wireless Telecommunications Bureau will act on these waiver applications within 90 days, absent extraordinary circumstances. This will help add certainty to operators' business models when they make their deployment plans. I am hopeful that this reform, along with the others that we adopt today, will accelerate infrastructure investment and improve the quality of mobile service enjoyed by rural Americans.

Backhauling mobile data traffic to the Internet is quickly becoming a more substantial component of the cost of operating a mobile network. Today's item will help to reduce those expenses, but as our Second Further Notice of Proposed Rulemaking suggests, there is more we can do. I look forward to reviewing the record that will be compiled in response to the Second Further Notice. I will also carefully examine the views of commenters as to whether it is time to institute a comprehensive review of our Part 101 antenna standards. In short, if anyone has ideas for how we can further remove regulatory barriers to the use of wireless backhaul, I'm ready to listen.

In conclusion, I would like to thank the hard-working staff of the Wireless Telecommunications Bureau for their perseverance on this complex, but important, proceeding. I especially appreciate the recent briefing on the nuts and bolts of this item I received from John Leibovitz, Melissa Tye, Blaise Scinto, and John Schauble.