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

In the Matter of	)	
	)	ET Docket No. 00-258
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	)	
	)	
Petition for Rulemaking of the Cellular Telecommunications Industry Association Concerning Implementation of WRC-2000: Review of Spectrum and Regulatory Requirements for IMT-2000	)	RM-9920
	)	
Amendment of the U.S. Table of Frequency Allocations to Designate the 2500-2520/2670-2690 MHz Frequency Bands for the Mobile-Satellite Service	)	RM-9911

NOTICE OF PROPOSED RULE MAKING AND ORDER

Adopted: December 29, 2000 **Released: January 5, 2001**

Comment Date: [30 days from date of publication in the Federal Register]
Reply Comment Date: [45 days from date of publication in the Federal Register]

By the Commission:

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I. INTRODUCTION

1. In this *Notice of Proposed Rule Making* ("*NPRM")*, we explore the possible use of frequency bands below 3 GHz to support the introduction of new advanced wireless services, including third generation ("3G") as well as future generations of wireless systems. Advanced wireless systems could provide, for example, a wide range of voice, data and broadband services over a variety of mobile and fixed networks. Specifically, we explore the possibility of introducing new advanced mobile and fixed services in frequency bands currently used for cellular, broadband Personal Communications Service ("PCS"), and Specialized Mobile Radio ("SMR") services, as well as in five other frequency bands: 1710-1755 MHz, 1755-1850 MHz, 2110-2150 MHz, 2160-2165 MHz and 2500-2690 MHz. By these actions, we initiate proceedings to provide for the introduction of new advanced wireless services to the public, consistent with our obligations under section 706 of the 1996 Telecommunications Act,[1] and promote increased competition among terrestrial services. In the *Order*, we deny a petition filed by the Satellite Industry Association ("SIA") requesting that the 2500-2520 MHz and 2670-2690 MHz bands be reallocated to the Mobile-Satellite Service ("MSS").

II. BACKGROUND

2. In November 1999, the Commission issued a *Policy Statement*, in which we set forth guiding principles for our spectrum management activities in the new millennium.[2] The *Policy Statement* noted

[1] *See* Pub.L. 104-104, Title VII, § 706, Feb. 8, 1996, 110 Stat. 153, reproduced in the notes under 47 U.S.C. § 157 ("Section 706"). Section 706(c)(1) defines "advanced telecommunications capability . . . without regard to any transmission media or technology, as high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data graphics, and video telecommunications using any technology." *See generally Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 199*6, CC Docket 98-146, Second Report, FCC 00-290, (rel. Aug. 21, 2000) ("*Section 706 Second Repor*t").

[2] *See* Principles for Reallocation of Spectrum to Encourage the Development of Telecommunications Technologies for the New Millennium, FCC 99-354, *Policy Statement*, 14 FCC Rcd 19868 (1999).

that demand for spectrum has increased dramatically as a result of explosive growth in wireless communications, and that we must focus on allowing markets to become more efficient in increasing the amount of spectrum available for use.[3] We stated that the principles articulated in the *Policy Statement* will serve as a guidepost for the reallocation of about 200 megahertz of spectrum mandated by Congress over the next three to five years.[4] We discussed reallocating several bands for new advanced mobile and fixed communications services, including the 1710-1755 MHz band, which had been identified for transfer from Federal Government to mixed use in 1995, paired with the 2110-2150/2160-2165 MHz bands, which had been identified for reallocation by the Commission under its Emerging Technologies proceeding. We stated that one possible use of this spectrum would be for the introduction of 3G systems, which we stated "would provide telecommunications services on a world-wide scale regardless of location, network, or terminal used."[5] We noted that the 1710-1755 MHz band is part of the spectrum transferred from Federal Government to mixed use.[6]

3. The International Telecommunication Union ("ITU") has been fostering the development of advanced wireless systems, commonly referred to as International Mobile Telecommunications-2000 ("IMT-2000") or 3G systems, for a number of years. It also has developed a series of technical recommendations, or standards, that define the key characteristics of IMT-2000 radio systems.[7] These standards are intended to minimize the number of different radio interfaces, maximize their commonality and provide a transition path to 3G systems from first generation ("1G") and second generation ("2G") technologies.[8] The ITU also has identified a number of frequency bands that could be used to implement 3G systems. Study of IMT-2000 and 3G implementation is ongoing within Working Party 8F of the ITU-R.

4. The 2000 World Radiocommunication Conference ("WRC-2000") adopted Resolution 223, which states that approximately 160 MHz of additional spectrum will be needed in order to meet the projected requirements of IMT-2000 in those areas where the traffic is highest by 2010.[9] WRC-2000 identified the 806-960 MHz, 1710-1885 MHz, and 2500-2690 MHz bands for possible terrestrial IMT-2000 use.[10] Previously, the World Administrative Radio Conferences ("WARC-92") had identified the

[3] *Id*. at ¶ 2.

[4] *Id*. at ¶ 3.

[5] *Id*. at ¶ 23.

[6] *Id*. at ¶ 17, n. 11.

[7] IMT-2000 are 3G systems that are scheduled to be initiated around the year 2000, subject to market considerations.

[8] First generation wireless systems consist of analog cellular and paging systems. Second generation wireless systems are digital systems, such as digital cellular and PCS.

[9] *See Provisional Final Acts of the World Radiocommunication Conference* (*Istanbul, WRC-2000*). Resolution 223, titled "Additional frequency bands identified for IMT-2000," was initially called Resolution [COM5/24].

[10] *See Provisional Final Acts of the World Radiocommunication Conference* (*Istanbul, WRC-2000*). At WRC-2000, the United States proposed that the 698-960 MHz, 1710-1885 MHz, and 2500-2690 MHz bands be identified for the terrestrial component of IMT-2000 and other advanced communication applications. During preparations for WRC-2000, the United States committed to studying the feasibility of using all or parts of these bands for IMT-2000.

1885-2025 MHz and 2110-2200 MHz bands for possible 3G system use.[11] Additionally, WRC-2000 adopted a resolution stating that some countries may implement IMT-2000 in the 698-806 MHz and 2300-2400 MHz bands.[12] WRC-2000 also adopted resolutions stating that a country may use any of the bands identified for IMT-2000, that IMT-2000 bands may also be used by other services that have allocations in those bands, and that IMT-2000 services do not have priority over other allocated services.[13] Further, WRC-2000 identified certain bands in the 1885-2170 MHz range for high-altitude platform IMT-2000 use and identified the 1525-1559, 1610-1660.5, 2483.5-2500, 2500-2520, and 2670-2690 MHz bands for mobile satellite IMT-2000 use.[14] Finally, WRC-2000 adopted a resolution to study the implementation of IMT-2000, including studying a means to facilitate global roaming across different bands, maintaining a database of national decisions and studies on selection of spectrum for IMT-2000, and studying the provision of a fixed wireless access interface using IMT-2000 technologies.[15]

5. Potential spectrum identified for possible use by advanced wireless services fall under the spectrum management responsibilities of both the Executive Branch and the Commission. Setting the

[11] *See Final Acts of the World Administrative Radio Conference (Istanbul, WARC-'92)*. The 2110-2200 MHz band is allocated in Region 2 on a primary basis to the Fixed and Mobile Services. In the United States, the 2110-2120 MHz band is also allocated to the Space Research Service on a primary basis limited to Goldstone, California, and the 2160-2200 MHz band is also allocated to the MSS. The 2110-2200 MHz band is currently used for fixed (including auxiliary broadcasting) and multipoint distribution services. In November 1998 the Commission proposed that the band be reallocated, *see* Amendment Of Section 2.106 Of The Commission's Rules To Allocate Spectrum At 2 GHz For Use By The Mobile-Satellite Service, ET Docket No. 95-18, *Memorandum Opinion and Order and Third Notice of Proposed Rule Making and Order*, 13 FCC Rcd 23949 (1998). ITU RR S5.388, which was adopted at WARC-92, states that the band 2110-2200 MHz is intended for use, on a worldwide basis, by administrations wishing to implement IMT-2000, and that such use does not preclude the use of the band by other services to which it is allocated. The Commission recently finalized the MSS allocation at 2165-2200 MHz, *see* Amendment Of Section 2.106 Of The Commission's Rules To Allocate Spectrum At 2 GHz For Use By The Mobile-Satellite Service, ET Docket No. 95-18, *Second Report and Order and Second Memorandum Opinion and Order*, FCC 00-233, released July 3, 2000.

[12] S*ee* Provisional Final Acts of WRC-2000. Resolution 223 titled, "Additional frequency bands identified for IMT-2000" and Resolution 224 titled, "Frequency bands for the terrestrial component of IMT-2000 below 1 GHz." The 2300-2400 MHz band is allocated in Region 2 on a primary basis to the Fixed, Mobile, and Radiolocation Services. In the United States, the major services in the band are the Wireless Communications Service, Digital Audio Radio Service, Government Radiolocation, and Amateur Radio. The 2300-2305 MHz and 2385-2390 MHz bands are part of the spectrum transferred from Federal Government to non-Federal Government use. *See NTIA Spectrum Reallocation Report*, NTIA Special Publication 95-32 (Feb. 1995); a copy of this report has been placed in the docket file of this proceeding and is also available on the Internet at <http://www.ntia.doc.gov/openness/contents.html>. The 2300-2305 MHz band became available to the private sector in August 1995. Such use is subject to significant constraints, however, in order to protect Federal Government operations in the adjacent 2290-2300 MHz band. The 2385-2390 MHz band is scheduled to be auctioned by September 30, 2002. Government operations in certain locations, however, will continue after this date and Government airborne telemetry operations in the adjacent 2360-2385 MHz band must be protected. *See NTIA Spectrum Reallocation Report*, NTIA Special Publication 98-36 (Feb. 1998) available on the Internet at <http://www.ntia.doc.gov/osmhome/reports/bba97.html>.

[13] *Id.*

[14] *See* Provisional Final Acts of WRC-2000 Article S5.351A and Resolution 225 titled, "Use of additional frequency bands for the satellite component of IMT-2000."

[15] *See* Provisional Final Acts of WRC-2000 Resolution 223 titled, "Use of additional frequency bands for the satellite component of IMT-2000."

policy direction for the executive branch, a recent Presidential Memorandum directs the Secretary of Commerce to work cooperatively with the Commission: (1) to develop a plan to select spectrum for 3G wireless systems by October 20, 2000; and (2) to issue by November 15, 2000 an interim report on the current spectrum uses and potential for reallocation or sharing of the federal government bands identified at WRC-2000 that could be used for 3G wireless systems.

6. In accordance with the Presidential Memorandum, the Department of Commerce released a "Plan to Select Spectrum for Third Generation (3G) Wireless Systems in the United States" ("Study Plan") on October 20, 2000.[16] The Study Plan notes that although various frequency bands have been identified for possible 3G use, further study of these bands are needed in order to obtain a better understanding of all of the spectrum options available. The Department of Commerce's National Telecommunications and Information Administration ("NTIA") subsequently completed a report of the 1755-1850 MHz band.[17] NTIA has committed to issuing a final report in March, 2001.

7. Pursuant to its independent spectrum management responsibility, the FCC simultaneously released a similar staff report on the 2500-2690 band.[18] The Commission plans to issue a final report regarding this band in March, 2001.

8. *SIA and CTIA Rulemaking Petitions*. In April 2000, prior to the convening of WRC-2000, SIA filed a petition for rulemaking with the Commission, requesting that the 2500-2520 MHz and 2670-2690 MHz bands ("2.5 GHz band") be allocated to the MSS.[19] In its petition, SIA states that the WARC-92 adopted this allocation internationally, but to date there has been no action to adopt it in the United States.[20]

9. Shortly after the conclusion of WRC-2000, the Cellular Telecommunications Industry Association ("CTIA") filed in July 2000 a petition for rulemaking with the Commission, requesting that we begin the process of designating additional spectrum for 3G wireless systems in a manner consistent with the decisions adopted at WRC-2000.[21] In its petition, CTIA states that additional spectrum for commercial wireless service is vital because existing mobile allocations are insufficient for development of 3G services and not in harmony with likely worldwide implementation of IMT-2000. CTIA contends that failure to keep pace with world identification of spectrum for IMT-2000 or to harmonize U.S. IMT-

[16] NTIA, "Plan to Select Spectrum for Third Generation (3G) Wireless Systems in the United States," released October 20, 2000, http://www.ntia.doc.gov/ntiahome/threeg/3g_plan14.htm.

[17] *See* U.S. Department of Commerce, National Telecommunications and Information Administration, "Federal Operations in the 1755-1850 MHz Band: The Potential for Accommodating Third Generation Mobile Systems," Interim Report, released November 15, 2000.

[18] *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," Interim Report, ET Docket No. 00-232, DA 00-2583, released November 15, 2000.

[19] *See* SIA Petition for Rule Making, filed April 28, 2000.

[20] *Id*. at i.

[21] *See* CTIA Petition for Rule Making, filed July 12, 2000.

2000 frequency bands with the rest of the world will harm U.S. consumers, manufacturers, and service providers.[22]

10. In July 2000, we placed the SIA Petition (RM-9911) on public notice.[23] Subsequently, we placed the CTIA Petition (RM-9920) on public notice, and also established a common date for comments to be submitted on the two petitions.[24] Comments were due by August 28, 2000, and reply comments were due by September 12, 2000. Commenting parties are listed in Appendix A.

III. DISCUSSION

11. Over the past two decades, consumer use of mobile radio has grown from virtually nothing to ubiquitous use today. Prior to the early 1980s, only a limited number of consumers had access to mobile communications and only a limited number of frequencies were available for their use. However, in the 1970s, the Commission reallocated frequencies in the 806-940 MHz range from broadcast and Government use to mobile radio use.[25] The 825-845/870-890 MHz bands were reallocated to the cellular radio service, and the 806-821/851-866 MHz and 896-901/935-940 MHz bands were reallocated to SMR systems.[26] Cellular service developed rapidly during the 1980s, necessitating an additional allocation of 10 megahertz of spectrum in 1985.[27] By 1990, it was apparent that an additional mobile radio service was required to provide additional competition and to satisfy strong consumer demand, and the Commission initiated its PCS proceeding.[28] In 1992, we reallocated the 1850-1910/1930-1990 MHz bands to PCS from fixed microwave services.[29] PCS growth also has been rapid and has contributed to the enormous growth in the wireless communications industry. Capital investment in the wireless mobile

[22] *Id*. at 2.

[23] *See* Petition for Rulemaking Filed, Report No. 2424, *Public Notice*, rel. July 7, 2000.

[24] *See* Comment Invited on Third Generation Wireless/IMT-2000 Petitions, DA 00-1673, *Public Notice*, rel. July 28, 2000.

[25] *See* An Inquiry Relative To The Future Use Of The Frequency Band 806-960 MHz; And Amendment Of Parts 2, 18, 21, 73, 74, 89, 91, And 93 Of The Rules Relative To Operations In The Land Mobile Service Between 806 a nd 960 MHz, Docket No. 18262, *First Report and Order and Second Notice of Inquiry*, 19 RR 2d 1663 (1970).

[26] *See* An Inquiry Relative To The Future Use Of The Frequency Band 806-960 MHz; And Amendment Of Parts 2, 18, 21, 73, 74, 89, 91, And 93 Of The Rules Relative To Operations In The Land Mobile Service Between 806 And 960 MHz, Docket No. 18262, *Second Report and Order*, 46 FCC 2d 752 (1974).

[27] *See* Amendment of Parts 2 and 22 of the Commission's Rules Relative to Cellular Communications Systems; Amendment of Parts 2, 15, and 90 of the Commission's Rules and Regulations to Allocate Frequencies in the 900 MHz Reserve Band for Private Land Mobile Use; Amendment of Parts 2, 22 and 25 of the Commission's Rules to Allocate Spectrum for, and to Establish Other Rules and Policies Pertaining to the Use of Radio Frequencies in a Land Mobile Satellite Service for the Provision of Various Common Carrier Services, GEN Docket Nos. 84-1231, 84-1233, and 84-1234, *Report and Order*, 2 FCC Rcd 1825 (1986).

[28] *See* Amendment Of The Commission's Rules To Establish New Personal Communications Services, GEN Docket No. 90-314, *Notice of Proposed Rule Making and Tentative Decision*, 7 FCC Rcd 5676 (1992).

[29] *See* Redevelopment Of Spectrum To Encourage Innovation In The Use Of New Telecommunications Technologies, ET Docket No. 92-9, *First Report and Order and Third Notice of Proposed Rule Making*, 7 FCC Rcd 6886 (1992).

industry has more than quadrupled since 1994 for a cumulative total of over $70 billion through 1999.[30] The number of subscribers for wireless mobile service has more than doubled since 1996 to more than 86 million subscribers through 1999, and revenues over the same time period doubled to almost $21 billion even while rates for service continued to fall.[31]

12. Now with the exponential growth of the Internet, an additional allocation of spectrum is likely necessary to support anticipated demand for consumer mobile data services.[32] Wireless providers in the United States and elsewhere have begun to offer mobile data services, such as Internet access electronic mail, and short messaging service.[33] Although the anticipated increased demand for new data services, as well as expected continued increases in mobile telephone service, may be met in part by the introduction of new technologies and continued spectrum management policies, we recognize that additional spectrum may be needed to meet these new and increased demands. The discussion that follows seeks to determine both the amount and availability (*i.e.*, timing) of these additional spectrum requirements.

13. In developing the allocation proposals presented below, we have been guided in large measure by the principles set forth in our *Policy Statement*. With increasing demand for radio services, our spectrum management activities must focus on promoting more efficient use of the spectrum as well as increasing the amount of spectrum available for new services while continuing to ensure access to adequate spectrum for essential incumbent services. We are proposing a flexible allocation approach for the provision of advanced wireless services, such as IMT-2000 or 3G systems. As indicated in the *Policy Statement*, a flexible allocation approach will allow licensees freedom in determining the services to be offered and the technologies to be used in providing those services.[34] This flexibility will allow licensees to make the most efficient use of their assigned frequencies in response to market forces. We also believe that this approach will provide a sufficient amount of spectrum to ensure a robust and competitive market in the provision of these advanced wireless services.

14. In the discussion below, we first address the service requirements for advanced mobile and fixed communication services, *i.e.*, the type of service that will likely be provided in the future and the technical characteristics of such systems. We then address the spectrum requirements needed to support the introduction of advanced mobile and fixed communication services, including the amount of spectrum needed and frequency bands that could be used by such systems. Finally, we address the SIA petition on additional allocations for MSS in the 2 GHz band.

