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

In the Matter of	)	
	)	
The Establishment of Policies	)	IB Docket No. 99-81
and Service Rules for the Mobile	)	
Satellite Service in the 2 GHz Band	)	

REPORT AND ORDER

Adopted: August 14, 2000 **Released: August 25, 2000**

By the Commission: Chairman Kennard, Commissioners Ness and Tristani, issuing separate statements; Commissioners Furchtgott-Roth and Powell approving in part, dissenting in part, and issuing a joint statement.

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I. INTRODUCTION

1. In this *Report and Order*, the Commission takes the next step toward authorizing a new generation of mobile satellite services (MSS).[1] These satellite systems will provide new and expanded regional and global data, voice, and messaging services using the 2 GHz frequency band (2 GHz MSS). The 2 GHz MSS systems also will enhance competition in mobile satellite and terrestrial communications services, and complement wireless service offerings through expanded geographic coverage. 2 GHz MSS systems will thereby promote development of regional and global communications to unserved communities in the United States, its territories and possessions, including rural and Native American areas, as well as

[1] MSS is defined as a radiocommunication service: (1) between mobile earth stations and one or more space stations, or between space stations used by this service; or (2) between mobile earth stations, by means of one or more space stations. This service may also include feeder links necessary for its operation. 47 C.F.R. § 25.201.

worldwide.[2] The policies and rules we adopt in this *Report and Order* are designed to expedite the authorization process and encourage utilization of 2 GHz spectrum for delivery of the benefits of MSS to all U.S. consumers nationwide.

2. Pursuant to a 2 GHz MSS processing round initiated in 1997, nine parties filed proposals to operate 2 GHz MSS systems in the United States.[3] Specifically, the Boeing Company (Boeing), Celsat America, Inc. (Celsat), Constellation Communications, Inc. (Constellation), Globalstar, L.P. (Globalstar), Iridium LLC (Iridium), and Mobile Communications Holding, Inc. (MCHI) filed applications for U.S. space station licenses;[4] and ICO Services Limited (ICO) (a United Kingdom company), Inmarsat Horizons (Inmarsat) (an inter-governmental satellite organization), and TMI Communications and Company, Limited Partnership (TMI) (a Canadian entity) filed letters of intent (LOIs) seeking reservation of spectrum to serve the U.S. market from non-U.S.-licensed systems.[5] All system proponents must amend their applications or LOIs to conform their proposed systems to the requirements and policies we adopt today. Given the enormous potential benefits these systems offer, and the public interest in their timely deployment, amendments to applications or LOIs must be filed no later than 30 days after a summary of this *Report and Order* is published in the Federal Register to receive continued consideration.

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[2] Operations outside the United States are subject to the regulatory requirements of those countries in which these systems may seek to operate.

[3] In this document, the terms "system proponents" or "system operators" refer to all parties seeking access to 2 GHz MSS spectrum, and the term "proposals" refers to their collective requests currently pending at the Commission; the terms "applicant" and "application" refer to those parties seeking to operate U.S.-licensed systems and their formal request; the terms "letter of intent (LOI) filer" and "LOI" refer to those non-U.S. licensed systems seeking to serve the U.S. market using 2 GHz MSS spectrum, and their formal request. Non-U.S.-licensed satellite systems, or LOI filers, seeking future access to U.S. spectrum may request, through a letter of intent, that the Commission "reserve" spectrum for the system when adopting service rules in anticipation of earth station applications to be filed in the future to access the non-U.S.-licensed satellite system. *See Amendment of the Commission's Regulatory Policies to Allow Non-U.S. Licensed Space Stations to Provide Domestic and International Satellite Service in the United States*, IB Docket No. 96-111, Report and Order, 12 FCC Rcd 24094, 24173-74 ¶ 185 (1997) (*DISCO II Order*) (detailed discussion of the procedures under which foreign-licensed satellite systems may provide service in the United States).

[4] Application of The Boeing Company, File Nos.179-SAT-P/LA-97(16) and 90-SAT-AMEND-98(20); IBFS File Nos. SAT-LOA-19970926-00149 and SAT-AMD-19980318-00021 (Boeing 2 GHz MSS Application); Application of Celsat America, Inc., File Nos. 26/27/28-DSS-P-94, 36-SAT-AMEND-95, 65/66/67-SAT-AMEND-96, 192-SAT-AMEND-97, and 88-SAT-AMEND-98; IBFS Nos. SAT-A/O-19940408-00016/17/18, SAT-AMD-19941125-00089, SAT-AMD-19960124-00007/8/9, SAT-AMD-19970925-00124 and SAT-AMD-19980113-00009; Application of Constellation Communications, Inc., File No. 181-SAT-P/LA-97(46); IBFS File Nos. SAT-LAO-19970926-00148 and SAT-AMD-19991230-00134 (Constellation 2 GHz MSS Application); Application of Globalstar, L.P., File Nos. 183 through 186-SAT-P/LA-97 and 182-SAT-P/LA-97(64); IBFS File Nos. SAT-LOA-19970926-00151 through SAT-LOA-19970926-00156 (Globalstar 2 GHz MSS Application); Application of Iridium LLC, File No. 187-SAT-P/LA-97(96); IBFS File No. SAT-LOA-19970926-00147; Application of Mobile Communications Holdings, Inc., File No. 180-SAT-P/LA-97(26); IBFS File No. SAT-LOA-19970926-00150 (MCHI 2 GHz MSS Application).

[5] Letter of Intent of ICO Services Limited, File No. 188-SAT-LOI-97; IBFS File No. SAT-LOI-19970926-00163; Letter of Intent of Inmarsat Horizons, File No. 190-SAT-LOI-97; IBFS File No. SAT-LOI-19970924-00098; Letter of Intent of TMI Communications and Company, Limited Partnership, File No. 189-SAT-LOI-97; IBFS File No. SAT-LOI-19970926-00161 (TMI 2 GHz MSS LOI).

II. BACKGROUND

3. The 1992 World Administrative Radio Conference (WARC-92) allocated the 1980-2010 MHz and 2170-2200 MHz bands to MSS worldwide, and the 2165-2170 MHz band to MSS in Region 2,[6] each on a co-primary basis with fixed and mobile services, effective January 1, 2000.[7] The 1995 World Radiocommunication Conference (WRC-95) allocated the 2010-2025 MHz band to MSS in Region 2, effective January 1, 2005.[8] A footnote to this allocation provides that the 2010-2025 MHz band will be usable by MSS in the United States and Canada, effective January 1, 2000.[9] In 1997, the Commission reallocated the 1990-2025 MHz (uplink) and 2165-2200 MHz (downlink) bands to MSS in the United States, effective January 1, 2000.[10]

4. In a Notice of Proposed Rulemaking (*Notice*) released on March 25, 1999, we proposed licensing and service rules governing operation of 2 GHz MSS systems.[11] To accomplish our goal of expediting licensing of 2 GHz MSS systems, we sought comment on spectrum assignment options that would permit the authorization of all qualified 2 GHz MSS system proponents.[12] To integrate our service rules for MSS systems, we proposed to amend the existing MSS Above 1 GHz (Big LEO) service rules to incorporate service rules for the 2 GHz MSS.[13] We sought comment on earth station licensing proposals,

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6 The world is divided into three Regions by agreement of the Members of the International Telecommunication Union (ITU). Generally, Region 1 includes Africa, Europe, Northern and Western portions of Asia; Region 2 includes the Americas and Greenland; and Region 3 includes Southern portions of Asia, Australia and the South Pacific. *See* ITU Radio Regulations Article S5, Section I.

7 *See* Final Acts of the 1992 World Administrative Radio Conference, Malaga-Torremolinos (1992). A service designated as primary in a particular band enjoys priority status to operate in that band. A service designated as co-primary shares the band with other services given co-primary status on a co-equal basis. A service designated as secondary may operate in a particular band only to the extent that it does not cause harmful interference to any primary or co-primary designated service. *See generally* 47 C.F.R. § 2.105(c).

8 *See* Final Acts of the 1995 World Radiocommunication Conference, Geneva (1995).

9 *See* ITU Radio Regulations S5.444A.

10 *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, First Report and Order and Further Notice of Proposed Rule Making, 12 FCC Rcd 7388, 7393-95 ¶¶ 10-15 (1997) (*2 GHz MSS Allocation Order*) (international allocation of portions of the 2 GHz frequency band for mobile satellite service links adopted for use in the United States), *on recon.*, Memorandum Opinion and Order and Third Notice of Proposed Rule Making and Order, 13 FCC Rcd 23949 (1998) (affirming 2 GHz MSS allocation and seeking further comment on relocation issues) (*2 GHz Relocation Third NPRM*). The 1980-1990 MHz portion of the international 2 GHz MSS allocation was allocated for domestic terrestrial mobile service use by Personal Communications Services (PCS) in 1994. *Amendment of the Commission's Rules to Establish New Personal Communications Services*, GEN Docket No. 90-314, Memorandum Opinion and Order, 9 FCC Rcd 4957 (1994).

