

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

In the Matter of)	
)	
Amendment of Part 2 of the Commission's Rules)	
to Allocate Spectrum Below 3 GHz for Mobile)	
and Fixed Services to Support the Introduction of)	ET Docket No. 00-258
New Advanced Wireless Services, including Third)	
Generation Wireless Systems)	

SECOND REPORT AND ORDER

Adopted: November 7, 2002

Released: November 15, 2002

By the Commission: Chairman Powell and Commissioners Copps and Martin issuing separate statements.

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I. INTRODUCTION

1. In this Second Report and Order (Second R&O), we take significant steps in our continuing effort to identify and allocate spectrum to support new advanced wireless services (AWS), the collective term we use for new and advanced wireless applications, such as voice, data and broadband services provided over a variety of high-speed fixed and mobile networks, and which are popularly

referred to as “third generation” (3G) systems.¹ The substantial amount of spectrum we allocate today will promote the development and deployment of these advanced systems, which are anticipated to provide widespread consumer benefits, both within the United States and throughout the world. Specifically, we allocate 90 MHz of spectrum in the 1710-1755 MHz and 2110-2155 MHz bands that can be used for AWS. This spectrum comes from bands that the Commission previously identified as candidate bands for the provision of AWS, and includes spectrum used by Federal Government entities that is slated for transfer to non-Federal Government use, spectrum currently used by fixed microwave services and designated for emerging technologies, and spectrum currently used by the Multipoint Distribution Service (MDS).²

II. BACKGROUND

2. We initiated this proceeding in January 2001 with the issuance of a *Notice of Proposed Rulemaking*³ that examined spectrum in both government and non-government use bands that could support AWS. In the *Notice*, we observed that the International Telecommunication Union (ITU) has identified a number of frequency bands that could be used to implement advanced wireless systems internationally, and established a set of standards – International Mobile Telecommunications-2000 (IMT-2000) – for these systems.⁴ In an August 2001 *Memorandum Opinion and Order and Further Notice of Proposed Rule Making*,⁵ we expanded the frequency bands under consideration to include additional spectrum currently allocated to various radio services.

3. Collectively, in the *Notice* and the *Further Notice*, we sought comment on the suitability of AWS use of the 1710-1755 MHz band (slated for transfer from Federal Government to non-Federal Government use and identified by the ITU for worldwide IMT-2000 use); the 1755-1850 MHz band (a

¹ The “3G” nomenclature is based on the popular view that analog cellular systems represent the first generation of advanced wireless devices, that digital cellular and broadband Personal Communications Service systems represent the second, and that the next deployment of wireless technologies (which we include in the collective term “AWS”) represents the third generation.

² MDS channels in the 2500-2690 MHz band are identified as the Multichannel Multipoint Distribution Service (MMDS). 47 C.F.R. § 21.2. We use the single term “MDS” in reference to both MDS and MMDS operations.

³ Amendment of Part 2 of the Commission’s Rules 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 Docket No. 00-258, *Notice of Proposed Rulemaking and Order*, 16 FCC Rcd 596 (2001) (*Notice*). The *Notice* also addressed a petition for rulemaking filed by the Cellular Telecommunications Industry Association (now known as the Cellular Telecommunication and Internet Association) in July 2000 requesting that the Commission begin the process of designating additional spectrum for AWS. See *Notice*, 16 FCC Rcd at 600, ¶ 9. We incorporated comments filed in response to the CTIA Rulemaking Petition into this proceeding. *Id.*, 16 FCC Rcd at 601, ¶ 10.

⁴ See *Provisional Final Acts of the World Radiocommunication Conference (Istanbul, WRC-2000)*. ITU identified the 806-960 MHz, 1710-1885 MHz, and 2500-2690 MHz bands for possible terrestrial use for IMT-2000 systems and recognized that some administrations will use the 698-806 MHz for these purposes. The ITU recognized that jurisdictions will need to protect existing services operating in the spectrum, that not all bands will be allocated for advanced wireless systems in all jurisdictions, and that advanced services will not have priority over other allocated services.

⁵ Amendment of Part 2 of the Commission’s Rules 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 Docket No. 00-258, ET Docket No. 95-18, and IB Docket No. 99-81, *Memorandum Opinion and Order and Further Notice of Proposed Rule Making*, 16 FCC Rcd 16043 (2001) (*Further Notice*).

Federal Government-use band identified by the ITU for worldwide IMT-2000 use); the 2110-2150 MHz and 2160-2165 MHz bands (used for point-to-point fixed microwave services and identified in the Commission's *Emerging Technologies* proceeding as suitable for advanced services); the 2500-2690 MHz band (used by Instructional Television Fixed Services (ITFS) and MDS and identified by the ITU for worldwide IMT-2000 use); the 2150-2160 MHz band (used by MDS); the 1990-2025 and 2165-2200 MHz bands (allocated and licensed for the Mobile-Satellite Service (MSS)); and the 1910-1930 MHz and 2390-2400 MHz bands (designated for unlicensed Personal Communications Services (UPCS) use). In the *Notice*, we also explored the possibility of introducing AWS in the 806-960 MHz and 1850-1910/1930-1990 MHz bands that are currently used for cellular, Broadband PCS, and Specialized Mobile Radio (SMR) services, as well as bands that were reallocated as part of the transition to digital television.⁶

4. We also sought comment on the effect of the allocation proposals on existing and prospective users of the bands and on global compatibility. We noted that ITU adopted a set of standards for IMT-2000 to define key characteristics of advanced radio systems and projected the amount of spectrum required to meet anticipated IMT-2000 demands in those areas where the traffic is projected to be highest by 2010.⁷

5. Because some of the potential spectrum that can be used by AWS falls under the spectrum management responsibilities of both the Executive Branch and the Commission, this proceeding could not have moved forward without the cooperative efforts of stakeholders within the Federal Government. Prior to the *Notice*, the President had executed an Executive Memorandum that directed the Secretary of Commerce to work with the Commission to develop a plan to select spectrum for AWS and to issue a report on the current spectrum uses and potential for reallocation or sharing of the Federal Government bands identified by the ITU as suitable for 3G systems.⁸ Following development of a plan to identify spectrum for AWS,⁹ NTIA completed a study of the 1755-1850 MHz band – which is used by many Federal agencies including the Department of Defense (DOD) – in March, 2001.¹⁰ Commission staff completed a study of the 2500-2690 MHz band in March 2001.¹¹ Both reports identified obstacles to viable AWS use of these bands. More recently, an intra-government working group identified the 1710-

⁶ *Notice*, 16 FCC Rcd at 610-13, §§ 34-38.

⁷ These standards are intended to maximize the commonality of radio interfaces and provide a transition path to advanced systems from existing technologies. Resolution 223 of the World Radiocommunication Conference states that up to 160 megahertz of additional spectrum will be in all three ITU regions, including Region 2, which includes the United States. See *Notice* 16 FCC Rcd at 598-99, ¶¶ 3-4 for additional background.

⁸ See Memorandum For the Heads of Executive Departments and Agencies, Subject: Advanced Mobile Communications/ Third Generation Wireless Systems, October 13, 2000. (Presidential Memorandum) (available at <http://www.ntia.doc.gov/ntiahome/threeg/3gmemo.htm>).

⁹ U.S. Department of Commerce, National Telecommunications and Information Administration, "Plan to Select Spectrum for Third Generation (3G) Wireless Systems in the United States," rel. Oct. 20, 2000, revised Jan. 22, 2001 (available at http://www.ntia.doc.gov/ntiahome/threeg/3g_plan14.htm).

¹⁰ U.S. Department of Commerce, National Telecommunications and Information Administration, "The Potential for Accommodating Third Generation Mobile Systems in the 1710-1850 MHz Band: Federal Operations, Relocation Costs, and Operational Impacts," *Final Report*, rel. March 30, 2001 (*NTIA Final Report*). NTIA had issued a preliminary report on Nov. 15, 2000.

¹¹ See FCC Staff Report Issued by the Office of Engineering and Technology, Mass Media Bureau, Wireless Telecommunications Bureau, and International Bureau: "Spectrum Study of the 2500-2690 MHz Band: The Potential for Accommodating Third Generation Mobile Systems" *Final Report*, ET Docket No. 00-232, 16 FCC Rcd 10272 (2001) (*FCC Final Report*). See also *Interim Report*, 15 FCC Rcd 22310 (2000).

1770 MHz and parts of the 2110-2170 MHz bands as holding the greatest potential for possible AWS use without significantly conflicting with Federal Government operations. A July 2002 study of these bands released by NTIA concluded that 90 megahertz of spectrum consisting of the 1710-1755 MHz band and a matching 45 megahertz from the 2110-2170 MHz band can be reallocated without disrupting critical national security communications systems if certain specific actions are accomplished.¹² Moreover, the report also concluded that there is adequate spectrum available to relocate users from the 2110-2170 MHz band, and thus the band could be made available for AWS.¹³ This report did not anticipate reallocation of the 1755-1770 MHz band due to difficulties in sharing with or relocating incumbent defense systems in this band.¹⁴ We incorporated the 2002 *Viability Assessment* into this proceeding and invited comment on its findings.¹⁵

6. The Commission addressed use of the 2500-2690 MHz band in the September 2001 *First Report and Order and Memorandum Opinion and Order* in this proceeding.¹⁶ In the *First R&O*, the Commission found that ITFS and MDS licensees operating in that band provided important services and would be difficult to relocate, and therefore decided not to relocate these incumbent licensees.¹⁷ The Commission also added a mobile allocation to the 2500-2690 MHz band to provide additional near-term and long-term flexibility for use of this spectrum.¹⁸ In light of our decision in this Second R&O to reallocate 5 megahertz of spectrum in the 2150-2155 MHz band, we will conduct further analysis of MDS operations, including relocation options for MDS licensees that currently operate in the 2150-2160 MHz band.

7. We reserve for further analysis the possible AWS use of the 1910-1930 MHz band (designated for UPCS use), the 2160-2165 MHz band (designated under the *Emerging Technologies* proceeding); and portions of the 1990-2025 and 2165-2200 MHz bands (allocated for MSS). We note that several parties to this docket have suggested alternate uses of some of these bands, some bands are subject to consideration in separate ongoing Commission proceedings, and some bands have been proposed for alternate uses in petitions filed before the Commission.¹⁹

¹² U.S. Department of Commerce, National Telecommunications and Information Administration, "An Assessment of the Viability of Accommodating Advanced Mobile Wireless (3G) Systems in the 1710-1770 MHz and 2110-2170 MHz Bands," *Report*, rel. July 22, 2002 (2002 *Viability Assessment*) (incorporated into the docket of this proceeding and available from NTIA at <http://www.ntia.doc.gov/ntiahome/threeg/va7222002/3Gva072202web.htm>).

¹³ *Id.* at 23.

¹⁴ *Id.* at 2.

¹⁵ See "FCC seeks comment on the National Telecommunications and Information Administration's Report 'An Assessment of the Viability of Accommodating Advanced Mobile Wireless (3G) Systems in the 1710-1770 MHz and 2110-2170 MHz Bands,'" *Public Notice*, 17 FCC Rcd 14390 (2002).

¹⁶ Amendment of Part 2 of the Commission's Rules 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 Docket 00-258, *First Report and Order and Memorandum Opinion and Order*, 16 FCC Rcd 17222 (2001) (*First R&O*).

¹⁷ *Id.* This decision was consistent with findings in the *FCC Final Report*.

¹⁸ *Id.* The Commission also affirmed its prior determination not to reallocate a portion of the 2.5 GHz band to MSS. *Id.*, 16 FCC Rcd at 17241, ¶¶ 35-36.

¹⁹ For example, within this docket, we have asked for comment on two petitions for rulemaking to expand UPCS use of the 1910-1930 MHz band. The Wireless Communications Association International (WCA) suggests that in the (continued....)

8. Finally, we note that certain bands identified in this proceeding are subject to additional legislative requirements. The 1710-1755 MHz band was identified by NTIA for transfer from Federal Government use to mixed Federal Government/non-Federal Government use in conjunction with Omnibus Budget Reconciliation Act of 1993 (OBRA-93).²⁰ Primary allocations were maintained for federal operations at a number of protected facilities and sites. In the Balanced Budget Act of 1997 (BBA-97),²¹ the Congress authorized Federal Government entities to accept compensation for the costs associated with relocating their operations.²² Furthermore, the Strom Thurmond National Defense Authorization Act of Fiscal Year 1999 (NDAA-99)²³ requires that “[a]ny person on whose behalf a Federal entity incurs costs...shall compensate the Federal entity in advance for such costs.”²⁴ NTIA recently adopted specific relocation and reimbursement rules, which will affect new licensees in the 1710-1755 MHz band.²⁵ Under these rules, a Federal user retains its primary status until relocation is complete

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event the Commission deems relocation of MDS from the 2150-2160 MHz band is necessary, an acceptable compromise would be to relocate MDS Channels 1 and 2/2A to the 1910-1916 MHz (now UPCS use) and the 1990-1996 MHz (allocated for MSS use) bands. *See* Letter from WCA, *et. al.*, to FCC Chairman Powell, July 11, 2002, in ET Docket 00-258, concerning “Compromise Solution for Relocating MDS from 2150-2162 MHz.” (*WCA Letter*) (This letter was sent jointly by WCA, Bellsouth, Nucentrix, Sprint, and Worldcom. WCA is the trade association of the MDS industry. The other parties hold the majority of licenses in the 2150-2160 MHz band.) We note that the 1910-1916 MHz UPCS band and the 1990-1996 MHz MSS band that the MDS parties have identified as relocation spectrum is the same spectrum (1910-1915 MHz/1990-1995 MHz) that Nextel has asked for in a spectrum swap where it would relinquish spectrum at 800 MHz and 900 MHz to provide a more interference-free environment for public safety licensees. *See* Nextel *ex parte* filing in WT Docket 00-258, Aug. 9, 2002. Satellite entities have also requested permission to operate an ancillary terrestrial component in conjunction with their mobile satellite operations in the 1990-2025 MHz and 2165-2200 MHz bands. The Commission issued a *Notice of Proposed Rule Making* seeking comments on providing this flexibility to the MSS band. *See* In the Matter of Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Band, IB Docket No. 01-185, *Notice of Proposed Rule Making*, 16 FCC Rcd. 15532 (2001).

²⁰ Pub. L. No. 103-66, 107 Stat. 312 (1993). In OBRA-93, the Congress directed the Secretary of Commerce to identify at least 200 megahertz of Federal Government primary spectrum below 5 GHz that is not required for the Federal Government’s present or identifiable future needs for transfer to non-Federal Government services. *Id.* at § 6001(a).

²¹ Pub. L. No. 105-33, 111 Stat. 251 (1997).

²² *Id.* at, § 3002(d). The BBA-97 relocation model is similar to the Commission’s relocation policy for emerging technology services, such as the relocation procedures associated with deployment of Broadband PCS. *See generally*, Redevelopment of Spectrum to Encourage the Establishment of Services Using New and Innovative Technologies, ET Docket No. 92-9, *First Report and Order and Third Notice of Proposed Rule Making*, 7 FCC Rcd 6886 (1992); *Second Report and Order*, 8 FCC Rcd 6495 (1993); *Third Report and Order and Memorandum Opinion and Order*, 8 FCC Rcd 6589 (1993); *Memorandum Opinion and Order*, 9 FCC Rcd 1943 (1994); *Second Memorandum Opinion and Order*, 9 FCC Rcd 7797 (1994), *aff’d*, Association of Public Safety Communications Officials-International, Inc. v. FCC, 76 F.3d 395 (D.C. Cir. 1996) (collectively, “*Emerging Technologies* proceeding”).

²³ Pub. L. No. 105-261, 112 Stat. 1920 (1998).

²⁴ NDAA-99 at § 1064(c)(3) (codified at 47 U.S.C. § 923(g)(1)(B)). Such compensation may take the form of a cash payment or in-kind compensation. *Id.* *See also* National Defense Authorization Act for Fiscal Year 2000, Pub. L. No. 106-65, 113 Stat. 512 (1999) (making additional modifications to the relocation procedures for Federal Government transfer spectrum).

²⁵ NDAA-99 required NTIA to establish these relocation reimbursement rules. *Id.* (codified at 47 U.S.C. § 923(g)(1)(A)). NTIA adopted these rules in 2002 and codified them at 47 C.F.R. §§ 301.1-301.150. U.S. Department of Commerce, National Telecommunications and Information Administration, Mandatory
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and the NTIA limits or terminates the Federal user's operating license.²⁶ We also note that the Administration has proposed legislation to facilitate the reimbursement process by creating a relocation fund using auctions proceeds.²⁷

III. DISCUSSION

A. Need for Additional Spectrum for AWS

9. Commenters expect the services that make up AWS will employ bandwidth-intensive functions, including high-speed data transfer and internet access,²⁸ and will offer multimedia applications, such as full-motion video.²⁹ For example, Siemens describes a seamless integration of voice and data elements, such as a message that contains pictures, short video clips, and/or short audio pieces, and that may change communications types (*e.g.* from voice to data) one or more times over the course of a communication session.³⁰ Commenters are also skeptical that existing spectrum currently deployed for commercial mobile wireless applications will be sufficient to support widescale AWS deployment, because they expect AWS use will develop in addition to current voice traffic, which is already at saturation in the highest-use areas;³¹ because they expect AWS demand to grow dramatically once applications are made available to the public;³² or because they envision the creation of new non-voice

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Reimbursement Rules for Frequency Band or Geographic Relocation of Federal Spectrum-Dependent Systems, *Final Rule*, 67 Fed. Reg. 41182-01 (June 17, 2002) (*NTIA Relocation Rules*). The rules require, *inter alia*, the identification of (i) a comparable facility to which the Federal user can relocate and (ii) the costs that will be incurred by a Federal entity to achieve comparable capability for its relocated systems, and establish negotiation and dispute resolution procedures.