A. Service Requirements

15. The United States wireless industry, a leader in the development and implementation of advanced wireless technologies, has expeditiously provided the latest innovations to U.S. consumers. To maintain this position and remain at the forefront of technological change, the U.S. wireless industry

[30] *See* Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services, *Fifth Report* (hereinafter *Fifth Competition Report*) FCC 00-289, released August 18, 2000.

[31] *Id.*

[32] *See Policy Statement, supra* ¶ 2.

[33] Mobile data service is the delivery of non-voice information to a mobile device. *Id.* at 33.

[34] *See Policy Statement* at 9.

must continue to grow. Perhaps the largest area for growth is in the provision of mobile data services, which is being fueled by advances in mobile handset technology. Many new handsets, through the use of technologies such as Wireless Application Protocol ("WAP")[35] and Bluetooth™,[36] and through advances in operating system design, are now capable of sending and receiving email and browsing the Internet.[37] These are a wide array of non-voice information services ranging from paging/messaging to vehicle tracking from satellites to wireless Internet connections and electronic mail via telephone handset, portable computers or Personal Digital Assistants ("PDAs").[38] The Commission noted in the *Fifth Competition Report* that only about two percent of mobile traffic is currently data, but that substantial growth is expected in the near future. In fact, the *Fifth Competition Report* points to one forecast that wireless data subscribers will outnumber wireline data subscribers by 2002 and another that predicts at least $35-$40 billion in revenues by 2007 – an annual growth rate of 25 to 30 percent—and 100 million subscribers using some form of mobile data.[39]

16. The anticipated increase in demand for new data services, as well as expected continued increases in mobile telephone service, may be met in part by the introduction of new technologies. For example, the *Fifth Competition Report* noted that a technology called Enhanced Data rates for Global Evolution ("EDGE") is compatible with both Time Division Multiple Access ("TDMA") and Global System for Mobile Communication ("GSM") networks. Carriers using TDMA and GSM technology may upgrade their systems to EDGE and provide the higher data rates (up to 384 kbps) needed for advanced wireless services.[40] The *Fifth Competition Report* noted that GSM operators in the United States are still evaluating the deployment of EDGE.[41] Similarly, carriers currently using Code Division Multiple Access ("CDMA") technology can upgrade their systems to the IS-95B standard which provides data rates up to 64 kbps.[42]

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[35] WAP is a set of standards that allow wireless devices, regardless of manufacturer, to access the Internet in the same way.

[36] Bluetooth™ is a protocol for connecting multiple wireless devices without cables. Bluetooth™-enabled devices use unlicensed spectrum in the 2.45 GHz band and have a range of about 10 meters.

[37] For example, a WAP enabled wireless phone could access data on the world wide web at a WAP compatible web site or a Bluetooth™ enabled wireless phone could communicate with a Bluetooth™ enabled laptop computer, PDA, or any other device. A thorough discussion of WAP, Bluetooth™, and operating systems is contained in the *Fifth Competition Report* at 45-49.

[38] *Fifth Competition Report* at 33.

[39] *Id*. at 34-35.

[40] The *Fifth Competition Report* stated that several TDMA carriers plan to launch EDGE in 2001 or 2002. *Id.* at 42. In addition, AT&T and Japan's NTT DoCoMo recently announced a strategic alliance in they will share technical resources and support staffing of a new wholly owned subsidiary of AT&T Wireless in order to deploy a network based on the Universal Mobile Telecommunications System (UMTS) 3G standard. To accomplish this, AT&T Wireless announced that it would overlay its existing TDMA network with a GSM/GPRS (General Packet Radio Service) platform. It will then deploy EDGE near the end of 2001 and begin deploying UMTS when equipment and devices become available in 2002. *See AT&T And NTT DoCoMo Announce Strategic Wireless Alliance*, News Release, November 30, 2000; available on the Internet at <http://www.att.com/press/item/0,1354,3502,00.html>.

[41] *Id*. at 44 (footnotes omitted).

[42] Both EDGE and IS-95B are commonly referred to as 2.5G technologies because they allow incremental advancements to 2G systems. Specifically, they would allow current system operators to offer high speed data and (continued….)

17. The ITU has developed worldwide standards for IMT-2000 or 3G wireless devices. A key objective of the ITU efforts to promote 3G standards is to allow for the incorporation of a wide variety of systems while also promoting a high degree of commonality of design beneficial to fostering worldwide use and achieving economies of scale. Within this framework, the ITU has defined five radio interface standards for the terrestrial component of IMT-2000.[43] These radio interfaces have been designed to provide compatibility with existing services and also to provide broadband services at high data rates, up to 2 Mbps. It is envisioned that these data rates will permit operators to provide a wide range of services based on mobile and fixed telecommunication networks such as audio and video multimedia and Internet access in addition to voice telephony and paging services. Service also could be provided to fixed users and for any circumstance where a rapid and economical implementation of fixed communications is required. The key features of IMT-2000 as defined by various ITU documents are summarized in the table below.[44]

(Continued from previous page)
additional voice capacity at lower cost than may be needed to deploy systems that comply with one of more of the IMT-2000 radio interface standards. In addition, 2.5G technology can be implemented using spectrum currently used for 2G systems.

[43] *See* "Detailed Specifications of the Radio Interfaces of IMT-2000," Recommendation ITU-R M.1457 (2000), International Telecommunication Union. A summary is provided in Appendix C.

[44] The information in this table is a summary of characteristics described in various ITU documents.

Table 1: IMT-2000/3G System Capabilities

Capabilities to support circuit and packet data at high bit rates: - 144 kb/s or higher in high mobility (vehicular) traffic - 384 kb/s for pedestrian traffic - 2 Mb/s or higher for indoor traffic
Interoperability and roaming
Common billing/user profiles: - Sharing of usage/rate information between service providers - Standardized call detail recording - Standardized user profiles
Capability to determine geographic position of mobiles and report it to both the network and the mobile terminal
Support of multimedia services/capabilities: - Fixed and variable rate bit traffic - Bandwidth on demand - Asymmetric data rates in the forward and reverse links - Multimedia mail store and forward - Broadband access up to 2 Mb/s

18. To ensure that the United States remains at the forefront of the development of wireless technology and the provision of wireless services, the Commission must implement policies that continue to foster new developments. Given the dynamic nature of the wireless industry and our flexible approach to spectrum management**,** we do not believe it is necessary or desirable to define specifically what is or is not a "3G" or "advanced" wireless service. Rather, we invite comment on a broad range of advanced services that may be introduced over time. In order to develop a record on the optimal size of spectrum block and the timing of spectrum assignments, we thus seek information from the public, including wireless system operators and equipment manufacturers, regarding current trends in technology and migration paths to advanced wireless systems. We also seek comment on the cost impacts and other financial effects that various technologies and migration paths will have on manufacturers, system operators, and consumers.

19. The Commission noted in the *Fifth Competition Report* that many analysts believe that the transition to advanced services will be accomplished in phases.[45] The Commission stated that the migration path to 3G may depend upon: (1) whether the mobile operator is an incumbent or a new

[45] Some analysts describe certain technologies as 2.5G, suggesting an incremental approach to upgrading networks to introduce high-speed data services. *See Fifth Competition Report* at 37-38.

entrant; (2) what 2G standard the carrier's network is based on; (3) what investments have been made for 2G; (4) the licensing regulations (whether spectrum is available, number of 3G-capable licenses awarded, and whether nationwide coverage is required); (5) capacity constraints on the existing system; (6) existing frequency range; (7) current demand for mobile data; and (8) intensity of competition in the operator's market.[46] We note that these factors apply to any advanced wireless service, such as broadband wireless Internet, and not just 3G systems.

20. To determine the amount of additional spectrum that may be needed to be allocated for advanced mobile and fixed communications services, we first must understand the types of advanced services that wireless providers now offer and anticipate offering in the future. We seek comment on the types of data services currently being offered to the public and projections for new service offerings. What is the current demand for these services, and what are projected demand and growth rates? What percentage of future offerings will be for fixed service and mobile service? What technological limitations currently exist to providing advanced services? Over what time period(s) do service providers plan to introduce certain new services? What market studies have been conducted to guide these plans? Based on projected demand for advanced wireless services, how many licensees are needed to accommodate market demand?

21. We noted above that the ITU has adopted a set of five radio interface standards for IMT-2000. These standards have a wide variety of channel bandwidths among them ranging from 30 kilohertz to 5 megahertz. The Commission traditionally has taken a flexible approach to standards and generally does not mandate a particular type of technology, leaving such an outcome to the marketplace. As an example, there are several standards being used for PCS, such as CDMA, TDMA, and GSM. We anticipate that a similar approach would occur with the onset of advanced wireless services. Therefore, we seek comment on whether the IMT-2000 radio interface standards constitute a sufficient set of standards for planning advanced wireless system spectrum requirements or whether service providers are contemplating other standards for advanced wireless system use. Are the data rates of the IMT-2000 interfaces sufficient to meet projected service offerings and demand? To what extent will service providers offer bandwidth on demand or will all services be provided with fixed bandwidth? What data rates need to be accommodated on the upstream and downstream sides, and what ratio of upstream to downstream bandwidth will be needed? What are the advantages and disadvantages of various methods (*e.g.*, Time Division Duplex ("TDD") operation, variable modulation, variable frequency block allocation, variable duplex spacing) to accommodate asymmetric traffic? Are there any significant developments anticipated in the standards context that might affect our spectrum allocation decisions?

22. We also seek information regarding the ability of existing 1G and 2G systems to use currently-licensed spectrum to provide advanced services. We note that capacity limitation is among the most important factors determining the types of new services that can be offered within a specific time frame. For example, if sufficient capacity exists, a service provider could implement advanced wireless services on a portion of their spectrum, transition existing subscribers, and upgrade cleared spectrum to advanced wireless services.

23. To assess the ability of existing systems to transition to advanced systems, we seek comment on the following issues. Do service providers currently have capacity on their networks that could be used to provide advanced services? Does the amount of capacity, if any, differ by market size? How are capacity demands changing as service providers offer new data services? Are needs for more capacity being met by introducing new technology (*i.e.*, advances in technology rather than the acquisition of additional spectrum)? Do current providers (*e.g.*, cellular and PCS licensees) have sufficient excess

[46] *Id*. at 38.

capacity to offer advanced wireless services on their current networks? If so, which services can be provided? What migration paths to advanced wireless services are being considered? What can be done to facilitate the evolution of existing systems to advanced wireless systems? How does the type of technology currently used by a system provider influence their transition plans?

24. Global roaming, which would allow consumers to use the same phone anywhere in the world, has been one of the objectives for 3G and IMT-2000 systems. To facilitate roaming, either common spectrum or multi-band phones must become available.[47] What steps can we or should we take to facilitate global or regional roaming? What percentage of and what type of U.S. or foreign consumers need access to global or regional roaming? What roaming applications are required? How can these requirements best be met – *e.g.*, common roaming frequency bands within the Americas, common roaming band with Europe and Asia? With respect to multi-band devices, how much more expensive are they than single-band devices and how many different frequency bands can be supported by current equipment? How wide a frequency range can be supported by existing equipment? Would new equipment have to be designed and when would it be available? How are economies of scale and complexities of deployment impacted if two, three, four or more different spectrum plans are adopted in different parts of the world?

B. Spectrum Requirements

25. The fundamental issues in this proceeding are the amount of additional spectrum that should be made available for use by new advanced mobile and fixed services, including 3G systems, and the frequency bands in which this spectrum should be located. The ITU has identified a number of frequency bands that could be used for advanced mobile and fixed communications services, including 3G systems.[48] Some of these bands already are used in the United States for 1G or 2G wireless systems that may transition to advanced wireless systems over time.[49] Consequently, this NPRM will focus primarily on additional frequency bands for possible use by advanced mobile and fixed systems, including two frequency bands that are not currently available for non-Federal Government use. We have included these bands in our analysis in order to develop a complete record on all possible frequency bands for new advanced mobile and fixed systems. We expect that the record developed in response to this NPRM will inform our decisions on the amount of spectrum to allocate or designate from each candidate band for advanced wireless systems.

1. Amount of Spectrum Needed

[47] While global roaming would obviously be facilitated by having a single global band for 3G systems, it is not clear at this time that this will occur in the near term. Some administrations in Europe and Asia have adopted initial band plans that, based on the WARC-92 identifications, pair 1920-1980 MHz with 2110-2170 MHz. Many of these countries have also indicated that they are likely to provide additional 3G spectrum in the 2500-2690 MHz band identified at WRC-2000. The United States, Canada, Mexico, and many other countries in the Americas and Asia have adopted band plans for PCS systems that overlap the WARC-92 spectrum, often pairing 1850-1910 MHz with 1930-1990 MHz. Canada, Mexico, and several other countries from the Americas have indicated that they are likely to provide additional 3G spectrum in the 1710-1850 MHz band and that, in particular, the 2500-2690 MHz band would not be available for 3G systems in their countries. As a result, it appears very unlikely that a single band plan can be adopted on a global basis. Nevertheless, global roaming could be facilitated by the adoption of a limited number of common frequency bands that could be included in multi-band phones.

[48] *See* ¶ 4, *supra.*

[49] *See* ¶ 34, *infra.*

26. Many commenters to the CTIA Petition asserted the need for additional spectrum to facilitate the introduction of advanced wireless systems.[50] Some noted the expected growth of mobile data services worldwide, especially for Internet capability, as the basis for additional spectrum.[51] Other comments noted that the ITU has determined that 160 megahertz of additional spectrum will be needed by 2010 for IMT-2000.[52]

27. We believe that today and historically the introduction and continued growth of advanced mobile and fixed services requires that additional spectrum must be made available. We solicit comment on how much additional spectrum should be made available to facilitate the introduction of these services. In addressing this issue, commenters should take into account and address the advanced wireless system characteristics that need to be accommodated, as discussed above; current capacity restraints on providing specific types of advanced services; market surveys or projections on expected demand and growth of advanced services; and any other technical requirements for efficient use of spectrum that may be used to deploy advanced wireless systems. We note, however, that it is not Commission policy to set aside a certain amount of spectrum restricted to a given technology – such as 3G. Instead, we intend to identify a flexible allocation for the provision of advanced wireless services, informed by our spectrum management policies and the spectrum needs as developed in this proceeding. In this context, we ask commenters to address a number of specific issues.

28. How much additional spectrum will be needed to satisfy unmet and projected mobile requirements such as toll-quality voice, high-speed data including Internet and other multimedia applications, and full-motion video? What size spectrum blocks would be appropriate to implement advanced wireless systems? What is the minimum spectrum block size needed? When will additional spectrum be needed? We note that whether spectrum is clear, shared, or segmented may impact the amount of spectrum required, and the amount of spectrum that may be made available. Commenters should be mindful that the total amount of spectrum and the size of spectrum blocks will affect the amount of competition that could be introduced in the provision of advanced wireless services.

29. Different technologies will use bandwidth in different ways, and we invite commenters to address the spectrum requirements needed to deploy various technologies. For example, frequency division duplex ("FDD") systems use different frequencies for upstream and downstream transmissions. To accommodate the duplexer device,[53] some amount of frequency separation is needed between these two paths. Alternatively, in TDD systems, the same frequency is used for both upstream and downstream traffic. The IMT-2000 radio interfaces, discussed above, incorporate both FDD and TDD technologies. We thus seek comment on the following issues. What are the relative merits of FDD and TDD for advanced wireless systems (*e.g.*, spectral efficiency, backward compatibility, capacity limitations, cost to deploy)? Do service providers anticipate implementing either FDD or TDD systems, or will both types of systems be implemented? We note that many of the spectrum allocations that have already taken place in Europe for 3G services have included both paired and unpaired spectrum. Do service providers anticipate that both are needed in the United States? If both types of systems must be supported, what

[50] *See, e.g.*, comments of AT&T Wireless Services ("AT&T") at 1; Motorola at 2; Nokia Inc. at 1; Telecommunications Industry Association ("TIA") reply comments at 1.

[51] *See, e.g.*, comments of AT&T at 1 (states that recent research suggests that 1.2 billion users worldwide will use mobile data services by 2005; Motorola at 3 (cites estimates that there will be 60 million wireless Internet users in the United States by 2005).

[52] *See, e.g.*, comments of Motorola at 2.

[53] A duplexer is a device that permits alternative transmission and reception with a common antenna.

limitations exist at the boundaries between paired and unpaired spectrum blocks (*e.g.*, guard bands)? What steps can be taken to minimize these limitations? For paired frequency bands, how much frequency separation is needed to enable FDD operation? Can TDD operate in the region between the FDD forward and reverse links?

2. Frequency Bands

30. In response to the CTIA Petition, several parties state that there are benefits of harmonizing domestic spectrum use with regional and global allocations and that studies must be initiated to determine whether 3G systems can share spectrum with existing services in IMT-2000 bands, whether relocation of existing services is feasible, and the cost and timing of such reallocations.[54] One party also maintains that harmonization via technology, such as the deployment of software defined radios ("SDRs"), is unlikely to be a commercially viable option for more than 10 years,[55] and argues that if bands are already in use for other purposes that fact should not end the review.[56] Another party states that several European countries have already licensed 3G systems.[57]

31. Other parties question the demand for 3G systems and the need for global harmonization; in particular the need to harmonize the U.S. Table of Allocations with that of other countries in ITU Region 2 or with the Table of Allocations in ITU Regions 1 and 3[58] to meet IMT-2000 requirements. [59] They argue that it is questionable whether the market for global roaming is large enough to warrant harmonization, and that harmonization is not necessary for 3G systems to succeed in the United States because the U.S. market is more than large enough to sustain research and development and timely deployment of 3G systems.[60] They also contend that the 3G rollout will not be immediate or universal and backward compatibility will be required.[61] Some parties contend that any 3G proposal is premature.[62]

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[54] *See, e.g.*, comments of AT&T at 1-4; Motorola at 1-2; Nokia at 1-3; TIA reply comments at 1-5.

[55] *See* comments of AT&T at 5. In a software defined radio, functions that were formerly carried out solely in hardware, such as the generation of the transmitted radio signal and the tuning and detection of the received signal, are performed by software residing in high-speed digital signal processors. Consequently, the radio can be programmed to transmit and receive over a wide range of frequencies and emulate different transmission formats. For a discussion of the potential of SDR to expand access to broadband communications, *see* Authorization and Use of Software Defined Radios, ET Docket No. 00-47, *Notice of Proposed Rule Making*, FCC 00-430, released December 8, 2000.

[56] *See* comments of AT&T at 6.

[57] *See* comments of Nokia at 3.