11 *The Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band*, IB Docket No. 99-81, 14 FCC Rcd 4843 (1999) (*Notice*). In response to the *Notice*, 31 comments and 26 reply comments were filed, as well as numerous *ex parte* letters. A list of parties is attached as Appendix A.

12 *Id.* at 4857-64 ¶¶ 26-48.

13 *Id.* at 4874-89 ¶¶ 71-103. *See generally Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands*, CC Docket No. 92-166, Report and Order, 9 FCC Rcd 5936 (1994) (*Big LEO Report & Order*), *on recon.*, Memorandum Opinion and Order, 11 FCC Rcd 12861 (1996) (*Big LEO Reconsideration*).

international coordination requirements, interservice sharing, and several other substantial issues.[14] In addition, we sought comment on specific incentives to encourage 2 GHz MSS operators to provide service to rural and unserved communities.[15]

5. In the *Notice*, we also reserved the option of adopting an alternative engineering solution or band sharing arrangement that would allow us to accommodate all qualified system proponents, including any hybrid solution arising from the proposed spectrum assignment alternatives.[16] On February 7, 2000, the International Bureau released a *Public Notice* seeking supplemental comments on authorizing the 2 GHz MSS systems using a processing alternative that combines elements of the options proposed in the *Notice*.[17] This additional band arrangement was intended to provide incentives for MSS operators to expedite implementation of their systems, while maximizing their operational flexibility during the incumbent relocation process.[18]

6. We recently finalized the incumbent relocation process for the 2 GHz MSS band.[19] The incumbent licensees in the 2 GHz MSS uplink band from 1990-2025 MHz are the broadcast auxiliary service, cable television relay service, and local television transmission service (collectively, "BAS").[20] Prior to the reallocation, BAS licensees were licensed to use seven channels of 17 or 18 megahertz each, spanning the 120 megahertz of spectrum from 1990 MHz to 2110 MHz (the "original BAS band").[21] In the reallocation of the 1990-2025 MHz band to 2 GHz MSS, the BAS band has been reduced from 120 megahertz to a total of 85 megahertz at 2025-2110 MHz (the "future BAS band"). In order to minimize the upfront relocation costs that 2 GHz MSS systems will pay, ensure that valuable spectrum does not lie fallow for several years, and allow advances in design and manufacture of new BAS equipment, we decided to adopt a two-phase BAS licensee relocation process.[22] Because the highly integrated nature of BAS nationwide makes isolated, link-by-link relocation infeasible, an entire BAS channel must be cleared

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14 *Notice*, 14 FCC Rcd at 4889-94 ¶¶ 104-119 (earth station licensing, international coordination, interservice sharing); *see also id.* at 4865-74 ¶¶ 49-70 (feeder links; tracking, telemetry, and command; inter-satellite links).

15 *Notice*, 14 FCC Rcd at 4886-87 ¶ 95.

16 *Id.* at 4858 ¶ 30.

17 *International Bureau Requests Further Comment on Selected Issues Regarding Authorization of 2 GHz MSS Systems*, IB Docket No. 99-81, Public Notice, 15 FCC Rcd 2696 (Int'l Bur. 2000) (*Public Notice*). In response to the *Public Notice*, 13 supplemental comments were filed, as well as *ex parte* letters. *See* list of parties, Appendix A.

18 *Id.*

19 *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 (rel. July 3, 2000) (*2 GHz Second R&O and Second MO&O*).

20 *2 GHz MSS Allocation Order*, 12 FCC Rcd at 7396 ¶ 16.

21 *See* 47 C.F.R. § 74.602. BAS licensees use these frequencies to relay news reports or other special events from remote locations to a broadcast station's main studio for on-air broadcast. Frequency coordinators at the news location coordinate use of the seven BAS channels among the BAS operators at the scene, which means that BAS operators might access any of the seven BAS channels on a moment's notice.

22 *See 2 GHz Second R&O and Second MO&O*, FCC 00-233, at ¶ 35.

nationwide before one 2 GHz MSS system can operate in that spectrum.[23] Thus, in Phase I, 2 GHz MSS operators will clear the lower 18 megahertz of the MSS uplink spectrum (1990-2008 MHz), primarily through BAS equipment retuning and filtering, narrowing the seven BAS channels to 14.5 or 15 megahertz each, occupying 2008-2110 MHz.[24] In Phase II, which will begin when the 18 megahertz of Phase I spectrum is no longer sufficient to meet 2 GHz MSS requirements, 2 GHz MSS operators will clear the upper 17 megahertz of the MSS uplink spectrum (2008-2025 MHz) by narrowing the seven BAS channels to approximately 12 megahertz each, at 2025-2110 MHz.[25]

7. The incumbent licensees in the 2 GHz MSS downlink band from 2165-2200 MHz are the commercial and private wireless fixed services ("FS").[26] Pursuant to the *2 GHz Second R&O and Second MO&O*, MSS will relocate incumbent FS microwave licensees upon determination that unacceptable interference would be caused to the incumbent operations,[27] based on the standards set by the Telecommunications Industry Association (TIA) in its publication TSB86.[28] Should relocation of FS microwave licensees be necessary, the *2 GHz Second R&O and Second MO&O* sets forth a relocation policy designed to allow early entry for new technology providers by allowing providers of new services to negotiate arrangements for reaccommodation of incumbent licensees, consistent with the policy established in the *Emerging Technologies Proceeding*, and refined in the *Microwave Relocation Proceeding*.[29]

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[23] *See id.* at ¶¶ 27, 62. *Accord* IUSG Supplemental Comments at 7 ("the first 2 GHz MSS entrant's efforts to make available even three or four megahertz of spectrum for its own use in the 2 GHz MSS uplink bands will require that all BAS licensee operations cease nationwide within the channel.").

[24] *2 GHz Second R&O and Second MO&O*, FCC 00-233, at ¶ 29. BAS equipment operating on channels of 17 or 18 megahertz width generally can be retuned and filtered to utilize narrower channels of 14.5 or 15 megahertz width. *Id.* at ¶ 67. The first 2 GHz MSS entrant must retune and filter (or replace, if necessary) the equipment of incumbent BAS licensees in the 30 largest television markets before beginning operations. After the first MSS entrant begins operations, it must retune BAS licensees' equipment in the next 70 largest markets within three years. Subsequent 2 GHz MSS entrants will be required to compensate the first 2 GHz MSS entrant on a *pro rata* basis. *Id.* at ¶ 71.

[25] *Id.* at ¶ 30. Phase II relocation likely will be costlier than Phase I, because the Phase II channel bandwidth is too narrow for current equipment design. Thus, new equipment will be required. *Id.* at ¶ 67.

[26] *2 GHz MSS Allocation Order*, 12 FCC Rcd at 7402 ¶ 34. Specifically, the lower 15 megahertz of the MSS downlink spectrum (2165-2180 MHz) is used for common carrier purposes such as phone company microwave links, while the upper 20 megahertz of the MSS downlink spectrum (2180-2200 MHz) is used for private operational fixed services by railroads, pipelines, utilities, local governments, and public safety organizations.

[27] *2 GHz Second R&O and Second MO&O*, FCC 00-233, at ¶ 78. Interference could be caused to fixed service microwave receivers by MSS satellites and to MSS handsets on the ground by microwave transmitters. *Id.* at ¶ 75.

