

APPENDIX A: LIST OF COMMENTERS**Commenters:**

American Petroleum Institute [API]
ArrayComm, Inc.
AT&T Wireless Services, Inc. [AT&T Wireless]
Cellular Telecommunications & Internet Association [CTIA]
Ericsson Inc
Fred R. Goldstein, Ionary Consulting
Lucent Technologies Inc.
John Mizelle
Motorola, Inc.
National Radio Astronomy Observatory [NRAO]
National Telecommunications and Information Administration [NTIA]
Nokia Inc.
PCIA, the Wireless Infrastructure Association
PetroCom License Corporation [PetroCom]
Rural Cellular Association [RCA]
United States Cellular Corporation [U.S. Cellular]
Verizon Wireless
Wireless Communications Association International, Inc. [WCAI]

Reply Commenters:

American Petroleum Institute
ArrayComm, Inc.
AT&T Wireless Services, Inc.
Cingular Wireless LLC
Motorola, Inc.
TDD Coalition
United States Cellular Corporation
Wireless Communications Association International, Inc.

APPENDIX B: FINAL REGULATORY FLEXIBILITY ANALYSIS

As required by the Regulatory Flexibility Act of 1980, as amended (RFA),¹ an Initial Regulatory Flexibility Analysis (IRFA) was incorporated in the Service Rules for Advanced Wireless Services in the 1.7 and 2.1 GHz Bands Notice of Proposed Rulemaking (*Notice*).² The Commission sought written public comment on the proposal in the Notice, including comment on the IRFA. This present Final Regulatory Flexibility Analysis (FRFA) conforms to the RFA.³

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

In this Report and Order, we adopt service rules for Advanced Wireless Services (AWS) in the 1710-1755 MHz and 2110-2155 MHz bands, including provisions for application, licensing, operating and technical rules, and for competitive bidding. Licensees in these bands will have the flexibility to provide any fixed or mobile service that is consistent with the allocations for this spectrum.⁴ We will license this spectrum under our market-oriented Part 27 rules and, in order to accommodate differing needs, our band plan includes both localized and regional geographic service areas and symmetrically paired spectrum blocks with the pairings being composed of different bandwidths. Our licensing plan will allow the marketplace rather than the Commission to ultimately determine what services are offered in this spectrum and what technologies are utilized to provide these services. The licensing framework that we adopt today for these bands will ensure that this spectrum is efficiently utilized and will foster the development of new and innovative technologies and services, as well as encourage the growth and development of broadband services.

Our actions today bring us closer to our goals of achieving the universal availability of broadband access and increasing competition in the provision of such broadband services both in terms of the types of services offered and in the technologies utilized to provide those services. The widespread deployment of broadband will bring new services to consumers, stimulate economic activity, improve national productivity, and advance many other objectives – such as improving education, and advancing economic opportunity for more Americans. By encouraging the growth and development of broadband, our actions today also foster the development of facilities-based competition. We achieve these objectives by taking a market-oriented approach to licensing this spectrum that provides greater certainty, minimal regulatory intervention, and leads to greater benefits to consumers.

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

We received no comments directly in response to the IRFA in this proceeding. We did, however, consider the potential impact of our rules on smaller entities. For example, we have adopted a building block approach to the licensing of this spectrum, including some smaller geographic licensing areas and some smaller spectrum block sizes. We have also provided for partitioning and disaggregation of

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 Service Rules for Advanced Wireless Services in the 1.7 and 2.1 GHz Bands Notice of Proposed Rulemaking, WT Docket No. 02-35, *Notice of Proposed Rulemaking*, 17 FCC Rcd 24135, xxxx (2002) (*Notice*).

³ See 5 U.S.C. § 604.

⁴ The service rules that we adopt today for this spectrum build on the policy objectives set forth in the Spectrum Policy Task Force Report. Spectrum Policy Task Force, ET Docket No. 02-135, *Report* (rel. Nov. 15, 2002) (*Spectrum Policy Task Force Report*).

licenses and we have adopted spectrum leasing policies. Finally, we have adopted 15 percent and 25 percent "bidding credits" for small and very small businesses, respectively. These policies should provide increased opportunities for small entities to acquire the appropriate amount of spectrum for their particular needs.

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

The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.⁵ The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small government jurisdiction."⁶ In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.⁷ A small business 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.⁸ Nationwide, there are approximately 22.4 million small businesses, total, according to the SBA data.⁹

A small organization is generally "any not-for-profit enterprise which is independently owned and operated and is not dominant in its field."¹⁰ Nationwide, as of 1992, there were approximately 275,801 small organizations.¹¹ Last, the definition of "small governmental jurisdiction" is one with populations of fewer than 50,000.¹² The term "small governmental jurisdiction" is defined as "governments of cities, towns, townships, villages, school districts, or special districts, with a population of less than fifty thousand."¹³ As of 1997, there were about 87,453 governmental jurisdictions in the United States.¹⁴ This number includes 39,044 county governments, municipalities, and townships, of which 37,546 (approximately 96.2%) have populations of fewer than 50,000, and of which 1,498 have populations of 50,000 or more. Thus we estimate the number of small governmental jurisdictions overall to be 84,098 or fewer.

⁵ 5 U.S.C. § 603(b)(3).

⁶ 5 U.S.C. § 601(6).

⁷ 5 U.S.C. § 601(3) (incorporating by reference the definition of "small business concern" in 15 U.S.C. § 632). Pursuant to the RFA, 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." 5 U.S.C. § 601(3).

⁸ Small Business Act, 15 U.S.C. § 632 (1996).

⁹ See SBA, *Programs and Services*, SBA Pamphlet no. CO-0028, at page 40 (July 2002).