[58] Generally, ITU Region 2 includes the Americas and Greenland; ITU Region 1 includes Europe, Africa, and northern and western portions of Asia (the former Soviet Union, the Middle East, and Mongolia); and ITU Region 3 includes the rest of Asia, Australia, and the South Pacific. *See* ITU Radio Regulations Article S5, Section I and § 2.104 of the Commission's Rules.

[59] *See* BellSouth Corporation reply comments at 6.

[60] *See* WorldCom, Inc. reply comments at 10.

[61] *See* Nucentrix Broadband Networks, Inc. ("Nucentrix") comments at 7.

[62] *See, e.g.*, Nucentrix comments at i; WorldCom reply comments at 3.

32. In this proceeding, we believe that it is prudent to explore the possible use of several frequency bands that could be used for advanced wireless systems.[63] We believe in this way we can ensure that the spectrum needs for advanced services, such as 3G, can best be met. In the discussion that follows, we first explore the possible use of frequency bands already being used by cellular and PCS systems and other spectrum that will soon be available for additional mobile and fixed service use. We then explore the possible use of five additional frequency bands for advanced wireless systems. We propose to allocate for mobile and fixed services the 1710-1755 MHz band that was designated for reallocation from Federal Government to non-Federal Government use under two statutory directives, the 1993 Omnibus Budget Reconciliation Act ("OBRA-93") and the 1997 Balanced Budget Act ("BBA-97").[64] Next, we seek comment on providing mobile and fixed service allocations for the 1755-1850 MHz band, if spectrum in the band is made available for non-Federal Government use, with some continued Federal use (*e.g.* similar to locations shown in Appendix F). Next, we propose to designate advanced mobile and fixed service use of the 2110-2150 MHz and 2160-2165 MHz bands that were identified for reallocation under the Commission's 1992 Emerging Technologies proceeding.[65] Finally, we seek comment on various approaches for the 2500-2690 MHz band.

33. We also solicit comment on several options for pairing these frequency bands. Although our options do not exhaust the range of all possible spectrum options, we believe that asking for comment on specific options will help focus the record. We also solicit comment on other possible arrangements and pairing options across all of the bands discussed in the NPRM. In soliciting comment on these options, we tentatively conclude that we should not reserve any spectrum exclusively for advanced wireless systems, but rather should make additional spectrum available generally for mobile and fixed use as proposed in our November 1999 *Policy Statement*.[66] We believe that reserving spectrum in the United States exclusively for 3G mobile is not the best approach and that the determination of the best use of these bands should be left to market forces. Finally, we note that we recently adopted a *Policy Statement* and a *Notice of Proposed Rule Making* on secondary markets, in which we recognized that a functioning system of secondary markets could increase the amount of spectrum available to prospective users, uses, and to new wireless technologies by making more effective use of spectrum already assigned to existing licensees.[67] The deployment of advanced wireless services in some of the frequency bands described below could be facilitated by the introduction of increased flexibility and other features designed to encourage secondary markets for spectrum in these bands.

(a) Currently Allocated Spectrum

34. As noted above, the ITU has identified for possible 3G systems several frequency bands, portions of which in the United States (approximately 210 megahertz of spectrum) are already allocated or in use for Mobile and Fixed services. The 806-960 MHz and the 1850-1910/1930-1990 MHz bands, which are currently used by cellular, SMR, and broadband PCS services, may eventually be transitioned

[63] *See* FCC Interim Report, at 8-16.

[64] *See* Omnibus Budget Reconciliation Act of 1993 (OBRA-93), Pub. L. No. 103-66, 107 Stat. 312 (1993) and Balanced Budget Act of 1997 (BBA-97), Pub. L. No. 105-33, 111 Stat. 251 (1997).

[65] *See* Redevelopment Of Spectrum To Encourage Innovation In The Use Of New Telecommunications Technologies, ET Docket No. 92-9, *Notice of Proposed Rule Making*, 7 FCC Rcd 1542 (1992).

[66] *See Policy Statement* at 23.

[67] *See Policy Statement*, FCC 00-401, released December 1, 2000; and *Notice of Proposed Rule Making*, WT Docket No. 00-230, FCC 00-402, released November 27, 2000.

for use by advanced wireless systems. In addition, approximately 70 megahertz of spectrum that is already allocated for Mobile and Fixed services and could be used to deploy new advanced wireless systems has yet to be auctioned in many parts of the country. Approximately 40 megahertz of new spectrum is in the 1850-1910/1930-1990 MHz bands, and approximately 30 megahertz of new spectrum is in the 746-806 MHz band, which was recently allocated for fixed and mobile services. We seek comment on the potential use of these bands, described below, for deploying advanced wireless systems. Commenters should address when advanced wireless systems could be deployed in this spectrum; how much spectrum in these bands could be used for advanced wireless systems; any regulatory impediments for using this spectrum for advanced wireless systems; the impact of using these bands on global roaming, harmonization and economies of scale; and any other considerations relevant to deploying advanced wireless systems in this spectrum.

35. *806-960 MHz*. WRC-2000 adopted a footnote to the International Table of Frequency Allocations stating that administrations wishing to implement IMT-2000 in the 806-960 MHz band may do so in segments that are allocated to the mobile service on a primary basis and that are used or planned to be used for mobile systems.[68] Based on this footnote, the Study Plan includes this band for consideration of advanced wireless systems.[69] The international Table of Frequency Allocations divides the 806-960 MHz band into a number of sub-bands, each of which has slightly different allocations. In Region 2, these bands are generally allocated on a primary basis among the Fixed, Mobile and Broadcasting Services. In the United States, the Fixed Service is primary throughout this band, the Mobile Service is primary in all but the 902-928 MHz segment, and the Broadcasting Service is primary in the 806-890 MHz segment. Parts of this spectrum are also allocated on a secondary basis for the radiolocation and amateur radio services. A number of specific radio services operate within these allocations under the Commission's Rules. The Cellular Radiotelephone Service operates in the 824-849 MHz and 869 – 890 MHz bands. The Private Land Mobile Radio ("PLMR") Service operates in large segments of this band, including the 806–821 MHz and 851-866 MHz bands which are shared by private land mobile systems, including public safety and SMR systems; the, 896-901and 935-940 MHz bands which are used by SMRs; and the 821–824 MHz and 866–869 MHz which are used exclusively for public safety. The 849–851 MHz and 894-896 MHz bands are used for Air-Ground-Radio-Telephone Service. Multiple Address Systems ("MAS"), many of which are used to by public safety licensees, operate in the 928-929 MHz and 942–944 MHz band. The 901-902 MHz, 930-931 MHz, and 940-941 MHz bands are used by narrowband PCS. The 944-960 MHz band is used by fixed services such as auxiliary broadcast. Finally, we note that the 902-928 MHz band is allocated on a primary basis for Federal Government radiolocation; and is also used on a secondary basis by Industrial, Scientific, and Medical equipment, including microwave ovens; the Location Monitoring Service ("LMS"); the Amateur Radio Service; and unlicensed Part 15 devices. Much of this spectrum, including SMR, PCS, MAS, and LMS, has already been auctioned or will be auctioned at a future date.

36. We note that both the cellular radio and SMR systems, which occupy the major portion of the 806–960 MHz band, have already introduced mobile data services under our current allocations and rules.[70] These services provide more than 70 megahertz of spectrum for introduction of advanced wireless services and for equipment that can be used for roaming domestically and internationally. We

[68] *See* Provisional Final Acts of WRC-2000, Resolution 224 titled, "Frequency bands for the terrestrial component of IMT-2000 below 1 GHz." The footnote also states that this identification does not preclude the use of these bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations.

[69] *See* Study Plan, Section III.

[70] *See Fifth Competition Report* at 27, 30.

believe this satisfies the objective of the ITU footnote adopted at WRC-2000. However, we do not intend to allocate any additional spectrum in this band for advanced wireless services. Therefore, reallocation of other parts of the 806-960 MHz band for advanced wireless systems would not further facilitate world-wide roaming or economies of scale in equipment manufacturing. Further, it appears that the remaining parts of the 806-960 MHz band are heavily occupied by existing services.[71] Accordingly, we do not believe that any additional reallocation of spectrum for advanced wireless services is appropriate in the 806–960 MHz band. We seek comment on this tentative conclusion.

37. *1850-1910/1930-1990 MHz.* These bands are allocated in Region 2 on a primary basis to the Fixed and Mobile Services. The 1970-1990 MHz band is also allocated to the MSS. In the United States, 120 megahertz of spectrum at 1850-1910 MHz and 1930-1990 MHz is used for broadband PCS. RR S5.388, which was adopted at WARC-92, states that the band 1885-2025 MHz is intended for use, on a worldwide basis, by administrations wishing to implement IMT-2000, and that such use does not preclude the use of the band by other services to which it is allocated. We also note that a number of broadband PCS licenses (in Blocks C and F) have been declared in default and approximately 40 megahertz of spectrum is being reauctioned.[72] This raises the possibility that new licensees of this spectrum could immediately put this spectrum to use for advanced wireless systems.[73] We seek comment on this possibility.

38. *746-806 MHz*. This band, comprising former television channels 60-69, is allocated in Region 2 on a primary basis to the Broadcasting Service and on a secondary basis to the Fixed and Mobile Services. [74] The 746-764 MHz and 776-794 MHz bands (former TV channels 60-62 and 64-66) were reallocated from TV use to commercial fixed, mobile, and broadcast services; and the 764-776 MHz and 794-806 MHz bands (TV channels 63-64 and 68-69) were reallocated from TV use to the fixed and

[71] *See* Table of Frequency Allocations, 47 C.F.R. § 2.106.

[72] Auction No. 35, broadband PCS Blocks C and F, began on December 12, 2000.

[73] In WT Docket No. 97-82, the Commission tentatively concluded "... that a 10 MHz C block license is a viable minimum size for voice and some data services, including Internet access ..." *See* Amendment of the Commission's Rules Regarding Installment Payment Financing for Personal Communications Services (PCS) Licensees, *Further Notice of Proposed Rulemaking*, 15 FCC Rcd 9773 (2000). The Commission adopted a 10 MHz minimum block size in the *Sixth Report and Order and Order on Reconsideration* to "... ensure the best use of spectrum through the competitive bidding process..." *See* FCC 00-313, released August 29, 2000.

[74] WRC-2000 also recognized that some administrations may use the 698-746 MHz band for 3G services. In the *Policy Statement*, the Commission stated that it would address future use of this band in a separate rulemaking proceeding. *Policy Statement* at ¶ 25. This band, comprising television channels 52-59, is allocated in Region 2 on a primary basis to the Broadcasting Service and on a secondary basis to the Fixed and Mobile Services. In addition, assignments may be made to television stations using frequency modulation in the Broadcasting-satellite Service, subject to agreement between administrations. This spectrum is currently used by existing analog full service TV stations, Low Power TV stations, TV translator and booster stations, and new digital television (DTV) stations. This band is also allocated to the Fixed Service to permit subscription television operations. Further, TV broadcast licensees are permitted to use subcarriers on a secondary basis for both broadcast and non-broadcast purposes. The Balanced Budget Act of 1997 requires this spectrum to be reallocated from TV use and auctioned by September 30, 2002. *See* BBA-97 at § 3003. However, TV use may continue until at least December 31, 2006, when the transition to DTV service is scheduled to be completed. The Commission's rules provide that any new services on the 698-746 MHz frequencies protect those TV stations during the DTV transition, *see* BBA-97 at §§ 3003 and 3004(e).

mobile services for public safety use.[75] The 746-747 MHz, 762-764 MHz, 776-777 MHz, and 792-794 MHz bands, totaling 6 megahertz and referred to as the public safety guard bands, were recently auctioned.[76] Cellular-type systems are prohibited in these guard bands in order to protect public safety operations against adjacent channel interference, and thus this spectrum is not available for 3G services. The remaining 30 megahertz of spectrum at 747-762 MHz and 777-792 MHz, which is scheduled to be auctioned by March 6, 2001, may be used for 3G services.

(b) Additional Candidate Spectrum

39. As noted above, three of the frequency bands addressed in this section--1710-1755 MHz, 2110-2150 MHz and 2160-2165 MHz--are ones that previously had been identified for reallocation by the Commission and identified by the ITU for possible use by 3G systems; two of the frequency bands—1755-1850 MHz and 2500-2690 MHz--are ones that the ITU identified for possible use by 3G systems. We seek comment on the potential use of these bands, described below, for deploying advanced wireless systems. In addition to the specific proposals below, commenters should address how much spectrum in these bands could be used for advanced wireless systems; when advanced wireless systems could be deployed in this spectrum; any regulatory impediments for using this spectrum for advanced wireless systems; the impact of using these bands on global roaming, harmonization and economies of scale; and any other considerations relevant to deploying advanced wireless systems in this spectrum.

(1) 1710-1755 MHz

40. This band is allocated in Region 2 on a primary basis to the Fixed and Mobile Services. The band in the United States is currently used by the Federal Government for point-to-point microwave communications, military tactical radio relay, airborne telemetry, and precision guided munitions. NTIA identified this spectrum for transfer to the Commission for mixed use, effective in 2004, to satisfy the requirements of the OBRA-93. As required under OBRA-93, all microwave communication facilities in the 1710-1755 MHz band that are operated by Federal power agencies will continue to operate and must be protected from interference. A list of exempted Federal power agency microwave systems is presented in the 1995 NTIA Spectrum Report.[77] Additionally, 17 Department of Defense sites must also be protected indefinitely for continued military use.[78] BBA-97 requires this spectrum to be assigned for commercial use by competitive bidding, with the auction to commence after January 1, 2001.[79] According to the NTIA report issued in response to OBRA-93, non-exempt Federal Government

[75] *See* Reallocation of Television Channels 60-69, The 746-806 MHz Band, ET Docket No. 97-157, *Report and Order*, 12 FCC Rcd 22953 (1998).

[76] 700 MHz Guard Band Auction (Auction #33). This auction began on September 6, 2000 and closed on September 21, 2000. In addition an Auction of 8 additional 700 MHz Guard Band licenses is scheduled to commence on February 13, 2001 (Auction #38).

[77] An excerpt of this report is reproduced in Appendix E. Additionally, a copy of the entire report has been placed in the docket file of this proceeding and is also available on the Internet at <http://www.ntia.doc.gov/openness/contents.html>.

[78] A list of these sites is presented in Appendix F.

[79] BBA-97, at § 3002(b).

incumbents do not have to vacate the band until January 2004 and are entitled to compensation for relocation to another band.[80]

41. We propose that the 1710-1755 MHz band be allocated for mobile and fixed services on a co-primary basis. This would allow this band to be used for the introduction of new advanced mobile and fixed communications services, including 3G systems. We seek comment on this proposal.

42. We recently adopted a *Notice of Proposed Rulemakin*g in ET Docket No. 00-221 that proposes to reallocate 27 megahertz of spectrum transferred from Federal Government use for non-Government services.[81] As stated in that *Notice*, the Strom Thurmond National Defense Authorization Act for Fiscal Year 1999 ("NDAA-99") provides for mandatory reimbursement of Government spectrum users in the 1710-1755 MHz band, as well as reimbursement of Government spectrum users when future actions lead to the relocation of a Federal Government station.[82] Specifically, NDAA-99 provides that any Government entity on such spectrum that is to be relocated proposes to relocate itself, shall notify NTIA of the marginal costs anticipated to be incurred in relocation or modifications necessary to accommodate prospective non-Government licensees. NTIA is directed in turn to notify the Commission of such costs before the auction concerned, and the Commission must then notify potential bidders prior to the auction of the estimated relocation or modification costs based on the geographic area covered by the proposed licenses. Further, NDAA-99 required any new licensee benefiting from Government station relocation to compensate the Government entity in advance for relocation or modification costs. Such compensation may take the form of a cash payment or in-kind compensation.[83]

43. As we noted in the *Notice* in ET Docket No. 00-221, statutory authority is conferred on NTIA and the Commission to promulgate rules governing relocation for new licensees seeking to relocate Federal Government entities.[84] In that rulemaking proceeding, we proposed the Commission's relocation procedures for the transfer spectrum at issue in that proceeding and coordinated those proposals with NTIA. NTIA will conduct a rulemaking proceeding in the near future regarding relocation rules for Federal Government incumbents, and we will work jointly to establish an overall relocation policy. The proposals we have made in ET Docket No. 00-221 apply equally to the 1710-1755 MHz band, and thus we propose to apply to the 1710-1755 MHz band the same relocation procedures that are ultimately adopted in ET Docket No. 00-221. We seek comment on this proposal.

44. As noted above, there will be continuing permanent and temporary use of the 1710-1755 MHz band by Federal users. We request comment on the effect of advanced mobile and fixed operations on Federal incumbents, and vice versa, in the band. Finally, we request comment on potential mitigating techniques to protect incumbent Federal users of this band.

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[80] *See* http://www.ntia.doc.gov/ntiahome/threeg/3gattach3.htm and the NTIA Spectrum Report, at iv. In this Report in Appendix A, NTIA also provides relocation options for the incumbent Federal Government users of the 1710-1755 MHz band.

[81] *See* Reallocation of the 216-220 MHz, 1390-1395 MHz, 1427- 1429 MHz, 1429-1432 MHz, 1432-1435 MHz, 1670-1675 MHz, and 2385-2390 MHz Government Transfer Bands, ET Docket No. 00-221, *Notice of Proposed Rule Making*, FCC 00-395, rel. Nov. 20, 2000.

[82] *Id.* at ¶ 56.

[83] *Id.*

[84] *Id.* at ¶ 57.