[28] *See* Letter from G. Rosenblatt, TIA, to M. Salas, Federal Communications Commission (filed Nov. 11, 1999) (cover letter submitting TIA, *Criteria and Methodology to Assess Interference Between Systems in the Fixed Service and the Mobile-Satellite Service in the Band 2165-2200 MHz*, TSB86 (Telecommunications Industry Association 1999)). TSB86 was developed by a Joint Working Group comprised of the TIA Engineering Subcommittees on Spectrum and Orbit Utilization, the TIA Engineering Subcommittee on Interference Criteria for Microwave Systems, and the National Spectrum Managers Association. *See id.*

[29] *See 2 GHz Second R&O and Second MO&O*, FCC 00-233, at ¶¶ 75-102. *See also 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); Second Report and Order, 8 FCC Rcd 6495 (1993); Third Report and Order and Memorandum Opinion and Order, 8 FCC Rcd 6589 (1993); Memorandum Opinion and Order, 9 FCC Rcd 1943 (1994); Second Memorandum Opinion and Order, 9

III. DISCUSSION

A. Service Link Licensing Procedures

1. Spectrum Sharing Plan

a. Spectrum Authorization Methodologies Proposed in the *Notice* and Alternatives Considered

8. In the *Notice*, we sought comment on four spectrum authorization methodologies that could accommodate all proposed 2 GHz MSS systems.[30] The first is a "flexible band arrangement," in which the Commission would grant each proposed system 2.5 megahertz in uplink and downlink spectrum, group systems into segments based on modulation technology (*i.e.*, code division multiple access (CDMA) or time division multiple access (TDMA)) and orbital geometry (*i.e.*, non-geostationary orbit (NGSO) or geostationary orbit (GSO)), and provide expansion spectrum between the assigned segments for additional system requirements.[31] In the second option, called the "negotiated entry" approach, the Commission would license all proposed systems across the entire band and allow the operators themselves to coordinate their operations; the Commission would be available to resolve disputes.[32] In the third proposal, the "traditional band arrangement," the Commission would assign or designate equal spectrum blocks to the proposed systems using system design as a function of spectrum allocation (*i.e.*, a CDMA-NGSO block, a TDMA-GSO block, etc.).[33] Under the fourth proposal, the Commission would auction the spectrum in the event that none of the preceding three options is viable.[34] Two additional alternatives arose in the comments filed in response to the *Notice*: ICO USA Service Group (IUSG) offers a variation of negotiated entry it calls the "ICO Negotiated Entry Arrangement (INEA)," and Globalstar proposes an "all shared band arrangement."

9. IUSG designed the INEA plan primarily to facilitate cost-effective relocation of the terrestrial incumbents, assuming that MSS operators would clear only as much spectrum as necessary for new operators to commence service on a rolling basis.[35] Under the INEA plan, early entrants would be permitted to operate anywhere in the bands, subject to negotiation and coordination with later arrivals that have filed a request for ITU coordination, met the Commission's milestones, signed an unconditional launch contract, and are within one year of launch. In addition, the INEA plan would guarantee spectrum

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FCC Rcd 7797 (1994), *aff'd*, *Association of Public Safety Communications Officials-Int'l Inc. v. FCC*, 76 F.3d 395 (D.C. Cir. 1996) (*Emerging Technologies Proceeding*); *Amendment to the Commission's Rules Regarding a Plan for Sharing the Costs of Microwave Relocation*, WT Docket No. 95-157, First Report and Order and Further Notice of Proposed Rule Making, 11 FCC Rcd 8825, 8837-38 ¶¶ 20-22 (1996); Second Report and Order, 12 FCC Rcd 2705 (1997); *Memorandum Opinion and Order on Reconsideration*, FCC 00-123 (released July 19, 2000) (*Microwave Relocation Proceeding*).

30 *Notice*, 14 FCC Rcd at 4857-64 ¶¶ 26-48.

31 *Id.* at 4858-61 ¶¶ 31-39.

32 *Id.* at 4861-62 ¶¶ 40-43.

33 *Id.* at 4863 ¶¶ 44-45.

34 *Id.* at 4863-64 ¶¶ 46-48.

35 ICO Comments at 6; IUSG Comments at 1 & Reply at 16-17; European Union/Delegation of the European Commission (EC) Comments at 4.

for later entrants through good faith intersystem coordination and dispute resolution mechanisms.[36] Commenters supporting the INEA argue that it accounts for divergent service implementation timetables,[37] and addresses international coordination concerns.[38] Commenters opposing INEA argue that early entrants can anti-competitively delay coordination negotiations with subsequent entrants, and that the lack of a guaranteed spectrum assignment would disadvantage later entrants, making it difficult to obtain financing.[39] To address some of these criticisms, IUSG revised the INEA in its reply comments. Under the revised INEA plan, if negotiations between MSS entrants prove unsuccessful, the earlier entrant would be required to relinquish 2.5 megahertz of cleared spectrum to the later entrant, subject to cost-sharing reimbursement.[40]

10. Globalstar calls its "all shared band arrangement" an "engineered solution" for assigning spectrum.[41] Globalstar believes all systems should be authorized across the available spectrum and share all the spectrum based on mutual agreement regarding basic system parameters.[42] Before any system begins service, all systems would adopt a sharing architecture, and as each system becomes ready to initiate service, all operational systems would be required to coordinate with the new system pursuant to the pre-negotiated sharing design.[43] Globalstar adds that no system should be assigned exclusive spectrum unless it can convince other systems that it should receive exclusive frequencies prior to any system being licensed.[44] At a minimum, Globalstar asks the Commission to assign spectrum to those systems that are capable of sharing in a separate segment of the band from those that cannot share spectrum.[45] Globalstar contends that its "all shared band" is the superior proposal as it would increase the potential for competition by authorizing all applicants, facilitate international coordination by giving global systems more flexibility to obtain spectrum assignments from other administrations, provide certainty by ensuring that each system

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36 IUSG Comments at 5-16 & Exhibit A (draft negotiation regulations).

37 ICO Comments at 1; EC Comments at 1-2.

38 IUSG Comments at 23-25 & Reply at 12-13.

39 *See* Celsat Reply at 14-18; Constellation Reply at 5; Globalstar Reply at 5; MCHI Reply at 6 n.12. *But see* IUSG Comments at Exhibit B (attaching two letters from Wall Street institutions opining that the INEA proposal would not be a barrier to raising capital because the INEA safeguards guarantee licensees spectrum to commence operations).

40 IUSG Reply at 5-8.

41 Globalstar Comments at 9. Globalstar compares its all shared band arrangement to the one the Commission attempted in licensing the radiodetermination satellite service (RDSS), *id.* at 11 n.13, without acknowledging that no RDSS system ever launched, and the Commission reclaimed the RDSS spectrum for the Big LEO MSS systems.

42 *Id.* at 11.

43 *Id.* at 12 & n.14. MCHI supports some elements of Globalstar's "all shared band arrangement," but believes that the Commission need not adopt any band sharing agreement if the system proponents are required by regulation to discuss in good faith (1) adopting a band plan harmonized with Europe; (2) obtaining spectrum throughout the world; (3) exploring co-frequency sharing with different modulations; (4) adopting out-of-band emission standards; and (5) modifying system designs to facilitate sharing. MCHI Reply at 12-14.

44 Globalstar Comments at 11. For example, Globalstar states that its studies "suggest that properly designed TDMA systems may well be able to share spectrum with other TDMA and CDMA systems." *Id.* at 17. *But see* IUSG Reply at 32-33 (Globalstar's "all shared" proposal is based on "unseen studies").

45 Globalstar Comments at 17, 20-21. *Accord* TMI Comments at 7 (Commission should permit sharing arrangements between operators).

can use the entire spectrum to maximum capability, and discourage warehousing because delay increases the complexity of entry coordination.[46] Alternatively, Globalstar proposes a hybrid plan under which the Commission would allow any system to operate anywhere within the band until a date certain, for instance, January 1, 2005, when a four-way band division – NGSO shared, NGSO exclusive, GSO shared, GSO exclusive would take effect and all operational systems would be required to conform.[47]

11. ICO and Inmarsat oppose Globalstar's proposal. According to ICO, despite Globalstar's statement that the Commission should be "neutral toward the marketplace" and "let the marketplace decide which systems achieve greater demand for spectrum,"[48] Globalstar's "all shared" approach would force all operators to use CDMA technology.[49] In addition, ICO claims Globalstar's plan would delay 2 GHz MSS implementation because lengthy negotiations would result in order to come to agreement regarding the sharing technology.[50] According to Inmarsat, Globalstar's "all shared" proposal is contrary to ITU technical studies and would require all operators to modify their systems to share spectrum, contrary to Commission policy promoting innovation.[51]

12. Although none of the proposed band arrangements generated support from a majority of the commenters, all system proponents believe that the Commission can develop a technical sharing solution to accommodate all qualified system proponents.[52] In that regard, certain themes emerged: the Commission should (1) authorize a guaranteed minimum amount of spectrum,[53] (2) permit flexible spectrum use,[54] (3) allow flexibility not to choose any technology schemes prematurely,[55] (4) set a

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46 Globalstar Comments at 11-12 & Reply at 3-4.

47 Globalstar Comments at 21-22.

48 Globalstar Reply at 7.

49 ICO Reply at 17-19.

50 *Id. See also* IUSG Reply at 32-33 (it is too late for ICO to alter its technology to CDMA, as would be necessary under Globalstar's plan); Iridium Reply at 15-16 (Globalstar's "all shared" proposal is too impractical to work effectively in the present environment of 2 GHz MSS applications).