¹⁰ 5 U.S.C. § 601(4).

¹¹ U.S. Department of Commerce, Bureau of the Census, 1992 Economic Census, Table 6 (special tabulation of data under contract to Office of Advocacy of the U.S. Small Business Administration) (1992 Economic Census).

¹² 5 U.S.C. § 601(5).

¹³ 5 U.S.C. 601(5).

¹⁴ U.S. Census Bureau, *Statistical Abstract of the United States: 2000*, Section 9, pages 299-300, Tables 490 and 492.

The rules adopted in the Order affect applicants who wish to provide service in the 1710-1755 MHz and 2110-2155 MHz bands. As discussed in the Order, we do not know precisely the type of service that a licensee in these bands might seek to provide.¹⁵ Nonetheless, we anticipate that the services that will be deployed in these bands may have capital requirements comparable to those in the broadband Personal Communications Service (PCS), and that the licensees in these bands will be presented with issues and costs similar to those presented to broadband PCS licensees. Further, at the time the broadband PCS service was established, it was similarly anticipated that it would facilitate the introduction of a new generation of service. Therefore, the Order adopts the same small business size standards here that the Commission adopted for the broadband PCS service. In particular, the Order defines a "small business" as an entity with average annual gross revenues for the preceding three years not exceeding \$40 million, and a "very small business" as an entity with average annual gross revenues for the preceding three years not exceeding \$15 million. The Order also provides small businesses with a bidding credit of 15 percent and very small businesses with a bidding credit of 25 percent.

We do not yet know how many applicants or licensees in these bands will be small entities. Thus, the Commission assumes, for purposes of this FRFA, that all prospective licensees are small entities as that term is defined by the SBA or by our two special small business size standards for these bands. Although we do not know for certain which entities are likely to apply for these frequencies, we note that the 1710-1755 MHz and 2110-2155 MHz bands are comparable to those used for cellular service and personal communications service.

Wireless Telephony Including Cellular, Personal Communications Service (PCS) and SMR Telephony Carriers. The SBA has developed a small business size standard for wireless small businesses within the two separate categories of **Paging**¹⁶ and **Cellular and Other Wireless Telecommunications**.¹⁷ Under both SBA categories, a wireless business is small if it has 1,500 or fewer employees. According to the Commission's most recent data,¹⁸ 1,387 companies reported that they were engaged in the provision of wireless service. Of these 1,387 companies, an estimated 945 have 1,500 or fewer employees and 442 have more than 1,500 employees.¹⁹ Consequently, the Commission estimates that most wireless service providers are small entities that may be affected by the rules and policies adopted herein.

D. Description of Reporting, Recordkeeping, and Other Compliance Requirements for Small Entities

Applicants for AWS licenses in the 1710-1755 MHz and the 2110-2155 MHz bands will be required to submit short-form auction applications using FCC Form 175.²⁰ In addition, winning bidders must submit long-form license applications through the Universal Licensing System using Form 601,²¹

¹⁵ See Report and Order, at ¶ 144.

¹⁶ 13 C.F.R. § 121.201, North American Industry Classification System (NAICS) code 513321 (changed to 517211 in October 2002).

¹⁷ 13 C.F.R. § 121.201, North American Industry Classification System (NAICS) code 513322 (changed to 517212 in October 2002).

¹⁸ FCC, Wireline Competition Bureau, Industry Analysis and Technology Division, "Trends in Telephone Service", Table 5.3, page 5-5 (Aug. 2003). This source uses data that are current as of December 31, 2001.

¹⁹ *Id.*

²⁰ See generally, 47 C.F.R. § 1.2105.

²¹ 47 C.F.R. § 1.913(a)(1).

FCC Ownership Disclosure Information for the Wireless Telecommunications Services using FCC Form 602, and other appropriate forms.²²

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

The RFA requires an agency to describe any significant alternatives that it has considered in reaching its adopted 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.²³

We have taken significant steps to reduce burdens on small entities wherever possible. To provide opportunities for small entities to participate in any auction that is held, we provide bidding credits for small businesses and very small businesses as defined in Section C of this FRFA. The bidding credits adopted are 15 percent for small businesses and 25 percent for very small businesses. We have found that the use of tiered or graduated small business size standards is useful in furthering our mandate under Section 309(j) of the Communications Act to promote opportunities for, and disseminate licenses to, a wide variety of applicants.

Regarding our decision to apply our Part 27 rules to this spectrum, *see* paragraphs 16-21, we do not anticipate any adverse impact on small entities. The flexibility afforded by Part 27 or our rules should benefit large and small entities alike, because licensees will be in a stronger position to meet changes in demand for services. Under this approach, all licensees will have the freedom to determine the services to be offered and the technologies to be used in providing these services. An alternative to this decision would have been to determine specific allowable service in each frequency band and apply the applicable rule part to the licensing of such services. This approach, however, would be unsatisfactory because it is too restrictive, and in any event, it is unclear that this approach would benefit small entities more than the flexible licensing approach we have decided upon today.

Regarding our decision to license this spectrum by geographic area, *see* paragraphs 27-46, we anticipate that on balance small entities will benefit from this licensing approach. Geographic licensing in these bands supports the Commission's overall spectrum management goals in that it allows licensees to quickly respond to market demand. Small entities that acquire spectrum that is licensed on a geographic area basis will benefit from such flexibility. Moreover, we have attempted to strike a balance here by using varying sizes of geographic areas. For example, small entities may be more interested in spectrum licensed by smaller geographic areas rather than in spectrum licensed on a nationwide or large regional basis. Consequently, we have decided to include licensing areas based on MSAs and RSAs. As RCA observes, MSAs and RSAs permit entities who are only interested in serving rural areas to acquire spectrum licenses for these areas alone and avoid acquiring spectrum licenses with high population densities that make purchase of license rights too expensive for these types of entities.²⁴ These types of service providers could acquire an RSA and create a new service area or they could expand an existing service territory or supplement the spectrum they are licensed to operate in by adding an RSA. They could also combine a few MSAs and RSAs to create a larger but localized service territory. MSAs and

²² 47 C.F.R. § 1.2107.