(2) 1755-1850 MHz

45. This band is allocated in Region 2 on a primary basis to the Fixed and Mobile Services, and to the space operation service (Earth-to-space) and space research service (Earth-to-space) by footnote S.5386. The 1755-1850 MHz band is currently used by the Federal Government for four main functions. Those functions are space telecommand, tracking, and control ("TT&C," or space operations); medium capacity fixed microwave services; tactical radio battlefield networks; and aeronautical mobile applications, including telemetry, video, target scoring systems, and precision munitions. Fixed links are used for voice, data, and/or video communications where commercial service is unavailable, excessively expensive, or unable to meet required reliability. Applications include law enforcement; emergency preparedness, supporting the National air space system; military command and control networks; and control links for various power, land, water, and electric-power management systems. Other specified fixed links include video relay, data relay, and timing distribution signals. A critical system in the band is the United States Air Force Space Ground Link Subsystem ("SGLS"). This system, via Earth-to-space uplinks in the 1761-1842 MHz band, controls U.S. military satellites, including satellites used for telecommunications, intelligence gathering, missile warning, weather reporting, surveillance, and reconnaissance; the Global Positioning System ("GPS") satellite constellation; and satellites of other Government agencies and U.S. allies. These satellites provide space-based capabilities that are critical to the execution of all U.S. military operations. The satellites already in use that are associated with the SGLS are not capable of being modified to operate to accommodate another frequency. SGLS operations must continue to control these in-orbit assets for the duration of their life spans, which for some operations may extend beyond 2017. Air Combat Training (ACT) systems are another military use of this band. ACT systems are complex by the nature of their operations, as both fixed and aeronautical mobile equipment is employed to support high-intensity fighter aircraft. The 1755-1850 MHz band is also used by U.S. airborne attack systems to enable precision munitions capabilities.[85]

46. As noted above, NTIA is studying the possible use of the 1755-1850 MHz band for advanced wireless systems.[86] If spectrum in the 1755-1850 MHz band ultimately is made available for non-Federal Government use, we seek comment on allocating the spectrum for mobile and fixed services on a co-primary basis. This would allow the spectrum to be used for the introduction of new advanced mobile and fixed communications services, including 3G systems.

47. In addressing our allocations for this band, commenters should take into consideration the NTIA Interim Report on the current use of and potential for co-frequency sharing or reallocation of the band. The NTIA Interim Report states that Federal Government use of the band encompasses several different types of use, and that electromagnetic compatibility analyses indicate potentially serious sharing problems between 3G systems and Federal Government systems, particularly uplink satellite control, military radiorelay, and air combat training systems.[87] The NTIA Interim Report presents two possible segmentation options: (1) pairing two 45 megahertz segments within the 1710-1850 MHz band for 3G systems, *e.g.*, 1710-1755 MHz (handsets) and 1805-1850 MHz (base stations), and (2) pairing approximately 80 megahertz of spectrum in the 1710-1790 MHz band, which would be made available for 3G systems (handsets) in phases, with spectrum above 2110 MHz (base stations). The band is undergoing further study, with a Final Report that will consider relocation options scheduled to be

[85] *See* http://www.ntia.doc.gov/ntiahome/threeg/3gattach3.htm and http://www.ntia.doc.gov/osmhome/reports/imt2000/chapt3.html

[86] *See* NTIA Interim Report, *supra* n. 17.

[87] *Id.*at Executive Summary.

released in March, 2001.[88] Commenters that address the issues raised in the NTIA Interim Report should reference the specific parts of the study relevant to their views. We also note that prior to release of the NTIA Interim Report the Department of Defense ("DoD") IMT-2000 Technical Working Group released its own Interim Report regarding the 1755-1850 MHz band.[89] Attachment 1 to the DoD Interim Report discusses adverse consequences that could result to DoD TT&C sites from IMT-2000 operations. We request comment regarding the possibility of implementing protection areas around these sites.

48. As discussed above, NDAA-99 provides for mandatory reimbursement of Federal Government spectrum users when future actions lead to the relocation of a Federal station. NDAA-99 therefore pertains to the 1755-1850 MHz band. Additionally, the National Defense Authorization Act of 2000 (NDAA-2000) sets certain conditions before DoD surrenders use of a band of frequencies in which it is a primary user.[90] The proposals we have made in ET Docket No. 00-221 concerning relocation procedures, discussed above, apply equally to the 1755-1850 MHz band.[91] We thus seek comment on applying to the 1755-1850 MHz band the same relocation procedures that are ultimately adopted in ET Docket No. 00-221.

49. If spectrum in the 1755-1850 MHz band is made available for advanced wireless systems, account would have be taken of some Federal uses that will continue into the foreseeable future. Accordingly, we request comment on the effect of continuing permanent and temporary use of that band by Federal incumbents on potential advanced mobile and fixed use of the band. If incumbent users had to be relocated, we request comment on how those users could be accommodated in other frequency bands. In particular, we request that commenters identify which frequency bands could accommodate incumbent Federal Government services.

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[88] For the second phase of the study, NTIA will be gathering information on frequency bands and costs related to possible relocation of incumbent users of the band.

[89] *See* "Investigation of the Technical Feasibility of Accommodating the International Mobile Telecommunications (IMT) 2000 Within the 1755-1850 MHz band," released October 27, 2000.

[90] "Surrender of Department of Defense Spectrum

(1) In General. If, in order to make available for other use a band of frequencies of which it is a primary user, the Department of Defense is required to surrender use of such band of frequencies, the Department shall not surrender use of such band of frequencies until—

(A) the National Telecommunications and Information Administration, in consultation with the Federal Communications Commission, identifies and makes available to the Department for its primary use, if necessary, an alternative band or bands of frequencies as a replacement for the band to be so surrendered; and

(B) the Secretary of Commerce, the Secretary of Defense, and the Chairman of the Joint Chiefs of Staff jointly certify to the Committee on Armed Services and the Committee on Commerce, Science, and Transportation of the Senate, and the Committee on Armed Services and the Committee on Commerce of the House of Representatives, that such alternative band or bands provides comparable technical characteristics to restore essential military capability that will be lost as a result of the band of frequencies to be so surrendered."

See Section 1062 of NDAA 2000, Public Law 106-65, 113 stat .512 (1999)(amending the NTIA Organizational Act to add a new section 156).

[91] The relocation procedures that NTIA will promulgate pursuant to 47 U.S.C. § 923(g) will include procedures for identifying spectrum for relocating incumbent Federal Government users of the 1755-1850 MHz band. As we noted in ET Docket No. 00-221, we will work with NTIA to establish an overall relocation policy.

(3) 2110-2150 MHz and 2160-2165 MHz

50. These bands, which are allocated in Region 2 on a primary basis to the Fixed and Mobile Services, have been used in the United States for a variety of services. These bands were identified by the Commission in 1992 for reallocation to services using new and innovative technologies under its *Emerging Technologies* proceeding.[92] In November 1998, the Commission proposed that portions of the 2110-2200 MHz band be reallocated as follows: the 2110-2150 MHz band would be allocated to the Fixed and Mobile Services for assignment by competitive bidding, the 2160-2162 MHz band would be allocated for shared use by the Multipoint Distribution Service ("MDS") and Instructional Television Fixed Service ("ITFS")[93] and fixed microwave use, and the 2162-2165 MHz band would be allocated for fixed and mobile emerging technologies.[94] In its 1999 *Policy Statement*, the Commission stated its intention to initiate a separate proceeding to propose using these bands for advanced mobile and fixed communication services.[95] BBA-97 requires reallocation of the 2110-2150 MHz band and assignment by competitive bidding by September 30, 2002.[96]

51. Currently, these bands are used primarily for non-Federal Government Fixed and Mobile services licensed under either the Fixed Microwave Service in Part 101 of the Commission's Rules or the Public Mobile Services under Part 22 of the Commission's.[97] We note that many of the stations were licensed subsequent to the Emerging Technologies *First Report and Order* in 1992 and have secondary status.[98] Additionally, licenses of stations with primary status that made major modifications were converted to secondary status.[99]

- The 2110-2130 MHz portion of the band supports 3,454 common carrier point-to-point licenses (Part 101), three 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), and one General Aviation and Air-Ground Radiotelephone license (Part 22). Use by Part 22 licensees is limited to point-to-point control and repeater operations for paging systems. Some licensees have paired spectrum at 2110-2115 MHz with spectrum at 2610-2165 MHz.

[92] *See* Redevelopment Of Spectrum To Encourage Innovation In The Use Of New Telecommunications Technologies, ET Docket No. 92-9, *First Report and Order and Third Notice of Proposed Rule Making*, 7 FCC Rcd 6886 (1992).

[93] The 2160-2162 MHz segment is used in only 50 markets by fixed stations in the MDS.

[94] *See* ET Docket No. 95-18, *Memorandum Opinion and Order and Third Notice of Proposed Rule Making and Order*, 13 FCC Rcd 23949, 23972 at ¶ 52.

[95] *See Policy Statement* at ¶ 23.

[96] *See* BBA-97 at § 3002(c).

[97] *See* 47 C.F.R. Parts 22 and 101. The information given here on current use is taken from the Commission's databases as of November 27, 2000.

[98] *See* Redevelopment Of Spectrum To Encourage Innovation In The Use Of New Telecommunications Technologies, ET Docket No. 92-9, *First Report and Order and Third Notice of Proposed Rule Making*, 7 FCC Rcd 6886 (1992) at ¶ 31.

[99] *See* 47 C.F.R. § 101.81.

- The 2130-2150 MHz portion of the band supports 2448 private non-public safety point-to-point licenses (Part 101), 1326 public safety point-to-point licenses (Part 101), and two common carrier point-to-point licenses (Part 101). Channels in the 2130-2150 MHz band are paired with spectrum in the 2180-2200 MHz band.

- The 2160-2165 MHz band supports 890 common carrier point-to-point licenses (Part 101), 13 Paging and Radiotelephone Service licenses (Part 22), and 40 Local Television Transmission Service Licenses (Part 101). The 2160-2162 MHz segment also is used for MDS in the top 50 markets.

52. The 2110-2150 MHz and 2160-2165 MHz bands are currently allocated to the Fixed, Mobile, and Space Research (Deep Space) services. We are not proposing to change this allocation. Instead, we are proposing that incumbent users of these bands (excluding the Space Research service) be relocated, if necessary, and the band be designated for the provision of advanced mobile and fixed communications services. We seek comment on this proposal.

53. The band segment 2110-2120 MHz is also allocated via US252 to the Space Research service on a primary basis and is used by NASA's Deep Space Network (DSN) at Goldstone, California for uplink transmissions to interplanetary spacecraft. Internationally, the 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. In order to ensure link integrity over interplanetary distances, the DSN employs earth station transmit powers up to 400 megawatts. During command link operations it is likely that service disruption would be experienced by mobile receivers when attempting to operate within the areas surrounding Goldstone. Additionally, considering the high transmit powers used at the site, the potential exists for adjacent band interference in bands above 2120 MHz. The Commission notes that 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.[100] We seek comment on these and other issues relating to sharing the band with the Space Research service.

54. In the 2110-2150 MHz and 2160-2165 MHz bands, fixed microwave service incumbents are entitled to compensation for relocation to other frequency bands under the policies adopted in the *Emerging Technologies* proceeding for incumbent fixed users in the frequency bands reallocated for broadband PCS.[101] Specifically, fixed microwave service incumbents are entitled to compensation for relocation of any links that may pose an interference threat to new fixed or mobile system licensees, including all engineering, equipment, site, and FCC fees.[102] Also, the new licensees must complete all activities necessary for implementing the replacement facilities, including engineering and cost analysis of the relocation procedures, and must test the new facilities to ensure comparability with the existing facilities.[103] We note that the Commission recently modified some of the relocation procedures for incumbent Fixed users at 2165-2200 MHz in order to accommodate the entry of the MSS in that band.[104]

[100] *See* http://auctions2.aca.gov.au/auctionbackground_infopackage.htm

[101] *See* 47 C.F.R. §§ 101.69-101.83.

[102] We note that only those licenses that have primary status are entitled to relocation compensation.

[103] *See* 47 CFR § 101.75(a).

[104] *See* Amendment of Section 2.106 of the commission's Rules to Allocate Spectrum at 2 GHz for Use by the Mobile-Satellite Service, ET Docket No. 95-18, *Second Report and Order and Second Memorandum Opinion* (continued….)

Because channels at 2165-2200 MHz are paired with spectrum at 2110-2115 MHz, we also adopted a new procedure on reimbursement of relocation costs that will apply to those paired links at issue in this proceeding that are relocated as a result of MSS entry in the higher band.[105] The new procedure takes into account that different new licensees may be responsible for relocating each half of a channel pair for a given incumbent licensee. Consequently, 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.

55. We thus propose to use the modified relocation procedures (i.e., those designated for fixed microwave service incumbents in the 2165-2200 MHz and 2110-2115 MHz bands) for any incumbent user of the 2110-2150/2160-2165 MHz bands, including MDS entities at 2160-2162 MHz. We seek comment on this proposal. We also invite comment from MDS/ITFS licensees on the current and planned use of the MDS channels 1, 2, and 2a in the 2150-2162 MHz band. Because the 2150-2162 MHz spectrum was not the focus of the FCC Interim Report, we ask the MDS/ITFS licensees to discuss the use of those channels in their business plans in conjunction with the channels in the 2500-2690 MHz band. In particular, we ask MDS/ITFS licensees what effect reallocation or relocation of the 2150-2162 MHz band would have on their current and planned use of the spectrum. We also invite comment from other interested parties on the current and future use of the 2150-2160 MHz band since this band is adjacent to the 2110-2150 MHz and 2160-2165 MHz bands.

56. In the *Emerging Technologies* proceeding, we reallocated the 4 GHz, 6 GHz, 10 GHz, and 11 GHz microwave bands to provide that private and common carrier fixed wireless users, and fixed satellite users, where appropriate, would each have co-primary status.[106] This action was taken to provide spectrum relocation options to incumbent users. We realize that this action was taken over seven years ago and spectrum use has changed since that time. Additionally, because spectrum coordination is accomplished by industry, we are not in a position to determine the number of frequency coordination conflicts that arise when new stations are proposed in any of these frequency bands. However, we believe that many of the incumbents in the 2110-2150 MHz and 2160-2165 MHz bands can be accommodated in the 4 GHz, 6 GHz, 10 GHz, and 11 GHz bands. Additionally, we note that relocation is not strictly a spectrum issue. Incumbents can be relocated using other mediums, such as fiber, and our relocation policies take this factor into consideration in allowing for the provision of comparable facilities. We seek comment on the various relocation options that exist for incumbents in the affected bands.

57. Finally, we note that the 2110-2150 MHz bands must be auctioned by September 30, 2002. Due to similarities in allocation, usage, and current licensing, we propose to auction the 2160-2165 MHz band in this same timeframe. We request comment on this proposal.

(Continued from previous page)
and Order, 15 FCC Rcd 12315 (2000), *recon. pending*, *petition for review pending*. *See also* 47 C.F.R. §§ 101.69(d) (eliminating voluntary negotiations and shortening the mandatory negotiation period); 101.73(d) (providing guidance on comparable facilities for the mandatory negotiation period); 101.75(d) (eliminating the right to return); 101.83 (reimbursement of relocation costs between MSS and other emerging technology licensees).

[105] *See* 47 C.F.R. § 101.83.

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

(4) 2500-2690 MHz

58. This band is allocated in Region 2 on a primary basis to the Fixed, Fixed Satellite, Mobile except aeronautical mobile, and Broadcasting-Satellite Services. In the United States, this band is allocated to the Fixed service and is used primary by two non-Federal Government services, Multichannel MDS and ITFS. There are currently thirty-one 6 megahertz channels and one 4 megahertz channel, or 190 MHz of spectrum, allocated to MDS and ITFS in this band. About 2,500 MDS licensees transmit programming from one or more fixed stations, which is received by multiple receivers at various locations. ITFS stations are licensed on a site specific basis as was MDS originally. However, in 1996, the Commission awarded one geographic MDS license in each of 487 Basic Trading Areas ("BTAs").[107]

59. In general, the ITFS channels are grouped at the lower end of the band from 2500–2596 MHz and the MDS channels occupy the 2596-2660 MHz portion of the band. The remaining ITFS and MDS channels are interleaved in the portion of the band above 2660 MHz. MDS and ITFS operators typically operate in a symbiotic relationship, with MDS operators providing funding used by ITFS licensees for their educational mission in exchange for the extra channel capacity needed to make MDS systems viable. Today, most ITFS licensees lease excess capacity to MDS operators.[108]

60. Although the ITFS/MDS spectrum traditionally was used for one-way analog video transmission, the communications industry is rapidly taking advantage of Commission service rule changes to permit the use of the 2500-2690 MHz band for very high speed, fixed wireless broadband services. The Commission's July 1996, *Digital Declaratory Ruling* permitted licensees to utilize digital technology on the MDS and ITFS spectrum.[109] With this Commission ruling and the advances in digital technology, ITFS/MDS video providers can now deliver as many as 200 channels of programming. In October 1996, the Commission allowed wireless cable and ITFS operators to use their spectrum for high-speed digital data applications, including Internet access.[110] In 1998, the FCC approved the use of two-way transmissions on MDS and ITFS frequencies, effectively enabling the provision of voice, video, and data services.[111] Today, approximately 25 companies are using MDS spectrum to offer high-speed Internet access in at least 43 markets, and several MDS licensees have announced plans to offer the service in additional markets. The initial filing window for two-way service occurred from August 14, 2000 until August 18, 2000 and approximately 2,267 applications were received.[112] On November 29,

[107] Basic Trading Areas (BTAs) are based on the *Rand McNally 1992 Commercial Atlas & Marketing Guide*, 123rd Edition, at pages 38-39, with the following additions: American Samoa (492), Guam (490), Northern Mariana Islands (493), San Juan, Puerto Rico (488), Mayagüez/ Aguadilla-Ponce, Puerto Rico (489), and the United States Virgin Islands (491). For extensions and revisions by the Federal Communications Commission, *see* 59 FR 46195 (September 7, 1994); *see also*, <http://www.fcc.gov/oet/info/maps/areas/>.

[108] The leasing of excess ITFS channel capacity has been subject to certain technical limitations and programming requirements. *See* 47 C.F.R. §§ 74.990 and 74.992.

[109] *See* Request for Declaratory Ruling on the Use of Digital Modulation by Multipoint Distribution Service and Instructional Television Fixed Service Stations, *Declaratory Ruling and Order*, 11 FCC Rcd 18839 (1996).

[110] *See The Mass Media Bureau Implements Policy for Provision of Internet Service on MDS and Leased ITFS Frequencies*, 11 FCC Rcd 22419 (1996).

[111] *See Two-Way Order*,13 FCC Rcd 19112 (1998), *recon.*, 14 FCC Rcd 12764 (1999), *further recon.*, FCC 00-244 (released July 21, 2000).

[112] *See* FCC Interim Report, Section 3 for a more thorough discussion of ITFS and MDS.