51 Inmarsat Reply at 4-7.

52 *See* Constellation Reply at 1. *See also* Globalstar Comments at 12-14; ICO Comments at 5; MCHI Comments at 17; TMI Comments at 8.

53 *See* Celsat Comments at 7-8 (benefit of flexible band arrangement); MCHI Comments at 5 (same). *See also* Boeing Comments at 21 (traditional band arrangement is the most attractive processing alternative because it is the most equitable in that it provides a minimum amount of guaranteed spectrum with the opportunity to later expand into unused or forfeited portions of the band); Constellation Comments at 13, 18 (same); MCHI Comments at 11 (same). *But see* IUSG Comments at 26-27 (guaranteed spectrum assignment not necessary to provide necessary certainty to permit confidence in system licenses for the purpose of financing).

54 Even parties that oppose the proposed flexible band arrangement argue for more flexibility. *See* Constellation Comments at 11, 15 (flexible band arrangement is too rigid); Globalstar Comments at 17 (same); ICO Comments at 10-11 & Reply at 10, 14-15 (denies early entrants the ability to operate flexibly and economically); IUSG Comments at 28-31 & Reply at 21 (cannot accurately predict the needs of all systems). *See also* ICO Comments at 10-11 & Reply at 10 (traditional band arrangement is too rigid); Inmarsat Comments at 11 & Reply Comments at 3 (same); IUSG Comments at 29-31 & Reply at 28 (same).

55 Constellation Comments at 11, 15; Globalstar Comments at 17; ICO Comments at 10-11 & Reply at 14-15; Inmarsat Comments at 5-6 (band plan should take new technological design developments into account); IUSG Comments at 28-31. IUSG urges the Commission not to segment the band by modulation schemes as technology may change and such a requirement would force applicants to elect a technology that may require submission of a

mechanism for systems to increase their amount of authorized spectrum when needed,[56] (5) provide disincentives for warehousing,[57] (6) prevent anti-competitive conduct by early entrants,[58] (7) avoid lengthy inter-system coordination negotiations,[59] (8) ease international coordination,[60] and (9) facilitate cost-effective relocation of the terrestrial incumbents.[61] To further explore these themes, the International Bureau released a *Public Notice* on February 7, 2000, seeking supplemental comments on authorizing the 2 GHz MSS systems using a processing alternative that combines the leading ideas on the record.[62]

b. Orbit Considerations and Regional Spectrum

13. The system proponents in this proceeding propose both NGSO and GSO mobile satellite systems.[63] Each type of system has technical advantages and disadvantages. For example, because NGSO satellites orbit close to the earth's surface, time delays during radio transmissions from the Earth to the satellite and back are shorter than for GSO systems. Conversely, because GSO satellites are at high altitudes, approximately 22,300 miles, a single GSO satellite has a very large potential coverage area, compared to a single NGSO satellite. Our goal is to provide an opportunity for both types of systems to

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major modification in the future to change the system. IUSG Comments at 20-22. *Cf.* Celsat Comments at 8 n.9 (requesting option of offering TDMA or CDMA service in its assigned segment).

[56] Celsat Comments at 7-8; Inmarsat Comments at 3; MCHI Comments at 5 & Reply at 9-10 (expressing preference for flexible band plan); TMI Comments at 5.

[57] Celsat Comments at 7-8; MCHI Comments at 5, 10-11; IUSG Comments at 33-34 & Reply at 28-29 (would invite warehousing of spectrum by "paper satellite" systems).

[58] Celsat, Constellation, Globalstar, Inmarsat, MCHI, and TMI all believe that early entrants could have the ability to delay entry of later entrants and, therefore, make it extremely difficult for later entrants to raise capital and to implement service. Celsat Comments at 16-17; Constellation Comments at 16-19; Globalstar Comments at 16, 18-19; Inmarsat Comments at 10-11; MCHI Comments at 5 n.12, 11-14; TMI Comments at 6-7. *See also* Celsat Comments at 9-12 (prevent the creation of "squatters rights"). *But see* IUSG Reply at 10-12 (all successful licensees to be accommodated once they are ready to provide service).

[59] ICO Comments at 10-11 & Reply at 11-12; MCHI Comments at 7-8 (adopt a good faith coordination standard); *but see* IUSG Reply at 23-24 (disputes over coordination could be contentious, delaying service).

[60] Inmarsat Comments at 4 (proposing spectrum assignments that would closely harmonize the Commission's band arrangement with the European 1.9/2.1 GHz MSS arrangement adopted by the European Radiocommunications Committee (ERC)); IUSG Reply at 22-23 & 29-30 (systems would require re-engineering, international re-coordination, and adjustments to the relocation scheme as system requirements change). MCHI states that the traditional approach would facilitate international coordination. MCHI Comments at 10-11. *See also* Celsat Comments at 14-16; Globalstar Comments at 16, 19; MCHI Comments at 5 n.12, 13-14.

[61] Of those commenters that addressed the relocation issue, most seek definitive action by the Commission to limit potential costs and to formulate rules to spread the costs equitably among the MSS licensees. Boeing Comments at 21-22 (advantage of the traditional arrangement is that relocation would be easier because each licensee would know what portion of the spectrum it is responsible for clearing); Celsat Comments at 9-12; IUSG Comments at 13-16, 20 n.45 & Reply at 26-27; TMI Comments at 4-6 (flexible arrangement does not address the relocation issue).

[62] *Public Notice*, 15 FCC Rcd 2696.

[63] We use the generic term NGSO to apply to low Earth orbit (LEO), medium Earth orbit (MEO), and highly elliptical orbit systems.

compete in the marketplace to provide users with the best combination of services and prices.[64] We proposed, therefore, to authorize both NGSO and GSO MSS systems for operations in the 2 GHz MSS bands. The comments support our proposal to authorize both NGSO and GSO 2 GHz MSS systems.[65] Consequently, we will accommodate both types of systems in our band plan.

14. Another difference between the two types of satellite systems is that NGSO systems can provide complete and continuous global coverage, whereas, a single GSO satellite, while capable of providing continuous coverage, typically only can provide regional service. In the *Notice*, we explained that because a single GSO satellite is inherently restricted to serving a particular geographic area, GSO systems may be better suited for regional spectrum than NGSO systems.[66] At that time, we had tentatively concluded that the transition from the current BAS band to the future BAS band would take place simultaneously on a date certain.[67] We therefore assumed that the authorized 2 GHz MSS systems would have immediate access to any portion of the 2 GHz MSS uplink band (1990-2025 MHz). Thus, given that portions of the 2 GHz MSS spectrum allocation are not uniformly available throughout the world,[68] the flexible and traditional band arrangements proposed in the *Notice* grouped GSO systems in that portion of the 2 GHz band allocated for MSS only in Region 2 (*i.e.*, the 2010-2025 MHz uplink band and the 2165-2170 MHz downlink band) ("regional spectrum").[69]

15. The two-phase transition from the current BAS band to the future BAS band described in the *2 GHz Second R&O and Second MO&O*[70] requires us to revisit our assumptions about relocation, and develop a modified MSS authorization approach that will provide greater flexibility for MSS operators to implement service. Specifically, the lower 18 megahertz of the MSS uplink spectrum (1990-2008 MHz), which roughly aligns with that portion of the uplink band allocated for global operations (1990-2010 MHz), will be cleared first. Consequently, the upper 17 megahertz of the MSS uplink spectrum (2008-2025 MHz), and thus, the regional uplink spectrum (2010-2025 MHz), will be cleared at a later date. We expect that the first 2 GHz MSS systems launched, whether NGSO or GSO, may wish to begin operations in the spectrum cleared in the first phase of the relocation in the uplink portion of the band (1990-2008

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64 As stated in the *Notice*, we limited eligibility to NGSO systems in the Big LEO proceeding because of a *de facto* limitation in other MSS bands to GSO services, a desire to foster LEO development, and to enhance consumer choice. *Notice*, 14 FCC Rcd at 4854 n.60 (citing *Big LEO Reconsideration*, 11 FCC Rcd at 12871 ¶ 29). We continue to believe that there is no reason to adopt a similar limitation in the 2 GHz frequency bands because there is adequate spectrum to accommodate both NGSO and GSO systems.

65 Constellation Comments at 8; Globalstar Comments at 3; ICO Comments at 4; Inmarsat Comments at 8; TMI Comments at 3. *See also* Iridium Comments at 10.

66 *See Notice*, 14 FCC Rcd at 4857-58 ¶ 28.

67 *2 GHz Relocation Third NPRM*, 13 FCC Rcd at 23966 ¶ 39.

68 *See supra* footnote 6 and accompanying text.