²⁶ See 47 C.F.R. § 301.140(a) (outlining the conditions that must be met before NTIA limits or terminates a Federal user's authority). We note that the *2002 Viability Assessment* offers a procedure that may substantially reduce federal incumbencies in the 1710-1755 MHz band, but that some federal systems will continue to remain in use on a primary basis for an indefinite period.

²⁷ See *Notice*, 16 FCC Rcd at 614, ¶ 43. See also U.S. Department of Commerce, National Telecommunications and Information Administration, "Commerce Department Asks Congress to Create Spectrum Relocation Fund for Federal Agencies Whose Spectrum is Reallocated to Commercial Use," NTIA Press Release, rel. July 23, 2002 (available at <http://www.ntia.doc.gov/ntiahome/press/2002/relocationfund7242002.htm>). The proposed legislation is available on the NTIA Web site at: <http://www.ntia.doc.gov/ntiahome/congress/2002/legistransmittal7232002.htm>. See also CTIA Comments to the *2002 Viability Assessment* at 3 (supporting these efforts).

²⁸ Nokia Comments to the CTIA Rulemaking Petition at 2; Universal Wireless Communications Corporation (UWCC) Comments to the CTIA Rulemaking Petition at 3; Personal Communications Industry Association (PCIA) Comments to the *Notice* at 5.

²⁹ See, *e.g.*, UWCC Comments to the CTIA Rulemaking Petition at 3.

³⁰ Siemens Comments to the *Notice* at 8.

³¹ See, *e.g.*, Cingular Wireless Comments to the *Notice* at 3-4.

³² Radio Advisory Board of Canada Comments to the *Notice* at 4; Orange Group Comments to the *Notice* at 1. See also Qualcomm Comments to the *Notice* at 3 (predicting that consumer acceptance will be high due to current widespread internet use); Verizon Wireless Reply Comments to the *Notice* at 7 (predicting that mobile data – which it claims represented 2 percent of traffic at the time it filed its comments – will grow at a rate of 25-30 percent and will result in more than 100 million wireless data customers by 2007).

applications that will develop independently of existing voice and voice-and-data models and that will use entirely new technologies.³³ We note that view is not unanimous, as Sprint Corporation (Sprint) claims it can provide AWS using existing spectrum.³⁴ We also distinguish the claim that existing spectrum may be used to launch AWS but additional spectrum will ultimately be required to support AWS,³⁵ from those comments that claim we must allocate an additional 160 MHz or more spectrum that can be used for AWS.³⁶ Although the ITU previously predicted 160 MHz of spectrum will be necessary by 2010 to meet demand in those areas where the traffic is highest,³⁷ several commenters note that there is evidence that worldwide AWS growth has been slower than expected.³⁸ Moreover, the Educational Community of the United States notes that no commenter has provided original research or studies to show that this additional spectrum is needed.³⁹

10. As discussed *infra*, we conclude that additional spectrum is necessary for AWS. We immediately allocate 90 megahertz of spectrum that can be used for these services. We also note that additional spectrum will likely be available in the future. For example, we previously reallocated spectrum as part of the migration to digital television. Spectrum in these bands will be available for new uses – including AWS – once incumbent television operations cease.⁴⁰ In the *First R&O*, we added a mobile allocation to the 2500-2690 MHz band to provide additional near-term and long-term flexibility, thereby making the band potentially available for advanced mobile and fixed wireless services.⁴¹ In addition, we are still considering other bands in this docket, and we may decide to make additional spectrum available for AWS.

11. Commenters identify numerous benefits associated with the deployment of AWS. The Information Technology Industry Council claims that AWS can provide a broadband alternative, promote

³³ LinkAir Reply Comments to the *Notice* at 8.

³⁴ Sprint Comments to the *Notice* at 37. Sprint launched its 3G-style “Vision PCS” services across its national network in late August 2002. *See also* Harold Nadel Comments to the *Further Notice* at 1.

³⁵ *See, e.g.*, AT&T Wireless Services (AT&T Wireless) Comments to the *Notice* at 10; *See also* Qualcomm Reply Comments to the *Notice* at 4.

³⁶ *See, e.g.*, Cingular Wireless Comments to the *Notice* at 4. *But see* Spectrumlink Networks Comments to the *Notice* at 15 (claiming that the uncertain wireless marketplace makes determining AWS spectrum needs a “very uncertain science”). Many commenters reiterate their support in pleadings filed in response to the *2002 Viability Assessment*. *See, e.g.*, Telecommunications Industry Association (TIA) Comments to the *2002 Viability Assessment* at 2-3; Ericsson Comments to the *2002 Viability Assessment* at 4.

³⁷ *See* Resolution 223 of the *Final Acts of the World Radiocommunication Conference (Istanbul, WRC-2000)*.

³⁸ Nucentrix Broadband Networks Reply Comments to the *Notice* at 7-8 (labeling commenters’ support of 160 MHz as “suspect” because of a “growing consensus” that consumer demand for advanced services may have been grossly overstated); Celsat America (Celsat) Reply Comments to the *Further Notice* at 5-6 (stating that 3G networks have been slow to roll out worldwide and many carriers have encountered numerous problems to date). *See also* DoCoMo to cut i-mode service rate, Reuters, Aug. 20, 2002 (noting that DoCoMo’s 3G subscriber levels in Japan are substantially behind projections, and the carrier is expected reduce its projections).

³⁹ *See* Educational Community of the United States Reply Comments to the *Notice* at 7.

⁴⁰ *See* Reallocation of Television Channels 60-69, The 746-806 MHz Band, *Report and Order*, ET Docket No. 97-157, 12 FCC Rcd 22953 (1998); *See also* Reallocation and Service Rules for the 698-746 MHz Spectrum Band (Television Channels 52-59), *Report and Order*, GN Docket No 01-74, 17 FCC Rcd 1022 (2002).

⁴¹ *First R&O*, 16 FCC Rcd at 17223, ¶ 2.

competition, foster innovation, and reach new service areas.⁴² Telephone and Data Systems asserts that no other prospective service for which we could make an allocation promises the economic benefits of AWS,⁴³ and TIA claims that the development of AWS is vital to the United States' ability to remain globally competitive.⁴⁴

12. Although the record reflects an expectation that bandwidth-intensive wireless applications will proliferate, we have found that a shift towards the development of wireless data applications is already occurring domestically,⁴⁵ and note that mobile telephone carriers in other countries are deploying next-generation mobile services that support data applications.⁴⁶ Accordingly, we agree with the commenters and conclude that AWS development in the U.S. is likely to build on the overall growth of wireless data services.⁴⁷ We also agree that the development of AWS will promote economic and public policy benefits.⁴⁸ For example, the provision of additional spectrum can foster the development of new and innovative service offerings that, in turn, have the potential to increase consumer demand. This process aids the development of competitive markets and provides the types of economic benefits that can promote economic recovery of telecommunications markets.⁴⁹ Finally, because of intensive use of existing commercial wireless spectrum, predictions that wireless data use will grow in addition to existing voice use, and the bandwidth-intensive nature of certain data applications, we conclude that current spectrum allocations may, in most cases, support only the introduction and limited growth of AWS. Moreover, additional spectrum will be necessary for new entrants who have no pre-

⁴² Information Technology Industry Council Reply Comments to the *Notice* at 2.

⁴³ Telephone and Data Systems Comments to the *Further Notice* at 4-5; *See also* Motorola Comments to the *Further Notice* at 2 (citing a prediction that AWS will generate \$38-47 billion in additional service revenues per year).

⁴⁴ TIA Reply Comments to the CTIA Rulemaking Petition at 2.

⁴⁵ *See* Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993 [and] Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services, *Seventh Report*, 17 FCC Rcd 12985, 13038 n.367 & 13052 (*Seventh Competition Report*) (estimating the number of mobile Internet users at the end of 2001 at 8 to 10 million, up from 2 to 2.5 million at the end of 2000 and finding that an increasing number of mobile devices offered voice and data service).

⁴⁶ For example, The "FOMA" service offered by NTT DoCoMo in Japan provides high-speed 3G data transmission capabilities. *See* "i-mode and the 3G network" *NTT DoCoMo*, www.nttdocomo.com/top.html (visited Nov. 6, 2002).

⁴⁷ We note that some commenters question how strongly we should draw conclusions about mobile data service usage based on the experiences of other countries, but conclude that, due to overall record data growth both domestically and world-wide, there is a demonstrated need for additional spectrum to support AWS. *See* Nucentrix Broadband Networks Reply Comments to the *Notice* at 10 (claiming that European wireline and internet access costs are higher than U.S. costs, which may drive greater wireless data use in Europe); National ITFS Association Comments to the *Notice* at 19 (claiming that because Americans spend far less time on public and mass transit, U.S. mobile data usage will trail that of Europe).

⁴⁸ *See generally* 47 U.S.C. §§ 157 & 303(g); *Emerging Technologies First Report and Order and Third Notice of Proposed Rule Making*, 7 FCC Rcd 6886 (1992) (finding that the allocation of spectrum that can be used for new services encourages the larger and more effective use of radio in the public interest).

⁴⁹ *See* Written Statement of Michael K. Powell, Chairman, Federal Communications Commission, on *Financial Turmoil in the Telecommunications Marketplace: Maintaining the Operations of Essential Communications*, before the Committee on Commerce, Science, and Transportation, United States Senate (July 30, 2002).

existing spectrum licenses that can be used to support AWS. Accordingly, we conclude that additional spectrum allocations are necessary to support the development of AWS.

13. We distinguish our approach in the identification and allocation of spectrum that is suitable for the provision of AWS from the approach taken by other countries – particularly many of those in Europe, where the rollout of advanced services has been slower and more difficult than anticipated. Carriers entering the European market had no choice but to compete for the only spectrum in which advanced services could be offered which, as a result, led to extremely high bids that in retrospect have impeded the availability of capital to actually construct the systems. Under our flexible use policies, current operators can make decisions that allow them to continuously improve the efficiency of their own systems and make choices as to the value of additional spectrum to enhance these services.⁵⁰

14. There are a variety of factors that can help us determine whether any particular band under study in this proceeding is suitable for the provision of AWS. These factors include harmonization of the AWS frequencies with other countries' allocations, as well as the amount of contiguous spectrum available that can be used to accommodate advanced technologies, and the effect of band reallocation on incumbent operations.

15. In the *Notice*, we sought to develop a record on the use of internationally harmonized spectrum,⁵¹ which can be used to facilitate global roaming.⁵² Several commenters find global roaming vital to the success of advanced services and claim that harmonized spectrum is the only way to effectively accomplish this goal.⁵³ Other commenters believe harmonization within the Americas is more important than finding common worldwide bands.⁵⁴ In contrast, WorldCom doubts whether international roaming represents a very large market,⁵⁵ and Sprint and WorldCom claim that complete global harmonization is neither likely nor feasible given the conflicting worldwide use of the bands identified by the ITU.⁵⁶ Others note that the lack of global harmonization has not stopped the provision of international roaming on existing networks, particularly through the use of multi-mode/multi-band phones.⁵⁷ In

⁵⁰ See Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993 [and] Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services, *Sixth Report*, 16 FCC Rcd 13350, 13397-402 (*Sixth Competition Report*) (examining this difference between the U.S. and European licensing approach as part of an overall discussion of AWS/3G developments).

⁵¹ See *supra* n.4 (listing the frequencies bands the ITU has identified as suitable for IMT-2000).

⁵² *Notice*, 16 FCC Rcd at 607, ¶ 24. Roaming, generally, is the ability to use a single wireless unit in a place distant from a user's "home" network.

⁵³ AT&T Wireless Comments to the *Notice* at 2; AT&T Wireless Reply Comments to the *Notice* at 3; CTIA Reply Comments to CTIA Rulemaking Petition at 1; Chilean Telecommunications Administration Reply Comments to the *Notice* at 2; UWCC Comments to the *Notice* at 2. See also Orange Group Comments to the *Notice* at 1 (claiming that roaming is a vital selling point regardless of whether consumers actually use the service).

⁵⁴ Radio Advisory Board of Canada Comments to the *Notice* at 2; Canadian Wireless Telecommunications Association Comments to the *Notice* at 4; Nucentrix Broadband Networks Reply Comments to the *Notice* at 12. See also Chilean Telecommunications Administration Reply Comments to the *Notice* at 2; National ITFS Association Comments to the *Notice* at 24; Nortel Comments to the *Notice* at 10.

⁵⁵ WorldCom Reply Comments to the CTIA Rulemaking Petition at 10.

⁵⁶ Sprint Comments to the *Notice* at 33; WorldCom Reply Comments to the CTIA Rulemaking Petition at 8-9.

⁵⁷ Lockheed Martin Corporation Comments to the *Further Notice* at 4; Nucentrix Broadband Networks Reply Comments to the *Notice* at 11. *But see* Radio Advisory Board of Canada Comments to the *Notice* at 6 (claiming that
(continued....)

addition, some commenters claim that it will be impossible to avoid the use of multi-mode/multi-band handsets completely.⁵⁸ Those who disfavor such equipment cite the added cost and complexity versus phones that use a single spectrum band.⁵⁹

16. The record also identifies general benefits of large contiguous blocks of harmonized spectrum, including economies of scale in equipment development and quicker deployment of advanced services.⁶⁰ These benefits are not directly related to whether carriers actually provide roaming capabilities or whether consumers use roaming features.

17. We conclude that it is beneficial to allocate spectrum for AWS use in the United States that has been identified by the ITU for AWS use globally, both because doing so will facilitate roaming and because there are other benefits of harmonized spectrum (such as lower equipment costs). However, because multi-band devices have been used successfully in the U.S.,⁶¹ we find that AWS does not need to be deployed exclusively on harmonized spectrum.⁶²

18. It is also important to identify spectrum that can accommodate appropriate technologies. In the *Notice*, we noted that the ITU has developed worldwide standards for IMT-2000 wireless devices designed to provide broadband services at high data rates up to 2 Mbps,⁶³ and asked whether these standards are sufficient to meet wireless system spectrum requirements in the U.S.⁶⁴ Siemens claims that the data rates of the IMT-2000 interfaces will serve the market need “for the foreseeable time.”⁶⁵

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people like to roam, and that roaming usage would be higher if the service were more readily available). Multi-band phones operate across different spectrum bands; multi-mode phones operate on different network technologies. See Qualcomm Comments to the *Notice* at 11.

⁵⁸ Qualcomm Reply Comments to the *Notice* at 4-5 (documenting existing multi-mode and multi-band equipment as evidence that it is possible to produce such devices without great cost or difficulty, and claiming that multi-band and multi-mode handsets will be necessary for global roaming due the different bands and technical standards the IMT-2000 standards support); See also Lockheed Martin Corporation Comments to the *Further Notice* at 3.

⁵⁹ TIA Comments to the *Notice* at 12; Ericsson Comments to the *Notice* at 12; Lucent Technologies Comments to the *Notice* at 5. (suggesting that, as a general principle, multi-band and multi-mode units are more technically complex, larger, heavier, costlier to develop and produce, and consume more power than similar single mode and single band devices).

⁶⁰ See, e.g., Verizon Wireless Reply Comments to the *Further Notice* at 7-8.

⁶¹ See, e.g., *Sixth Competition Report* 16 FCC Rcd at 13367 (describing the convergence of cellular and PCS, and noting that the AT&T Wireless holds interests in both types of licenses); *Seventh Competition Report*, 17 FCC Rcd at 13011 (describing Cingular’s current mix of TDMA and GSM networks).

⁶² We also note that several commenters said that while harmonized spectrum is important, it should not serve to limit the amount of spectrum we ultimately decide is required for the provision of advanced services nor delay its allocation. Cingular Comments to the *Notice* at 11; CTIA Reply Comments to the *Notice* at 13.

⁶³ The IMT-2000 standards provide for the capabilities to support circuit and packet data at high bit rates at 144 kbps or higher in high mobility (vehicular) traffic environments; 384 kbps for pedestrian traffic; and 2 Mbps or higher for indoor traffic. The *Notice* describes other aspects of the ITU standards (such as interoperability and common billing/user profiles) in greater depth.

⁶⁴ *Notice*, 16 FCC Rcd at 604, ¶ 17.

⁶⁵ Siemens Comments to the *Notice* at 12.