2000, we issued a Public Notice listing the applications tendered for filing, thereby triggering a 60 day amendment period. Absent petitions to deny, these applications will be granted after an additional 60 day period.[113]

61. In its 1998 *Two*-Way *Order*, the Commission established a regulatory framework under which MDS/ITFS can provide either one-way or two-way service to fixed or portable locations. MDS and ITFS licensees can reconfigure their licensed spectrum not only to change the direction of transmissions but also to change the bandwidth used in any direction. In these two-way systems, operators are able to deploy a cellular configuration to take advantage of frequency reuse techniques and to employ modulation schemes that would permit the use of variable bandwidth while assuring appropriate levels of interference protection to other licensed users of the spectrum. Further, the Commission's rules allow MDS and ITFS licensees to swap channels, subject to Commission approval. Finally, it should be noted that under certain circumstances, MDS entities could apply for licenses for up to eight ITFS channels per community, and ITFS entities have a subsequent right of access to those channels.[114] As a consequence, MDS and ITFS spectrum use is an amalgam of different channels and geographic boundaries that vary from location to location.[115]

62. As noted above, the Commission is studying possible use of the 2500-2690 MHz band for advanced wireless systems. For example, the FCC Interim Report considered three band segmentation plans that could provide 90 megahertz of spectrum for advanced mobile and fixed communications systems while retaining 100 megahertz of spectrum for ITFS/MDS. The Interim Report concluded that large separation distances between 3G and ITFS/MDS systems are needed to allow co-channel sharing. The Interim Report also found that there are few geographic areas where incumbent systems are not operating, and that segmenting the band would raise technical and economic difficulties for incumbents, especially in their ability to provide service to rural areas.[116] The band is undergoing further study, with a Final Report that will consider relocation options scheduled to be released in March, 2001. We request comment on all aspects of the FCC Interim Report.

63. If spectrum in this band is made available for advanced wireless systems, we seek comment on allocating the spectrum for Mobile and Fixed services on a co-primary basis. An allocation for Mobile service would allow for additional flexibility in the use of this band, allowing the spectrum to be used for the introduction of new advanced mobile and fixed communications services, including 3G systems.

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[113] *See Public Notice*, Report No. 148 (MMB November 29, 2000). The Commission will conduct random audits on a select number of applications prior to or after a license has been issued in reliance on a certification.

[114] *See* 47 C.F.R. §§ 74.990, 74.991, 79.992; Amendment of Parts 21, 43, 74, 78, and 94 of the Commission's Rules Governing Use of the Frequencies in the 2.1 and 2.5 GHz Bands, 6 FCC Rcd 6792, 6801-06 (1991). The rules provide that an MDS operator may be licensed on ITFS frequencies in areas where at least eight other ITFS channels remain available in the community for future ITFS use. In addition, no more than eight ITFS channels per community may be licensed to MDS operators. To be licensed on ITFS channels, an MDS applicant must hold a conditional license, license or a lease; must have filed an unopposed application for at least four MDS channels to be used in conjunction with the facilities proposed on the ITFS frequencies; and must show that there are no MDS channels available for application, purchase or lease. Finally, ITFS entities have the right to demand access to ITFS channels licensed to MDS operators. Today, some MDS entities have licenses for ITFS channels.

[115] *See* FCC Interim Report at 26-29.

[116] *Id*. at iii.

64. We also invite comment on the public interest costs and benefits of adding a mobile allocation to these bands without any mandatory relocation. Consistent with our secondary markets initiative, are there any steps that the FCC should take to facilitate a secondary market in these bands to allow them to evolve to their highest valued use, whether that be fixed broadband, mobile applications, or some other use? Could current ITFS/MDS licensees reorganize their systems to continue providing current services and also offer new mobile services on a competitive basis with other wireless system providers, such as cellular or PCS? Could a portion of this spectrum be made available to new entities? If so, which portion of the band and how much spectrum could be make available? How would reallocation of a portion of this band affect MDS operations at 2150-2160/2162 MHz band? We invite ITFS licensees to discuss whether adding a Mobile service allocation in the 2500-2690 MHz band would be beneficial to educators and, if so, how such operations could be utilized in an educational context. We also ask ITFS licensees to comment on what effect, if any, reallocation or relocation will have on their distance learning programs and overall educational mission. We also invite MDS licensees to discuss whether adding a mobile service allocation in the 2500-2690 MHz band would be beneficial to their plans for use of the band. In addressing these issues, commenters should take into consideration that 66 megahertz of this band has already been auctioned to MDS licensees and that the current MDS/ITFS sharing and leasing arrangements in this band are complex.

65. If a portion of this band were to be made available for advanced services and incumbent users had to be relocated, we request comment on how incumbent users could be accommodated in other frequency bands. In particular, we request that commenters identify which frequency bands could accommodate incumbent MDS/ITFS services. If a portion of this band were made available for advanced services, either through reallocation or relocation, we seek comment on applying to incumbent users in this band the same relocation procedures that we decide to apply to incumbent users in the 2110-2150 MHz and 2160-2165 MHz bands.[117] In particular, we request that commenters provide information about the type and the amount of costs to relocate incumbent MDS/ITFS operations. For example, could equipment be retuned or would facilities need to be replaced? What would be the cost to retune or replace equipment? We expect to rely on some of the information filed in response to this *Notice* in conducting the second phase of the study on the 2500-2690 MHz band, which will focus on relocation options and the costs and benefits of such action.

(5) Pairing Options

66. We recognize that the optimal use of the 1710-1755 MHz, 1755-1850 MHz, 2110-2150 MHz, 2160-2165 MHz, and 2500-2690 MHz bands for introducing advanced mobile and fixed services may be achieved by pairing these bands with one another or with other spectrum that has been identified for these services. As a way to focus this discussion, we solicit comment on several band pairing schemes discussed below as well as other spectrum pairing options, including those discussed in the FCC Interim Report. When evaluating pairing options, commenters should specify how much spectrum they believe will be required for advanced mobile and fixed communications systems from each band in each option addressed; the time period in which spectrum in the paired bands could be made available and whether those time periods are consistent with deployment plans; and whether the separation distance between the paired bands would impair the economical development of duplex equipment. Commenters also should address the following topics: the potential for sharing or segmenting the frequency bands to facilitate the implementation of advanced wireless systems; whether reallocation or relocation of incumbent users may be needed; and the identification of frequency bands to accommodate incumbent users that would have to be relocated.

[117] *See* ¶ 54, *supra*.

Option 1

67. An option ("Option 1") for advanced mobile and fixed communications systems is our proposal in the *Policy Statement*; *i.e.*, allocating the 1710-1755 MHz band paired with the 2110-2150/2160-2165 MHz band. A variation of this option could be to make spectrum available in phases in the 1710-1790 MHz band (similar to the second segmentation option discussed in the NTIA Interim Report), paired with additional spectrum above 2110 MHz. This option would be consistent with the proposal recently made to ITU-R Working Party 8F by Brazil, Chile, Guatemala, Mexico, and Venezuela that Region 2 countries use for 3G systems spectrum in part of the 1710-1850 MHz band (up to 60 megahertz) for mobile-to-base operations paired with spectrum in the 2110-2170 MHz band for base-to-mobile operations.[118] As these countries note, this approach could permit compatible base-to-mobile use of the 2110-2170 MHz band among Region 2 and non-Region 2 countries to support global roaming.[119] Accordingly, Option 1 could make available up to 90 megahertz of spectrum for advanced mobile and fixed communications systems and could also promote compatibility in the upper band. We note, however, that compatibility with non-Region 2 countries would not occur in the lower band if non-Region 2 countries use bands other than 1710-1755 MHz for 3G mobile-to-base operations.

Option 2

68. A second option ("Option 2") for accommodating advanced mobile and fixed communications systems is allocating the 1710-1755 MHz band paired with spectrum in the 1755-1850 MHz Federal Government band. As detailed in its Interim Report, NTIA has expressed serious reservations about using the 1755-1850 MHz band for non-Federal systems because of that band's use by critical Government systems. However, if NTIA were to make spectrum in that band available, it could be paired with the 1710-1755 MHz band on either a symmetrical or asymmetrical basis. The NTIA Interim Report suggests various band segmentation plans that could make 45 megahertz or more of spectrum available for advanced mobile and fixed communications systems.[120] A symmetrical pairing might permit the 1805-1850 MHz band to be paired with the 1710-1755 MHz band, whereas an asymmetrical pairing would permit a larger block of spectrum in the 1755-1850 MHz band to be paired with the 1710-1755 MHz band. Option 2 would also have the potential advantage of permitting compatible Region 2/non-Region 2 use of the 1710-1755 MHz and 1805-1850 MHz bands because these bands are used in much of Europe for second generation GSM mobile radio systems. However, a disadvantage of Option 2 is that it is unclear whether European countries will transition these bands to 3G systems. A further disadvantage of Option 2 is that even if spectrum in the 1755-1850 MHz band is reallocated for non-Federal use, Federal satellite systems may continue to operate in that band on a grandfathered basis for a number of years in a manner that would limit the use of this band for advanced services.

Option 3

69. A third option ("Option 3") for accommodating advanced mobile and fixed communications systems is allocating the 2110-2150/2160-2165 MHz bands paired with spectrum in the 2500-2690 MHz band. Alternatively, the 1710-1755 MHz band could be paired with spectrum in the 2500-2690 MHz band. Option 3 would also permit either symmetrical or asymmetrical pairing. The potential advantage

[118] *See* ITU-R Document 8F/148-E, "Possible Frequency Arrangements in the Spectrum Identified by WARC-92 and WRC-2000 for IMT-2000," October 20, 2000.

[119] *Id*. at 2-3.

[120] *See* NTIA Interim Report at 38-46.

of this approach is that both the 2110-2150/2160-2165 MHz and the 2500-2690 MHz bands are available for 3G systems in many countries. Accordingly, Option 3 could directly permit 3G compatibility without concern as to whether 2G systems will be transitioned to 3G systems. However, a disadvantage of Option 3 is that it would require reallocation of ITFS/MMDS spectrum in the 2500-2690 MHz band, which could adversely impact broadband fixed use of that band, as detailed in the FCC Interim Report. A further disadvantage of Option 3 is that, while the 2500-2690 MHz band is potentially available for 3G systems in other countries, it remains unclear how many of these countries will actually use that band for such systems.

IV. ORDER

70. *SIA Petition*. In its petition for rulemaking, SIA contends that to facilitate the growing demand for MSS-delivered voice, data, and 3G satellite services, the Commission must provide additional spectrum for MSS use. SIA argues that MSS is growing from merely providing telephone service in remote locations to ensuring availability of Internet access to a large segment of the global population. SIA further argues that MSS systems are generally less expensive and more efficient for service to rural, remote, and underserved areas than wireline systems.[121]

71. *Comments on SIA Petition*. Many incumbent MMDS and ITFS users of the 2.5 GHz band object to reallocation of all or a portion of the 2500-2690 MHz band.[122] One party also contends that SIA does not address the interference potential to incumbents if MSS were made co-primary in the band, and states that we concluded in our 18 GHz proceeding that sharing between terrestrial and satellite systems was not feasible. That party further contends that MSS already has sufficient spectrum because it has access to approximately 171 megahertz in the United States.[123]

72. Other parties state that the Commission should examine all bands identified by the ITU for IMT-2000, including the 2.5 GHz band.[124] One party contends that virtually all of the spectrum that we have designated for MSS has been assigned or will soon be assigned, and that MSS providers will need additional spectrum to meet their business plans and provide customers with a richer service. That party further contends that the 2.5 GHz band is ideal for MSS because it has been allocated internationally for that service for almost 10 years, and is the only internationally-allocated band likely to be available for global satellite service in the foreseeable future.[125]

73. *Decision.* We concur with the majority of commenters that addressed the SIA Petition that reallocation of the 2.5 GHz band to the MSS is unwarranted. Sharing between terrestrial and satellite

[121] SIA Petition at i.

[122] *See, e.g*; comments of Mississippi Authority for Educational Television at 1-6; and Arizona Board of Regents for Arizona State University *et al* at 4-5; Worldcom, Inc. at 2

[123] *Id*. at 11.

[124] *See, e.g.*, comments of CTIA at 2; Nokia at 4.

[125] *See* comments of Globalstar L.P. at 2-6.

systems would present substantial technical challenges in that band and MSS already has access to a significant amount of spectrum below 3 GHz to meet its needs in the foreseeable future.[126] Further, the SIA Petition does not otherwise present sufficient reasons to justify institution of a rulemaking proceeding.[127] Accordingly, we deny the SIA Petition.

V. PROCEDURAL INFORMATION

A. Initial Regulatory Flexibility Analysis

74. As required by Section 603 of the Regulatory Flexibility Act (RFA) of 1980,[128] the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on small entities of the policies and rules proposed in this Notice of Proposed Rule Making. The IRFA is set forth in Appendix B. We request written public comment on the IRFA. In order to fulfill the mandate of the Contract with American Advancement Act of 1996 regarding the Final Regulatory Flexibility Analysis, we ask a number of questions in our IRFA regarding the prevalence of small businesses in the affected industries.

75. Comments on the IRFA must be filed in accordance with the same filing deadlines as comments filed to the Notice of Proposed Rule Making, but they must have a separate and distinct heading designating them as responses to the IRFA.

B. Paperwork Reduction Analysis

76. The *Notice of Proposed Rule Making* does not contain a proposed information collection.

C. Ex Parte Presentations

77. For purposes of this permit-but-disclose notice and comment rulemaking proceeding, members of the public are advised that ex parte presentations are permitted, except during the Sunshine Agenda period, provided they are disclosed under the Commission's Rules.[129]

D. Comment Dates

78. Pursuant to Section 1.415 and 1.419 of the Commission's Rules, 47 C.F.R. §§ 1.415, 1.419, interested parties may file comments on the *Notice of Proposed Rule Making* on or before **30 days after Federal Register publication** and reply comments on or before **45 days after Federal Register publication**. Comments may be filed using the Commission's Electronic Comment Filing System

[126] For example, MSS has a global allocation at 1610-1626.5/2483.5-2500 MHz; and a Region 2 allocation at 1990-2025/2165-2200 MHz, of which 1990-2010/2170-2200 MHz is global. Globalstar is licensed in the band 1610-1621.35 MHz for service uplinks and in the band 2483.5-2500 MHz for service downlinks, and is an applicant in the United States for the band 1990-2025 MHz for service uplinks and for the band 2165-2200 MHz for service downlinks.

[127] *See* 47 C.F. R. § 1.407.

[128] *See* 5 U.S.C. § 603.

[129] *See generally* 47 C.F.R. §§ 1.1202, 1.1203, 1.1206(a).

(ECFS) or by filing paper copies.[130] All relevant and timely comments will be considered by the Commission before final action is taken in this proceeding. To file formally, interested parties must file an original and four copies of all comments, reply comments, and supporting comments. If interested parties want each Commissioner to receive a personal copy of their comments, they must file an original plus nine copies. Interested parties should send comments and reply comments to the Office of the Secretary, Federal Communications Commission, 445 12th Street, S.W., Washington, D.C. 20554. Parties are also encouraged to file a copy of all pleadings on a 3.5 inch diskette in Word 97 format.

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

80. Parties who choose to file by paper must file an original and four copies of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, commenters must submit two additional copies for each additional docket or rulemaking number. All filings must be sent to the Commission's Secretary, Magalie Roman Salas, Office of the Secretary, Federal Communications Commission, 445 12th Street, S.W., Washington, D.C. 20554.

81. Comments and reply comments will be available for public inspection during regular business hours in the FCC Reference Center, 445 12th Street, S.W., Washington, D.C. 20554. Comments are also available on the ECFS, at https://gullfoss2.fcc.gov/cgi-bin/websql/prod/ecfs/comsrch_v2.hts.

E. Further Information

82. For further information concerning the *Notice of Proposed Rulemaking*, contact the Office of Engineering and Technology –Rodney Small at (202) 418-2452, Ira Keltz at (202) 418-0616, or Geraldine Matise at (202) 418-2322.

VI. ORDERING CLAUSES

83. Accordingly, **IT IS ORDERED** that pursuant to the authority contained in Sections 1, 4(i), 7(a), 301, 303(c), 303(f), 303(g), 303(r), 308, and 309(j) of the Communications Act of 1934, as amended, 47 U.S.C. Sections 151, 154(i), 157(a), 301, 303(c), 303(f), 303(g), 303(r), 308, and 309(j), this *Notice of Proposed Rulemaking and Order* **IS ADOPTED**.

84. **IT IS FURTHER ORDERED** that the petition filed by the Cellular Telecommunications Industry Association, RM-9920, **IS GRANTED** to the extent consistent with the terms of the *Notice of Proposed Rulemaking.*

85. **IT IS FURTHER ORDERED** that the petition filled by the Satellite Industry Association, RM-9911, **IS DENIED**.

[130] *See* Electronic Filing of Documents in Rulemaking Proceedings, GC Docket No. 97-113, *Memorandum Opinion and Order*, 13 FCC Rcd 21517 (1998); Electronic Filing of Documents in Rulemaking Proceedings, GC Docket No. 97-113, *Report and Order*, 13 FCC Rcd 11322 (1998).

86. **IT IS FURTHER ORDERED** that the Commission's Consumer Information Bureau, Reference Information Center, **SHALL SEND** a copy of this *Notice of Proposed Rulemaking and Order*, including the Initial Regulatory Flexibility Analysis, in a report to Congress pursuant to the Small Business Regulatory Enforcement Fairness Act of 1996, *see* 5 U.S.C. § 801(a)(1)(A); and shall also send a copy of the Notice of Proposed Rulemaking and Order, including the Initial Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration. A summary of the *Notice of Proposed Rulemaking and Order* will be published in the Federal Register. *See* 5 U.S.C. § 605(b).

FEDERAL COMMUNICATIONS COMMISSION

Magalie Roman Salas
Secretary

APPENDIX A: COMMENTING PARTIES

Comments on the SIA Petition:
ACTUA – The Association for Telecommunications Professionals in Higher Education
Alliance for Higher Education, *et al*.
Archdiocese of New York
Arizona Board of Regents, *et al*.
Bladen Community College
California State University, Stanislaus
Catholic Television Network *et al*
Cellular Telecommunications Industry Association
Central Piedmont Community College
Digital Broadcast Corporation
Edgecombe Community College
Friends of WRLN, Inc.
Globalstar L.P.
Hispanic Information and Telecommunications Network, Inc.
ICO Services Limited
Instructional Telecommunications Foundation
IP Wireless, Inc.
James Sprunt Community College
Johnston Community College
Martin Community College
Miami-Dade County Public Schools
Mississippi Authority for Educational Television
Mississippi Department of Education
Mississippi EdNet Institute, Inc.
Mississippi Institutions of Higher Learning
Mississippi Sate Board for Community and Junior Colleges
National ITFS Association
Nash Community College
Network for Instructional TV, Inc.
Nokia Inc.
Nucentrix Broadband Networks, Inc.
Pikes Peak Community College
Randolph Community College
San Bernardino Community College
Sandhills Community College
South Carolina Educational Television Commission
South Piedmont Community College
University of Minnesota
Wireless Communications Association International, Inc.
Wireless One of North Carolina, L.L.C.
Worldcom, Inc.