69 *See Notice*, 14 FCC Rcd at 4857-58 ¶ 28. *See, e.g.*, Constellation Comments at 8 (group GSO systems primarily in that portion of the 2 GHz band allocated for MSS in Region 2); Celsat Comments at 6-7 & Reply at 6-7 (segment the 2 GHz spectrum into global and regional bands); TMI Comments at 4 (supports the segmentation of the band into regional and global spectrum as long as there are no undue relocation costs as a result); Boeing Supplemental Comments at 7-10 (assign regional systems to regional spectrum); IUSG Supplemental Comments at 8 n.9 (confine GSO systems to regional spectrum). *Cf.* ICO Comments at 4-5 (limit the spectrum available to all GSO systems to an aggregate 10 MHz in either direction (2015-2025 MHz and 2165-2175 MHz); IUSG Comments at 7 (same). *But see* Celsat Reply at 7-8 (opposing the establishment of a GSO spectrum limitation).

70 *See 2 GHz Second R&O and Second MO&O*, FCC 00-233, at ¶¶ 22-35; *see also* paragraph 6, *supra*.

MHz).[71] Though the *Notice* proposed to authorize NGSO and GSO systems in separate global and regional portions of the bands, based on the 2 GHz relocation policy we adopted since the *Notice*, we now do not believe it would be fair to prohibit GSO satellite operators from seeking access to the spectrum that is cleared in the first phase of the uplink relocation. Instead, we permit both GSO and NGSO system operators to use spectrum anywhere in the 2 GHz MSS bands. We believe that by eliminating distinctions between spectrum allocated for MSS in Region 2 and spectrum allocated for MSS globally, we are providing the most equitable mechanism for assigning the available spectrum in light of the incumbent relocation process. In addition, we expect that, because of differing regional spectrum assignments for MSS, many of the proposed systems may have to operate in different bands in different regions of the world, reducing the significance of any distinctions between regional and global 2 GHz MSS spectrum in the U.S. allocation.

c. The 2 GHz MSS Band Arrangement

16. We adopt a hybrid band arrangement that includes features of the various proposals in the record. Under this arrangement, first we divide the 2 GHz MSS uplink (1990-2025 MHz) and downlink (2165-2200 MHz) bands into distinct segments of equal bandwidth ("Selected Assignments") based on the number of system proponents at the time that we authorize the 2 GHz MSS systems, or the first of these systems, whichever occurs sooner.[72] We also will reserve an additional segment of spectrum equal to the other segments for expansion of system(s) by operators meeting certain criteria for service to unserved areas.[73] The band arrangement, including the segment reserved for service to unserved areas, can be described as follows:

35 megahertz ÷ (Number of System Proponents + One) = Total Size of Spectrum Segments.

The segments will consist of adjacent blocks stretching from one end of the band to the other.[74] Each segment will represent an operator's potential selected spectrum assignment in each of the uplink and downlink bands. This arrangement is similar to the Traditional Band Arrangement proposal in the *Notice* in that we are dividing the spectrum into distinct segments for assignment. Unlike the Traditional Band Arrangement, however, we do not mandate a particular system orbit (that is, GSO or NGSO) for a given segment. Each 2 GHz MSS operator voluntarily will identify its selected spectrum at the time that the first satellite in its system reaches its intended orbit.[75] Operators must notify the Commission in writing regarding their Selected Assignment. The Commission staff will then issue a Public Notice to provide notification of the operator's selected segment. We adopt this arrangement to provide the certainty of a specific spectrum assignment that many commenters observed is critical to obtaining financing and thus ultimately to market success.

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[71] Of course, we will not prohibit 2 GHz MSS systems from operating in Phase II portion of the uplink band (2008-2025 MHz) if they are able to operate without causing interference to BAS licensees, *see* paragraph 24, *infra*, or are willing to escalate Phase II relocation.

[72] Based on the framework established in *DISCO II*, we will license U.S. systems and designate spectrum for foreign-licensed systems.

[73] *See* Section III.A.1.d., *infra*.

[74] For instance, if the Selected Assignments are 3.5 megahertz each, in the uplink portion of the band, the first Selected Assignment will begin at 1990 MHz and end at 1993.5 MHz. The second Selected Assignment will begin at 1993.5 MHz and end at 1997 MHz. The same segmentation will apply to the downlink portion of the band.

[75] A satellite's intended orbit is the orbit it will occupy to provide commercial service.

17. As the *Notice* explained, our experience has demonstrated that five megahertz of spectrum assigned to one system, 2.5 megahertz in either direction, is sufficient for commencement of service.[76] Under the band arrangement we adopt today, if all nine proponents are authorized, each system would choose Selected Assignments of 3.5 megahertz bandwidth in both the uplink and the downlink, with the remaining spectrum available for assignment based on service to unserved areas.[77] Several commenters supported our Flexible Band Arrangement in the *Notice* that would have provided for 2.5 megahertz of initial spectrum in both the uplink and downlink bands.[78] Still others favored our traditional band arrangement as a viable second choice because it offered a minimum amount of 3.75 megahertz of spectrum.[79] Thus, we believe that providing for 3.5 megahertz for each system is sufficient to commence operations. In addition, although we are hopeful that all proposed systems proceed toward authorization, it is possible that not all will do so before we first authorize a 2 GHz MSS system.[80] In such case, the remaining system proponents would receive more than 3.5 megahertz of spectrum upon authorization. For example, if at that time there are seven remaining proposals, each system authorized from that point would receive 4.375 megahertz of spectrum.[81]

18. Furthermore, as explained in the *Notice*, although we are hopeful that all authorized systems will be built, we recognize that this might not occur.[82] Thus, there is a probability that additional spectrum will become available as some authorized systems are not able to implement service. Spectrum abandoned by authorized systems may be available for expansion of systems that are operational and require additional spectrum. We do not, however, establish a policy or rule for redistribution of abandoned spectrum here. Instead, we will evaluate whether to redistribute such spectrum or make it available to new entrants after achievement of each of our system implementation milestones. We will also consider whether to designate abandoned spectrum for award to operators meeting our unserved area service criterion, described below.

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[76] *Notice*, 14 FCC Rcd at 4959 ¶ 34 (citing *Big LEO Report & Order*, 9 FCC Rcd at 5955 ¶ 44).

[77] That is, 35 megahertz of spectrum divided by nine system proponents plus one segment for assignment based on service to unserved areas would yield ten segments of 3.5 megahertz each.

[78] Celsat Comments at 7-8; Inmarsat Comments at 3; MCHI Comments at 5; TMI Comments at 5.

[79] Globalstar Comments at 21-22; MCHI Comments at 11; TMI Comments at 7. *Cf.* Celsat Comments at 13-14 (may provide enough spectrum if forfeited spectrum is reassigned to first round operators as expansion spectrum under Celsat's proposed expansion spectrum assignment rules).

[80] *See* Letter of F. Thomas Tuttle, Senior Vice President, Iridium LLC to Magalie Salas, Secretary, FCC, File No. 187-SAT-P/LA-97 (Sept. 13, 1999) (advising the Commission of the company's filing of a voluntary petition for reorganization under Chapter 11 of the Federal Bankruptcy Code); Constellation Comments at 25-26 ("[i]t will be very difficult for any system operator to finance two systems at the same time. . . . [F]ull [second] system construction is unlikely to begin until about three years prior to the end of the first generation system."). *Compare* Celsat Supplementary Comments at 2 n.3 (presuming that Inmarsat has abandoned its proposed 2 GHz MSS system) *and* MCHI Supplementary Comments at 2 n.5 (same) *with* Letter of Kelly Cameron, Inmarsat Counsel to Thomas Tycz, Chief, Satellite and Radiocommunications Division, International Bureau, FCC, File No. 190-SAT-LOI-97(4) (Jan. 28, 2000) (reporting the Inmarsat Board's decision that Project Horizons "is not appropriate to pursue at this time" yet "[d]espite this, Inmarsat remains interested in participating in the Commission's 2 GHz processing round."). *See generally American Telephone and Telegraph Co./Ford Aerospace Satellite Services Corp.*, Memorandum Opinion and Order, 2 FCC Rcd 4431, 4435 ¶ 29 (1987) (it is the Commission's policy not to consider applications that propose launch more than five years after grant).

[81] That is, 35 megahertz of spectrum divided by seven system proponents plus one segment for assignment based on service to unserved areas would yield eight segments of 4.375 megahertz each.

[82] *Notice*, 14 FCC Rcd 4858 ¶ 29.