²³ *See* 5 U.S.C. § 603(c)(1)-(4).

²⁴ RCA Comments at 2-3; *see also* U.S. Cellular Comments at 5-7.

RSAs allow entities to mix and match rural and urban areas according to their business plans. By being smaller, these types of geographic service areas provide entry opportunities for smaller carriers, new entrants, and rural telephone companies. Their inclusion in our band plan will foster service to rural areas and tribal lands and thereby bring the benefits of advanced services to these areas.²⁵ An alternative to our decision to use geographic areas for licensing would have been to employ a site-by-site licensing approach. Site-by-site licensing, however, would be an inefficient licensing method due to a greater strain on Commission resources and less flexibility afforded to licensees.

We have also made the decision to license the spectrum in different bandwidths. We do not believe this will disadvantage small entities. In fact, we have decided that the RSA/MSA license areas will be licensed as paired spectrum at 1735-1740 and 2135-2140 for a total of 734 licenses, thus providing the opportunity for entities to obtain a license encompassing as little as 10 megahertz of spectrum. Other spectrum will be licensed in pairs of 10 and 15 MHz blocks, providing flexibility to licensees in constructing their systems. Our approach provides maximum flexibility for both small and large entities to offer a wide range of communications services.

We have also decided to permit the disaggregation and partitioning of these spectrum blocks, *see* paragraphs 80-83. Licensees will thus be able to increase or decrease the size of their service areas to better meet market demands. Allowing licensees to partition and/or disaggregate their licensed spectrum should improve opportunities for small entities to acquire spectrum for their particular needs. An alternative to his approach would have been to prohibit partitioning and disaggregation; we believe that such an approach could foreclose options for small entities.

In addition, we have decided that this spectrum will also be subject to the rules recently adopted in the *Secondary Markets Report and Order*,²⁶ *see* paragraph 26. In that *Order*, we took action to remove unnecessary regulatory barriers to the development of secondary markets. The *Order* established new policies and procedures that enable most wireless licensees, including Part 27 licensees, to lease some or all of their spectrum usage rights to third-party spectrum lessees.²⁷ Application of the new secondary market rules to this spectrum should help ensure that small businesses and rural carriers can acquire spectrum to meet their business needs by allowing more entities access to the AWS spectrum and permit the marketplace, rather than the Commission, to decide what use is made of this spectrum.

We believe our objectives of ensuring both efficient use of spectrum and diversity of licensees can best be achieved by adopting a variety of license areas and spectrum block sizes, and ensuring the ability of licensees to partition and disaggregate their licenses and fully participate in the secondary markets. By adopting some smaller geographic licensing areas and some smaller spectrum block sizes, we believe we will encourage participation by smaller and rural entities, without the necessity of adopting set-asides and eligibility restrictions, because such licenses will be less expensive and should more closely mirror such bidders' needs. We believe that these same factors support our decision to decline to adopt other suggested alternatives, such as spectrum aggregation limits, in this band.

²⁵ While we did not receive any comments from Tribal governments, we remain interested in ensuring that the communication needs of these communities are met. *See AWS Service Rules NPRM*, 17 FCC Rcd at 24146-47 ¶ 25; *see also* Statement of Policy on Establishing a Government-to-Government Relationship with Indian Tribes, *Policy Statement*, 16 FCC Rcd 4078 (2000).

²⁶ *See Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets, Report and Order and Further Notice of Proposed Rulemaking*, WT Docket No. 00-230, FCC 03-113, (rel. Oct. 6, 2003) (*Secondary Markets Report and Order*).

²⁷ *See id.* at ¶ 84.

Finally, regarding our decision to require a showing of "substantial service" at license renewal time, *see* paragraphs 73-79, we do not anticipate any adverse impact on small entities. An alternative would have been to adopt a "minimal coverage" requirement. We believe, however, that the substantial service standard is better because it will provide both small and large entities the flexibility to determine how best to implement their business plans based on actual service to end users.

F. Report to Congress

The Commission will send a copy of the Order, including this FRFA, in a report to be sent to Congress pursuant to the Congressional Review Act.²⁸ In addition, the Commission will send a copy of the Order, including the FRFA, to the Chief Counsel for Advocacy of the Small Business Administration. A copy of the Order and FRFA (or summaries thereof) will also be published in the Federal Register.²⁹

²⁸ *See* 5 U.S.C. § 801(a)(1)(A).

²⁹ *See* 5 U.S.C. § 604(b).

APPENDIX C: FINAL RULES

PART 27 – MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

1. The authority citation for Part 27 continues to read as follows:

AUTHORITY: 47 U.S.C. 154, 301, 302, 303, 307, 309, 332, 336, and 337 unless otherwise noted.

2. The table of contents for Part 27 is amended by adding subpart L as follows:

Subpart L – 1710-1755 MHz and 2110-2155 MHz Bands

LICENSING AND COMPETITIVE BIDDING PROVISIONS

- 27.1101 1710-1755 MHz and 2110-2155 MHz bands subject to competitive bidding.
- 27.1102 Designated Entities.

RELOCATION OF INCUMBENTS

- 27.1111 Relocation of fixed microwave service licensees in the 2110-2150 MHz band.