Reply Comments on the SIA Petition:
Association of America's Public Television Stations and The Public Broadcasting Service
Worldcom, Inc.

Comments on the CTIA Petition:
AT&T Wireless Services
Archdiocese of New York
Arizona Board of Regents, *et al*.
CDMA Development Group
Cisco Systems, Inc.
Digital Broadcast Corporation
Globalstar L.P.
Hispanic Information and Telecommunications Network, Inc.
Instructional Telecommunications Foundation
IP Wireless, Inc.
LCC International, Inc.
Lucent Technologies, Inc.
Motorola, Inc.
National ITFS Association
Network for Instructional TV, Inc.
Nokia Inc.
Nucentrix Broadband Networks, Inc.
Qualcomm Incorporated
Sprint Corporation
Universal Wireless Communications Corporation
Verizon Wireless
Wireless Communications Association International, Inc.
Wireless One of North Carolina, L.L.C.
Worldcom, Inc.

Reply Comments on the CTIA Petition:
Association of America's Public Television Stations and The Public Broadcasting Service
BellSouth Corporation
Cellular Telecommunications Industry Association
Telecommunications Industry Association
Telephone and Data Systems, Inc.
Worldcom, Inc.

APPENDIX B: INITIAL REGULATORY FLEXIBILITY ANALYSIS

As required by the Regulatory Flexibility Act ("RFA"),[131] the Commission has prepared this Initial Regulatory Flexibility Analysis ("IRFA") of the possible significant economic impact on small entities by the policies and rules proposed in this *NPRM*. Comment is requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments on the *NPRM* as provided above in paragraph 78. The Commission will send a copy of the *NPRM*, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration. *See* 5 U.S.C. § 603(a). In addition, the *NPRM* and IRFA (or summaries thereof) will be published in the Federal Register.

Need for, and Objectives of, the Proposed Rules

The *NPRM* proposes the possible use of several frequency bands that could be used for advanced wireless communications systems, and solicits comments on various pairing options for those bands. The objective of these proposed actions is to allocate spectrum that could be used to provide a wide range of voice, data, and broadband services over a variety of mobile and fixed networks.

Legal Basis

The proposed action is authorized under Sections 4(i), 7(a), 303(c), 303(f), 303(g), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 157(a), 303(c), 303(f), 303(g), and 303(r).

Description and Estimate of the Number of Small Entities To Which the Proposed Rules May Apply

The RFA directs agencies to provide a description of, and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.[132] The Regulatory Flexibility Act defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small business concern" under section 3 of the Small Business Act.[133] A small business concern is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.[134]

A small organization is generally "any not-for-profit enterprise which is independently owned and operated and is not dominant in its field."[135] Nationwide, as of 1992, there were approximately 275,801 small organizations.[136] The definition of "small governmental jurisdiction" is one with

[131] *See* 5 U.S.C. § 603. The RFA, *see*, 5 U.S.C. § 601 *et seq.*, has been amended by the Contract With America Advancement Act of 1996, Pub. L. No. 104-121, 110 Stat. 847 (1996) (CWAAA). Title II of the CWAAA is the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA).

[132] 5 U.S.C. § 603(b)(3).

[133] *Id.* § 601(3).

[134] *Id.* § 632.

[135] *Id.* § 601(4).

[136] 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).

populations of fewer than 50,000.[137] There are 85,006 governmental jurisdictions in the nation.[138] This number includes such entities as states, counties, cities, utility districts and school districts. There are no figures available on what portion of this number has populations of fewer than 50,000. However, this number includes 38,978 counties, cities and towns, and of those, 37,556, or 96 percent, have populations of fewer than 50,000.[139] The Census Bureau estimates that this ratio is approximately accurate for all government entities. Thus, of the 85,006 governmental entities, we estimate that 96 percent, or about 81,600, are small entities that may be affected by our rules. Nationwide, there are 4.44 million small business firms, according to SBA reporting data.[140] The applicable definition of small entity is the definition under the SBA rules applicable to radiotelephone (wireless) companies. This provides that a small entity is a radiotelephone company employing no more than 1,500 persons.[141] According to the Bureau of the Census, only 12 radiotelephone firms from a total of 1,178 such firms that operated during 1992 had 1,000 or more employees;[142] therefore, at least 1,166 radiotelephone firms in 1992 had 1,500 or fewer employees. We are unable at this time to quantify the specific impact of our proposals on these firms, but invite comment on this issue.

Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements

This item deals only with the possible use of frequency bands below 3 GHz to support the introduction of new advanced wireless services, and does not propose service rule. Thus, the item proposes no new reporting, recordkeeping, or other compliance requirements.

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

The RFA requires an agency to describe any significant alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives: (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities. We considered proposing spectrum for the mobile-satellite service in the 2500-2520/2670-2690 MHz bands, as requested by the Satellite Industry Association, but rejected that alternative for technical reasons and because the MSS already has access to a significant amount of spectrum below 3 GHz. We believe that our proposal to explore the possible use of several frequency bands that could be used to provide a wide range of voice, data, and broadband services over a variety of mobile and fixed networks may provide new opportunities for small entities. We request comment on alternatives that could minimize the impact of this proposed action on small entities.

[137] 5 U.S.C. § 601(5).

[138] 1992 Census of Governments, U.S. Bureau of the Census, U.S. Department of Commerce.

[139] *Id*.

[140] *See* 1992 Economic Census, U.S. Bureau of the Census, Table 6 (special tabulation of data under contract to Office of Advocacy of the U.S. Small Business Administration).

[141] 13 CFR 121.201, SIC code 4812.

[142] 1992 Census, Series UC92-S-1, at Table 5, SIC code 4812.

Federal Rules that May Duplicate, Overlap, or Conflict With the Proposed Rules

None.

APPENDIX C: IMT-2000/3G RADIO INTERFACES

[Information gathered from Recommendation ITU-R M.1457]

(1) CDMA Direct Spread Spectrum - This interface is called the Universal Terrestrial Radio Access (UTRA) Frequency Division Duplex (FDD) or Wideband CDMA (WCDMA). The radio access scheme is direct-sequence CDMA with information spread over a bandwidth of about 5 MHz with a chip rate of3.84 Mchip/s. The radio interface is defined to carry a range of services to support both circuit switched as well as packet switched services.

(2) CDMA Multi-Carrier - This radio interface is called cdma2000. The radio interface is a wideband spread spectrum system that uses CDMA technology and provides a 3G evolution for systems using the current TIA/EIA-95-B family of standards. This radio interface permits any combination of voice, packet data, and high-speed circuit data services to be operated concurrently. RF channel bandwidths of 1.25 MHz (1X component) and 3.75 MHz (3X component) are supported at this time but the specification can be extended to bandwidths up to 15 MHz.

(3) CDMA TDD – This interface is called UTRA TDD. It employs a direct-sequence CDMA radio access scheme. There are two versions UTRA Time Division Duplex (TDD) that uses a 5 MHz bandwidth and a chip rate of 3.84 Mchip/s and TD-SCDMA that uses 1.6 MHz bandwidth with a chip rate of 1.28 Mchip/s. The UTRA TDD specifications were developed to provide commonality with UTRA FDD. This radio interface has been designed for flexibility where different services such as speech, data, and multimedia can simultaneously by used by a user and multiplexed on a single carrier.

(4) TDMA Single-Carrier - This radio interface is called Universal Wireless Communication-136 (UWC-136). It was developed with the objective of maximum commonality between TIA/EIA-136 and GSM General Packet Radio Service (GPRS). The radio interface is intended for evolving TIA/EIA-136 technology to 3G. This is done by enhancing the voice and data capabilities of the 30 kHz channels, adding a 200 kHz carrier for high speed data (384 kbits/s) for high mobility applications and adding a 1.6 MHz carrier for very high speed data (2 Mbits/s) for low mobility applications.

(5) FDMA/TDMA – This radio interface is called Digital Enhanced Cordless Telecommunications (DECT) and is defined by a set of ETSI standards. The standard specifies a TDMA radio interface with time division duplex (TDD) and supports symmetric and asymmetric connections, connection oriented and connectionless data transport as well as variable bit rates up to 2.88 Mbits/s per carrier. The carrier spacing is 1.728 MHz.

The IMT-2000 radio interface development process is ongoing with a view toward seeking a single terrestrial standard encompassing high level groupings of CDMA, TDMA, or a combination thereof. Additionally, consistent with ITU-T Recommendations, IMT-2000 air interfaces should include the capability of operating with both of the major third generation core networks, evolved ANSI-41 and GSM-MAP.

APPENDIX D: SPECTRUM USAGE IN OTHER COUNTRIES[143]

[Charts reproduced from Report ITU-R M.2024][144]

Current and planned utilization	
Terrestrial component	
470-862 MHz	
CEPT(1)	This band is currently used in Europe for analogue broadcasting. With the replacement of analogue television by DVB-T, it is possible that parts of this band may be made available for other services. At present parts of the band are also used for other services (e.g. tactical radio relay links) and demand for these services are likely to continue. CEPT is investigating whether this band may be considered as a candidate band for IMT-2000 expansion
United States of America	**470-806 MHz –** TV broadcast band and land mobile use. With transition from analogue to digital TV, 24 MHz (764-776/794-806 MHz) has been re-allocated for FS and MS for public safety use. This spectrum would not be suitable for IMT-2000. 36 MHz (746-764/776-794 MHz) has been re-allocated for FS, MS and broadcast service (BS) for commercial use. Transition to digital TV scheduled to be substantially complete by December 31, 2006, an additional 48 MHz of spectrum (698-746 MHz) will be recovered in the long term. Specific usage of the additional spectrum blocks of 36 MHz and 48 MHz is not yet defined, some portions might be suitable for IMT-2000. **608-614 MHz –** allocated to radio astronomy in the United States of America. (and many other places worldwide), and heavily used. This band is shared in the United States of America with low power biomedical telemetry devices (data transmission from cardiac monitors to IC units in hospitals)
Malaysia	**470-806 MHz –** UHF TV BS

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[144] "Summary of Spectrum Usage Survey Results," Report ITU-R M.2024 (2000), International Telecommunications Union.

Current and planned utilization	
Terrestrial component (*cont.*)	
470-862 MHz	
Korea	**762-780 MHz –** possible candidate band 470-752 MHz: UHF-TV 752-762 MHz: FS 762-780 MHz: possible candidate band for IMT-2000 additional 780-806 MHz: FS 752-806 MHz: digital TV transition purpose 806-824 MHz: TRS(T) 824-849 MHz: cellular (T) 849-851 MHz: FS 851-869 MHz: TRS(R)
China	470-566 MHz/606-798 MHz: TV BS 566-606 MHz: FS
Japan	470-770 MHz: TV BS 810-828 MHz, 838-840 MHz and 843-846 MHz: second generation (2G) cellular system
Canada	This band is used in Canada for television broadcasting. The introduction of digital TV in the band and the ultimate phase-out of analogue (NTSC) TV should allow future consideration of other services in spectrum not required for digital TV
Australia	**470-520 MHz** – heavily used for FS and MS. **520-820 MHz** – not available for mobile due to broadcasting use. Transition from analogue broadcasting will make full use of this allocation until 2012 due to the simulcasting requirements. Other services including wireless microphones, biomedical telemetry services and similar low power uses also use the available localised holes in the spectrum used for broadcasting. Requirements for future broadcasting and datacasting requirements will be subject to further reviews
South Africa	**470- 854 MHz** – reserved for digital TV. **790- 854 MHz –** sharing broadcasting with fixed in wireless access (FWA) and FS
Brazil	**470-608 MHz/614-806 MHz –** these bands are used in Brazil for television broadcasting. Although the introduction of digital television in these bands is not already scheduled, the ultimate phase-out of analogue TV should allow future consideration of other services in parts of the spectrum not required for digital television. **608-614 MHz –** this band is allocated to radio astronomy in Brazil
New Zealand	**470-494 MHz –** MS. Potentially available and suitable for IMT-2000 extension. **494-518 MHz –** under review. Potentially unavailable and unsuitable for IMT-2000 extension: – potential interference from existing BS TV in adjacent band. – possible future national allocation for BS TV. **518-806 MHz –** BS TV; much of this spectrum is privately owned. Unavailable and unsuitable for IMT-2000 extension

Current and planned utilization	
Terrestrial component (*cont.*)	
470-862 MHz	
Morocco	**470-838 MHz –** UHF TV broadcast band **806-866 MHz –** MS and FS. Trunk radio systems
806-821/851-866 MHz	
CEPT(1)	See the band 470-862 MHz
United States of America	Currently used for specialized mobile radio (SMR) service, private and public safety systems that substantially limit use for IMT-2000. Some pre-IMT-2000 SMR licensees may choose to evolve to IMT-2000 technologies and services
Malaysia	806-862 MHz: trunk radio service
China	806-821/851-866 MHz: trunk radio systems
Japan	860-885 MHz: 2G cellular system
Canada	These bands are used for mobile radio services, including public safety applications
Australia	806-820 MHz: BS. See comments on the 470-862 MHz band
South Africa	**856-900 MHz –** FS **864.1-868.1 MHz –** CT-2/short-range FWA
Brazil	**806-824/851-869 MHz –** these bands are used for SMR services, including public safety applications
New Zealand	**806-819/851-870 MHz –** FS, trunked mobile. Potentially available and suitable for IMT-2000 extension, currently not available
824-849/869-894 MHz	
CEPT(1)	See the bands 470-862 MHz and 880-960 MHz
United States of America	Current United States of America's cellular telephone paired bands. Pre-IMT-2000 cellular system operators may choose to evolve to next generation technologies and services such as IMT-2000
Korea	These bands were assigned for land mobile service (using CDMA system). AMPS will be replaced by 2002
China	825-880 MHz: cellular systems 821-825/866-870 MHz: wireless data transmission system
Japan	860-885 MHz and 893-895 MHz: 2G cellular system
Canada	These bands are used for cellular radiotelephone services
Australia	825-845 MHz and 870-890 MHz: licences have been issued until year 2013 which do allow use of IMT-2000 technology. 850-915 MHz: not available in off-shore areas due to radiolocation use.

Current and planned utilization	
Terrestrial component (*cont.*)	
824-849/869-894 MHz	
South Africa	**824-849/869-894 MHz –** FWA systems. **872-905/917-950 MHz –** shared band; FWA with other services such as CDMA, TACS, etc. **876-880/921-925 MHz –** GSM
Brazil	**824-849/869-894 MHz –** these bands are used for cellular radiotelephone services. Suitable for IMT-2000 when the use of first generation (1G) and 2G decreases
New Zealand	**825-845 MHz –** MS, spectrum privately owned. Potentially available and suitable for IMT-2000 extension. **870-915 MHz –** MS, spectrum privately owned. Potentially available and suitable for IMT-2000 extension
Morocco	**866-880 MHz –** MS and FS. Trunk radio systems
880-915/925-960 MHz	
CEPT(1)	This band is currently used extensively in Europe for 2G mobile (GSM 900). Availability of this band for IMT-2000 can only be made progressively in the longer term as GSM use decreases. Times-cales for availability of this band for IMT-2000 may differ on a national basis. On this basis, this band as a whole is considered by CEPT to be a candidate for IMT-2000 expansion
United States of America	902-928 MHz: heavily congested by radiolocation, government fixed and mobile, radio amateur, vehicle location monitoring and low power unlicensed devices. Some defense systems operate on a worldwide basis. Not suitable and not available for IMT-2000. 894-902 MHz and 928-960 MHz: various fixed and mobile applications, parts of this band are not suitable for IMT-2000, 894-896 MHz is used for aeronautical mobile communications and 932-935/941-944 MHz is used for fixed point-to-point microwave systems for federal government agencies. 896-901/935-940 MHz is used for private and SMR systems. Some pre-IMT-2000 SMR operators may choose to evolve to technologies and services such as IMT-2000
Malaysia	**880-890 MHz –** current AMPS/ETACS use. **925-935 MHz –** possible use of two-way paging as well
Korea	These bands were assigned for CT, CT-2, mobile data, broadcasting relay service: 869-894 MHz: cellular (R) 894-898 MHz: FS 898-900 MHz: MS (data communications) (T) 900-910 MHz: FS, MS 910-914 MHz: CT-2 914-915 MHz: CT-1 915-924.55 MHz: FS, MS 924.55-925.45 MHz: paging (T) 925.45-928 MHz: FS, MS 928-930 MHz: FS, MS (wireless microphone) 930-938 MHz: FS, MS 938-940 MHz: MS (data communications) (R) 940-942 MHz: FS, MS 942-959 MHz: FS, MS (auxiliary BS)

	959-960 MHz: CT-1

Current and planned utilization	
Terrestrial component (*cont.*)	
880-915/925-960 MHz	
China	880-915/925-960 MHz: cellular systems. 915-917 MHz: non-central controller personal system. 917-925 MHz: stereo broadcast transmission system
Japan	**895-901 MHz –** 2G cellular system
Australia	**915-928 MHz –** not available for mobile due to radiolocation usage. **928-942 MHz –** not available for MSS due to radiolocation. **890-915 MHz** and **935-960 MHz –** extensively used for 2G (GSM) mobile systems. Their refarming for terrestrial use could only be made progressively over the long term when 2G mobile system use decreases and is replaced by IMT-2000
South Africa	**880-890/925-935 MHz –** extended GSM (urban) shared with FWA (rural). **914-915/959-960 MHz –** CT-1
Brazil	**896-901/935-940 MHz –** these bands are used for SMR services, including public safety applications. **902-942 MHz –** in Brazil there are various fixed and mobile applications, including low-power unlicensed devices in this band. It appears not suitable for IMT-2000. **942-960 MHz –** heavily used by auxiliary BS. It appears not suitable for IMT-2000
New Zealand	**915-921/929-935 MHz –** FS, suitable but unavailable for IMT-2000 extension. **921-929 MHz –** Industrial, scientific and medical (ISM), unsuitable and unavailable for IMT-2000 extension. **935-960 MHz –** MS**,** spectrum privately owned. Suitable and potentially available for IMT-2000 extension
Morocco	**880-890 MHz –** MS and FS. Extended GSM band. **890-915/935-960 MHz –** MS (GSM). **915-935 MHz –** MS and FS
1 350-1 400 MHz	
CEPT(1)	Channel plan for the FS (1 350-1 375 MHz paired with 1 492-1 517 MHz and 1 375-1 400 MHz paired with 1 427-1 452 MHz). Radiolocation
United States of America	**1 350-1 385 MHz –** exclusive Government allocation to FS, MS radiolocation service, aeronautical radionavigation service (ARNS) (see RR No. S5.334). The ARNS is used by ATC radars. Not suitable or available for IMT-2000. **1 385-1 400 MHz –** will be made available for commercial use in January 1999 with suitable standards to protect ATC radars
Korea	These bands were assigned for radiolocation service
China	Radiolocation and radionavigation
Japan	This band was assigned for radiolocation service
Australia	Not available for mobile or MSS due to radiodetermination usage
Brazil	Not available for IMT-2000 due to radiolocation usage. ATC radars are used in ARNS systems
Morocco	MS and FS