19. In addition to authorizing each operational system to use a Selected Assignment, each operator may provide service anywhere else in the 2 GHz MSS spectrum on a secondary basis as to other MSS operators, with respect to the unoccupied spectrum assignments available for selection by other 2 GHz MSS operators. For example, one operator may utilize spectrum in another operator's selected spectrum, but must vacate that spectrum if the operator that has selected that spectrum wishes to occupy it. In addition, each operator may coordinate with any other 2 GHz MSS operator also seeking to use spectrum outside of its Selected Assignment. In that case, both such operators would operate on a secondary basis with respect to the system that has selected the spectrum. Thus, if two systems desire to operate on the same frequencies outside each of their Selected Assignments, neither has priority over the other. If those operators cannot coordinate secondary spectrum use in the desired portion of secondary spectrum, then they both must vacate those frequencies and operate elsewhere. In other words, systems can claim priority use of only Selected Assignments, and must operate outside of selected spectrum subject to appropriate intersystem coordination.[83] The sharing aspects of this band arrangement are similar to the negotiated entry alternative proposed in the *Notice* in that operators will coordinate spectrum usage among themselves.[84] Operators using spectrum on a secondary basis must comply with all applicable incumbent relocation requirements before commencing service. Later entrants selecting spectrum as their Selected Assignment that has been cleared by an earlier entrant for secondary use will be required to reimburse the earlier entrant for relocation costs.

20. System operators will be required to comply with the rules adopted for negotiations with and transition of terrestrial incumbents in the 2 GHz MSS uplink and downlink bands.[85] Operators that intend to use spectrum designated as Phase II spectrum in the uplink portion of the band must comply with all negotiation periods and transition requirements, unless they can share the spectrum. We recognize that system proponents may not be able to predict the segment of the uplink band they intend to select until late in the implementation process. This could make negotiations with incumbents more difficult under the two-year time periods established for negotiations for Phase II spectrum and in the downlink portion of the band. We believe, however, that 2 GHz MSS operators will have sufficient incentives to conclude negotiations in order to begin service. In addition, we believe that it will become clear once 2 GHz MSS systems begin implementing which operators will be in Phase II spectrum and which portions of the downlink spectrum remain available for Selected Assignments.

21. We do not limit the amount of spectrum available to 2 GHz MSS operators on a secondary basis outside of their Selected Assignments. In order to limit the potential for strategic delays, such as those raised by commenters, system operators will be required to inform service providers and subscribers in writing that service provided using spectrum outside of the Selected Assignment is subject to preemption.[86] In the event that a later entrant selects spectrum for its Selected Assignment that is being used by an earlier entrant, the earlier entrant will be required to move to other available spectrum or return to its Selected Assignment.[87] This part of the arrangement is designed to allow MSS systems to begin

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83 *See* paragraph 29, *infra*.

84 *Notice*, 14 FCC Rcd 4861-62 at ¶ 40-43.

85 *2 GHz Second R&O and Second MO&O*, FCC 00-233, at ¶¶ 38-49, 83-90.

86 For example, a 2 GHz MSS operator may operate solely in its Selected Assignment, entirely outside of its Selected Assignment (on a secondary basis), or partially in each.

87 Operators will be required to vacate spectrum identified as a Selected Assignment by another operator within 30 days of receipt of a letter from the new entrant requesting the move. Operators requesting a move shall file a copy of the demand letter with the Commission.

providing service in any available frequencies during the incumbent transition process, to encourage use of spectrum, and to facilitate inter-system coordination in the band when later entrants begin operations.

22. The comments received in response to the February 7, 2000 *Public Notice* generally support this band arrangement with several commenters raising specific concerns or recommending minor modifications.[88] Many of the commenters express concern about the ability of operators to access spectrum beyond the amount assigned for each Selected Assignment by sharing with other operators or other means.[89] For similar reasons, several commenters urge us to adopt a policy that would redistribute spectrum obtained from abandoned or revoked authorizations to the remaining operators.[90] We agree that our licensing arrangement should maximize spectrum sharing efficiencies. We recognize that some technologies may benefit from spectrum sharing techniques. Therefore, we permit operators to aggregate Selected Assignments by reaching agreement for sharing of those assignments among themselves. For example, several CDMA operators could agree to select and operate in adjacent Selected Assignments and design their spectrum use to overlap each other. This feature balances the needs of operators capable of using overlapping frequencies with those of systems that may not be designed to share co-frequency by providing incentives for shared technology proponents to cooperate during system implementation.[91]

23. ICO and IUSG seek clarification as to whether our band arrangement will require operators to select paired Selected Assignments in the service link bands.[92] That is, whether we will pair uplink Selected Assignments with downlink Selected Assignments. We do not require operators to select paired assignments of spectrum in the service links. We permit operators to request segments that are independent of each other. We agree with IUSG that this approach could reduce the burden of incumbent transitions during the initial phases of MSS deployment.

24. Similarly, in discussing how our band arrangement could reduce incumbent transition costs, Celsat requests that we clarify our position with regard to 2 GHz MSS systems sharing spectrum with BAS in the 1990-2025 MHz band.[93] In the *2 GHz Second R&O and Second MO&O*, we generally applied our relocation policy in the *Emerging Technologies Proceeding* to the relocation obligations facing the 2 GHz MSS system proponents.[94] This policy permits new licensees that can share spectrum with

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88 Boeing Supplemental Comments at 1; Celsat Supplemental Comments at 7; Constellation Supplemental Comments at 2; ICO Supplemental Comments at 2; Inmarsat Supplemental Comments at 2; Iridium Supplemental Comments at 2-3; IUSG Supplemental Comments at 2; MCHI Supplemental Comments at 3; TMI Supplemental Comments at 2.

89 Celsat Supplemental Comments at 4 (operators should be permitted to occupy two blocks because not all applicants will implement); Constellation Supplemental Comments at 7-8 (Commission should permit certain systems using CDMA technology to operate over two selected assignments); ICO Supplemental Comments at 3 (allow use of spectrum beyond selected assignment on secondary basis); Inmarsat Supplemental Comments at 2 (allow some selected assignments to overlap if operators agree); IUSG Supplemental Comments at 5 (operators launching the first satellite should be able to use spectrum beyond the selected assignment on a secondary basis); MCHI Supplemental Comments at 6-8 (concerned that the band plan does not provide the type of spectrum efficiencies that the Traditional Band Approach employed through technology groupings).

90 ICO Supplemental Comments at 4-5; Inmarsat Supplemental Comments at 3; Iridium Supplemental Comments at 3-4; IUSG Supplemental Comments at 6; and MCHI Supplemental Comments at 9-10.

91 In order to be able to aggregate spectrum, system proponents capable of sharing may want to coordinate launch of the first satellites in each system to coordinate the selection of Selected Assignments.

92 ICO Supplemental Comments at 6-7; IUSG Supplemental Comments at 7-8.

93 Celsat Comments at 11 n.13.

94 *2 GHz Second R&O and Second MO&O*, FCC 00-233, at ¶ 63.

incumbents to do so without incurring relocation obligations.[95] Therefore, if a particular 2 GHz MSS system proponent can demonstrate conclusively that its proposed system is capable of sharing spectrum with all types of BAS operations in the 2 GHz band, that system will be exempt from relocation obligations.

25. Because an entire BAS channel must be cleared nationwide before an MSS system can operate in that spectrum, the first 2 GHz MSS system to begin service in that portion of the uplink will have to clear more spectrum than it will be authorized to use.[96] As a result, the first entrant will clear BAS spectrum for later entering systems. That operator is thus entitled to relocation cost reimbursement from those systems using the cleared BAS spectrum. It would be grossly unfair to allow a system claiming it can share spectrum with BAS to take advantage of spectrum cleared by an earlier entrant. If that system can share with BAS to avoid relocation obligations, it must do so. Therefore, a 2 GHz MSS operator will be exempt from relocation obligations only if it chooses its Selected Assignment in an uncleared portion of the band. Furthermore, to maintain its relocation exemption, this 2 GHz MSS operator may not operate on a secondary basis in spectrum outside of its Selected Assignment that has been cleared by earlier entrants. For example, assuming the Phase I spectrum has been cleared, the 2 GHz MSS operator claiming it can share with BAS must choose its Selected Assignment in the Phase II portion of the band, and only operate in the Phase II portion of the band. If the system, once operational, discovers that it cannot share with BAS, or otherwise desires to operate in cleared spectrum in Phase I, it may do so, subject to compliance with the relocation procedures established in our relocation order.