PROTECTION OF INCUMBENT OPERATIONS

- 27.1131 Protection of Part 101 operations.
- 27.1132 Protection of Part 21 operations.
- 27.1133 Protection of Part 74 and Part 78 operations.
- 27.1134 Protection of Federal Government operations.

3. Section 27.1 is amended by adding a subparagraph (8) to paragraph (b) to read as follows:

§ 27.1 Basis and purpose.

(b) ***

(8) 1710-1755 MHz and 2110-2155 MHz.

4. Section 27.3 is amended by redesignating paragraphs (m) through (p) as paragraphs (n) through (q), and by adding new paragraph (m) to read as follows:

§ 27.3 Other applicable rule parts.

(m) *Part 64, subpart V*. This part sets forth the requirements and conditions applicable to telecommunications carriers under the Communications Assistance for Law Enforcement Act.

* * * * *

5. Section 27.4 is amended by adding a new definition to read as follows:

§ 27.4 Terms and definitions.

Advanced wireless service (AWS). A radiocommunication service licensed pursuant to this part for the frequency bands specified in § 27.5(h).

* * * * *

6. Section 27.5 is amended by adding a new paragraph (h) to read as follows:

§ 27.5 Frequencies.

* * * * *

(h) *1710-1755 MHz and 2110-2155 MHz bands*. The following frequencies are available for licensing pursuant to this part in the 1710-1755 MHz and 2110-2155 MHz bands:

(1) Two paired channel blocks of 10 megahertz each are available for assignment as follows:

Block A: 1710-1720 MHz and 2110-2120 MHz; and
Block B: 1720-1730 MHz and 2120-2130 MHz.

(2) Two paired channel blocks of 5 megahertz each are available for assignment as follows:

Block C: 1730-1735 MHz and 2130-2135 MHz; and
Block D: 1735-1740 MHz and 2135-2140 MHz.

(3) One paired channel block of 15 megahertz each is available for assignment as follows:

Block E: 1740-1755 MHz and 2140-2155 MHz.

7. Section 27.6 is amended by adding a new paragraph (h) to read as follows:

§ 27.6 Service areas.

* * * * *

(h) *1710-1755 and 2110-2155 MHz bands*. AWS service areas for the 1710-1755 MHz and 2110-2155 MHz bands are as follows:

(1) Service areas for Block A (1710-1720 MHz and 2110-2120 MHz) are based on Economic Areas (EAs) as defined in paragraph (a) of this section.

(2) Service areas for Blocks B (1720-1730 MHz and 2120-2130 MHz), C (1730-1735 MHz and 2130-2135 MHz), and E (1740-1755 MHz and 2140-2155 MHz) are based on Regional Economic Area Groupings (REAGs) as defined by paragraph (a) of this section.

(3) Service areas for Block D (1735-1740 MHz and 2135-2140 MHz) are based on cellular markets comprising Metropolitan Statistical Areas (MSAs) and Rural Service Areas (RSAs) as defined by Public Notice Report No. CL-92-40 "Common Carrier Public Mobile Services Information, Cellular MSA/RSA Markets and Counties," dated January 24, 1992, DA 92-109, 7 FCC Rcd 742 (1992), with the following modifications:

(i) The service areas of cellular markets that border the U.S. coastline of the Gulf of Mexico extend 12 nautical miles from the U.S. Gulf coastline.

(ii) The service area of cellular market 306 that comprises the water area of the Gulf of Mexico extends from 12 nautical miles off the U.S. Gulf coast outward into the Gulf.

8. Section 27.11 is amended by adding a new paragraph (i) to read as follows:

§ 27.11 Initial authorization.

* * * * *

(i) *1710-1755 MHz and 2110-2155 MHz bands.* Initial authorizations for the 1710-1755 MHz and 2110-2155 MHz bands shall be for 5, 10 or 15 megahertz of spectrum in each band in accordance with § 27.5(h) of this part.

(1) Authorizations for Block A, consisting of two paired channels of 10 megahertz each, will be based on those geographic areas specified in § 27.6(h)(1).

(2) Authorizations for Block B, consisting of two paired channels of 10 megahertz each, will be based on those geographic areas specified in § 27.6(h)(2).

(3) Authorizations for Block C, consisting of two paired channels of 5 megahertz each, will be based on those geographic areas specified in § 27.6(h)(2).

(4) Authorizations for Block D, consisting of two paired channels of 5 megahertz each, will be based on those geographic areas specified in § 27.6(h)(3).

(5) Authorizations for Block E, consisting of two paired channels of 15 megahertz each, will be based on those geographic areas specified in § 27.6(h)(2).

9. Section 27.13 is amended by adding a new paragraph (g) to read as follows:

§ 27.13 License period.

* * * * *

(g) *1710-1755 MHz and 2110-2155 MHz bands.* Authorizations for the 1710-1755 MHz and 2110-2155 MHz bands will have a term not to exceed ten years from the date of initial issuance or renewal, except that authorizations issued on or before December 31, 2009, shall have a term of fifteen years.

10. Section 27.14 is amended by revising paragraph (a) as follows:

§ 27.14 Construction requirements; Criteria for comparative renewal proceedings.

(a) AWS and WCS licensees must make a showing of "substantial service" in their license area within the prescribed license term set forth in § 27.13. * * *

* * * * *

11. Section 27.15 is amended by revising subparagraph (2) of paragraph (a) as follows:

§ 27.15 Geographic partitioning and spectrum disaggregation.

* * * * *

(2) AWS and WCS licensees may apply to partition their licensed geographic service area or disaggregate their licensed spectrum at any time following the grant of their licenses.