19. Most carriers in the U.S. have indicated plans to provide service that meet the IMT-2000 data rates by deploying systems based on cdma2000 and W-CDMA technologies.⁶⁶ These technologies use paired channels of 1.25 to 7.5 MHz.⁶⁷ In order to support multiple channels and capabilities, we conclude that small amounts of noncontiguous spectrum (*i.e.*, blocks less than about 5 MHz in size) are apt to be less beneficial for the provision of AWS than are larger allocations.

20. In the *Further Notice*, we noted that spectrum efficiencies are inherent in the allocation of contiguous frequency blocks for AWS.⁶⁸ The record reflects support for such allocations.⁶⁹ For example, Motorola claims that if we allocate only 45 MHz of spectrum in the 2110-2170 MHz band for AWS, we should allocate a contiguous 45 MHz block within the band to maximize spectrum efficiencies.⁷⁰

21. Finally, any decision to provide additional spectrum for the provision of AWS has the potential to affect incumbent uses of the reallocated bands. Many commenters also contend that key characteristics of any spectrum we find to be suitable for the provision of AWS are our ability to readily identify incumbent users and to provide a clear and comprehensive procedure to migrate incumbent users to suitable alternate bands.⁷¹ We agree. The easier it is to readily identify and clear incumbent users from a band, the more useful the band is likely to be for the provision of AWS.

B. Spectrum for AWS

1. 1710-1755 MHz

22. The 1710-1755 MHz band was initially identified in 1995 for transfer from Federal Government use to mixed Federal Government/non-Federal Government use.⁷² At that time, NTIA determined that this band could be made available to non-Federal Government users in 2004.⁷³ NTIA also identified certain incumbent Federal Government facilities that may continue to operate in the band and must be protected from interference.⁷⁴ In its *2002 Viability Assessment*, NTIA outlined additional

⁶⁶ See *Seventh Competition Report*, 17 FCC at 13038 n.368. See also “Wireless Missionary Qualcomm fighting uphill battle to convert cell customers to use its CDMA technology,” San Diego Union-Trib., June 9, 2002 at H1.

⁶⁷ Cdma2000 requires a 1.25 megahertz channel (1x) to meet the vehicular performance value, a 3.75 megahertz channel (3x) to meet the pedestrian performance value and a 7.5 megahertz (6x) channel to meet the indoor performance value. W-CDMA meets the standards using paired channels of a minimum size of 5 megahertz each. See ITU Rec. ITU-R M.1455-1 at 16.

⁶⁸ *Further Notice*, 16 FCC Rcd at (16043) ¶ 38.

⁶⁹ See, e.g., AT&T Wireless Comments to the *Further Notice* at 5-6; Verizon Wireless Comments to the *Further Notice* at 7-8.

⁷⁰ Motorola Reply Comments to the *Further Notice* at 5.

⁷¹ Cingular Wireless Comments to the *Notice* at 11; Cook Inlet Region Comments to the *Notice* at 5.

⁷² See U.S. Department of Commerce, National Telecommunications and Information Administration, “Spectrum Reallocation Final Report; Response to Title VI – Omnibus Budget Reconciliation Act of 1993,” NTIA Special Publication 95-32, rel. Feb. 1995 (*1995 Spectrum Reallocation Final Report*) at §5, p. 3.

⁷³ *Id.* at §4, p. 7.

⁷⁴ OBRA-93 stated that microwave communications facilities operated by Federal power agencies are not required to relocate. OBRA-93, § 113(c)(4) (codified at 47 U.S.C. § 923). These facilities are discussed in Appendix E of the *1995 Spectrum Reallocation Final Report*. In addition, NTIA identified a number of fixed microwave sites as well as 16 sites operated by the Department of Defense as “Essential Federal Operations” subject to indefinite continued primary use in the band. See Appendix F & figure F-3 of the *1995 Spectrum Reallocation Final Report*

(continued...)

steps for reaccommodating existing Federal Government users in the band segment, including some that have a right to remain in the band indefinitely.⁷⁵ The NTIA plan offers a mechanism that could largely clear the band of Federal Government users no later than December 31, 2008.

23. Specifically, the *2002 Viability Assessment* proposes that 1) Federal Government non-military systems and DOD fixed microwave systems be relocated; 2) existing facilities at 16 sites where DOD has the right to continued primary use also be relocated; 3) DOD ground systems remain on a primary basis at two of these 16 sites – Cherry Point, N.C., and Yuma, Ariz., but operate on a secondary, coordinated basis at all other sites;⁷⁶ and 4) precision guided munitions (PGM) systems continue to operate on a primary basis in the 1710-1720 MHz band segment until the current inventory is exhausted or until the end of 2008, whichever occurs first.⁷⁷ We note that this band is subject to the provisions of NDAA-99 and all Federal Government systems therein that are relocated are entitled to reimbursement, and that such systems can continue to operate in the band on a primary basis until or unless they are relocated. In addition, the *2002 Viability Assessment* envisions that the Commission would conduct a rulemaking that would reallocate other spectrum to accommodate Federal systems that otherwise would remain in the 1710-1755 MHz band indefinitely on a primary basis. We note that any relocation of Federal Government systems from the 16 protected sites is subject to the reimbursement and relocation rules of NDAA-1999.⁷⁸ Many commenters urge us to adopt a quick and efficient means to relocate incumbent Federal Government users from the 1710-1755 MHz band,⁷⁹ and overwhelmingly support the *2002 Viability Assessment* as a mechanism for reducing Federal Government operations in the band.⁸⁰

24. Commenters note that the 1710-1755 MHz band enjoys many characteristics that make it suitable for AWS. They note it is already being used in many countries for 2G-style wireless services⁸¹ so it is likely to promote global spectrum harmonization in the long term,⁸² which in turn will foster roaming,⁸³ and economies of scale that can translate into lower development costs and manufacturing

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(identifying these sites); OBRA-93, § 113(b)(2) (allowing for the designation of such facilities within the bands designated for Federal Government/non-Federal government mixed use).

⁷⁵ We note that NTIA's Reimbursement Order states that "[d]uring the transition period, all incumbent Government systems will remain on a primary basis and must be protected by the non-Government licensee." See *NTIA Relocation Rules*, *supra* n. 25, at ¶18.

⁷⁶ *2002 Viability Assessment* at 3.

⁷⁷ *Id.* at 17.

⁷⁸ We further note that if a future transfer of spectrum should require subsequent relocation of these Federal Government systems, additional provisions contained in the National Defense Authorization Act for Fiscal Year 2000 may also apply to these systems. See Pub. L. No. 106-65, 113 Stat. 512 (1999), § 1062(b).

⁷⁹ CTIA Comments to the *2002 Viability Assessment* at 3-4; Nokia Comments to the *2002 Viability Assessment* at 3; TIA Comments to the *2002 Viability Assessment* at 5.

⁸⁰ See, e.g., Ericsson Comments to the *2002 Viability Assessment* at 1-2; ArrayComm Comments to the *2002 Viability Assessment* at 2; Verizon Wireless Comments to the *2002 Viability Assessment* at 2.

⁸¹ AT&T Wireless Reply Comments to the *Notice* at 5; Motorola Comments to the *Notice* at 13.

⁸² Nokia Comments to the *Notice* at 5; Motorola Comments to the *Notice* at 12; Information Technology Industry Council Reply Comments to the *Notice* at 3.

⁸³ Siemens Comments to the *Notice* at 20.

efficiencies.⁸⁴ They further state that this band can also help ensure that United States residents enjoy the same level of advanced services as in other countries.⁸⁵ The parties observe that the 1710-1755 MHz band is slated to be made available for non-Federal Government commercial use,⁸⁶ and that the *2002 Viability Assessment* offers a plan that can make the band even more useful for AWS. Catholic Television Network also states that the band “offers better propagation characteristics,” than other bands under consideration.⁸⁷ We also note that the band size – 45 megahertz – is large enough to support IMT-2000 protocols and would provide flexibility to accommodate a variety of channelization plans.

25. For the above reasons, we find that it serves the public interest to allocate the 1710-1755 MHz band segment for mobile and fixed services on a co-primary basis contingent on its becoming available for non-Federal Government mixed use January 1, 2004.⁸⁸ In addition, we are deleting the fixed and mobile allocations from the Federal Government Table in the 1710-1755 MHz band, except as specified in the new United States footnote US378, which codifies Federal Government residual rights. We also retain and modify footnote US311 in the Table of Frequency Allocations. This footnote identifies certain pre-existing radio astronomy activities that exist between 1718.8 MHz and 1722.2 MHz at observatories set forth in Appendix F of the *Notice*. Because radio astronomy facilities in this band operate on an unprotected basis, we conclude that it is not necessary to add rules setting forth coordination procedures and exclusion zones, as the National Academies of Science (NAS) suggests.⁸⁹ The footnote, modified to update the list of radio astronomy facilities,⁹⁰ will serve to apprise parties of these operations.

⁸⁴ Information Technology Industry Council Reply Comments to the *Notice* at 4; WorldCom Reply Comments to the *FCC Staff Report* at 5.

⁸⁵ CTIA Comments to the *FCC Staff Report* at 4-5.

⁸⁶ Network for Instructional TV Reply Comments to the *Notice* at 6. *See also* National ITFS Association Comments to the *Notice* at 22; AT&T Wireless Reply Comments to the *Notice* at 5.

⁸⁷ Catholic Television Network Reply Comments to the *Notice* at 10. *See also* Nortel Networks Reply Comments to the *Notice* at 3 (stating that the 1.7 MHz band in general has “technical and practical advantages” over the 2.5 MHz band that was initially identified as a candidate band).

⁸⁸ BBA-97 designated the 1710-1755 MHz band for assignment to commercial use by competitive bidding. BBA-97 § 3002(b). More generally, BBA-97 amended Section 309(j) of the Act to require the Commission to grant licenses through the use of competitive bidding when mutually exclusive applications for initial licenses are accepted for filing, unless certain specific statutory exemptions apply. BBA-97 § 3002(a) (codified at 47 U.S.C. § 309(j)). Section 309(j)(2) exempts from auctions licenses and construction permits for public safety radio services, digital television service licenses and permits given to existing terrestrial broadcast licensees to replace their analog television service licenses, and licenses and construction permits for noncommercial educational broadcast stations and public broadcast stations described in section 397(6) of the Communications Act. We will address the requirements of BBA-97 with respect to the 1710-1755 MHz band in greater depth in conjunction with our service rules proceeding for the band.

⁸⁹ NAS Comments to the *Notice* at 3-4 (late filed).

⁹⁰ *See id.* (asking that Haystack Observatory be deleted from the list and that the National Radio Astronomy Observatory’s Very Large Array at Socorro, New Mexico, Very Long Baseline Array stations, and the Goldstone Observatory in California be added to the list). We also include the Allen Telescope Array in Hat Creek, California, pursuant to our recent decision in The 4.9 GHz Band Transferred from Federal Government Use, WT Docket No 00-32, *Second Report and Order and Further Notice of Proposed Rulemaking*, 17 FCC Rcd 3955, 3963 ¶ 13 n.73 (2002).

26. We believe that the steps outlined in the *2002 Viability Assessment* offer a roadmap for addressing the encumbrances on the band in a timely and predictable manner, and we anticipate exploring its proposals in a further reallocation proceeding that we expect to initiate in the near future.⁹¹ At that time, we will also consider what, if any, mitigating techniques are necessary for new licensees to protect remaining incumbent Federal Government users of this band segment.

2. 2110-2150/2150-2155 MHz

27. The 2110-2150 MHz band is among those frequency bands the ITU has identified for use, on a worldwide basis, by administrations wishing to implement IMT-2000 services.⁹² Currently, this band is used in the United States primarily for non-Federal Government fixed and mobile services licensed under the Fixed Microwave Service in Part 101 of the Rules, the Public Mobile Services under Part 22 of the Rules, and the Domestic Public Fixed Radio Services under Part 21 of the Rules.⁹³ Federal Government use of this band is generally on a secondary basis and is limited to space research earth stations for earth-to-space transmissions in the 2110-2120 MHz portion of the band.⁹⁴

28. The 2110-2150 MHz band is currently allocated for non-Government use for fixed and mobile services on a co-primary basis. The Commission originally identified this band for new advanced fixed and mobile services in the 1992 *Emerging Technologies* proceeding and adopted rules and procedures to permit new licensees to relocate existing fixed service microwave licensees from this spectrum band.⁹⁵

29. In the *Notice*, we proposed to make this band available for advanced mobile and fixed communication services.⁹⁶ Commenters endorse use of the band for AWS, particularly due to the fact that the band possesses many of the harmonization characteristics that can support global roaming capabilities. AT&T Wireless, WCA, and Ericsson describe the lower development and equipment costs that are expected to be associated with this spectrum, given the fact that it has already been designated by

⁹¹ Several comments we received in response to the *2002 Viability Assessment* are best addressed in this subsequent proceeding. For example, Verizon asks us to continue to work with NTIA to make spectrum available for commercial use in the Arizona and North Carolina locations that DOD anticipates it will operate on a primary basis for the indefinite future, and that suggests that Federal Government users should anticipate ultimate relocation once advanced services are deployed widely. Verizon Wireless Comments to the *2002 Viability Assessment* at 8. Cingular asks for a clarification of the “secondary coordinated basis” concept. Cingular Wireless Comments to the *2002 Viability Assessment* at 3. See also CTIA Comments to the *2002 Viability Assessment* at 4.

⁹² International footnote 5.388 reads as follows: “The bands 1885-2025 MHz and 2110-2200 MHz are intended for use, on a worldwide basis, by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000). Such use does not preclude the use of these bands by other services to which they are allocated. The bands should be made available for IMT-2000 in accordance with Resolution 212 (Rev.WRC-97).” See 47 C.F.R. § 2.106, footnote 5.388.

⁹³ See 47 C.F.R. Parts 21, 22, and 101.

⁹⁴ See 47 C.F.R. § 2.106 footnote US111. This footnote lists specific locations where these earth stations can be located. See also, 47 C.F.R. § 2.106 footnote US252 which authorizes such use at Goldstone, CA for the 2110-2120 MHz band on a primary basis.

⁹⁵ *Emerging Technologies First Report and Order and Third Notice of Proposed Rule Making*, 7 FCC Rcd at 6890, ¶¶ 23-24. This relocation right was affirmed in the *Emerging Technologies Memorandum Opinion and Order and Third Notice of Proposed Rulemaking and Order*, 13 FCC Rcd 23949 (1998).

⁹⁶ See *Notice*, 16 FCC Rcd at 618, ¶ 52.

the ITU as a 3G terrestrial base station transmit band.⁹⁷ In reply comments, Nucentrix Broadband Networks notes that commenters in this proceeding “fundamentally concluded” that the spectrum in the band is the “most viable” candidate for provision of the advanced services.⁹⁸ NEC America submits that the 2110-2150 MHz band is already available and designated for commercial use,⁹⁹ and the record broadly supports its use for the provision of the AWS.¹⁰⁰

30. The 2110-2150 MHz band is already allocated to the fixed and mobile services on a primary basis, and thus it is not necessary that we reallocate this spectrum in order to make it available for AWS use. Instead we re-designate the band for new uses consistent with the general outline of our *Emerging Technologies* proceeding. The amount of spectrum in the band is suitable for the provision of AWS by multiple licensees, based on our evaluation of the spectrum characteristics necessary to support appropriate AWS technologies. We also note that BBA-97 identifies the 2110-2150 MHz band for advanced wireless use and specifies that the band must be assigned under the competitive bidding procedures.¹⁰¹

31. In addition, we note that the National Aeronautical and Space Administration (NASA) operates on a primary basis a station in the 2110-2120 MHz band at Goldstone, California as part of the Space Research service. This station, which is authorized via United States footnote US252, is used by NASA’s Deep Space Network (DSN) for uplink transmissions to interplanetary spacecraft.¹⁰² In the *Notice*, we proposed not to relocate this facility.¹⁰³ Moreover, the DSN earth station transmits with a nominal EIRP of 105.5 dBW.¹⁰⁴ In the *Notice*, we noted that during command link operations it is likely that mobile receivers on the 2110-2120 MHz segment (and possibly in adjacent bands above 2120 MHz)

⁹⁷ AT&T Wireless Reply Comments to the *Notice* at 6; WCA Reply Comments to the *Notice* at 11; Ericsson Comments to the *2002 Viability Assessment* at 3.

⁹⁸ Nucentrix Broadband Networks Reply Comments to the *Notice* at 16 (also discussing the 1710-1850 MHz band). See also Motorola Reply Comments to the *Notice* at i; CDMA Development Group Reply Comments to the *Further Notice* at 3; AT&T Wireless Comments to the *Notice* at 9.

⁹⁹ NEC America Comments to the *Further Notice* at 23.

¹⁰⁰ Many commenters support allocation of the 2110-2150 MHz band as part of a request for the allocation of a larger amount of spectrum between 2110 MHz and 2170 MHz. See, e.g., Cingular Wireless Comments to the *2002 Viability Assessment* at 2 (supporting allocation of the entire 60 MHz in the 2110-2170 MHz band to promote AWS development).