26. The only system opposing the band approach proposed in the *Public Notice*, Globalstar, reiterates its recommendation that we adopt its "all shared" band arrangement. Under that arrangement, immediately upon licensing all eligible systems would share the entire available 2 GHz MSS spectrum through coordination. Globalstar's "all shared" band arrangement is premised on completion of coordination among all eligible 2 GHz MSS operators.[97] Globalstar admits in its comments, however, that "[n]egotiations do not always succeed, or can drag on for years."[98] We agree with Globalstar on that point and are concerned that if we were to adopt its proposal, deployment of all 2 GHz MSS systems could be delayed indefinitely. Such delay would significantly compromise our objective of expediting the delivery of 2 GHz MSS service to consumers. We also are troubled by the prerequisite under Globalstar's proposal that would potentially require the Commission to mandate that all 2 GHz MSS operators use the same technology or to coordinate (*e.g.*, modulation schemes) in order to facilitate co-frequency sharing among the 2 GHz MSS providers.[99] It has been our policy to allow licensees to optimize system designs within our regulatory framework in order to promote innovation.[100] Given that most of the 2 GHz MSS proponents, including Globalstar, have not committed to implementing a particular technology, we find no

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95 "[W]e will encourage spectrum sharing between emerging technologies services and incumbent 2 GHz fixed microwave users whenever technically feasible. . . . We are hopeful, however, that spectrum sharing techniques for some services . . . may prove workable. The success of those techniques could allow co-primary operation of some emerging technologies with existing fixed microwave services on a non-interference basis without the need for any relocation agreements." *Emerging Technologies Proceeding*, First Report and Order and Third Notice of Proposed Rule Making, 7 FCC Rcd at 6891 ¶ 29.

96 *2 GHz Second R&O and Second MO&O*, FCC 00-233, at ¶ 62.

97 Globalstar Supplemental Comments at 16.

98 *Id.* at 19-20.

99 *Id.* at 14.

100 47 U.S.C. § 157(a) ("It shall be the policy of the United States to encourage the provision of new technologies and services to the public.")

justification for adopting Globalstar's proposal and believe that the band arrangement adopted here best addresses the various system proposals.[101]

27. We also recognize, as stated by Globalstar, the ITU International Mobile Telecommunications for the Year 2000 ("IMT-2000") Project's progress on standardization of personal communication services technologies and its relevance to the MSS industry. All but one of the IMT-2000 radio transmission technologies can be implemented within 3.5 megahertz of selected spectrum. The implementation of IMT-DS (Wideband CDMA) requires more spectrum than may be available to a single operator under our band approach. The band approach we adopt today, however, provides sufficient flexibility for operators convinced of the efficiencies of using Wideband CDMA in shared spectrum to use spectrum outside of their Selected Assignment on a secondary basis or aggregate their spectrum assignments.

28. Several commenters raise other concerns about our band arrangement in their supplemental comments. Inmarsat suggests that authorized systems be entitled to select spectrum six months before launch to allow sufficient time to finalize plans and procedures for in-orbit testing.[102] We are not convinced by Inmarsat's assertion. We do not believe that launch dates are reliable deadlines. For instance, launch dates for any type of satellite – GSO or NGSO – can be delayed indefinitely or cancelled. TMI contends that triggering spectrum selection at the time of launch of a system's first satellite would disadvantage GSOs, as compared to NGSOs, because it takes longer to build and launch GSO satellites.[103] It is accurate that construction and launch of GSO satellites typically takes longer than that of individual NGSO satellites. On balance, however, we believe it is best to allow spectrum selection at the time the first satellite in a system reaches its intended orbit. It is at that moment that a 2 GHz MSS satellite system will need to identify spectrum and begin to operate there. In addition, though NGSO systems usually can be built faster, they require more launches to implement a constellation and conditions often vary and, thus, it is not certain what systems will be the first to be deployed. Moreover, allowing the first system that launches to select its spectrum, and each subsequent system to do so sequentially provides market-based incentives to launch systems. Thus, this approach furthers the Commission's strong policies favoring competition, efficient use of spectrum resources and quick deployment of services for the benefit of U.S. consumers.

29. MCHI raises the concern that operators may resort to "gaming" under our band arrangement by selecting an assignment based on its value to another applicant and requests that the Commission be prepared to address such problems on an *ad hoc* basis.[104] We do not intend to intervene unless the parties are unable to resolve an issue after first attempting to negotiate in good faith. We will be available to address specific concerns if an operator presents sufficient evidence to demonstrate that another operator has violated our rules. TMI raises a similar concern about preventing "squatting" by early entrants that use spectrum outside of their selected assignment on a secondary basis.[105] We address the potential for early entrants to abuse their negotiating position with later entrants by only allowing secondary use of spectrum outside of the Selected Assignment and requiring written notice to service

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101 Globalstar Supplemental Comments at 10 n.5.

102 Inmarsat Supplementary Comments at 2-3.

103 TMI Supplemental Comments at 2-3.

104 MCHI Supplemental Comments at 8-9.

105 TMI Supplementary Comments at 2.

providers and subscribers that service can be preempted.[106] Furthermore, we will enforce our rules if the need arises.

30. We adopt the band arrangement discussed above for assignment of the 2 GHz MSS spectrum to accommodate all proposed systems with adequate spectrum to launch service, and thus, we resolve mutual exclusivity among the system proponents.[107] This approach, which essentially consists of a combination of our Traditional Band Arrangement and Negotiated Entry Approach, provides certainty for qualified operators to pursue financing and design systems. At the same time, it provides sufficient flexibility to maximize the use of the 2 GHz MSS spectrum and minimize the burdens of incumbent relocation. In addition, the band arrangement adopted here promotes our goals of encouraging technical innovation, facilitating deployment of service, maximizing the efficient use of spectrum, and using market-based incentives.

d. Service to Unserved Areas

31. Section 151 of the Communications Act mandates that the Commission "make available, so far as possible, to all the people of United States without discrimination on the basis of race, color, religion, national origin, or sex, a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges . . . ."[108] In fulfilling this mandate, the Commission has had a long history of encouraging the deployment of basic and advanced telecommunications services to all U.S. consumers throughout the entire United States and associated geographic areas. For example, in 1994 in the *Big LEO Report & Order*, the Commission explained that the "new mobile satellite service [Big LEO] will offer Americans in rural areas that are not otherwise linked to the communications infrastructure immediate access to a feature-rich communications network."[109] On August 5, 1999, this Commission commenced two additional proceedings intended to foster the delivery of telecommunications services, including satellite services, to unserved areas.[110] On June 8, 2000, we adopted the first two Orders arising from these proceedings.[111]

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106 Celsat Supplementary Comments at 4-5. *See* paragraph 19, *supra*.

107 Our decision to forge a band arrangement that avoids mutual exclusivity by accommodating all 2 GHz MSS system proponents moots our consideration of competitive bidding as a method of authorizing the 2 GHz MSS system proponents. For the same reason, we do not address the Open-Market Reorganization for the Betterment of International Telecommunications Act (ORBIT Act), enacted after release of the *Notice*. *See* Pub. L. No. 106-180, § 3, 114 Stat. 48 (2000) (adding Section 647 to the Communications Satellite Act of 1962, 47 U.S.C. § 701 *et seq.*).

108 47 U.S.C. § 151.

109 *Big LEO Report & Order*, 9 FCC Rcd at 5940 ¶ 3.

110 First, in a Federal-State Joint Board on Universal Service Further Notice of Proposed Rulemaking, we sought comment on the availability of, and possible impediments to, deployment and subscribership in unserved and underserved areas of the Nation, including for satellite services. *Promoting Deployment and Subscribership in Unserved and Underserved Areas, Including Tribal and Insular Areas*, CC Docket No. 96-45, Further Notice of Proposed Rulemaking, 14 FCC Rcd 21177 (1999). We also sought comment on a range of possible modifications to the high-cost, low-income and rural health care support mechanisms that are designed to promote deployment and subscribership in these areas. Second, in a separate Notice of Proposed Rulemaking addressing wireless and satellite technologies specifically, we sought comment on any policies that we could adopt, or regulations that we should eliminate or streamline, including for satellite services, to promote the deployment of services in tribal lands and other unserved areas. *Extending Wireless Telecommunications Services to Tribal Lands*, WT Docket No. 99-266, Notice of Proposed Rulemaking, 14 FCC Rcd 13679 (1999). The Commission has recently imposed conditions on the merged SBC Communications Inc. (SBC) – Ameritech Corporation (Ameritech) entity to

32. We believe that access to telecommunications services is essential to ensuring that persons residing in unserved or geographically isolated areas are able to participate in today's fast-changing information economy. If access is not provided, persons residing in these areas will have less opportunity to seek or access educational, medical, economic or other important resources. As we stated in the *Notice*, we believe satellites are an excellent technology for delivering basic and advanced telecommunication services to unserved, rural, insular or economically isolated areas, including Native American communities, Alaska, Hawaii, and Puerto Rico, and U.S. territories and possessions such as communities within the U.S. Virgin Islands, Guam and American Samoa ("unserved areas").[112] In the *Notice*, we sought guidance as to the policies or rules we could implement (or forbear from) to encourage provision of 2 GHz MSS to unserved areas. For example, we asked whether one criterion for awarding expansion spectrum and resolving coordination disputes should be whether a licensee is providing service to unserved areas.[113] We noted that we have thus far not adopted such policies or rules for Big LEO licensees or other MSS providers. We therefore sought comment on whether we should, in a separate proceeding, adopt similar policies or rules for unserved areas for Big LEO and other satellite licensees.