* * * * *

12. Section 27.50 is amended by re-designating paragraph (d) as paragraph (e), and adding a new paragraph (d) to read as follows:

§ 27.50 Power and antenna height limits.

* * * * *

(d) The following power and antenna height requirements apply to stations transmitting in the 1710-1755 MHz and 2110-2155 MHz bands:

(1) Fixed and base stations transmitting in the 2110-2155 MHz band are limited to a peak effective isotropic radiated power (EIRP) of 1640 watts and a peak output power of 100 watts.

(2) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band are limited to a peak EIRP of 1 watt. Fixed stations operating in this band are limited to a maximum antenna height of 10 meters above ground, and mobile and portable stations must employ a means for limiting power to the minimum necessary for successful communications.

* * * * *

13. Section 27.53 is amended by re-designating paragraphs (g), (h), (i), (j), and (k) as paragraphs (h), (i), (j), (k), and (l), respectively, and adding a new paragraph (g) to read as follows:

§ 27.53 Emission limits.

* * * * *

(g) For operations in the 1710-1755 MHz and 2110-2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB.

(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center

frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(3) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

* * * * *

14. Section 27.55 is amended to read as follows:

§ 27.55 Signal strength limits.

(a) *Field strength limits.* For the following bands, the predicted or measured median field strength at any location on the geographical border of a licensee's service area shall not exceed the value specified unless the adjacent affected service area licensee(s) agree(s) to a different field strength. This value applies to both the initially offered service areas and to partitioned service areas.

(i) 2110-2155, 2305-2320 and 2345-2360 MHz bands: 47 dB μ V/m.

(ii) 698-764 and 776-794 MHz bands: 40 dB μ V/m.

(iii) The paired 1392-1395 MHz and 1432-1435 MHz bands and the unpaired 1390-1392 MHz band (1.4 GHz band): 47 dB μ V/m.

(b) *Power flux density limit.* For base and fixed stations operating in the 698-746 MHz band, with an effective radiated power (ERP) greater than 1 kW, the power flux density that would be produced by such stations through a combination of antenna height and vertical gain pattern must not exceed 3000 microwatts per square meter on the ground over the area extending to 1 km from the base of the antenna mounting structure.

15. Section 27.57 is amended by adding a new paragraph (c) to read as follows:

§ 27.57 International coordination.

* * * * *

(c) Operation in the 1710-1755 MHz and 2110-2155 MHz bands is subject to international agreements with Mexico and Canada.

16. Section 27.63 is amended to read as follows:

§ 27.63 Disturbance of AM broadcast station antenna patterns.

AWS and WCS licensees that construct or modify towers in the immediate vicinity of AM broadcast stations are responsible for measures necessary to correct disturbance of the AM station antenna pattern which causes operation outside of the radiation parameters specified by the FCC for the AM station, if the disturbance occurred as a result of such construction or modification.

(a) *Non-directional AM stations.* If tower construction or modification is planned within 1 kilometer (0.6 mile) of a non-directional AM broadcast station tower, the AWS or WCS licensee must notify the

licensee of the AM broadcast station in advance of the planned construction or modification. Measurements must be made to determine whether the construction or modification would affect the AM station antenna pattern. The AWS or WCS licensee is responsible for the installation and continued maintenance of any detuning apparatus necessary to restore proper non-directional performance of the AM station tower.

(b) *Directional AM stations.* If tower construction or modification is planned within 3 kilometers (1.9 miles) of a directional AM broadcast station array, the AWS or WCS licensee must notify the licensee of the AM broadcast station in advance of the planned construction or modification. Measurements must be made to determine whether the construction or modification would affect the AM station antenna pattern. The AWS or WCS licensee is responsible for the installation and continued maintenance of any detuning apparatus necessary to restore proper performance of the AM station array.

17. A new subpart L is added to read as follows:

Subpart L – 1710-1755 MHz and 2110-2155 MHz Bands

LICENSING AND COMPETITIVE BIDDING PROVISIONS

§ 27.1101 1710-1755 MHz and 2110-2155 MHz bands subject to competitive bidding.

Mutually exclusive initial applications for 1710-1755 MHz and 2110-2155 MHz band licenses are subject to competitive bidding. The general competitive bidding procedures set forth in 47 C.F.R. Part 1, Subpart Q will apply unless otherwise provided in this subpart.

§ 27.1102 Designated Entities.

(a) Eligibility for small business provisions.

(1) A small business is an entity that, together with its affiliates, its controlling interests and the affiliates of its controlling interests, has average gross revenues that are not more than \$40 million for the preceding three years.

(2) A very small business is an entity that, together with its affiliates, its controlling interests and the affiliates of its controlling interests, has average gross revenues that are not more than \$15 million for the preceding three years.

(b) Bidding credits.

(1) A winning bidder that qualifies as a small business, as defined in this section, or a consortium of small businesses may use a bidding credit of 15 percent, as specified in § 1.2110(f)(2)(iii), to lower the cost of its winning bid on any of the licenses in this part.

(2) A winning bidder that qualifies as a very small business, as defined in this section, or a consortium of very small businesses may use a bidding credit of 25 percent, as specified in § 1.2110(f)(2)(ii), to lower the cost of its winning bid on any of the licenses in this part.

RELOCATION OF INCUMBENTS

§ 27.1111 Relocation of fixed microwave service licensees in the 2110-2150 MHz band.

Part 101, subpart B of the Commission's rules contains provisions governing the relocation of incumbent fixed microwave service licensees in the 2110-2150 MHz band.

PROTECTION OF INCUMBENT OPERATIONS

§ 27.1131 Protection of Part 101 operations.