¹⁰¹ See BBA-97 § 3002(c)(1)(D). We note that the 2110-2150 MHz band was previously subject to Section 3007 of BBA-97, which required us to auction it in a manner that ensured that proceeds were deposited in the Treasury by September 30, 2002. See BBA-97 § 3007 (codified in notes to Section 309 of the Communications Act of 1934, as amended, 47 U.S.C. § 309). This deadline was recently rescinded. See Auction Reform Act of 2002, Pub. L. No. 107-195, 116 Stat. 715 (2002).

¹⁰² See 47 C.F.R. § 2.106 footnote US252. Internationally, the 2110-2120 MHz band is allocated in all three ITU Regions to the Fixed, Mobile and Space Research (deep space) (Earth-to-space) services and is used by NASA at DSN facilities in Spain and Australia.

¹⁰³ *Notice*, 16 FCC Rcd at 618, ¶ 53.

¹⁰⁴ The DSN, under emergency conditions, transmits with EIRP up to 118 dBW.

will not be able to operate within the areas surrounding Goldstone.¹⁰⁵ We sought comment on how we can best accommodate AWS and account for continued DSN use of the band segment.¹⁰⁶

32. The *2002 Viability Assessment* concluded that advanced wireless mobile receivers “will probably experience service disruption in the 2110-2120 MHz band when attempting to operate in areas surrounding the Goldstone site during uplink transmissions,” although the severity and duration of the disruption will vary depending on a number of factors.¹⁰⁷ The Jet Propulsion Laboratory (JPL) states that its interference calculations¹⁰⁸ show that receivers complying with IMT-2000 specifications would be disrupted during Goldstone’s uplink transmissions, and proposes establishment of a protected operating zone in the 2110-2120 MHz band of approximately 200 km in radius around the Goldstone facility where AWS operations would not be permitted.¹⁰⁹ JPL states that this area has an overall low population density and is largely comprised of the Mojave Desert and Death Valley areas. This proposed protected area also includes the city of Las Vegas, the I-15 corridor between Cajon Pass and Las Vegas, and portions of other major thoroughfares.¹¹⁰ In contrast to JPL, AT&T Wireless suggests that sharing is a better option,¹¹¹ and Motorola urges us not to reject use of the frequency band outright but to instead examine the timing of Goldstone’s transmissions in order to affect some sort of sharing.¹¹²

33. We examined the interference characteristics of the Goldstone DSN facility and based on its typical operation pattern, which is intermittent, the amount of its signal that would be blocked by terrain in many directions, and the low population density in the areas near Goldstone, we conclude that a significant amount of interference should not occur to AWS.¹¹³ Therefore, we will not formally restrict use of the 2110-2120 MHz band in the vicinity of Goldstone. However, we anticipate that this band will be unusable for advanced services at certain times in the immediate vicinity of Goldstone, and expect that potential licensees will take this fact into account and will develop their business and service plans accordingly. We believe that such an approach is practical, given the comments of the AWS proponents that discussed Goldstone interference, and we will work cooperatively with JPL and other interested parties to insure that our approach does in fact achieve its goals.

34. The 2150-2160 MHz band is allocated internationally to the fixed and mobile services on a primary basis.¹¹⁴ Domestically, the 2150-2160 MHz band is allocated to the fixed service on a primary

¹⁰⁵ The Australian government, faced with a similar situation, excluded the 2110-2125 MHz portion of the spectrum in areas around the DSN facility at Canberra in a recent auction of spectrum for IMT-2000. *Notice*, 16 FCC Rcd at 618, ¶ 53; *See also* http://auction.fcc.gov/auction_results/2ghz_results_page/pdf/3gpaper2.pdf.

¹⁰⁶ *Notice*, 16 FCC Rcd at 618, ¶ 53.

¹⁰⁷ *2002 Viability Assessment* at 23.

¹⁰⁸ JPL defined interference as the receiver experiencing an unacceptable level of interference more than 1% of the time. *See JPL Comments to the Notice* at 5.

¹⁰⁹ JPL Comments to the *Notice* at 2.

¹¹⁰ These include I-40, I-10, and the Golden State Freeway (I-5). *See JPL Comments to the Notice* at 7, fig.2.

¹¹¹ AT&T Wireless Comments to the *Notice* at 12.

¹¹² Motorola Comments to the *Notice* at 18-19.

¹¹³ *See Appendix D* for details of the analysis. We also note that our analysis did not account for the significant processing gain expected by the use of CDMA-type technologies.

¹¹⁴ In Region 2 (the Americas) this band is also allocated for MSS downlinks on a secondary basis.

basis¹¹⁵ and is regulated under Part 21 of our Rules as part of MDS.¹¹⁶ This band is generally operated as two channels - Channel 1 (2150-2156 MHz) and Channel 2A (2156-2160 MHz).¹¹⁷ In addition, licensees may use channel 2 (2156-2162 MHz) on a limited basis in 50 cities.¹¹⁸ MDS may also use spectrum in the 2500-2690 MHz band.¹¹⁹

35. In the *Further Notice*, we requested comment on whether the 2150-2160 MHz band should be reallocated for AWS, and if so, how this band might be used with other spectrum being considered for AWS.¹²⁰ We solicited comment on the impact of reallocating this band from MDS operations to AWS. In this regard, we proposed that if relocation were deemed necessary MDS incumbents would be entitled to comparable facilities and/or adequate replacement spectrum and sought comment on the relocation policies and procedures that should apply.¹²¹ In addition, we requested comment on whether the spectrum sharing conclusions of the *FCC Final Report* on MDS use of the 2500-

¹¹⁵ We note that prior to February 25, 1974, footnote NG23 made the 2150-2162 MHz band available for assignment to stations in the International Fixed Public Radiocommunication Services in the Caribbean. A review of our licensing database finds that there are no such licensees. In a separate proceeding, we are proposing to delete footnote NG23. See Amendment of Parts 2, 25, and 87 of the Commission's Rules to Implement Decisions from World Radiocommunication Conferences Concerning Frequency Bands Between 28 MHz and 36 GHz and to Otherwise Update the Rules in this Frequency Range, ET Docket No. 02-305, *Notice of Proposed Rule Making*, FCC 02-261, rel. Oct. 7, 2002, at ¶ 103.

¹¹⁶ See 47 C.F.R. Part 21—Domestic Public Fixed Radio Services. Subpart K of Part 21 is titled “Multipoint Distribution Service.”

¹¹⁷ Under an informal agreement among MDS licensees, the principal use of the 2150-2160/2 MHz band is for response stations transmitting to hub stations, which is generally known as upstream communications. See generally Sprint Comments to the *Notice* at 21 and WCA Comments to the *Notice* at 42-43. A response station in a two-way system is a customer-premises transceiver used for the reception of downstream and transmission of upstream signals as part of a large system of such stations licensed under the authority of a single license. A maximum e.i.r.p. of 33 dBW (2000 watts) per 6 MHz is permitted. A hub station is a receive-only station licensed as part of a system of response stations in a two-way system and used for the purpose of receiving the upstream transmissions of those response stations.

¹¹⁸ The 2 megahertz at 2160-2162 MHz can only be assigned where there is evidence that no harmful interference would occur to any authorized co-frequency point-to-point facility. See 47 C.F.R. § 21.901(c). We collectively refer to MDS channels 1, 2, and 2A in our discussion of MDS use of the 2150-2160 MHz band.

¹¹⁹ There are other MDS channels in the 2596-2644 MHz, 2650-2656 MHz, 2662-2668 MHz, and 2674-2680 MHz bands, as well as response channels in the 2686-2690 MHz band. In addition, MDS licensees often lease spectrum in the 2500-2690 MHz band from ITFS licensees. Historically, the 2150-2162 MHz and 2500-2690 MHz bands were predominantly used for one-way analog video transmission. Increasingly, MDS operators are using these bands for two-way digital broadband services. In October 1996, the Commission decided to allow high-speed digital data applications, including Internet access. Then, in 1998, the Commission approved the use of two-way transmissions, effectively enabling the provision of voice, video, and data services. In 2001, a mobile, except aeronautical mobile, service allocation was added to the 2500-2690 MHz band. See *First R&O*, 17 FCC Rcd at 17235, ¶ 21 (describing these regulatory developments).

¹²⁰ See *Further Notice* 16 FCC Rcd at 16060-61, ¶¶ 38-41.

¹²¹ *Id.*, 16 FCC Rcd at 16061, ¶ 40. We likewise asked for a suggested timeframe for clearing the band as well as the types and magnitude of costs that would be involved. *Id.*

2690 MHz band apply to the 2150-2160 MHz band.¹²² We invited comment on the public interest costs and benefits of adding a mobile allocation to the 2150-2160 MHz band.¹²³

36. In general, wireless carriers believe that the 2150-2160 MHz band should be reallocated to allow AWS and that the MDS operators should be relocated.¹²⁴ Such an action, they contend would have many benefits for AWS. For example, Telephone and Data Systems claims that the 2150-2160 MHz band is vital as part of a large contiguous allocation for AWS in the 2.1 GHz band.¹²⁵ The Wireless Communications Division of the Telecommunications Industry Association states that the reallocation of the 2150-2160 MHz band “offers the only practical opportunity” to create a global downlink band for AWS.¹²⁶ The Radio Advisory Board of Canada states that a significant step towards the objective of ensuring maximum worldwide commonality would be the adoption of a common base station transmit band that includes the 2150-2160 MHz band.¹²⁷ In addition, some AWS proponents argue that continued MDS transmissions in the 2150-2160 MHz band would cause harmful interference to AWS systems and therefore must be relocated.¹²⁸ Verizon states that continued MDS operations in this band could completely preclude AWS operations in the 2110-2150 MHz band.¹²⁹ However, it also comments that if more stringent emission limits are adopted for MDS, then a guard band may be able to protect 3G receivers from interference.¹³⁰

37. MDS licensees have generally expressed a strong desire to retain the 2150-2160 MHz band for MDS operations.¹³¹ However, they express a desire for a mobile allocation to be added to the 2150-2160 MHz band, or to any replacement spectrum they might be allocated.¹³² To facilitate sharing in

¹²² The *FCC Final Report* concluded that MDS and AWS sharing would not be possible in the 2500-2690 MHz band, and that it would not be possible to relocate MDS users on the band without jeopardizing the unique and valuable services that MDS users provide.

¹²³ See *Further Notice* at 16 FCC Rcd at 16061, ¶ 40.

¹²⁴ See, e.g., Cingular Wireless Comments to the *Further Notice* at 11; Ericsson Comments to the *Further Notice* at 2.

¹²⁵ See Telephone and Data Systems Comments to the *Further Notice* at 8.

¹²⁶ See Telecommunications Industry Association – Wireless Communications Division (TIA-Wireless) Comments to the *Further Notice* at 4.

¹²⁷ See Radio Advisory Board of Canada Comments to the *2002 Viability Assessment* at 4.

¹²⁸ Motorola Reply *Notice* at 11 and Appendix.

¹²⁹ Verizon Wireless Comments to the *Notice* at 14. Verizon states that with the out-of-band emission limits for MDS, an MDS transmitter operating at maximum power would preclude 3G mobile receiver operation regardless of the amount of guard band. For example, Verizon provides an analysis showing that at a separation distance of 300 meters with a guard band of 3 megahertz, an MDS base station would exceed the 3G handsets interference criteria by about 7 dB. *Id.* at Appendix. See also Motorola Comments to the *Notice* at 11 and Appendix.

¹³⁰ Verizon Wireless Comments to the *Notice* at 15.

¹³¹ See, e.g., Sprint Comments to the *Further Notice* at 2; WorldCom Comments to the *Notice* at 24.

¹³² See, e.g., Nucentrix Broadband Networks Comments to the *Further Notice* at 6-7; WorldCom Comments to the *Further Notice* at 10-11. Nucentrix avers that the same public interest benefits of new technology development and efficient use of spectrum that were articulated in the *Further Notice* would be achieved by the addition of a flexible use allocation for MDS Channels 1 and 2A. It also states that the record in this proceeding clearly demonstrates that
(continued...)

the band, WCA states that under certain conditions MDS and AWS can co-exist in the 2110-2165 MHz band.¹³³ First, WCA states that a modest guard band between MDS and AWS would be necessary.¹³⁴ However, alleging flaws in Verizon's analysis, WCA refutes the assertion that the entire band would be unusable.¹³⁵ Second, WCA states that to enable band sharing an appropriate spectral mask must be imposed on AWS and AWS power levels must be limited.¹³⁶

38. Commenters advocating the relocation of MDS operations offer several approaches. AT&T states that moving MDS to the 2155-2165 MHz band would provide 45 megahertz of contiguous spectrum for 3G and require only one guard band.¹³⁷ Likewise, Verizon argues that MDS operations in the 2150-2160 MHz band could be shifted up to the 2155-2165 MHz band or alternatively moved to spectrum within or adjacent to the MDS spectrum at 2500-2690 MHz.¹³⁸ Cingular presents a plan recommending that MDS operations be relocated to the MSS spectrum at 2010-2025 MHz.¹³⁹ Ericsson argues that the MDS spectrum should be reallocated for AWS, but replacement spectrum for MDS should only be considered if market developments indicate a clear need. In that case, Ericsson suggests that replacement spectrum could come from the 2385-2400 MHz band, in abandoned MSS spectrum below 2025 MHz, or in the 700 MHz spectrum bands.¹⁴⁰

39. WCA argues that each of these options poses difficulties for MDS operations. With respect to moving MDS to the 2155-2165 MHz band, it notes that in 50 markets, MDS licensees may use up to 12 megahertz which must be accommodated, that such relocation would eliminate the *de facto*

(...continued from previous page)

MDS Channels 1 and 2A and the 2500-2690 MHz band are used together to deliver the same broadband services and, therefore, that the same service rules should apply to both bands. Nucentrix Broadband Networks Comments to the *Further Notice* at 6-7.

¹³³ WCA Reply Comments to the *Notice* at 27-31.

¹³⁴ WCA states that further analysis is needed to determine the correct size for a guard band. *Id.* at 30.

¹³⁵ WCA states that Verizon's analysis fails to consider the elevation angles between MDS base stations and 3G-style handsets and unrealistically assumes that downstream MDS stations would operate with an attenuation of 60 dB on all frequencies more than 3 MHz from the channel edge. WCA points out that the MDS base station emissions continue to roll off to a level of -67 dBc at ± 5 MHz away from the band edge, which is enough to meet Verizon's desired interference criterion. WCA also maintains that the antenna height differential between MDS base and AWS mobile stations is enough to reduce interference to levels below Verizon's interference limit at distances up to 1.6 km. See WCA Reply Comments to the *Notice* at 29-30 and Appendix A.

¹³⁶ See WCA Reply Comments to the *Notice* at 30. WCA states that if the stated conditions are adopted, it would not be opposed to a modification to the MDS base station emission mask to reflect actual equipment performance. *Id.* at 29-30. See also Joint Comments of The Cellular Telecommunications & Internet Association, Telecommunications Industry Association, and Personal Communications Industry Association at Attachment I: Report of the Working Group on 3G Characteristics. The report indicates that mobile stations would operate with a typical transmitter power of 100 mW, and a maximum transmitter power of 250 mW for cdma2000, TD-CDMA, and W-CDMA, and 1 W for UWC-136 (TDMA) EDGE. The report also indicates that base stations would operate with a transmitter power of 10 W.

¹³⁷ AT&T Wireless Comments to the *Notice* at 12.

¹³⁸ Verizon Comments to the *Notice* at 15.

¹³⁹ Cingular Comments to the *Further Notice* at 11.

¹⁴⁰ Ericsson Comments to the *Further Notice* at 10-11.

guard band between MDS and MSS,¹⁴¹ and that such a transition would have to be accomplished without disrupting service to customers and all costs must be reimbursed.¹⁴² WCA further states that other options proposed are also lacking. It states that moving MDS into the MSS bands is problematic because it would reduce the size of the MSS spectrum.¹⁴³ Additionally, WCA states that the 2385-2400 MHz band is not suitable for MDS relocation because the 2385-2390 MHz band is not readily available and because there is a likelihood of adjacent channel interference from Federal Government airborne telemetry operations and co-channel interference to amateur operations in the 2390-2400 MHz band.¹⁴⁴ WCA does however, offer a relocation solution, stating that in the event the Commission deems relocation necessary, an acceptable compromise would be to relocate MDS Channels 1 and 2/2A to the 1910-1916/1990-1996 MHz bands and allow fixed or mobile use.¹⁴⁵

40. We conclude that the record supports reallocation of 5 megahertz of spectrum at 2150-2155 MHz to add a mobile allocation to support the provision of AWS.¹⁴⁶ Because this spectrum is contiguous to the 2110-2150 MHz band, this reallocation will allow efficiencies in deploying new AWS. For example, there will be only one point where AWS and MDS bands are adjacent and interference issues will need to be addressed.¹⁴⁷ We note that the 2150-2155 MHz band is part of the “worldwide” IMT-2000 base station transmit band that extends from 2110 MHz to 2170 MHz. Thus our action here more closely aligns U.S. spectrum with allocations in the rest of the world and could lead to lower equipment costs and promote global roaming. Furthermore, this action will provide two contiguous 45 megahertz blocks of paired spectrum (*i.e.*, 1710-1755 MHz paired with 2110-2155 MHz), and provide more options for assigning large spectrum blocks suitable for AWS use.