Current and planned utilization	
Terrestrial component (*cont.*)	
1 427-1 525 MHz	
CEPT[(1)]	Channel plan for the FS (1 350-1 375 MHz paired with 1 492-1 517 MHz and 1 375-1 400 MHz paired with 1 427-1 452 MHz). 1 517-1 525 MHz: unidirectional fixed links. 1 452-1 492 MHz: digital audio broadcasting (DAB)
United Stated of America	1 427-1 435 MHz: available for commercial use in January 1999, suitability and availability for IMT-2000 has not been determined. 1 435-1 527 MHz: telemetering, telecommand, aeronautical telemetry. Vital and extensive use for aeronautical telemetry supporting U.S. test flight and equipment. Not suitable or available for IMT-2000
Malaysia	1 427-1 452 MHz: available. 1 452-1 469 MHz: terrestrial DAB (T-DAB). 1 467-1 492 MHz: satellite DAB (S-DAB)
Korea	1 427-1 525 MHz: FS
China	Point-to-multipoint microwave communication system
Japan	1 429-1 453 MHz and 1 477-1 501 MHz: 2G cellular system
Canada	In Canada, the sub-bands 1 427-1 452/1 492-1 517 MHz are used for subscriber radio systems and possibly for wireless meter reading systems. Canada is implementing digital radio broadcasting in the band 1 452-1 492 MHz
Australia	1 427-1 452 MHz: FS. MS: aeronautical telemetry has priority. Not suitable for public mobile/MSS systems due to sharing constraints. 1 452-1 492 MHz: broadcasting/broadcasting-satellite, for digital audio systems. Not suitable for public mobile/MSS systems due to sharing constraints. 1 492-1 525 MHz: FS. MS: aeronautical telemetry has priority. Not suitable for public mobile/MSS systems due to sharing constraints
South Africa	**1 429-1 465/1 477-1 513 MHz –** shared FWA. **1 452-1 492 MHz –** S-DAB/T-DAB
Brazil	**1 427-1 452/1 492-1 517 MHz –** in Brazil, these bands are used for low capacity digital radio relay systems of the FS. **1 452-1 492 MHz –** Brazil is planning the introduction of DAB in this band
New Zealand	**1 429-1 462/1 490-1 525 MHz –** FS, multi-access radio; used extensively for reticulation of telecommunications in rural areas; suitable but unavailable for IMT-2000 extension. **1 462-1 490 MHz –** reserved for BS, BSS. Unsuitable and unavailable for IMT-2000 extension
Morocco	FS and MS. Point-to-multipoint systems. **1 452-1 492 MHz –** FS (point-to-multipoint systems). BSS

Current and planned utilization	
Terrestrial component (*cont.*)	
1 710-1 785/1 805-1 885 MHz	
CEPT[(1)]	**1 710-1 785/1 805-1 880 MHz –** this band is also used in Europe for 2G mobile (GSM 1800). Availability of this band for IMT-2000 can only be made progressively in the longer term as current usage of the band decreases. Time-scales for availability of this band for IMT-2000 may differ on national basis. On this basis, this band as a whole is also considered by CEPT to be a candidate for IMT-2000 expansion. **1 880-1 885 MHz –** this band in Europe currently forms the lower part of the DECT band. The upper part of the DECT band (1 885-1 900 MHz) is already identified for IMT-2000. The band 1 880-1 885 MHz is considered by CEPT as a candidate for IMT-2000 expansion. The whole of the DECT band (1 880-1 900 MHz) can only be made available for IMT-2000 in the longer term however as DECT usage decreases
United States of America	**1 710-1 755 MHz –** re-allocated for mixed (government/non-government use after January 1999) available for commercial use in January 2004. This band may be suitable for IMT-2000. **1 805-1 850 MHz –** satellite ground link system (SGLS). Exclusive government allocation. Not suitable or available for IMT-2000. **1 755-1 805 MHz –** Exclusive government allocations to FS, MS and in parts of the band, space operations. Not suitable or available for IMT-2000. **1 850-1 910/1 930-1 990 MHz –** USA PCS Band. Suitable for IMT-2000 as pre-IMT-2000 services evolve to IMT-2000. **1 910-1 930 MHz –** unlicensed low-power PCS. May be suitable for low-power IMT-2000 applications as pre-IMT-2000 services evolve to IMT-2000
Malaysia	DCS 1800. **1 880-1 900 MHz –** DECT (for indoor use only)
Korea	These bands were assigned for land mobile service (using CDMA system): 1 710-1 750 MHz: MS (existing FS will be relocated) 1 750-1 780 MHz: PCS(T) 1 780-1 800 MHz: MS (existing FS will be relocated) 1 800-1 805 MHz: APC 1 805-1 840 MHz: MS (existing FS will be relocated) 1 840-1 870 MHz: PCS(R) 1 870-1 885 MHz: MS (existing FS will be relocated)
China	**1 710-1 755/1 805-1 850 MHz –** cellular system. **1 880-1 900/1 960-1 980 MHz –** wireless access system of frequency division duplex (FDD) mode. **1 900-1 920 MHz –** wireless access systems of time division duplex (TDD) mode
Japan	These bands were assigned for FS, MS, space research and space operation services

Current and planned utilization	
Terrestrial component (*cont.*)	
1 710-1 785/1 805-1 885 MHz	
Canada	**1 710-1 850 MHz –** in Canada, this band is used for low capacity fixed systems. Canada's view is that fixed systems can be phased out at an appropriate time and this band has been identified by Canada as a candidate for IMT-2000. **1 850-1 885 MHz –** this band forms part of the frequency range referred to as the PCS Band Plan and has also been identified as a candidate for IMT-2000
Australia	**1 710-1 980 MHz –** FS/MS in extensive use. Not available for any MSS due to sharing difficulties with terrestrial systems. The bands 1 710-1 785 MHz and 1 805-1 880 MHz could be refarmed for IMT-2000. **1 980-2 010 MHz –** FS/MS in extensive use. Potentially available for MSS sharing
South Africa	**1 710-1 785/1 805-1 880 MHz –** DCS 1800. **1 880-1 900 MHz –** DECT. **1 900-1 920 MHz –** extended DECT. **1 885-2 025/2 110-2 200 MHz –** identified for IMT-2000 in the RR. **1 980-2 010/2 170-2 200 MHz –** identified for satellite component of IMT-2000
Brazil	**1 710-1 850 MHz –** in Brazil, this band is used for low capacity fixed systems although new licenses have not been granted since 1996. Suitable and available for IMT-2000. **1 850-1 885 MHz –** in Brazil, this band is used for low capacity fixed systems. It forms part of the frequency range referred to as the PCS Band Plan, although Brazil has not implemented it. The bands 1 850-1 870/1 930-1 950 MHz are planned for introduction of FWA systems. Parts of this band might be suitable for IMT-2000
New Zealand	**1 706.5-1 880 MHz –** FS, potentially suitable and available for IMT-2000 extension. **1 880-1 920 MHz –** FS, PHS, DECT potentially suitable but unavailable for IMT-2000 extension; clearance may be difficult
Morocco	**1 710-1 785/1 805-1 880 MHz –** FS and MS. To be used by MS. **1 880-1 885 MHz –** FS and FWA systems
2 025-2 110/2 200-2 290 MHz(2)	
CEPT(1)	Sharing between space services and IMT-2000 is impossible in these bands (see RR No. S5.391/ Recommendation ITU-R SA.1154(3),(4)
United Sates of America	Extensive government use in space operations, earth exploration satellite service (EESS) and space research service (SRS) and auxiliary BS. Sharing between space services and IMT-2000 is impossible in these bands (see RR No. S5.391/Recommendation ITU-R SA.1154) (4). Not suitable or available for IMT-2000
Korea	2 025-2 110 MHz: FS, MS, SRS, EESS. 2 200-2 290 MHz: FS, MS, SRS, EESS
China	FS, MS and space service
Japan	These bands were assigned for FS and MS in extensive use
Canada	RR No. S5.391 precludes use of these bands for IMT-2000. In addition, these bands are heavily used by fixed systems in Canada and Canada is adopting a FS plan for these bands in accordance with *recommends* 1 of Recommendation ITU-R F.1098

Current and planned utilization	
Terrestrial component (*cont.*)	
2 025-2 110/2 200-2 290 MHz(2)	
Australia	**2 010-2 025 MHz –** extensively used for FSs. Not available for any MSS due to sharing difficulties with terrestrial systems. **2 025-2 110 MHz –** extensively used for FSs Not available for any MSS due to sharing difficulties with space sciences and fixed services. **2 076-2 111 MHz –** licensed to fixed point-to-multipoint pay TV services until 2002. **2 110-2 070 MHz –** extensively used for FSs. Not available for any MSS due to sharing difficulties with terrestrial systems. **2 070-2 200 MHz –** extensively used for FSs. Potentially available for MSS sharing. **2 200-2 290 MHz –** not available for any MSS due to sharing difficulties with FS, space sciences and aeronautical telemetry services
South Africa	**1 980-2 010/2 170-2 190 MHz –** reserved for satellite component of IMT-2000
Brazil	These bands are used for medium capacity fixed systems. Brazil intends refarming the use of such bands as Annex 1 of Recommendation ITU-R F.1098. Not suitable for IMT-2000
New Zealand	**2 025-2 110 MHz –** FS, unsuitable and unavailable for IMT-2000 extension. **2 200-2 290 MHz –** FS, unsuitable and unavailable for IMT-2000 extension
Morocco	FS
2 290-2 300 MHz	
CEPT(1)	The size of this band is rather limited. Studies to address protection of earth stations for deep space research have indicated that large separation distances (of several hundred km) are required around the 10 earth stations that are used for deep space research world-wide (the number of earth stations is planned to increase by 20 within the next decade). There are two existing earth stations in CEPT (Spain and Germany). Plan for other stations is under consideration. Also, used for radio astronomy very long base line interferometry (VLBI)
United States of America	Exclusive government allocation FS and MS. Allocation to space research (deep space) (government/non-government) will require large separation distances. Not available for IMT-2000
China	FS, MS and space service
Japan	This band was assigned for the FS, MS and space research service
Australia	**2 290-2 300 MHz –** sharing with deep space earth stations and mobile or base stations is not possible in the same geographical area. Separation distances of the order of 400 km are required between deep space earth stations IMT-2000 mobile and bases stations
South Africa	**2 290-2 300 MHz –** various services
Brazil	**2 290-2 300 MHz –** used for medium capacity fixed systems. After phasing out of existing systems, this band might be suitable for IMT-2000
New Zealand	**2 290–2 300 MHz –** FS, unsuitable and unavailable for IMT-2000 extension
Morocco	**2 290-2 300 MHz –** FS and MS

Current and planned utilization	
Terrestrial component (*cont.*)	
2 300-2 360 MHz	
CEPT(1)	**2 300-2 400 MHz** – fixed and mobile allocation : point-to-point, video cameras and electronic news gathering/outside broadcasting (ENG-OB) (Recommendation ERC 25-10), military use. Parts of the band are used for aeronautical telemetry on a national basis according to Recommendation ERC 62-02
Korea	2 300-2 330 MHz: FS (FWA, remote area). 2 330-2 370 MHz: FS (remote area, private). 2 370-2 400 MHz: FS (FWA, remote area)
China	**2 300-2 400 MHz** – FS, MS, radiolocation, and space services
Australia	**2 300-2 400 MHz –** used for fixed point-to-multipoint pay TV services and thus not available for MSS. Also used for aeronautical telemetry purposes
South Africa	**2 300-2 360 MHz –** FS
Brazil	**2 300-2 400 MHz –** used by auxiliary BS (ENG and studio-transmitter links) as well as by relay stations, which re-transmit television signals
New Zealand	**2 300-2 396 MHz –** BS multipoint distribution service (MDS) TV; spectrum privately owned. Potentially suitable and available for IMT-2000 extension
Morocco	FS and MS. **2 300-2 400 MHz –** to be used by multiple microwave distribute systems (MMDSs) (television FSs)
2 360-2 400 MHz	
CEPT	See above
United States of America	**2 360-2 385 MHz** – used for telemetry operations and is not suitable for IMT-2000. **2 385-2 390 MHz –** available for commercial use in January 2005; availability and suitability for IMT-2000 is not yet determined. **2 390-2 400 MHz –** for amateur radio operations and unlicensed devices
Japan	This band was assigned for FS and MS
Australia	2 300-2 400 MHz: point-to-multipoint pay TV services
Brazil	Used by auxiliary BS (ENG and studio-transmitter links) as well as relay systems, which re-transmit television signals
Morocco	FS and MS. **2 300-2 400 MHz –** to be used by MMDS systems (television FSs)
2 400-2 483.5 MHz	
CEPT(1)	FA and MS allocations. ISM, short-range device, radio LANs, radio TAGS
United States of America	**2 400-2 483.5 MHz –** heavy use by unlicensed devices and ISM devices. Not suitable for IMT-2000. Government allocation to radiolocation and non-government allocation to amateur and amateur satellite

Current and planned utilization	
Terrestrial component (*cont.*)	
2 400-2 483.5 MHz	
Malaysia	ISM low-power device
China	Spread spectrum data communication system. ISM applications
Japan	These bands are used for low power channels for data communication systems
Canada	Spread spectrum data communication system ISM applications
Australia	ISM band. MSS operation may be difficult
Brazil	Used by auxiliary BS (ENG and studio-transmitter links) as well as relay systems, which re-transmit television signals. Also unlicensed spread spectrum communication systems
Morocco	FS and MS. To be used by MMDS systems (television FSs) and ISM applications
2 500-2 690 MHz	
CEPT	This band is considered by CEPT as a prime candidate band for IMT-2000 expansion after phasing out of existing usage (fixed and ENG/OB). Geographical sharing (urban/rural) is one solution to facilitate the transition, or where sharing between services in the longer term is required
United States of America	MDS instructional television FS, point-to-multipoint video links to homes, schools and businesses. Two-way response use as well. This band is also assigned to the BSS. Coordination of the BSS service with additional satellite and terrestrial systems would be difficult. This band is currently not available for IMT-2000, however some licencees may choose to evolve to technologies and services such as IMT-2000
Malaysia	MMDS application
Korea	2 500-2 690 MHz: FS, MS (TV relay) 2 500-2 535 MHz: MSS, FS 2 535-2 655 MHz: DAB, CATV 2 655-2 690 MHz: MSS, FS
Japan	This band is used for mobile satellite systems and was assigned to the BSS
China	**2 535-2 599 MHz –** MMDS of cable TV transmission system; BSS (audio)
Canada	This band has been identified for use for multipoint communication service (MCS) (2 500-2 596 MHz) and MDS (broadcasting) (2 596-2 686 MHz). Canada has extensive licensing activity for MCS and MDS underway in this band. No other types of radio systems are currently being licensed in this range
Australia	**2 450-2 690 MHz –** ENG/OB in extensive use. Current use would make usage by MSS difficult

Current and planned utilization	
Terrestrial component (*cont.*)	
2 500-2 690 MHz	
South Africa	**2 690-2 700 MHz –** MMDS/FS, radio astronomy. **2 520-2 593/2 597-2 670 MHz –** FS
Brazil	**2 500-2 690 MHz –** This band is used for multichannel MDS. At this time Brazil is concluding an extensive licensing activity for MMDS in this band. No other type of radio systems are currently being licensed in this range. Not suitable for IMT-2000
New Zealand	**2 498.5-2 690 MHz –** FS, used extensively for ENG/OB**.** Suitable for IMT-2000 extension, but currently unavailable due to extensive ENG/OB applications
Morocco	FS. To be used by MMDS systems (television FSs)
2 700-3 400 MHz	
CEPT(1)	2.7-2.9 GHz: this band is still under consideration in Europe as a possible candidate band for IMT-2000; no final decision has yet been reached. 2.9-3.4 GHz: recent studies carried out within the CEPT have indicated that this band is not a viable option for IMT-2000 expansion
United States of America	2 700-2 900 MHz: government exclusive allocation to aeronautical radionavigation, meteorological aids and radiolocation. 2 900-3 000 MHz: allocated for maritime radionavigation, meteorological aids and radiolocation. 3 000-3 100 MHz: allocated for maritime radionavigation and radiolocation. 3 100-3 400 MHz: allocated for radiolocation. No changes are planned in any of these bands and current usage is expected to increase. The band 2 700-3 400 MHz is not suitable or available for IMT-2000
Malaysia	2 700-3 000 MHz: radar (DCA). 3 000-3 400 MHz: point-to-point links; must vacate by 2002
Korea	3 000-3 300 MHz: radiolocation service
China	2 700-2 900 MHz: radiolocation and aeronautical radionavigation. 2 900-3 100 MHz: radiolocation and radionavigation. 3 100-3 300 MHz: radiolocation. 3 300-3 600 MHz: radiolocation, FS and MS
Japan	This band was assigned for aeronautical radionavigation service, FS and MS
Canada	It is noted that in Canada fewer systems are deployed in the band 2 700-2 900 MHz than at 2 900-3 400 MHz. The band 3 100-3 400 MHz is a military essential band in Canada. The band 3 300-3 500 MHz is also used by the amateur service
Australia	**2 700- 3 100 MHz –** aeronautical radionavigation and radiolocation usage make any MSS use very difficult. **3 100- 3 400 MHz –** radiolocation usage. MSS sharing is not possible.