All AWS licensees, prior to initiating operations from any base or fixed station, must coordinate their frequency usage with co-channel and adjacent channel incumbent, Part 101 fixed-point-to-point microwave licensees operating in the 2110-2155 MHz band. Coordination shall be conducted in accordance with the provisions of section 24.237 of this title.

§ 27.1132 Protection of Part 21 operations.

All AWS licensees, prior to initiating operations from any base or fixed station, must coordinate their frequency usage with co-channel and adjacent channel incumbent Part 21 MDS licensees operating in the 2150-2155 MHz band. In the event that AWS and MDS licensees cannot reach agreement in coordinating their facilities, either licensee may seek the assistance of the Commission, and the Commission may then, at its discretion, impose requirements on either or both parties.

§ 27.1133 Protection of Part 74 and Part 78 operations.

AWS operators must protect previously licensed Broadcast Auxiliary Service (BAS) or Cable Television Radio Service (CARS) operations in the adjacent 2025-2110 MHz band. In satisfying this requirement AWS licensees must, before constructing and operating any base or fixed station, determine the location and licensee of all BAS or CARS stations authorized in their area of operation, and coordinate their planned stations with those licensees. In the event that mutually satisfactory coordination agreements cannot be reached, licensees may seek the assistance of the Commission, and the Commission may, at its discretion, impose requirements on one or both parties.

§ 27.1134 Protection of Federal Government operations.

(a) Protection of Department of Defense operations in the 1710-1755 MHz band. The Department of Defense (DoD) operates communications systems in the 1710-1755 MHz band at 16 protected facilities, nationwide. AWS licensees must accept any interference received from these facilities and must protect the facilities from interference. AWS licensees shall protect the facilities from interference by restricting the operation of their base and fixed stations from any locations that could potentially permit AWS mobile, fixed, and portable stations transmitting in the 1710-1755 MHz band to cause interference to government operations within the radii of operation of the 16 facilities (the radii of operation of each facility is indicated in the third column of Table 1 immediately following paragraph (a)(3) of this section). In addition, AWS licensees shall be required to coordinate any operations that could permit mobile, fixed, and portable stations to operate in the specified areas of the 16 facilities, as defined in paragraph (a)(3) of this section. Protection of these facilities in this manner shall take place under the following conditions:

(1) At the Yuma, Arizona and Cherry Point, North Carolina facilities, all operations shall be protected indefinitely.

(2) At the remaining 14 facilities, airborne and military test range operations shall be protected until such time as these systems are relocated to other spectrum, and precision guided munitions (PGM) operations shall be protected until such time as these systems are relocated to other spectrum or until PGM inventory at each facility is exhausted, whichever occurs first.

(3) AWS licensees whose transmit operations in the 1710-1755 MHz band consist of fixed or mobile operations with nominal transmit EIRP values of 100 mW or less and antenna heights of 1.6 meters above ground or less shall coordinate their services around the 16 sites at the distance specified in row a) of Table 2, below. AWS licensees whose transmit operations in the 1710-1755 MHz band consist of fixed or mobile operations with nominal transmit EIRP values of 1 W or less and antenna heights of 10 meters above ground or less shall coordinate their services around the 16 sites at the distance specified in row b) of Table 2, below. These coordination distances shall be measured from the edge of the operational distances indicated in the third column of Table 1, and coordination with each affected DoD facility shall be accomplished through the Commander of the facility.

TABLE 1: PROTECTED DEPARTMENT OF DEFENSE FACILITIES.

Location	Coordinates	Radius of Operation (km)
Cherry Point, NC.....	34° 58' N 076° 56' W	100
Yuma, AZ.....	32° 32' N 113° 58' W	120
China Lake, CA.....	35° 41' N 117° 41' W	120
Eglin AFB, FL.....	30° 29' N 086° 31' W	120
Pacific Missile Test Range/Point Mugu, CA	34° 07' N 119° 30' W	80
Nellis AFB, NV.....	36° 14' N 115° 02' W	160
Hill AFB, UT.....	41° 07' N 111° 58' W	160
Patuxent River, MD.....	38° 17' N 076° 25' W	80
White Sands Missile Range, NM.....	33° 00' N 106° 30' W	80
Fort Irwin, CA.....	35° 16' N 116° 41' W	50
Fort Rucker, AL.....	31° 13' N 085° 49' W	50
Fort Bragg, NC.....	35° 09' N 079° 01' W	50
Fort Campbell, KY.....	36° 41' N 087° 28' W	50
Fort Lewis, WA.....	47° 05' N 122° 36' W	50
Fort Benning, GA.....	32° 22' N 084° 56' W	50
Fort Stewart, GA.....	31° 52' N 081° 37' W	50

TABLE 2: COORDINATION DISTANCES FOR THE PROTECTED DEPARTMENT OF DEFENSE FACILITIES.

1710-1755 MHz Transmit Operations	Coordination Distance (km)
a) EIRP <= 100 mW, antenna height <= 1.6 m AG	35
b) EIRP <= 1 W, antenna height <= 10 m AG	55

(b) *Protection of non-DoD operations in the 1710-1755 MHz and 1755-1761 MHz bands.* Until such time as non-DoD systems operating in the 1710-1755 MHz and 1755-1761 MHz bands are relocated to other spectrum, AWS licensees shall protect such systems by satisfying the appropriate provisions of TIA Telecommunications Systems Bulletin 10-F, "Interference Criteria for Microwave Systems," May, 1994 (TSB 10-F).

(c) *Protection of Federal Government operations below 1710 MHz.* AWS licensees operating fixed stations in the 1710-1755 MHz band, if notified that such stations are causing interference to radiosonde receivers operating in the Meteorological Aids Service in the 1675-1700 MHz band or a meteorological-satellite earth receiver operating in the Meteorological-Satellite Service in the 1675-

1710 MHz band, shall be required to modify the stations' location and/or technical parameters as necessary to eliminate the interference.