41. We recognize that our decision here to reallocate the 2150-2155 MHz band from MDS to AWS use requires that we address certain issues regarding MDS operations. In particular, we will have to consider relocation spectrum and propose relocation procedures for MDS, keeping in mind the need to avoid disruption to existing customers. Because we do not anticipate licensing the band for new services until after we adopt service rules,¹⁴⁸ and because the companion Federal Government transfer spectrum in

¹⁴¹ WCA notes that it has filed a Petition for Reconsideration of the *Report and Order* in IB Docket No. 99-81 seeking to revise the MSS spectral mask to limit the power flux density into the MDS band. WCA Reply Comments to the *Notice* at 32.

¹⁴² *See id.* at 31-33.

¹⁴³ *See WCA Letter, supra* n.19. This letter was sent jointly by WCA, Bellsouth, Nucentrix, Sprint, and Worldcom. WCA is the trade association of the MDS industry. The other parties to the letter hold the majority of licenses in the 2150-2160 MHz band.

¹⁴⁴ *Id* at 8-9.

¹⁴⁵ *Id* at 2.

¹⁴⁶ *See, e.g.*, Verizon Wireless Comments to the 2002 *Viability Assessment* at 3 (supporting allocation of a contiguous 45 MHz block of spectrum at 2110-2155 MHz and claiming that large contiguous blocks are necessary to promote the economic deployment of advanced services and to limit the mitigation of harmful interference necessary to account for services on adjacent bands). *See also* Motorola Comments to the 2002 *Viability Assessment* at 5 and TIA Comments to the 2002 *Viability Assessment* at 4 (advocating a 60 MHz allocation that includes a 45 MHz contiguous block in the 2110-2155 MHz band but suggesting that 15 MHz between 2155 and 2170 be held in reserve until a matching 15 MHz block can be made available).

¹⁴⁷ In the *Notice*, we had proposed to designate 45 megahertz of spectrum at 2110-2150 MHz and 2160-2165 MHz for AWS. Were we to adopt this proposal, MDS would be between two AWS allocations. This would raise adjacent band interference issues on both sides of the MDS allocation. *Notice*, 16 FCC Rcd at 618, ¶ 52.

¹⁴⁸ Concurrent with the adoption of this Second R&O, we adopt a Notice of Proposed Rulemaking to examine service rules for the newly allocated bands.

the 1710-1755 MHz band will not be available until 2004, there is sufficient time for us to identify in a separate proceeding to be initiated in the near future any necessary relocation spectrum for MDS licensees and to craft appropriate relocation procedures. In addressing relocation, however, we recognize the importance of avoiding unnecessary delay so as to minimize uncertainty to existing licensees.

42. We now turn to the relocation procedures for incumbent fixed microwave service licensees that currently operate in the 2110-2150 MHz band. Because this band was identified and reallocated for new uses in the *Emerging Technologies* proceeding, a mechanism already exists to clear these incumbent licensees. In the *Notice*, we noted that fixed microwave service incumbents holding primary status¹⁴⁹ in the 2110-2150 MHz band are entitled to compensation for relocation of facilities under these policies.¹⁵⁰ We further noted that certain fixed microwave incumbents in the 2110-2150 MHz band segment consist of links that are paired with frequencies in the 2165-2200 MHz band, which was previously reallocated to support MSS.¹⁵¹ Moreover, some microwave licensees at 2110-2115 MHz have paired links in the 2160-2165 MHz band.¹⁵²

¹⁴⁹ Only those incumbent fixed facilities that were licensed or had pending applications as of January 16, 1992 may have primary status. See *Emerging Technologies First Report and Order and Third Notice of Proposed Rule Making*, 7 FCC Rcd at 6891-2, ¶ 31. See also 47 C.F.R. § 101.147(a). In addition, under the rules any major modifications or extension to an existing fixed system after April 25, 1996, is authorized only on a secondary basis to Emerging Technology stations. See 47 C.F.R. § 101.81. As of September 2002, the licensing database includes the following:

Band (MHz)	Number of Licensees	Service
2110-2130	3454.....	Common carrier point-to-point licenses (Part 101)
	3.....	Private non-public safety point-to-point licenses (Part 101),
	56.....	Paging and Radiotelephone Service licenses (Part 22)
	47.....	Local Television Transmission Service Licenses (Part 101)
	1.....	General Aviation and Air-Ground Radiotelephone license (Part 22)
2130-2150	2448.....	Private non-public safety point-to-point licenses (Part 101)
	1326.....	Public safety point-to-point licenses (Part 101)
	2.....	Common carrier point-to-point licenses (Part 101)
2160-2165	890.....	Common carrier point-to-point licenses (Part 101)
	13.....	Paging and Radiotelephone Service licenses (Part 22)
	40.....	Local Television Transmission Service Licenses (Part 101)

¹⁵⁰ See *Emerging Technologies Third Report and Order and Memorandum Opinion and Order*, 8 FCC Rcd 6589 (1993). New licensees may relocate incumbent licensees' systems at their option. In general, a new licensee will relocate an incumbent system if it determines that the incumbent system will cause interference to the new licensee's system. The main elements of the relocation process include a set negotiation period or periods, usually triggered at the request of the new licensee; a requirement that the parties negotiate in good faith during the mandatory negotiation period; and the right of the incumbent to be relocated to comparable facilities at the expense of the new licensee. The relocation compensation includes all engineering, equipment, site, and FCC fees. The new licensee must complete all activities necessary for implementing the replacement facilities, and must test the new facilities to ensure comparability with the existing facilities. See generally 47 C.F.R. §§ 101.69-101.99.

¹⁵¹ *Notice*, 16 FCC Rcd at 617-18, ¶ 51. Specifically, these microwave incumbents are paired in the 2130-2150 MHz and 2180-2200 MHz bands. Other parts of the *Notice* erroneously discuss microwave channels at 2165-2200 MHz being paired with spectrum at 2110-2115 MHz. See *Notice*, 16 FCC Rcd at 618-19, ¶¶ 54 & 55.

¹⁵² *Notice*, 16 FCC Rcd at 617-18, ¶ 51.

43. In the MSS proceeding, which affected bands used by both fixed microwave incumbents and the Broadcast Auxiliary Service (BAS), the Commission adopted modified relocation procedures that, *inter alia*, imposed a single, shortened mandatory negotiation period in lieu of distinct voluntary and mandatory negotiation periods, and eliminated an incumbent's right of return to its original spectrum.¹⁵³ For paired microwave links, the Commission adopted a procedure by which the first new licensee would relocate both microwave links – including the “second” link that was not in the new licensee's licensed band. Once a subsequent licensee sought to begin operations on frequencies formerly used by this second link, that licensee would be obligated to reimburse the first licensee that relocated the paired microwave facilities half of the total relocation costs.¹⁵⁴ We note that this procedure applies to the first licensee to displace a microwave incumbent with paired facilities, regardless of whether the licensee is a MSS license in the 2165-2200 MHz band or a new service license in the 2110-2150 MHz band.¹⁵⁵

44. In the *Notice*, we noted that it would be possible for both relocation procedures to apply to the same new entrant in the 2110-2150 MHz band – the modified MSS relocation procedure for a link paired between the 2110-2150 MHz and 2165-2200 MHz bands and the *Emerging Technologies* procedure for all other relocations (including the relocation of a link paired between the 2110-2150 MHz and 2160-2165 MHz bands).¹⁵⁶ We thus proposed to use the modified procedure for the relocation of any incumbent user in order to provide a single relocation process for this band.¹⁵⁷ For microwave links paired in the 2110-2150 and 2160-2165 MHz bands, a new licensee would be required to relocate both paths (if such a relocation had not yet been done), but would retain a right to seek reimbursement of 50 percent of its relocation costs from the licensee that ultimately uses frequencies in the second path. All new licensees, regardless of whether they relocate paired or unpaired microwave incumbents, would be subject to the modified relocation rules (such as the shortened mandatory negotiation period) discussed above.

45. Blooston opposes the proposed modification and says that the distinctions that led us to adopt a revised relocation procedure in the MSS proceeding do not justify extension of that procedure to the entire Emerging Technologies band.¹⁵⁸ It claims that the modified procedures will remove much of the negotiating leverage between incumbents and new entrants, which in turn will diminish the likelihood

¹⁵³ Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum at 2 GHz for Use by the Mobile-Satellite Service, *Second Report and Order and Second Memorandum Opinion and Order*, ET Docket No. 95-18, 15 FCC Rcd 12315 (*MSS Second R&O*); 47 C.F.R. §§ 101.69(d), 101.73(d), and 101.75(d). During the voluntary negotiation period, parties are encouraged to negotiate and reach agreement, but are not required to do so. During the involuntary negotiation period, parties must negotiate relocation terms in good faith. *See Emerging Technologies Third Report and Order and Memorandum Opinion and Order*, 8 FCC Rcd at 6595, ¶ 15. Only if these negotiations fail can a new licensee force an incumbent to relocate. Under involuntary relocation, an emerging technology service provider must 1) guarantee payment of all relocation costs; 2) complete all activities necessary to bring the facilities into operation; and 3) build and test the new system. *Emerging Technologies Memorandum Opinion and Order*, 9 FCC Rcd at 1944, ¶ 3.

¹⁵⁴ *MSS Second R&O*, 15 FCC Rcd at 12345-6, ¶¶ 95-96.

¹⁵⁵ *See* 47 C.F.R. § 101.99.

¹⁵⁶ *Notice*, 16 FCC Rcd at 618-19, ¶ 54.

¹⁵⁷ *Id.*, 16 FCC Rcd at 618-19, ¶¶ 54-55 (noting that, otherwise, “it is possible that a new entrant in the 2110-2150 MHz band could be assigned spectrum that would have two sets of relocation procedures in effect”).

¹⁵⁸ Blooston Comments to the *Notice* at 2 & 5.

that incumbents will obtain adequate replacement facilities.¹⁵⁹ Furthermore, it claims that the unique needs of the BAS incumbents (which required a unified, integrated relocation) are wholly different from the fixed microwave services (which can be relocated on a case-by-case basis), and, therefore, that the specialized relocation procedures should not be expanded to additional fixed services outside the MSS relocation bands.¹⁶⁰ Several commenters also expressed concern that incumbent licensees might not be adequately relocated under the procedures we proposed to adopt.¹⁶¹

46. We conclude that the modified relocation procedures, as proposed, represent the best course. A unified approach to our rules and procedures serves the public interest,¹⁶² and can promote the rapid development of AWS, which many commenters support.¹⁶³ Moreover, if the demand for the advanced services is as robust as commenters claim, incumbent licensees should find new licensees particularly eager to reach relocation agreements so as not to be competitively disadvantaged by a delay in their service deployment. This, in turn, would appear to mitigate Blooston's concerns that the proposal would skew the negotiating leverage in favor of the new licensee.¹⁶⁴ Finally, we note that under our basic relocation principles, incumbents retain a right to comparable facilities. We stress that we are not altering this process, nor an incumbent's right to seek relief if it believes the relocation process has not been conducted in good faith.¹⁶⁵ We observe, however, that we may need to modify the reimbursement provisions if MDS is reassigned to the 2155-2165 MHz band because Fixed Service microwave operations in the 2160-2165 MHz band would have to be relocated. Under the current rules, for example, MDS would have to reimburse a new AWS entrant who is trying to clear paired microwave links at 2110-2115 and 2160-2165 MHz.

47. In the *Emerging Technologies* proceeding, we identified the 4 GHz, 6 GHz, 10 GHz, and 11 GHz bands as relocation spectrum for fixed microwave operations.¹⁶⁶ This action was taken to provide

¹⁵⁹ *Id.* at 6-7.

¹⁶⁰ *Id.*

¹⁶¹ See The Rural Telecommunications Group Comments to the *Notice* at 3-4; Pinnacle West Capital Corporation Comments to the 2002 *Viability Assessment* at 2.

¹⁶² See, e.g., Biennial Regulatory Review – Amendment of Parts 0, 1, 13, 22, 24, 26, 27, 80, 87, 90, 95, 97, and 101 of the Commission's Rules to Facilitate the Development and Use of the Universal Licensing System in the Wireless Telecommunications Services, WT Docket No. 98-20, *Report and Order*, 13 FCC Rcd 21027, 21054-5 ¶ 56 (1998) (finding that the consolidation and unification of disparate rules for different wireless services would speed wireless service to the public).

¹⁶³ If a licensee is subject to varying relocation time periods, and the licensee is unable to begin service until it relocates incumbents across its entire licensed service area, then it may be unable to deploy AWS until it relocates those incumbents that are subject to the latest relocation time period – particularly if those incumbents do not readily reach a relocation agreement. Thus, it makes sense to unify the time frame for relocation to the greatest extent possible, and to favor the shortened time periods reflected in the modified procedures. See also *Emerging Technologies Third Report and Order and Memorandum Opinion and Order*, 8 FCC Rcd at 6594-95, ¶ 14 (stating that “[u]ndue delay would be inconsistent with the public interest in fostering and implementing new services that utilize emerging technologies as quickly as possible.”)

¹⁶⁴ See Blooston Comments to the *Notice* at 8.

¹⁶⁵ The burden of providing comparable facilities and paying relocation costs rests on the new licensee. See Amendment of Part 90 of the Commission's Rules to Facilitate Future Development of SMR Systems in the 800 MHz Frequency Band, PR Docket No 93-114, *Third Order on Reconsideration*, 16 FCC Rcd 2866, 2877 ¶ 10 (2001).

¹⁶⁶ See *Emerging Technologies Second Report and Order*, 8 FCC Rcd 6495 (1993).

spectrum relocation options to incumbent users. Pinnacle West Capital Corporation states that suitable spectrum must be available in the event it needs to relocate facilities,¹⁶⁷ while Cingular Wireless states that it would not be too difficult to accommodate many of the incumbents in the 2110-2150 MHz band in the 4 GHz, 6 GHz, 10 GHz, and 11 GHz bands.¹⁶⁸ In addition, no party refuted our observation that incumbents may also be able to be relocated using other mediums, such as fiber or through existing commercial services.¹⁶⁹ In the absence of specific evidence to the contrary, we continue to believe that the replacement spectrum first identified in the *Emerging Technologies* can be used to provide adequate relocation facilities and will provide suitable spectrum for any microwave incumbent licenses that are ultimately relocated.

3. Other Bands

48. *1755-1850 MHz.* In the *Notice*, we identified the 1755-1850 MHz band for consideration for the provision of AWS. The 1755-1770 MHz band segment was considered as part of the initial NTIA studies, and was again evaluated in the *2002 Viability Assessment*. In this most recent review, NTIA concluded that the 1755-1850 MHz band is not viable for use by AWS due to the extensive and critical Federal Government operations in the band, including DOD mobile systems operating in the 1755-1850 MHz range that “have recently been elevated in importance due [to] the war on terrorism, homeland defense, and possible requirements for ballistic missile defense.”¹⁷⁰ Moreover, NTIA was unable to identify alternative spectrum bands that could readily accommodate many of these systems, including air combat training systems, the Land Warrior systems, and DOD satellite telemetry, tracking and command facilities that operate in the 1761-1842 MHz band segment and which cannot be easily re-tuned.¹⁷¹ The 1770-1850 MHz band segment was previously rejected by NTIA as incompatible for shared use and was not included in the most recent band evaluation process.¹⁷² Throughout the evaluation process, Federal Government users have consistently expressed skepticism that any portion of the 1755-1850 MHz band segment can be made available for advanced commercial wireless systems, either through relocation of Federal users or by shared use.¹⁷³ Moreover, NTIA anticipates that the process that will allow it to relocate Federal users from the 1710-1755 MHz band segment will result in system relocations to spectrum above 1755 MHz, as well as a generally more intensive use of the 1770-1850 MHz band segment for existing, relocated, and new systems.¹⁷⁴ We note that some commenters identify benefits

¹⁶⁷ Pinnacle West Capital Corporation Comments to the *2002 Viability Assessment* at 3.

¹⁶⁸ Cingular Wireless Comments to the *Notice* at 22-24.

¹⁶⁹ See Blooston Comments to the *Notice* at 6 (stating that “some of the best solutions to a microwave relocation situation may be non-traditional solutions, such as the use of commercial services”).

¹⁷⁰ See *2002 Viability Assessment* at 18-19.

¹⁷¹ *Id.* at 19. NTIA did suggest that it would be possible to relocate non-military users of the band segment.

¹⁷² This band was discussed in the *NTIA Final Report*. See *supra* n.10 and accompanying text.