	FWA services are being introduced in the 3.5 GHz band

Current and planned utilization	
Terrestrial component (*end*)	
2 700-3 400 MHz	
South Africa	FSs and government services
Brazil	**2 700-2 900 MHz –** this band is allocated to aeronautical radionavigation in Brazil. **2 900-3 100 MHz –** this band is allocated to radionavigation and radiolocation in Brazil. **3 100-3 300 MHz –** this band is allocated to radiolocation, Earth exploration-satellite and space research in Brazil. **3 300-3 400 MHz –** used by auxiliary BS (studio transmitter links) as well as by relay stations, which re-transmit television signals
New Zealand	**2 700-2 900 MHz –** aeronautical, radionavigation, radiolocation. Unsuitable and unavailable for IMT-2000 extension. **2 900-3 100 MHz –** radionavigation. Unsuitable and unavailable for IMT-2000 extension. **3 100-3 300 MHz –** radiolocation. Unsuitable and unavailable for IMT-2000 extension. **3 300-3 400 MHz –** radiolocation, amateur. Unsuitable and unavailable for IMT-2000 extension
Morocco	Aeronautical radionavigation

(1) Agreed and developed within European Radiocommunications Committee Task Group 1 of the Conférence Européenne des Administrations des Postes et des Télécommunications (CEPT ERC TG1).

(2) Radiocommunication Study Group 7 requested not to consider these bands due to their importance for space science services and the increasing use by developed as well as developing countries. It should also be noted that Radiocommunication Study Groups 7, 8 and 9 have adopted nine ITU-R Recommendations that establish mutually beneficial, long term, provisions for sharing between space science and compatible FS and MS.

(3) Studies indicated that despite the increasing use of higher frequency bands, the space science services make extensive use of these bands.

(4) The expected increasing spectrum requirements for all services in these bands (FS, MS and space service) have resulted in RR Recommendation 622 (WRC-97) which emphasizes the need to implement enhancements in technology as early as practicable with a view to minimizing the total bandwidth required by systems of each service. This will allow accommodation of the increasing number of systems within the currently available bandwidth. There are also harmonised North Atlantic Treaty Organization (NATO) requirements in these bands for military tactical radio relay (2 025-2 070 MHz/2 200-2 245 MHz).

Current and planned utilization in relation with the satellite component

Current and planned utilization	
Satellite component	
1 525-1 559/1 626.5-1 660.5 MHz	
CEPT(1)	The existing MSS allocations could be made available for IMT-2000 satellite component. All these bands are used for second generation satellite mobile systems. Their refarming could only be made progressively in the long term when second generation system use will decrease and IMT-2000 use will increase
United States of America	1 525-1 544/1 545-1 559 MHz: MSS systems operational in the band will preclude early implementation of the satellite component of IMT-2000. Availability in a portion of the band: Only with priority and pre-emption for AMS(R)S communications. See RR footnotes Nos. S5.357A and S5.362A. 1 626.5-1 645.5/1 646.5-1 660 MHz: MSS systems operational in the band will preclude early implementation of the satellite component of IMT-2000. Availability in a portion of the band: only with priority and pre-emption for AMS(R)S communications. See RR Nos. S5.357A and S5.362A. 1 544-1 545/1 645.5-1 646.5 MHz: government usage only in this band for NOAA search and rescue satellite (SARSAT) retransmit emergency transmitter signal on 1 544.5 MHz to surface stations
Malaysia	1 626.5-1 645.5 MHz 1 656.5-1 660.5 MHz 1 525-1 544 MHz 1 555-1 559 MHz All of the above frequencies have been filed by MEASAT for MSS/GEO use
Korea	These bands were assigned for MMSS applications
China	MSS
Japan	These bands were assigned for MSS
Australia	In the band 1 525-1 535 MHz Australia operates fixed systems. The existing MSS allocations (*except the search and rescue band*) could be made available for the IMT-2000 satellite component. All these bands are used for 2G satellite mobile systems. Their refarming could only be made progressively in the long term when 2G system use will decrease and IMT-2000 use will increase. However, it must be noted that AMS(R)S and GMDSS are given priority in terms of spectrum use and availability in the bands 1 545-1 555/1 646.5-1 656.5 and 1 530-1 544/1 626.5-1 645.5 MHz respectively
Brazil	These bands were assigned for mobile satellite systems
Morocco	FS and MS services. Point-to-multipoint systems. To be available for MSS systems
1 610-1 626.5/2 483.5-2 500 MHz	
CEPT(1)	The existing MSS allocations could be made available for IMT-2000 satellite component. All these bands are used for 2G satellite mobile systems. Their refarming could only be made progressively in the long term when 2G system use will decrease and IMT-2000 use will increase
United Stated of America	1 610-1 626.5/2 483.5-2 500 MHz: these bands are to be used by MSS systems providing GMPCS. The band 1 610-1 626.5 MHz is also allocated to the AMS(R)S, see RR footnote No. S5.367, and the ARNS, RR footnote No. S5.366 reserves the band on a worldwide basis for the use and development of airborne electronic aids to air navigation and any directly associated ground-based or satellite-borne facilities

Current and planned utilization	
Satellite component (*cont.*)	
1 610-1 626.5/2 483.5-2 500 MHz	
Malaysia	1 610-1 626.5 MHz 2 483.5-2 520 MHz All of the above frequencies have been filed by MEASAT for LEO/MEO use
Korea	These bands are assigned for both CDMA (Globalstar) and TDMA (Iridium). Spectrum sharing between CDMA and TDMA has not been studied extensively
China	RDSS and MSS
Japan	These bands were assigned for MSS
Australia	See comments under 1 525-1 559/1 626.5-1 660.5 MHz. Use of channels centred on 2 477.5 MHz and 2 505.5 MHz for ENG and OB may cause infrequent interference to reception of MSS
Brazil	These bands were assigned for RDSS and MSS systems. 2 483.5-2 490 MHz: used by auxiliary BS (ENG and studio-transmitter links) as well as relay systems, which re-transmit television signals
Morocco	**2 483.5- 2 500 MHz –** FS
1 559-1 567 MHz (part of 1 675-1 690 MHz)	
CEPT(1)	Studies are ongoing in ITU-R and in CEPT in this band. Availability for IMT-2000 will depend on the outcome of these studies
United Stated of America	1 559-1 567 MHz: aeronautical radionavigation, and radionavigation-satellite (space-to-Earth). Current use is expected to increase. There is a need to retain this band for exclusive use by ARNS and RNSS. Not suitable or available for IMT-2000. 1 675-1 690 MHz: meteorological aids (radiosonde), meteorological-satellite (space-to-Earth). No changes are planned in these bands, current use is expected to increase. Not suitable or available for IMT-2000
Malaysia	Allocated for MSS
China	1 559-1 567 MHz: ARNS and space service. 1 675-1 690 MHz: meteorological aids and meteorological satellites (space-to-Earth)
Japan	These bands were assigned for MSS
Australia	**1 559-1 567 MHz –** sharing difficulties with the RNSS. Current ITU-R sharing studies are needed to show that sharing with MSS is not feasible. **1 660.5-1 670 MHz –** not available for public mobile/MSS systems, due to sharing difficulties with radioastronomy and with METAIDS above 1 688.4 MHz. **1 670-1 675 MHz –** not available for public mobile/MSS systems, due to sharing difficulties with METAIDS. **1 675-1 683 MHz –** may be available for MSS supporting IMT-2000 subject to WRC-2000 conclusions. ITU-R sharing studies have concluded that sharing with METAIDS is not possible. **1 683-1 710 MHz –** not available for public mobile/MSS systems, due to sharing difficulties with METSAT service

Current and planned utilization	
Satellite component (*cont.*)	
1 559-1 567 MHz (part of 1 675-1 690 MHz)	
Brazil	This band is used for ARNS and RNSS. Sharing with MSS is not feasible. Not suitable for IMT-2000
Morocco	Radionavigation and aeronautical services. **1 675-1 690 MHz –** METSAT service
2 500-2 520/2 670-2 690 MHz	
CEPT(1)	This frequency band could be made available for IMT-2000 in Europe, pending market demand
United States of America	MDS/instructional television FS, point-to-multipoint video links to homes, schools and businesses. Two-way response use as well. Not suitable for IMT-2000. Not allocated to MSS on a worldwide basis until 2005
Malaysia	Frequencies have been filed by MEASAT for LEO/MEO use
Korea	These bands were allocated for MSS at WARC-92. Any assignment for these bands is reserved until specific plans in Korea
China	Space service
Japan	These bands are extensively used for mobile-satellite systems
Canada	These bands have been identified for terrestrial services
Australia	Current Australian usage of these bands would make usage by MSS in Australia difficult
Brazil	These bands are used for multichannel MDS. At this time Brazil is concluding an extensive licensing activity for MMDS in these bands. No other types of radio systems are currently being licensed in this range. Not suitable for IMT-2000
2 520-2 535/2 655-2 670 MHz	
CEPT(1)	These bands have been identified as possible candidate bands for the terrestrial component of IMT-2000, and are therefore not identified as suitable for satellite component. However, it is envisaged that these bands may be used for MSS in some areas, where the demand for satellite services is high.
United States of America	2 520-2 655 MHz: MDS/instructional television FS, point-to-multipoint video links to homes, schools and businesses. Two-way response use as well. This band is currently not available for IMT-2000, however some licencees may choose to evolve to technologies and services, such as IMT-2000. 2 655-2 670 MHz: MDS/instructional television FS, point-to-multipoint video links to homes, schools and businesses. Two-way response use as well. Also used for radio astronomy. This band is currently not available for IMT-2000, however some licences may choose to evolve to technologies and services, such as IMT-2000
Malaysia	Available
Korea	These bands were allocated for MSS at WARC-92. Any assignment for these bands is reserved until specific plans in Korea
China	Space service

Current and planned utilization	
Satellite component (*end*)	
2 520-2 535/2 655-2 670 MHz	
Japan	These bands are extensively used for mobile-satellite systems
Canada	Currently identified for terrestrial services
Australia	Current Australian usage of these bands would make usage by MSS in Australia difficult
Brazil	These bands are used for multichannel MDS. At this time Brazil is concluding an extensive licensing activity for MMDS in these bands. No other types of radio systems are currently being licensed in this range. Not suitable for IMT-2000

(1) Agreed and developed within European Radiocommunications Committee Task Group 1 of the Conférence Européenne des Administrations des Postes et des Telécommunications (CEPT ERC TG1).

APPENDIX E: FEDERAL GOVERNMENT FIXED MICROWAVE STATIONS IN THE 1710-1755 MHZ BAND EXEMPT FROM REALLOCATION

INTRODUCTION

This Appendix contains information regarding Federal Government fixed microwave stations in the 1710-1755 MHz band that are exempt from reallocation. These stations were authorized as of February 10, 1994 to operate in this band, and are predominantly fixed microwave stations used by Federal Power Agencies ("FPAs") where the majority of communications carried involve safety-of-life operations. In addition, certain fixed microwave stations belonging to Federal agencies where operation of these stations supports FPAs in the generation and distribution of electric power energy are also exempt from reallocation.

EXEMPT FPA FIXED MICROWAVE STATIONS

Any frequency assigned to, or any frequency assignment used by, an FPA either may not be reallocated to non-Federal sector use or may be reallocated only on a mixed Federal/non-Federal sector use basis. These facilities are mainly operated by the Federal Aviation Administration, Coast Guard, and Treasury Department. FPA operations conducted on frequencies reallocated for mixed use must be protected from harmful interference by non-Federal sector users. The geographical representation of FPA fixed microwave stations exempt from reallocation is shown in Figure E-1. A marker indicates the location of one or more fixed microwave stations.

EXEMPT SAFETY-OF-LIFE FIXED MICROWAVE STATIONS

Because spectrum is in great demand by non-Federal users in urban areas, NTIA has provided protection to only those safety-related fixed microwave stations operating in the 1710-1755 MHz band that are outside a 150 km radius of the 25 most populated cities in the United States. The geographical representation of the location of these stations is shown in Figure E-2. As before, a marker represents one or more fixed microwave stations supporting safety-related operations.

LIST OF EXEMPT FIXED MICROWAVE STATIONS

A list of exempt fixed microwave stations is included in the docket file of this proceeding. Electronic access to this list is available to the public via the set of Internet servers operated by NTIA. Detailed instructions for gaining access to these servers can be obtained by connecting through the Internet to http://www.ntia.doc.gov.

FIGURE E-1: Geographic Distribution of Federal Power Agencies Fixed Microwave Stations in the 1710-1755 MHz Band Exempt from Reallocation.

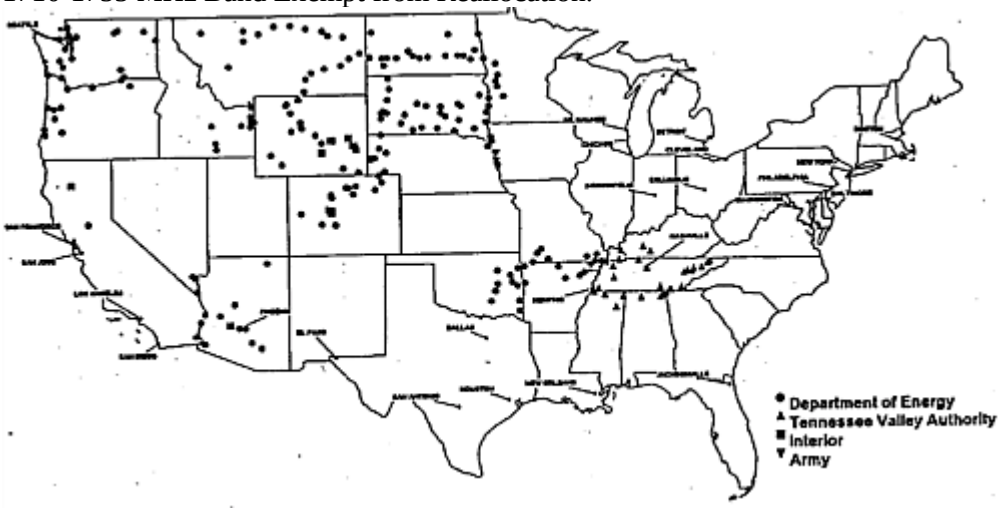

FIGURE E-2: Geographic Distribution of Safety-of-Life Fixed Microwave Stations in the 1710-1755 MHz Band Exempt from Reallocation.

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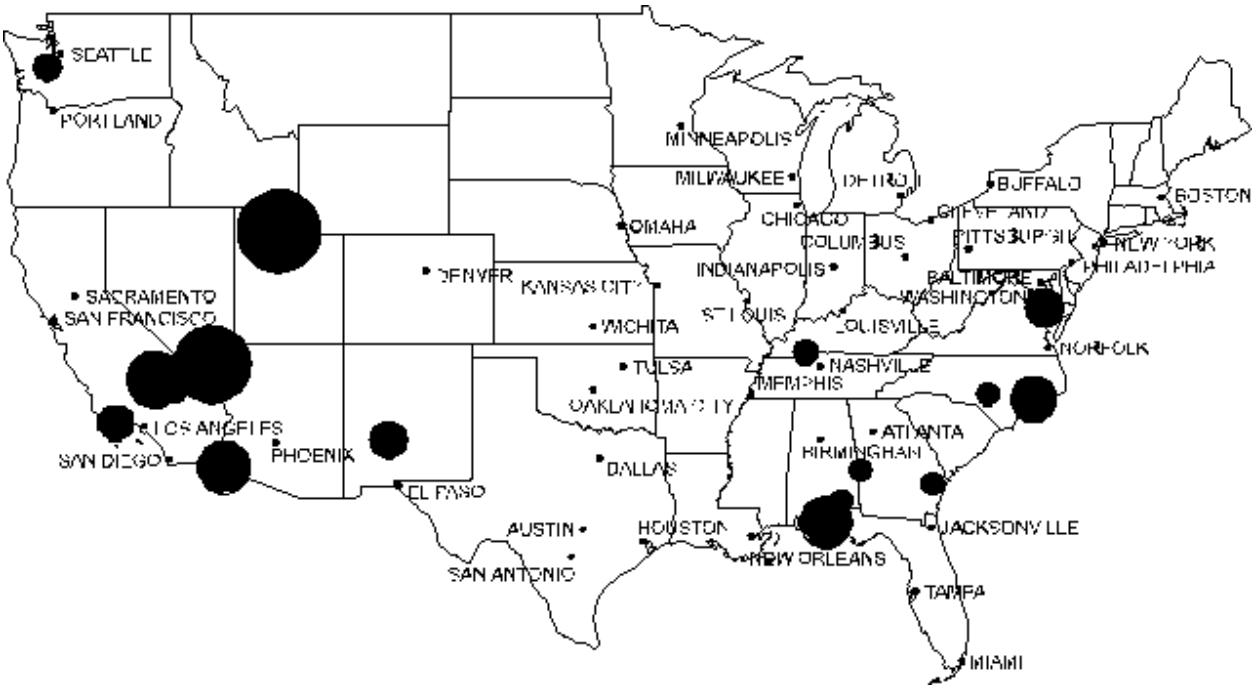
APPENDIX F: SITES AT WHICH GOVERNMENT OPERATIONS WILL CONTINUE INDEFINITELY IN THE 1710-1755 MHz BAND

Sites include fixed microwave, tactical radio relay, and aeronautical mobile stations.

Location	Coordinates	Operating Radius (km)
Eglin AFB, FL	30°29'N, 86°31'W	120
Yuma, AZ	32°29'N, 114°29'W	120
Pacific Missile Test Range, CA	34°07'N, 119°30'W	80
China Lake, CA	35°41'N, 117°41'W	120
Nellis AFB, NV	36°14'N, 115°02'W	160
Hill AFB, UT	41°08'N, 115°58'W	160
Holloman AFB, NM	33°29N, 106°50'W	80
Cherry Point, NC	34°58'N, 76°56'W	100
Patuxent River, MD	38°17'N, 76°25'W	80
Ft. Irwin, CA	35°16'N, 116°41'W	50
Ft. Bragg, NC	35°09'N, 79°01'W	50
Ft. Campbell, KY	36°41'N, 87°28'W	50
Ft. Rucker, AL	31°13'N, 85°49'W	50
Ft. Lewis, WA	47°05'N, 122°36'W	50
Ft. Benning, GA	32°22'N, 84°56'W	50
Ft. Stewart, NC	31°52'N, 81°37'W	50



Radio Observatory Areas

Hat Creek Observatory Hat Creek, California	Rectangle between latitudes 40°00'N and 42°00'N and between longitudes 120°15'W and 122°15'W.
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 30°00'N and between longitudes 118°00'W and 118°50'W
Haystack Radio Observatory Tyngsboro, Massachussetts	Rectangle between latitudes 41°00'N and 43°00'N and between longitudes 71°00'W and 73°00'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 Astronomy Radio 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.

APPENDIX G: 2G AND POSSIBLE 3G USE OF THE 1710-2200 MHz BAND AND U.S. GOVERNMENT USE OF THE 1710-1850 MHz BAND