(d) *Recognition of NASA Goldstone facility operations in the 2110-2120 MHz band.* The National Aeronautics and Space Administration (NASA) operates the Deep Space Network (DSN) in the 2110-2120 MHz band at Goldstone, California (see Table 3). NASA will continue its operations of high power transmitters (nominal EIRP of 105.5 dBW with EIRP up to 119.5 dBW used under emergency conditions) in this band at this location. AWS licensees must accept any interference received from the Goldstone DSN facility in this band.

TABLE 3: LOCATION OF THE NASA GOLDSTONE DEEP SPACE FACILITY.

Location	Coordinates	Maximum Transmitter Output Power
Goldstone, California	35° 18' N 116° 54' W	500 kW

§ 27.1135 Protection of non-Federal Government Meteorological-Satellite operations.

AWS licensees operating fixed stations in the 1710-1755 MHz band, if notified that such stations are causing interference to meteorological-satellite earth receivers operating in the Meteorological-Satellite Service in the 1675-1710 MHz band, shall be required to modify the stations' location and/or technical parameters as necessary to eliminate the interference.

APPENDIX D: PROPAGATION FORMULAS

Basic Formula for Calculating Field Strength at a Distance

$$FS = 107.2 + Pt + 20 \log f - PL$$

where: FS is the field strength at the receiving antenna location, in $\text{dB}\mu\text{V/m}$

Pt is the equivalent isotropically radiated power of the transmitting station, in dBw

(i.e., $Pt = 10 \log \text{EIRP}$, where EIRP is the equivalent isotropically radiated power, in watts)

f is the transmitter carrier frequency, in MHz

PL is the path loss between isotropic antennas, in dB

Note: The value of PL is a function of the distance between the transmitting and receiving antennas and the particular propagation model utilized, which may incorporate factors such as the transmitting and receiving antenna heights, the frequency of the transmitted wave, environmental (building heights, clutter) and/or topographical (terrain) features.

Formulas for Calculating Path Loss Between Isotropic Antennas for Certain Propagation Models

Extended COST231-Hata Model

The Extended COST231-Hata model is appropriate for calculating path loss of the forward link for base stations using antennas above the rooftop levels of adjacent buildings, and transmitting in the 1500 to 2000 MHz frequency range.

$$PL = 46.3 + 33.9 \log f - 13.82 \log Ht - a + (44.9 - 6.55 \log Ht) \log d + C$$

where: PL is the median path loss between isotropic antennas, in dB

f is the transmitter carrier frequency, in MHz

Ht is the effective height of the transmitting antenna, in meters

Note: $30 \text{ m} \leq Ht \leq 200 \text{ m}$

d is the distance to the receiving antenna, in kilometers

Note: $1 \text{ km} \leq d \leq 20 \text{ km}$

a is attenuation, in dB, as a function of the receiving antenna height, Hr , in meters:

For a small or medium-sized city:

$$a = (1.1 \log f - 0.7) Hr - (1.56 \log f - 0.8)$$

For a large city:

$$a = 3.2 (\log 11.75 Hr)^2 - 4.97$$

Note: $1 \text{ m} \leq Hr \leq 10 \text{ m}$

C is a correction factor to account for building and tree density:

$C = 0 \text{ dB}$ for medium-sized cities and suburban areas

$C = 3 \text{ dB}$ for metropolitan centers

Plane Earth Model

The plane earth (or two-ray) model is a simple model that is appropriate for calculating path loss between two antennas separated by a few tens of kilometers over flat terrain where ground reflection can be assumed. With this model, the path loss is independent of the transmitting frequency.

$$PL = 119.4 + 40 \log d - 20 \log H_t - 20 \log H_r$$

where: PL is the path loss between isotropic antennas, in dB
 H_t is the effective height of the transmitting antenna, in meters
 H_r is the effective height of the receiving antenna, in meters
 d is the distance to the receiving antenna, in kilometers
Note: $d \gg H_t, H_r$

Free Space Model

The free space (or geometric spreading) model is a simple model that is appropriate for calculating path loss between two antennas that have an unobstructed line-of-sight and are high enough such that ground reflection is not a significant factor. It is also useful for worst-case analysis.

$$PL = 32.44 + 20 \log d + 20 \log f$$

where: PL is the path loss between isotropic antennas, in dB
 d is the distance to the receiving antenna, in kilometers
 f is the transmitter carrier frequency, in MHz

**SEPARATE STATEMENT OF
CHAIRMAN MICHAEL K. POWELL**

Re: Report and Order in the Matter of Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands

The 90 MHz of additional licensed spectrum made available today is a key building block for the broadband Internet future of licensed wireless service. Across the country, wireless providers -- from Verizon Wireless in Washington DC to Monet Mobile Networks in the Dakotas -- are increasingly utilizing their licensed spectrum holdings to build infrastructure to support Internet applications. Another ninety megahertz of spectrum will add momentum to that important trend. Wireless broadband internet deployment will bring valuable new services to consumers, stimulate economic activity, improve national productivity, increase investment, create jobs and advance many other worthy objectives -- such as improving education and enhancing rural communications.

Our service rules also reflect several key principles for efficient use of spectrum as noted by the Commission's Spectrum Policy Task Force, including:

- maximizing the flexibility of licensees to choose the types and characteristics of the services that they will offer in their licensed spectrum;
- grouping like spectrum uses together so that technically compatible operations remain close to one another; and
- defining spectrum users' rights and responsibilities in the clearest manner possible.