¹⁷³ See, e.g., *NTIA Final Report* at xv. (concluding that full band sharing was not feasible in the 1755-1850 MHz band segments, that some systems may not be able to vacate until 2030, and that compatible relocation spectrum may not even be available). Notably, the most recent cooperative investigation into spectrum reallocation – which resulted in the *2002 Viability Assessment* – did not even consider the 1770-1855 band segment.

¹⁷⁴ See *2002 Viability Assessment* at 10-11 and 19-20. In addition, NTIA anticipates increased government spectrum needs in this band segment for homeland security and related missions. See *Id.* at 5-6.

from the use of this band for AWS, including regional harmonization¹⁷⁵ and the possibility that allocation of the 1755-1850 MHz band (in conjunction with the 1710-1755 MHz band) would serve as a catalyst for making these frequencies as globally accepted as the core bands identified in IMT-2000.¹⁷⁶

49. Given the statements by NTIA regarding the intense use of this band by military users and other Federal Government agencies that provide critical safety-of-life operations, and the concern expressed by many commenters about clearing existing government users,¹⁷⁷ we conclude that this band is too encumbered to be used for the provision of AWS. We note that while some comments suggest that we explore a combination of sharing and migration for incumbent users,¹⁷⁸ NTIA and other commenters do not believe that co-channel sharing is possible.¹⁷⁹ We acknowledge the *2002 Viability Assessment's* conclusion that “[a] leap forward in technology may permit extensive sharing in all bands below 3 GHz in the future,” but that until such developments occur, it appears that use of the 1755-1770 MHz band for advanced wireless applications is not technically viable.¹⁸⁰ Accordingly, we conclude that the 1755-1850 MHz band is not suitable for the provision of AWS at this time.

50. *Currently Allocated Spectrum.* In the *Notice*, we noted that currently allocated spectrum may also be suitable for the provision of AWS.¹⁸¹ This spectrum includes television bands that were reallocated to commercial fixed, mobile, and broadcast services and are in the process of being vacated as part of the transition to digital television.¹⁸² We note that the disposition of these bands has taken place in separate proceedings. The record in the instant proceeding contains nothing that would cause us to revisit these decisions, nor to reassess our general conclusion that the reallocated television bands will be available for new uses, including AWS.¹⁸³ However, we reach an opposite conclusion with respect to the 2390-2400 MHz band. The record reflects little support for AWS use of this band, which is designated for UPCS and Amateur Service use, and the *2002 Viability Assessment* identified this spectrum as suitable

¹⁷⁵ Canadian Wireless Telecommunications Association Comments to the *2002 Viability Assessment* at 2-3.

¹⁷⁶ Siemens Comments to the *Notice* at 2. See also Orange Group Comments to the *Notice* at 4.

¹⁷⁷ See, e.g., Cingular Wireless Comments to the *Notice* at 20; Verizon Wireless Comments to the *2002 Viability Assessment* at 7-8.

¹⁷⁸ See, e.g., Motorola Comments to the *FCC Staff Report* at 2; Motorola Comments to the *Notice* at 14, 17-19; WorldCom Reply Comments to the *FCC Staff Report* at 11; TIA-Wireless Comments to the *Further Notice* at 8.

¹⁷⁹ See Verizon Wireless Comments to the *2002 Viability Assessment* at 7-8; Cingular Wireless Comments to the *Notice* at 19.

¹⁸⁰ *2002 Viability Assessment* at 4.

¹⁸¹ *Notice*, 16 FCC Rcd at 610-12, ¶¶ 34-38.

¹⁸² See Reallocation of Television Channels 60-69, The 746-806 MHz Band, *Report and Order*, ET Docket No. 97-157, 12 FCC Rcd 22953 (1998) (making 30 MHz of spectrum in the 747-762 MHz and 777-792 MHz bands available for commercial use); See also Reallocation and Service Rules for the 698-746 MHz Spectrum Band (Television Channels 52-59) *Report and Order*, GN Docket No 01-74, 17 FCC Rcd 1022 (2002) (making 48 MHz of spectrum in the 698-746 MHz band available for flexible use).

¹⁸³ Because of television incumbencies that are likely to continue for some time, and because these bands were not part of the ITU's bands designated for worldwide use, some commenters do not believe that these bands will meet near-term AWS needs. See, e.g., Verizon Wireless Reply Comments to the *Notice* at 11. But see CTIA Comments to the *Notice* at 9; NEC America Comments to the *Further Notice* at 23; Illinois Institute of Technology Reply Comments to the *Notice* at 4 (supporting the ultimate use of these bands for commercial use and expressing preferences over the use of other bands under consideration).

replacement spectrum for some Government systems currently operating in the 1710-1755 MHz band. Therefore, we will not further examine the possible use of the 2390-2400 MHz band for the provision of AWS.

IV. CONCLUSION

51. The 90 megahertz of spectrum that we are identifying for AWS is a sizeable amount of spectrum that compares favorably with previous spectrum allocations for commercial wireless applications. For example, this is more than twice the 40 MHz of spectrum that the Cellular Radiotelephone Service was initially allocated when the service was initiated,¹⁸⁴ and represents three quarters of the amount of spectrum allocated to Broadband PCS.¹⁸⁵ Including the spectrum we make available today, the total spectrum allocated for commercial wireless services is approximately 280 MHz.¹⁸⁶

52. Under the criteria discussed *supra*, the 90 megahertz of spectrum we allocate today will promote the robust deployment of AWS, and we will continue to strive to make allocation decisions that can lead to the widescale deployment of innovative new services. Moreover, technological developments may foster further efficiencies in the deployment of AWS. These technologies include software defined radio (SDR)¹⁸⁷ and adaptive antenna technology (increasing directionality) or new modulation or coding techniques (more information in the same spectrum) that may allow for greater spectral efficiency than that which is typically associated with current wireless systems.¹⁸⁸ Finally, we stress that this action is part of a continuing effort to identify and evaluate both the current and future spectrum needs for AWS. The further decisions that we make in this continuing proceeding may well result in the allocation of additional spectrum for commercial use, including the provision of AWS.

V. PROCEDURAL MATTERS

A. Final Regulatory Flexibility Analysis

53. As required by Section 603 of the Regulatory Flexibility Act, 5 U.S.C. § 603, the Commission has prepared a Final Regulatory Flexibility Analysis (FRFA) of the possible significant economic impact on small entities of the proposals suggested in this document. The FRFA is set forth in Appendix C.

¹⁸⁴ See 47 C.F.R. § 22.900 *et seq.* The Cellular Radiotelephone Service initially was titled the Domestic Public Cellular Radio Telecommunications Service. See Revision of Part 22 of the Commission's Rules Governing the Public Mobile Services, CC Docket No. 92-115, *Report and Order*, 9 FCC Rcd 6513, 6538 (1994) (changing name). The service was subsequently expanded to meet a growth in demand, and now consists of a 50 MHz total allocation. See <http://wireless.fcc.gov/services/cellular/data/bandplan.html>.

¹⁸⁵ See 47 C.F.R. § 24.229.

¹⁸⁶ This includes the 90 MHz allocation in this proceeding, 50 MHz for cellular services, 120 MHz for broadband PCS, and an estimated 20 MHz of Specialized Mobile Radio (SMR) spectrum that is used to provide commercial services that compete with cellular and PCS providers. As a general rule, United States licensees may use their existing spectrum allocations, as well as any additional spectrum we allocate in this proceeding, for the provision of advanced services.

¹⁸⁷ SDR is projected to allow carriers to deploy AWS flexibly across different frequency bands. See Software Defined Radio Forum Comments to the *Notice*. But see AT&T Wireless Comments to the *Notice* at 9 (stating that SDR is still "years away").

¹⁸⁸ See, e.g., ArrayComm comments to the *Further Notice* at 1, n.1.

B. Contact Person

54. For further information concerning this rule making proceeding contact Jamison Prime at (202) 418-7474, jprime@fcc.gov, Office of Engineering and Technology.

VI. ORDERING CLAUSES

55. Accordingly, IT IS ORDERED that pursuant to Sections 1, 4(i), 7(a), 301, 302(a), 303(f), 303(g), 303(r), 307, 308, 309(j), 316, and 332 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 151, 154(i), 157(a), 301, 302(a), 303(f), 303(g), 303(r), 307, 308, 309(j), 316, and 332 the SECOND REPORT AND ORDER is hereby ADOPTED.

56. IT IS FURTHER ORDERED that the rules set forth in Appendix A WILL BECOME EFFECTIVE 30 days after publication in the Federal Register.

57. 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, including the Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A: FINAL RULES

For the reasons discussed in the preamble, the Federal Communications Commission amends 47 CFR parts 2, 21, and 101 as follows:

PART 2 -- FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

1. The authority citation for Part 2 continues to read as follows:

AUTHORITY: 47 U.S.C. 154, 302a, 303, and 336, unless otherwise noted.

2. Section 2.106, the Table of Frequency Allocations, is amended as follows:

a. Revise pages 47 and 49.

b. In the list of United States (US) Footnotes, remove footnote US256, revise footnote US311, and add footnote US378.

c. In the list of non-Federal Government (NG) Footnotes, revise footnote NG153 and add footnote NG176.

§ 2.106 Table of Frequency Allocations.

The revisions and additions read as follows:

* * * * *

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
1670-1675 METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE 5.380			1670-1675	1670-1675 FIXED MOBILE except aeronautical mobile	Wireless Communications (27)
5.341			5.341 US211 US362	5.341 US211 US362	
1675-1690 METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SAT- ELLITE (space-to-Earth) MOBILE except aeronautical mobile	1675-1690 METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SAT- ELLITE (space-to-Earth) MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space)	1675-1690 METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SAT- ELLITE (space-to-Earth) MOBILE except aeronautical mobile	1675-1700 METEOROLOGICAL AIDS (radiosonde) METEOROLOGICAL-SATELLITE (space-to-Earth)		
5.341	5.341 5.377	5.341			
1690-1700 METEOROLOGICAL AIDS METEOROLOGICAL-SAT- ELLITE (space-to-Earth) Fixed Mobile except aeronautical mobile	1690-1700 METEOROLOGICAL AIDS METEOROLOGICAL-SAT- ELLITE (space-to-Earth) MOBILE-SATELLITE (Earth-to-space)	1690-1700 METEOROLOGICAL AIDS METEOROLOGICAL-SAT- ELLITE (space-to-Earth)	5.289 5.341 US211		
5.289 5.341 5.382	5.289 5.341 5.377 5.381	5.289 5.341 5.381			
1700-1710 FIXED METEOROLOGICAL-SAT- ELLITE (space- to-Earth) MOBILE except aeronautical mobile	1700-1710 FIXED METEOROLOGICAL-SAT- ELLITE (space-to-Earth) MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space)	1700-1710 FIXED METEOROLOGICAL-SAT- ELLITE (space-to-Earth) MOBILE except aeronautical mobile	1700-1710 FIXED G118 METEOROLOGICAL-SAT- ELLITE (space-to-Earth)	1700-1710 METEOROLOGICAL-SAT- ELLITE (space-to-Earth) Fixed	
5.289 5.341	5.289 5.341 5.377	5.289 5.341 5.384	5.289 5.341	5.289 5.341	
1710-1930 FIXED MOBILE 5.380 5.384A 5.388A			1710-1755	1710-1755 FIXED MOBILE	
			5.341 US311 US378	5.341 US311 US378 NG176	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
2110-2120 FIXED MOBILE 5.388A SPACE RESEARCH (deep space) (Earth-to-space)			2110-2120	2110-2155 FIXED NG23 MOBILE	Public Mobile (22) Fixed Microwave (101)
5.388			US252		
2120-2160 FIXED MOBILE 5.388A	2120-2160 FIXED MOBILE 5.388A Mobile-satellite (space-to-Earth)	2120-2160 FIXED MOBILE 5.388A	2120-2200	US252	Domestic Public Fixed (21) Fixed Microwave (101)
5.388	5.388	5.388		2155-2160 FIXED NG23	
2160-2170 FIXED MOBILE 5.388A	2160-2170 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth)	2160-2170 FIXED MOBILE 5.388A		2160-2165 FIXED NG23 NG153 MOBILE	
5.388 5.392A	5.388 5.389C 5.389D 5.389E 5.390	5.388		2165-2200 MOBILE-SATELLITE (space-to-Earth)	Satellite Communications (25)
2170-2200 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.351A					
5.388 5.389A 5.389F 5.392A				NG23 NG168	
2200-2290 SPACE OPERATION (space-to-Earth) (space-to-space) EARTH EXPLORATION-SATELLITE (space-to-Earth) (space-to-space) FIXED MOBILE 5.391 SPACE RESEARCH (space-to-Earth) (space-to-space)			2200-2290 SPACE OPERATION (space-to-Earth) (space-to-space) EARTH EXPLORATION- SATELLITE (space-to- Earth) (space-to-space) FIXED (line-of-sight only)	2200-2290	

* * * * *

UNITED STATES (US) FOOTNOTES

* * * * *

US311 Radio astronomy observations may be made in the bands 1350-1400 MHz, 1718.8-1722.2 MHz, and 4950-4990 MHz on an unprotected basis at the following radio astronomy observatories:

Allen Telescope Array, Hat Creek, California	Rectangle between latitudes 40° 00' N and 42° 00' N and between longitudes 120° 15' W and 122° 15' W.		
NASA Goldstone Deep Space Communications Complex, Goldstone, California	80 kilometers (50 mile) radius centered on latitude 35° 18' N, longitude 116° 54' W.		
National Astronomy and Ionosphere Center, Arecibo, Puerto Rico	Rectangle between latitudes 17° 30' N and 19° 00' N and between longitudes 65° 10' W and 68° 00' W.		
National Radio Astronomy Observatory, Socorro, New Mexico	Rectangle between latitudes 32° 30' N and 35° 30' N and between longitudes 106° 00' W and 109° 00' W.		
National Radio Astronomy Observatory, Green Bank, West Virginia	Rectangle between latitudes 37° 30' N and 39° 15' N and between longitudes 78° 30' W and 80° 30' W.		
National Radio Astronomy Observatory, Very Long Baseline Array Stations	80 kilometer radius centered on:		
	Latitude (North)	Longitude (West)	
	Brewster, WA	48° 08'	119° 41'
	Fort Davis, TX	30° 38'	103° 57'
	Hancock, NH	42° 56'	71° 59'
	Kitt Peak, AZ	31° 57'	111° 37'
	Los Alamos, NM	35° 47'	106° 15'
	Mauna Kea, HI	19° 48'	155° 27'
	North Liberty, IA	41° 46'	91° 34'
	Owens Valley, CA	37° 14'	118° 17'
	Pie Town, NM	34° 18'	108° 07'
Saint Croix, VI	17° 46'	64° 35'	
Owens Valley Radio Observatory, Big Pine, California	Two contiguous rectangles, one between latitudes 36° 00' N and 37° 00' N and between longitudes 117° 40' W and 118° 30' W and the second between latitudes 37° 00' N and 38° 00' N and between longitudes 118° 00' W and 118° 50' W.		

In the bands 1350-1400 MHz and 4950-4990 MHz, every practicable effort will be made to avoid the assignment of frequencies to stations in the fixed and mobile services that could interfere with radio astronomy observations within the geographic areas given above. In addition, every practicable effort will be made to avoid assignment of frequencies in these bands to stations in the aeronautical mobile service which operate outside of those geographic areas, but which may cause harmful interference to the listed observatories. Should such assignments result in harmful interference to these observatories, the situation will be remedied to the extent practicable.

* * * * *

US378 In the band 1710-1755 MHz, Federal Government stations in the fixed and mobile services shall operate on a primary basis until reaccommodated in accordance with the Strom Thurmond National Defense Authorization Act for Fiscal Year 1999. Further, Federal Government stations may continue to operate in the band 1710-1755 MHz as provided below:

(a) Federal fixed microwave and tactical radio relay stations may operate indefinitely on a primary basis at the sites listed below:

Location	Coordinates	Radius of Operation (km)
Cherry Point, NC.....	34° 58' N 076° 56' W	80
Yuma, AZ.....	32° 32' N 113° 58' W	80

(b) Federal fixed microwave and tactical radio relay stations may operate on a secondary basis, and shall not cause harmful inference to, and must accept harmful interference from, primary non-Federal Government operations at the sites listed below:

Location	Coordinates	Radius of Operation (km)
China Lake, CA.....	35° 41' N 117° 41' W	80
Eglin AFB, FL.....	30° 29' N 086° 31' W	80
Pacific Missile Test Range/Point Mugu, CA..	34° 07' N 119° 30' W	80
Nellis AFB, NV.....	36° 14' N 115° 02' W	80
Hill AFB, UT.....	41° 07' N 111° 58' W	80
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

(c) In the sub-band 1710-1720 MHz, precision guided munitions shall operate on a primary basis until inventory is exhausted or until December 31, 2008, whichever is earlier.

* * * * *

NON-FEDERAL GOVERNMENT (NG) FOOTNOTES

* * * * *

NG153 The band 2160-2165 MHz is reserved for future emerging technologies on a co-primary basis with the fixed and mobile services. Allocations to specific services will be made in future proceedings. Authorizations in the band 2160-2162 MHz for stations in the Multipoint Distribution Service applied for after January 16, 1992 shall be on a secondary basis to emerging technologies.