The migration to a more market-oriented approach will not always prove easy. Today's Order, with its emphasis on flexibility, compatibility and clear definitions of rights, demonstrates how better rules can create better, more reliable, more affordable services for American consumers.

Our decision also designates spectrum for smaller license areas that may be particularly useful in rural America. Over the past few months, I have outlined a vision for competition and innovation in rural telecommunications. Central to that vision is increasing the spectrum resources available in rural America -- we also advance that goal today.

Finally, I would like to thank the National Telecommunications and Information Administration (NTIA) for their extraordinary leadership and partnership in bringing this proceeding to closure. Without our common commitment and goals, these spectrum resources would never have been made available for commercial use.

**SEPARATE STATEMENT OF
COMMISSIONER MICHAEL J. COPPS**
Approving in Part, Concurring in Part

Re: Report and Order in the Matter of Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands

Advanced Wireless Services, such as 3G and IMT-2000, obviously hold tremendous potential for consumers. I join my colleagues and the Bureau in hopes that these service rules and the auction process will bring about a robust and efficient use of this spectrum, which is exactly what we are supposed to be encouraging. I also hope that as we design the specifics of the auction, we will work hard to learn from those countries where the 3G rollout is moving ahead successfully and from countries where 3G auctions may have contributed to problems.

While I approve of the majority of this Order, I have serious concern with the Commission's decision to move ahead without consolidation protections in the form of a spectrum aggregation limit. Under the rules we adopt today, one company could apparently end up controlling the entire AWS band in a city or a geographic region, leaving no AWS spectrum for competitors. That's a result I do not like. But we have arrived at this point because the Commission eliminated the overall spectrum cap more than a year ago, in a decision from which I dissented. So the Commission has already crossed the Rubicon. Establishing a limit for one band alone will not fix the larger mistake that we have already made. Consumers benefit from the competition that we enjoy in wireless services today, and we should protect it. So I continue to believe that we would be better served by protection against one company dominating too much spectrum in a particular city or region, and my concurrence instead of approval is intended to make this point.

Thank you.

**SEPARATE STATEMENT OF
COMMISSIONER KEVIN J. MARTIN**

Re: Report and Order in the Matter of Service Rules for Advanced Wireless Services in the 1.7 and 2.1 GHz Bands

I am pleased to support this item, which adopts service rules for advanced wireless services in the 1.7 GHz and 2.1 GHz bands. The flexible rules we adopt allow the two 45 MHz blocks of contiguous spectrum at issue to be used for a range of advanced wireless services. The wireless industry is already on the forefront in offering innovative new services, and it continues to make advances that will bring exciting new applications to consumers. For example, since we issued the notice of proposed rulemaking in this proceeding, camera phones, which send digital pictures to other phones or computers at the touch of a button, have become widely available. There are also phones that play MP3s, run video games, and connect to the Internet with ease. Better and faster services are becoming available every day.

A crucial ingredient to these services, however, is sufficient spectrum. This Order provides some of that spectrum, allowing a significant amount of spectrum to be used for services such as expanded voice, data, and broadband applications provided over high-speed fixed and mobile networks – applications often called “third generation” or “3G.” This item should thus lead to substantial consumer benefits, as new and better quality services develop in the 1.7 GHz and 2.1 GHz bands.

I would like to once again commend all of the different parts of government for working together to make this happen. In particular, the National Telecommunications and Information Administration deserves praise for spearheading this effort. NTIA, working with the Department of Defense, the State Department, the Office of Management and Budget, and the FCC’s staff, developed the blueprint for making this spectrum available. They accomplished a major step in ensuring that new and innovative wireless services will be available to American consumers.

**SEPARATE STATEMENT OF
COMMISSIONER JONATHAN S. ADELSTEIN**

Re: Report and Order in the Matter of Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands

Today is a banner day for wireless service in the United States. By adopting service and technical rules for Advanced Wireless Services in the 1.7 and 2.1 GHz bands, we are moving a step closer to seeing a new generation of wireless services in this country, including the so-called third generation or 3G mobile systems. I think our item represents just the right framework for further innovation in the wireless arena by promoting continued industry development while employing a light regulatory touch.

Determining a band plan is an inexact science, at best. I believe that the Commission should continue to improve the availability of spectrum to those providers who want to serve smaller areas. Though, we have been making great strides in this area recently through such work as our rural wireless NPRM and our secondary markets proceeding.

I have been concerned that large license areas raise auction prices so high that many companies that want to serve smaller areas cannot even afford to make a first bid. Large service areas also can have the effect of creating swaths of fallow spectrum in areas outside of our nation's populated service areas. Licensees, no matter how large their service areas are, understandably focus their resources on serving the more-populated metropolitan areas.

I certainly recognize that there is value in offering larger service areas for economies of scale and to facilitate larger scale deployments. Indeed, one of the noteworthy developments of the wireless industry over the past several years is the development of the so-called "nationwide" carriers. However, I believe we should find a balance in developing a band plan, and I am pleased to note that a diverse group of commenters in this proceeding supported different sizes of license areas for different blocks of the spectrum.

I believe we got the balance right here. I am especially pleased that the band plan we adopt today not only provides for several licenses to be available on a Regional Economic Area Grouping basis, but also provides for a 2x5 MHz block of spectrum on a RSA/MSA basis and a 2x10 MHz block of spectrum on an Economic Area basis.

In providing a balance of smaller and larger areas, we hopefully offer something for everyone.

Finally, I am pleased to support the technical and service rules that are in this item. In combining the flexibility of Part 27, with the proven technical rules of Part 24, I believe that we have put in place just the right regulatory framework. I said back in April that our PCS service rules should prove a model for our future regulatory efforts for licensed mobile services, and am pleased to support this aspect of our item today.