* * * * *

NG176 The allocations to the fixed and mobile services in the band 1710-1755 MHz shall come into effect on January 1, 2004.

PART 21—DOMESTIC PUBLIC FIXED RADIO SERVICES

3. The authority citation for Part 21 continues to read as follows:

AUTHORITY: Secs. 1, 2, 4, 201-205, 208, 215, 218, 303, 307, 313, 403, 404, 410, 602, 48 Stat. as amended, 1064, 1066, 1070-1073, 1076, 1077, 1080, 1082, 1083, 1087, 1094, 1098, 1102, 47 U.S.C. 151, 154, 201-205, 208, 215, 218, 303, 307, 313, 314, 403, 404, 602,; 47 U.S.C. 552, 554.

4. Remove Section 21.50 and reserve the section number for future use.

§ 21.50 [Reserved].**PART 101—FIXED MICROWAVE SERVICES**

3. The authority citation for Part 101 continues to read as follows:

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

4. Section 101.69 is amended by revising paragraph (d) to read as follows:

§ 101.69 Transition of the 1850-1990 MHz, 2110-2150 MHz, and 2160-2200 MHz bands from the fixed microwave services to personal communications services and emerging technologies.

* * * * *

(d) Relocation of FMS licensees in the 2110-2150 and 2160-2200 MHz bands will be subject to mandatory negotiations only. Mandatory negotiation periods are defined as follows:

* * * * *

5. Section 101.73 is amended by revising paragraphs (d) and (d)(3) to read as follows:

§ 101.73 Mandatory negotiations.

* * * * *

(d) Provisions for Relocation of Fixed Microwave Licensees in the 2110-2150 and 2160-2200 MHz bands. Mandatory negotiations will commence when the ET licensee informs the fixed microwave licensee in writing of its desire to negotiate. * * *

* * * * *

(3) *Operating Costs.* Operating costs are the cost to operate and maintain the FMS system. ET licensees would compensate FMS licensees for any increased recurring costs associated with the replacement facilities (*e.g.*, additional rental payments, and increased utility fees) for five years after relocation. ET licensees could satisfy this obligation by making a lump-sum payment based on present value using current interest rates. * * *

* * * * *

4. Section 101.75 is revised by amending paragraph (d) to read as follows:

§ 101.75 Involuntary relocation procedures.

* * * * *

(d) *Twelve-month trial period.* If, within one year after the relocation to new facilities, the FMS licensee demonstrates that the new facilities are not comparable to the former facilities, the ET licensee must remedy the defects or pay to relocate the microwave licensee to one of the following: its former or equivalent 2 GHz channels, another comparable frequency band, a land-line system, or any other facility that satisfies the requirements specified in paragraph (b) of this section. This trial period commences on the date that the FMS licensee begins full operation of the replacement link. If the FMS licensee has retained its 2 GHz authorization during the trial period, it must return the license to the Commission at the end of the twelve months. FMS licensees relocated from the 2110-2150 and 2160-2200 MHz bands may not be returned to their former 2 GHz channels. All other remedies specified in paragraph (d) are available to FMS licensees relocated from the 2110-2150 MHz and 2160-2200 MHz bands, and may be invoked whenever the FMS licensee demonstrates that its replacement facility is not comparable, subject to no time limit.

* * * * *

5. Section 101.99 is revised by amending paragraph (a) to read as follows:

§ 101.99 Reimbursement and Relocation expenses in the 2110-2150 MHz and 2160-2200 MHz bands.

(a) Whenever an ET licensee (including Mobile-Satellite Service licensees) in the 2110-2150 or 2160-2200 MHz bands relocates an incumbent paired microwave link with one path in the 2110-2150 MHz band and the paired path in the 2160-2200 MHz band, the ET licensee is entitled to reimbursement of 50% of its relocation costs from any subsequently entering ET licensee which would have been required to relocate the same fixed microwave link.

APPENDIX B: LIST OF COMMENTING PARTIES[†]**Commenters to the *Notice of Proposed Rule Making*****Comments (due February 22, 2001):**

Ad Hoc MDS Alliance	Eureka College
Alan Dixon	Halifax Community College
American Association of School Administrators	Henry County Board of Education
American Association of Community Colleges	Illinois Institute of Technology
American Federation of Teachers	IPWireless
American Petroleum Institute	ITFS Spectrum Development Alliance
Arizona Board of Regents for Arizona State University	Jet Propulsion Laboratory, California Institute of Technology
ArrayComm	Joint Comments of CTIA, TIA, and PCIA
Association of America's Public Television Stations	K-12 Community
AT&T Wireless Services	Lee County School District
Austin Community College	LinkAir Communications
Baypoint TV	Lucent Technologies
Black Hawk College	MMDS Mankato
Blooston	Motorola
Board of Regents of the University of Wisconsin System	National Academy of Science
Burlington County College	National ITFS Association
Canadian Wireless Telecommunications Association	National Telecommunications and Information Administration
Catawba Valley Community College	Network for Instructional TV
Catholic Television Network	Nokia
CDMA Development Group	Nortel Networks
CelPlan Technologies	Northern Arizona University Foundation
Central Dakota Telecommunications Consortium	Nucentrix Broadband Networks
Champion Industries	Oklahoma States Regents for Higher Education
Cingular Wireless	Orange Group
Cisco Systems	Personal Communications Industry Association
Clearwire Technologies	Petroleum Communications
Community Telecommunications Network	Public Utility Commission of Texas
Cook Inlet Region	Qualcomm
Council of the Great City Schools	Qwest Wireless
CTIA	Radio Advisory Board of Canada
DCT Los Angeles	Rebekah E. Adams
Digital Broadcast Corporation	Red Partnerships
Dutchess Community College	Richardson Independent School District
Education Community of the United States	The Rural Telecommunications Group
Education Service Center Region 9	San Diego County Office of Education
Ericsson	San Diego County Superintendent of Schools
	San Jose State University/William D. Nance
	Siemens
	SkyCable TV of Madison
	Sprint Corporation
	Software Defined Radio
	South Carolina Educational Television Commission

[†] A list of commenting parties to the CTIA Petition was included in the *Notice*. *Notice*, 16 FCC Rcd at 628-29, Appendix A.

Spectrumlink Networks
 Superintendent of Huntsville City Schools
 Tarrant County College
 Telephone and Data Systems
 Telecommunications Industry Association
 Treacy Lau
 University of Colorado
 University of North Carolina
 Verizon Wireless
 Virginia Communications
 VoiceStream Wireless Corporation
 Wireless Communications Association
 International
 Wireless One of North Carolina
 WorldCom
 Yuba Community College District

Reply Comments (due March 9, 2001):

Adams Telecom
 ArrayComm
 AT&T Wireless Services
 Baypoint TV
 Brown University
 Catholic Television Network
 Chilean Telecommunications Administration
 Cingular Wireless
 Cisco Systems
 Clearwire Technologies
 Council of the Great City Schools
 CTIA
 Education Community of the United States
 Illinois Institute of Technology
 Information Technology Industry Council
 ITFS Spectrum Development Alliance
 LinkAir Communications
 Microband Corporation of America
 Motorola
 National ITFS Association
 Network for Instructional TV
 Nortel Networks
 Nucentrix Broadband Networks
 Orange Group
 Qualcomm
 Red Partnerships
 Siemens
 Spectrumlink Networks
 Sprint Corporation
 Telephone and Data Systems
 The University of North Carolina
 Verizon Wireless
 VoiceStream Wireless Corporation

Wireless Communications Association
 International
 Wireless One of North Carolina
 WorldCom

***Commenters to the Further Notice of
 Proposed Rule Making***

Comments (due October 9, 2001):

21st Century Telesis/Robert Hart
 Ad Hoc MDS Alliance
 American Petroleum Institute
 APCO
 ArrayComm
 ARRL, The National Association for Amateur
 Radio
 AT&T Wireless Services
 Avaya
 Aviatel Communications
 Blackfoot Telephone Cooperative
 Blooston
 The Boeing Company
 Bryan P. King
 CTIA
 Celsat America
 Cingular Wireless
 Constantine Fantanas
 Constellation Communications Holdings
 Ericsson
 Globalstar
 iBee Communications
 Iridium Satellite
 Lockheed Martin Corporation
 Orange Group
 Midstate Communications
 Midvale Telephone Exchange
 Mobile Satellite Users Association
 Motorola
 MSTV and NAB
 NEC America
 New ICO Global Communications
 Nikolaus E. Leggett
 Nokia
 Nortel Networks
 Nucentrix Broadband Networks
 Panasonic
 Paul Toth-NA4AR
 Penasco Valley Telephone Cooperative
 PHS MoU Group
 The Progress & Freedom Foundation

Qualcomm
 Quantum Communications
 RNI Communications
 The Rural Telecommunications Group
 Satellite Industry Association
 Siemens
 Skycross
 Society of Broadcast Engineers
 Sprint Corporation
 TDD Coalition
 Telecom Consulting Associates
 Telecommunications Industry Association-
 Satellite Communications Division
 Telecommunications Industry Association-
 Wireless Communications Division
 Telephone and Data Systems
 TMI Communications and Company, Limited
 Partnership
 UTAM
 UTStarcom
 Verizon Wireless
 Wireless Communications Association
 International
 Wireless Information Networks Forum
 WorldCom

Reply Comments (due November 5, 2001):

2 GHz Broadcast Group
 Ad Hoc MDS Alliance
 ArrayComm
 ARRL, The National Association for Amateur
 Radio
 Avaya
 The Boeing Company
 Blackfoot Telephone Cooperative, Midstate
 Communications, Midvale Telephone
 Exchange, and Penasco Valley Telephone
 CDMA Development Group
 CTIA
 Celsat America
 Cingular Wireless
 Constellation Communications Holdings
 Cox Broadcasting and Cosmos Broadcasting
 Corporation
 DCT Los Angeles
 Globalstar
 Meredith Corporation
 Motorola
 MSTV and NAB
 National Telephone Cooperative Association
 New ICO Global Communications

Nucentrix Broadband Networks
 Orange Group
 Public Safety Wireless Network
 Siemens
 Society of Broadcast Engineers
 Space Enterprise Council
 Sprint Corporation
 TDD Coalition
 Telephone and Data Systems
 TMI Communications and Company, Limited
 Partnership
 UTAM and Wireless Information Networks
 Forum
 UTStarcom
 VoiceStream Wireless Corporation
 Wireless Communications Association
 International
 WorldCom

Commenters to the 2002 Viability Assessment

Comments (due August 8, 2002):

Ad Hoc MDS Alliance
 Aerospace and Flight Test Radio Coordinating
 Council
 ArrayComm
 Bell South Corporation, Nucentrix Broadband
 Networks, Inc., Sprint Corporation,
 Worldcom, Inc., and Wireless
 Communications Association International,
 Inc. (collectively, the "MDS Commenters")
 Canadian Wireless Telecommunications
 Association
 CTIA
 Cingular Wireless
 DCT Los Angeles
 Ericsson
 ICO Global Communications (Holdings) Ltd.
 Maximum Service Television, Inc. and the
 National Association of Broadcasters
 (collectively, "Joint Broadcasters")
 Motorola
 Nokia
 Pinnacle West Capital Corporation
 Radio Advisory Board of Canada
 Siemens
 Sirius Satellite Radio Inc. and XM Radio Inc.
 (collectively, the "Satellite Radio
 Licensees")
 Telecommunications Industry Association
 Verizon Wireless

APPENDIX C: FINAL REGULATORY FLEXIBILITY ANALYSIS

As required by the Regulatory Flexibility Act (RFA)¹⁸⁹ an Initial Regulatory Flexibility Analysis (IRFA) was incorporated in the *Notice of Proposed Rulemaking and Order (Notice)*,¹⁹⁰ as well as the *Memorandum Opinion and Order and Further Notice of Proposed Rule Making (Further Notice)*.¹⁹¹ The Commission sought written public comments on the proposals in the *Notice* and *Further Notice*, including comment on each IRFA. This present Final Regulatory Flexibility Analysis (FRFA) conforms to the RFA.¹⁹²

Need for, and Objectives of, the Second Report and Order

The goal of the *Second Report and Order (Second R&O)* is to promote the provision of advanced wireless services (AWS) to the public, which in turn supports our obligations under Section 706 of the 1996 Telecommunication Act¹⁹³ and, more generally, serves the public interest by promoting rapid and efficient radio communication facilities.

The *Second R&O* discusses the need for spectrum allocations of sufficient size and with particular characteristics so as to allow for the provision of AWS, and evaluates spectrum that could be allocated to support these services. Specifically, the *Second R&O* allocates spectrum that is suitable for advanced services in the 1710-1755 MHz, 2110-2150 MHz, and 2150-2155 MHz bands.

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

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

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

The RFA directs agencies to provide a description of, and, where feasible, an estimate of, the number of small entities that may be affected by the rules adopted herein.¹⁹⁴ The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”¹⁹⁵ In addition, the term “small business” has the same meaning as

¹⁸⁹ See 5 U.S.C. § 603. The RFA (codified at 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).

¹⁹⁰ Amendment of Part 2 of the Commission’s Rules 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 Docket No. 00-258, *Notice of Proposed Rulemaking and Order*, 16 FCC Rcd 596 (2001)

¹⁹¹ Amendment of Part 2 of the Commission’s Rules 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 Docket No. 00-258, ET Docket No. 95-18, and IB Docket No. 99-81, *Memorandum Opinion and Order and Further Notice of Proposed Rule Making*, 16 FCC Rcd 16043 (2001).

¹⁹² See 5 U.S.C. § 604.

¹⁹³ Section 706 of the Communications Act of 1934, as amended, codified at 47 U.S.C. § 157.

¹⁹⁴ 5 U.S.C. § 604(a)(3).

¹⁹⁵ 5 U.S.C. § 601(6).

the term “small business concern” under the Small Business Act.¹⁹⁶ 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 Small Business Administration (SBA).¹⁹⁷

A small organization is generally “any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.”¹⁹⁸ Nationwide, as of 1992, there were approximately 275,801 small organizations.¹⁹⁹ “Small governmental jurisdiction” generally means “governments of cities, counties, towns, townships, villages, school districts, or special districts, with a population of less than 50,000.”²⁰⁰ As of 1992, there were approximately 85,006 governmental entities in the United States.²⁰¹ This number includes 38,978 counties, cities, and towns; of these, 37,566, or 96%, have populations of fewer than 50,000.²⁰² The Census Bureau estimates that this ratio is approximately accurate for all governmental entities. Thus, of the 85,006 governmental entities, we estimate that 81,600 (96%) are small entities.

Fixed Microwave Services. Microwave services include common carrier,²⁰³ private-operational fixed,²⁰⁴ and broadcast auxiliary radio services.²⁰⁵ At present, there are approximately 22,015 common carrier fixed licensees and 61,670 private operational-fixed licensees and broadcast auxiliary radio licensees in the microwave services. The Commission has not yet defined a small business with respect to microwave services. For purposes of this FRFA, we will use the SBA’s definition applicable to wireless and other telecommunications companies – *i.e.*, an entity with no more than 1,500 persons.²⁰⁶

¹⁹⁶ 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.”

¹⁹⁷ 15 U.S.C. § 632.

¹⁹⁸ 5 U.S.C. § 601(4).

¹⁹⁹ Department of Commerce, U.S. 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).

²⁰⁰ 5 U.S.C. § 601(5).

²⁰¹ U.S. Dept. of Commerce, Bureau of the Census, “1992 Census of Governments.”

²⁰² *Id.*

²⁰³ 47 CFR 101 *et seq.* (formerly, part 21 of the Commission's Rules).

²⁰⁴ Persons eligible under parts 80 and 90 of the Commission's rules can use Private Operational-Fixed Microwave services. See 47 CFR 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.

²⁰⁵ Auxiliary Microwave Service is governed by Part 74 of Title 47 of the Commission's Rules. See 47 CFR Part 74 *et seq.* Available to licensees of broadcast stations and to broadcast and cable network entities, broadcast auxiliary microwave stations are used for relaying broadcast television signals from the studio to the transmitter, or between two points such as a main studio and an auxiliary studio. The service also includes mobile TV pickups, which relay signals from a remote location back to the studio.

²⁰⁶ 13 C.F.R. § 121.201, NAICS code 517212 (formerly 513322).

According to Census Bureau data for 1997, there were 977 firms in this category, total, that operated for the entire year.²⁰⁷ Of this total, 965 firms had employment of 999 or fewer employees, and an additional 12 firms had employment of 1,000 employees or more.²⁰⁸ Thus, under this size standard, the great majority of firms can be considered small.

We note that the number of firms does not necessarily track the number of licensees. We estimate that all of the Fixed Microwave licensees (excluding broadcast auxiliary licensees) would qualify as small entities under the SBA definition. Of these licenses, approximately 8,210 are issued for frequencies in the *Emerging Technologies* bands affected by this proceeding. In addition, these bands contain approximately 70 licenses in the paging and radiotelephone service and the general aviation and air-ground radio telephone services. Thus, assuming that these entities also qualify as small businesses, as many as 8,280 small business licensees could be affected by the rules we adopt. We note that these entities have been subject to relocation under rules originally adopted ten years ago in the Commission's *Emerging Technologies* proceeding. The *Second Report and Order* anticipates that these general relocation rules will continue to apply to FS microwave licensees and does not modify the class of licensees that are subject to these relocation provisions.

Multipoint Distribution Service (MDS). This service has historically provided primarily point-to-multipoint, one-way video services to subscribers, and Local Multipoint Distribution Service (LMDS).²⁰⁹ The Commission recently amended its rules to allow MDS licensees to provide a wide range of high-speed, two-way services to a variety of users.²¹⁰ In connection with the 1996 MDS auction, the Commission defined small businesses as entities that had annual average gross revenues for the three preceding years not in excess of \$40 million.²¹¹ The Commission established this small business definition in the context of this particular service and with the approval of the SBA.²¹² The MDS auction resulted in 67 successful bidders obtaining licensing opportunities for 493 Basic Trading Areas (BTAs).²¹³ Of the 67 auction winners, 61 met the definition of a small business. At this time, we estimate that of the 61 small business MDS auction winners, 48 remain small business licensees. In addition to the 48 small businesses that hold BTA authorizations, there are approximately 392 incumbent

²⁰⁷ U.S. Census Bureau, 1997 Economic Census, Subject Series: Information, "Employment Size of Firms Subject to Federal Income Tax: 1997," Table 5, NAICS code 517212 (issued Oct. 2000).

²⁰⁸ *Id.* The census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is "Firms with 1,000 employees or more."

²⁰⁹ For purposes of this item, MDS includes single channel Multipoint Distribution Service (MDS) and the Multichannel Multipoint Distribution Service (MMDS). See 66 Fed. Reg. 36177.

²¹⁰ Amendment of Parts 21 and 74 to Enable Multipoint Distribution Service and Instructional Television Fixed Service Licensees to Engage in Fixed Two-Way Transmissions, MM Docket No. 97-217, *Report and Order*, 13 FCC Rcd 19112 (1998), *recon.*, 14 FCC Rcd 12764 (1999), *further recon.*, 15 FCC Rcd 14566 (2000).

²¹¹ 47 C.F.R. §§ 21.961 and 1.2110.

²¹² Amendment of Parts 21 and 74 of the Commission's Rules with Regard to Filing Procedures in the Multipoint Distribution Service and in the Instructional Television Fixed Service and Implementation of Section 309(j) of the Communications Act - Competitive Bidding, MM Docket No. 94-131, *Report and Order*, 10 FCC Rcd 9589, 9670 (1995), 60 Fed. Reg. 36524 (July 17, 1995).

²¹³ Basic Trading Areas (BTAs) were designed by Rand McNally and are the geographic areas by which MDS was auctioned and authorized. See *id.* at 9608.

MDS licensees that are considered small entities.²¹⁴ After adding the number of small business auction licensees to the number of incumbent licensees not already counted, we find that there are currently approximately 440 MDS licensees that are defined as small businesses under either the SBA or the Commission's rules. Because the Commission's action only affects MDS operations in the 2150-2155 MHz band, the actual number of MDS providers who will be affected by the *Second Report and Order* will only represent a small fraction of those 440 small business licensees.

Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements

The *Second R&O* addresses the possible use of frequency bands below 3 GHz to support the introduction of new AWS, but does not propose service rules. Thus, the item contains no new reporting, recordkeeping, or other compliance requirements. Because the item does not establish procedures for the relocation of MDS incumbents from the 2150-2155 MHz band, there are no new compliance requirements for MDS at this time.

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 developing its 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 and reporting requirements under the rule for such 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 such small entities.”²¹⁵

Providing spectrum to support the introduction of new advanced mobile and fixed terrestrial wireless services is critical to the continuation of technological advancement. First and foremost, the Commission believes that our proposal to explore the possible use of several frequency bands that could offer a wide range of voice, data, and broadband services over a variety of mobile and fixed networks may provide substantial new opportunities for small entities.

However, we realize that some entities must be displaced to clear a sufficient quantity of contiguous spectrum to support new services. We endeavored to avoid this effect by identifying unencumbered spectrum, but spectrum in the suitable frequency range is heavily used already and a sufficient amount of unencumbered spectrum simply does not exist. We have therefore sought to minimize an adverse impact by proposing to reallocate frequency bands for those incumbents, including small entities, which might be accommodated in other spectrum and could be relocated more easily. The spectrum we allocate in the 1710-1755 MHz band is currently used for Federal Government services, and therefore there are no non-Federal Government incumbent small entities that will be displaced by the reallocation of this band. Similarly, as noted in paragraph 28, the 2110-2150 MHz band was previously identified as an Emerging Technology band, and relocation procedures already exist for incumbents in this band. These existing procedures (as modified in the *Second R&O*) should serve to ease the relocation

²¹⁴ 47 U.S.C. § 309(j). (Hundreds of stations were licensed to incumbent MDS licensees prior to implementation of Section 309(j) of the Communications Act of 1934, 47 U.S.C. § 309(j)). For these pre-auction licenses, the applicable standard is SBA's small business size standard for “other telecommunications” (annual receipts of \$12.5 million or less). See 13 C.F.R. § 121.201.

²¹⁵ 5 U.S.C. § 603(c)(1)-(c)(4).

of small entity incumbents in the 2110-2150 MHz band, and make reallocation of this band preferable to the reallocation of other bands where we would have to establish new relocation rules.

Finally, the Commission has already received extensive comments in this proceeding on issues related to the possible reallocation of the 2150-2160 MHz (2.1 GHz) spectrum for advanced wireless purposes. Comments filed by the multipoint distribution/instructional television fixed services industry and several equipment manufacturers argue that the 2.1 GHz band is necessary for the continued roll-out of fixed wireless services across the country. Other commenters support the use of 2.1 GHz for advanced wireless services. Although many commenters ask that we reallocate a large contiguous spectrum block to include the entire 2150-2160 MHz band, we instead decide to reallocate 5 megahertz in the 2150-2160 MHz band as part of a 45 megahertz block of contiguous spectrum that can be used to provide advanced services. By doing so, we satisfy the need to designate a large block of contiguous spectrum that can be paired in order to allow for the deployment of advanced services (and thus, serve the goals of this proceeding). However, by allocating 5 megahertz of existing MDS spectrum, we retain greater flexibility to accommodate small entities that are MDS licensees than had we redesignated the entire 2.1 GHz MDS spectrum. For example, paragraph 39 notes that we retain the option to realign MDS spectrum to a 10 megahertz block in the 2155-2165 MHz band. Had we reallocated the entire 2.1 GHz MDS spectrum, as some commenters had suggested, this option would not have been available.

Report to Congress:

The Commission will send a copy of the Second Report and Order including this FRFA, in a report to be sent to Congress pursuant to the Congressional Review Act.²¹⁶ In addition, the Commission will send a copy of the Second Report and Order, including this FRFA, to the Chief Counsel for Advocacy of the SBA. A copy of the Second Report and Order and FRFA (or summaries thereof) will also be published in the Federal Register.²¹⁷

²¹⁶ See 5 U.S.C. § 801(a)(1)(A).

²¹⁷ See 5 U.S.C. § 604(b).

**APPENDIX D: ANALYSIS OF INTERFERENCE IMPACT ON GOLDSTONE, CA
DEEP SPACE NETWORK FACILITY**

Given the concern expressed by the commenters, staff from the Commission's Office of Engineering and Technology conducted an analysis of the possible impact of the Goldstone, California Deep Space Network ("DSN") Facility. This facility is operated by NASA and is an international network of antennas that supports interplanetary spacecraft missions and radio and radar astronomy observations for the exploration of the solar system and the universe. The DSN provides the two-way communications link that guides and controls these interplanetary missions, and brings back the images and new scientific information they collect. The Goldstone DSN facility has a 70-meter and a 34 meter steerable, high-gain, parabolic reflector antennas.²¹⁸ The DSN 70-meter antenna has a mainbeam gain of 62.7 dBi and can be connected to either a 20 kW or a 400 kW transmitter. The 400kW power level is generally used under emergency conditions, which are expected to be rare. The 34-meter antenna has a gain of 55 dBi. However, since the 70-meter dish is the worst case, our results consider primarily the 400 kW transmitter with the 70-meter antenna. Both of these dishes have minimum elevation angles of 10 degrees from horizontal.²¹⁹

We input these parameters, the antenna pattern of the 70-meter antenna, and the latitude and longitude of the antenna facility into a software package called RFCAD.²²⁰ RFCAD uses the Longley-Rice propagation model to produce propagation studies and displays the results over topographic maps for to show predicted signal strengths. We selected a confidence level of 99% for 99% of the locations and 99% of the levels to ensure the most accurate results possible. We also assumed that the antenna could be pointing in any direction in azimuth and above 10 degrees in elevation. We rotated the 70-meter antenna 360 degrees in azimuth to get a composite plot of the power levels in all azimuths.

The analysis showed that for the 70-meter DSN antenna using the 400 kW transmitter, power levels that could cause 3G handset receiver burn-out are limited to within about 15 kilometers of the DSN transmitter. This area is almost entirely within the bounds of Ft Irwin and the Naval Weapons Center. In the remaining directions where there is significant terrain blockage, power levels above -94 dBm²²¹ in the main beam are limited to about 45 km away from the antenna.²²² However, power levels in the mainbeam

²¹⁸ See Document 7B/14-E, *Characteristics of SRS stations operating in the 2110-2120 MHz band for use in the development of IMT-2000 frequency arrangement*, Submitted by the United States of America, 2 April, 2001.

²¹⁹ See ITU-R RR 21.10 and 21.15. Under these constraints, the DSN station is limited to a minimum elevation angle of 10 degrees and a power limit of 55 dBW/4kHz in the horizontal direction.

²²⁰ RFCAD is a software package produced by SiteSafe. See <http://www.rfcad.com> for more details.

²²¹ This level is the 3G interference threshold for a desired signal 10 dB above the sensitivity for a 10^{-3} BER. See *FCC Final Report*, page A-26. However, we note that intrasystem noise would be considerably higher, thus negating any interference impact of a -94 dBm signal.

²²² Most of this area is also within the Ft. Irwin Military Reservation or the U.S. Naval Weapons Center. Based upon computations using RFCAD software, power levels in Barstow, California, the closest city to Goldstone, are expected to be below -110 dBm. Power levels at the closest approach to I-15 are also in the same range. The 20 kW transmitter generates power levels above -110 dBm within 32 km of the antenna in the mainbeam and 8 km in the sidelobes.

greater than -110 dBm²²³ can be expected up to approximately 150 km away from the antenna on the highest terrain in the southwest direction where there is little terrain blockage.²²⁴ These peaks are typically located away from populated areas and roads. The only large road found to the southwest of Goldstone is California Route 58. Based upon computations using RFCAD software, the maximum power that a vehicle traveling on this road is likely to see is -94 dBm. Since the highway is 66 kilometers away, the width of this -94 dBm “spot” on Highway 58 is 161 meters wide. A car traveling at 100 kilometers per hour (60 miles per hour) would transit this area in about 6 seconds. However, the road would only “see” these levels if the Goldstone antenna were pointing between 190 and 200 degrees from North.²²⁵ The 20 kW transmitter also generates power levels above -110 dBm within 150 km of the antenna in the mainbeam in the southwesterly direction, but the maximum power levels are about 8 dB lower than with the 400 kW transmitter and affect a much smaller segment of Route 58. Outside of the southwesterly direction, power levels above -94 dBm are contained within a circle centered at the transmitter with a radius of approximately 35 km.

²²³ In a pristine interference-free environment, this is the interference level for a 3G mobile receiver for a 10% degradation in range. *See FCC Final Report*, page A-26. However, we note that intrasystem noise would be considerably higher, thus negating any interference impact of a -110 dBm signal.

²²⁴ The mountains surrounding Los Angeles block the transmitted energy from Goldstone from reaching the metropolitan Los Angeles area.

²²⁵ Maximum power levels outside of this 10-degree wide arc should not exceed -102 dBm. Approximately 24 kilometers of Route 58 could see these power levels, but only if the mainbeam of the DSN antenna was pointed in that direction.

STATEMENT OF CHAIRMAN MICHAEL K. POWELL

Re: *Amendment of Part 2 of the Commission's Rules 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* (adopted November 7, 2002).

Re: *Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands* (adopted November 7, 2002).

I previously identified new revenue sources and new services as among the key steps to recovery in the telecommunications sector. By our action today, we will make available spectrum resources that carriers and the consuming public demand – a major step in creating an environment hospitable to the introduction of new and innovative products and services. Access to new spectrum is not a cure for today's financially ailing wireless industry, but it is a key pre-condition to the long term health of the industry.

Today's decisions on the allocation and proposed service rules lay the groundwork for future innovation. We have allocated a significant slice of spectrum – two, contiguous 45 MHz blocks capable of being paired. Moreover, we have proposed few limitations on its use. Our service rules *NPRM* proposes affording future licensees the maximum possible flexibility in deciding how to put this resource into service for the public benefit. Within this framework, service providers can be expected to move spectrum quickly to its highest and best use.

We have not acted alone in taking this significant step toward making advanced wireless services a reality. Throughout this proceeding, the Commission has coordinated closely with NTIA, particularly since the release of its *3G Viability Study* this summer. I am grateful for Assistant Secretary Victory's leadership and support, and look forward to working with NTIA in carrying this process forward.

STATEMENT OF COMMISSIONER MICHAEL J. COPPS

RE: In the Matter of Amendment of Part 2 of the Commission's Rules 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 (Second Report and Order).

In the Matter of Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands (NPRM).

I commend the Commission for moving forward with these critical proceedings. 3G has been a hot issue since I arrived at the Commission, and before, I'm certain. Like my colleagues, I am very excited about what the future holds for wireless technologies in these frequencies.

This Commission has, of course, a large and important role in promoting innovative and efficient uses of the American people's spectrum. It is our responsibility in allocating spectrum and setting service rules to place the highest value on what new uses of spectrum will mean to consumers. I mention this because I hope that no one will think the FCC can magically make the current woes of the wireless industry go away by merely allocating new spectrum. Life is not that simple! More importantly, we should always keep in mind that our job is to create a landscape where Americans can know that the spectrum that they have entrusted to us is used in their best interest, and that the endgame here goes beyond business interests to serve the public interest. If we do our job right here, I believe it will be a win-win for everyone.

I also hope that we will study the European experience with 3G very carefully. Various European countries moved ahead with 3G allocations before we did. Many of these countries allocated large amounts of spectrum to 3G. Despite that, 3G has been less than a success in Europe. What role did government allocations and service rules play? What other factors were at work? We need to know. Those who don't study history are condemned to repeat it.

But all that comes in the future. Today, the Commission has done the right thing, and has started the ball rolling on making spectrum available for exciting new technologies. I know that the negotiations over 3G spectrum were tough, and that the wireless industry was under some heavy pressures regarding things it may have wanted, and I hope those negotiations ended with the right result. We'll see.

What I can't wait to see is what all the amazing innovators in the communications industry come up with for these frequencies. From cellular to PCS to satellite to Wi-Fi, they have consistently brought us exciting new technologies that pushed the envelope. We will have done our job well if our actions today result in more such advances.

Thank you.

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

Re: Amendment of Part 2 of the Commission's Rules To Allocate Spectrum Below 3 GHz for Mobile and Fixed Services To Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Services, Second Report and Order, ET Docket No. 00-258; Service Rules for Advanced Wireless Services in the 1.7 and 2.1 GHz Bands, Notice of Proposed Rulemaking, WT Docket No. 02-353

I am pleased to support these items, which allocate spectrum and seek comment on service rules for advanced wireless services in the 1.7 GHz and 2.1 GHz bands. These items provide two 45 MHz blocks of contiguous spectrum which, we propose, can be used for a range of advanced wireless services. While the wireless industry is already on the forefront in offering innovative new services, advances in technology are developing that will provide consumers exciting new applications such as truly high-speed Internet access on their mobile phones and the ability to use their mobile phones as cameras, sending digital pictures to other phones or computers at the touch of a button. A crucial ingredient to these services, however, is sufficient spectrum. These items provide some of that spectrum, making available a significant amount of spectrum that can 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” (“3G”) or, internationally, “International Mobile Telecommunications-2000” (“IMT-2000”). These items 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 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 a plan that serves as 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.

These items also mark an important move toward a more predictable spectrum policy at the FCC. In the past, spectrum decisions have often been made ad hoc, leading to short bursts of spectrum being made available in response to specific exigencies. These items, in contrast, are part of a longer-range plan, in which we will make a significant amount of spectrum available over a period of several years. Spectrum users thus should have the certainty to develop business plans in advance of critical needs. They can be assured that when spectrum is needed it will be there.

These items are a step in the right direction, and I look forward to continuing our efforts to provide new and better services to consumers and certainty and predictability to the spectrum community.