33. We remain committed to encouraging the expeditious delivery of telecommunications services, via satellite services, to unserved communities. The comments in this proceeding support our belief that satellites are an excellent technology for delivering these services.[114] Indeed, the record shows that many of the 2 GHz MSS system proponents claim that providing service to unserved and rural areas is a major part of their business plans.[115] For example, Celsat explains that it envisions being able to bring

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promote service to rural and unserved areas. We are requiring that at least ten percent of all rural/urban wire centers where the merged entity's xDSL separate affiliate provides service be low-income rural/urban centers. Summary of SBC/Ameritech Conditions, http://www.fcc.gov/Bureaus/Common_Carrier/News_Releases/1999/nrc9077a.html.

111 *Promoting Deployment and Subscribership in Unserved and Underserved Areas, Including Tribal and Insular Areas*, CC Docket No. 96-45, Twelfth Report and Order, Memorandum Opinion And Order, and Further Notice of Proposed Rulemaking, FCC 00-208 (rel. June 30, 2000) (*Universal Service Twelfth R&O*); *Extending Wireless Telecommunications Services to Tribal Lands*, WT Docket No. 99-266, Report and Order and Further Notice of Proposed Rule Making, FCC 00-209 (rel. June 30, 2000) (*Wireless Tribal Order*).

112 *Notice*, 14 FCC Rcd at 4886-87 ¶ 95.

113 *Id.*

114 Boeing Comments at 16-18; Celsat Comments at 28; Constellation Comments at 28; Globalstar Comments at 44; ICO Comments at 19; IUSG Comments at 44; Iridium Comments at 41; MCHI Comments at 26; Satellite Industry Association (SIA) Comments at 2-3. We also received comments from two very small aperture terminal (VSAT) providers. Both of the VSAT commenters agree that satellites are an excellent technology for providing telecommunications services to unserved areas. STM Wireless, Inc. (STM) argues that MSS systems may not be an efficient technology for providing service to these areas. *Ex Parte* Letter of STM Wireless, Inc. (dated July 13, 1999) (explaining that STM is currently using the latest VSAT technologies to successfully serve these markets for 10-15 cents per minute for voice telephone service to anywhere in the United States). The other VSAT commenter, Titan Wireless (Titan), requests Commission support in various regulatory areas. Titan seeks assistance in the areas of interconnection with the PSTN, access to Universal Service Funds, coordination of space segment frequency and expeditious licensing of earth stations, and availability of extended C-band frequencies to make it easier for VSAT operators to provide service in these unserved areas. Titan Reply Comments at 2-4. These issues are outside the context of this proceeding and will be considered in other rulemakings.

115 Constellation 2 GHz MSS Application at 13; MCHI 2 GHz MSS Application, Exhibit 2: Market Information; Globalstar 2 GHz MSS Application at 52-3; *Ex Parte* Letter of Eagle River Investments, LLC, and ICO Global Communications (dated March 17, 2000) (Eagle River/ICO *Ex Parte* Letter); Celsat Consolidated Replies and Opposition at 2 (filed June 3, 1998).

service to these communities for as little as eight cents per minute, including long-distance voice telephony service.[116] Celsat agrees with our proposal to award expansion spectrum based on providing service to unserved areas as an incentive to provide such service.[117] Moreover, ICO states that its technology and business plan are uniquely suited to serving remote areas.[118]

34. We agree with the commenters who state that satellites are an excellent method for quickly extending basic and advanced telecommunications services to rural and unserved areas. We believe that the incentives we adopt below are an efficient method for deploying service in unserved areas. We find that it is more appropriate to create a spectrum-based incentive mechanism, rather than to adopt specific and detailed requirements, as an efficient means to more closely approximate a market-based mechanism for ensuring that unserved areas receive needed services in a timely manner. In other words, firms that choose to deploy service to unserved areas will obtain additional guaranteed spectrum as a result of providing such service, but will have the option of choosing not to deploy such service and therefore not avail themselves of the opportunity to obtain additional guaranteed spectrum.

35. Therefore, we will make available a separate segment of spectrum for assignment as expansion spectrum in both the uplink and the downlink portions of the service band. In the Flexible Band Arrangement section in the *Notice*, we proposed the concept of expansion spectrum by which additional spectrum would be assigned to an entity when it demonstrated that its commercial operations were exceeding the capacity of its original spectrum assignment.[119] The expansion spectrum as adopted here will be available to authorized 2 GHz MSS systems that first demonstrate they will offer MSS *capacity* directed at providing service to consumers in unserved areas. Authorized systems will be eligible for the expansion spectrum whether or not they are operational. The expansion segment will be available in any assignment available for selection in the Phase I portion of the uplink band (1990-2008 MHz), as long as sufficient spectrum remains available to accommodate at least one additional entrant. If there is not sufficient spectrum to accommodate an additional authorized system in the Phase I spectrum, the expansion spectrum will be located in the Phase II portion of the uplink band (2008-2025 MHz). The expansion spectrum will be available in any assignment available for selection in the downlink portion of the MSS spectrum (2165-2200 MHz) that has not already been selected.

36. In order to be eligible for assignment of the expansion spectrum, authorized 2 GHz MSS systems must demonstrate that at least ten percent of their contracted U.S. capacity is committed to service providers that offer 2 GHz MSS services in unserved or rural service areas. For purposes of this incentive, we will adopt as the definition of unserved area any area falling within a Rural Service Area (RSA).[120] RSAs closely fit the unserved areas we identified as areas that could most benefit from 2 GHz MSS in the *Notice*, and provide a well-established geographic designation. We will determine the amount of unserved or rural capacity contributed by each individual capacity contract by multiplying the total amount of capacity covered by that contract by the percentage of the relevant retail carrier's service area that falls

116 Celsat Comments at 28.

117 *Id.* at 29.

118 Eagle River/ICO *Ex Parte* Letter at 1.

119 *Notice*, 14 FCC Rcd at 4859 ¶ 33.

120 RSAs are 428 areas, other than Metropolitan Statistical Areas (MSAs), established by the Commission for the purposes of defining cellular markets. *See* 47 C.F.R. § 22.909. The 428 RSAs, and the counties they comprise, are listed in Public Notice, Report No. CL-92-40, DA 92-109, 7 FCC Rcd 742, 762-97 (1992).

within an RSA. We will then add up the aggregate amount of rural capacity provided by all contracts and divide that figure by the total amount of the 2 GHz provider's contracted-for capacity.[121]

37. We believe that ten percent of an authorized 2 GHz MSS system's contracted U.S. capacity represents a reasonable approximation of the capacity that is necessary to provide meaningful service to unserved areas. RSAs cover approximately 20 percent of the U.S. population, a significant percentage of potential subscribers.[122] Thus, we believe that a ten percent RSA contracted-capacity service offering incentive is an appropriate and reasonable voluntary incentive that would not create an undue burden on operators. We also note that the spectrum available for expansion is optional, and is merely available as an incentive for those interested in providing service to unserved areas.

38. Authorized 2 GHz MSS systems that seek to establish eligibility for the expansion spectrum must submit copies of service contracts evidencing such eligibility. To maximize the opportunity for all 2 GHz MSS operators to obtain service contracts, we will accept requests for expansion spectrum beginning one year from the date the first 2 GHz MSS system is authorized. When a request for the expansion spectrum is filed, Commission staff will issue a Public Notice announcing that the Commission is accepting competing requests for the expansion spectrum from authorized 2 GHz MSS systems. As stated above, authorized 2 GHz MSS systems do not have to be operational to qualify for the expansion spectrum. Once the deadline for requests closes, we will evaluate the requests based on the criterion described above, and issue an order assigning or designating the spectrum to those authorized 2 GHz MSS systems meeting or exceeding the criterion. A successful entity for expansion spectrum will be required to contribute all applicable incumbent relocation costs under our incumbent relocation rules and the 2 GHz MSS band arrangement adopted here. In addition, satellite operators receiving expansion spectrum under this process will be required to report on the actual number of subscriber minutes originating or terminating in unserved areas as a percentage of the actual U.S. system use, as part of their annual system-utilization reporting requirement.[123]

39. The benefits of 2 GHz MSS, including two-way voice, data, and Internet services, should be available to U.S. customers in all parts of the United States, including unserved areas.[124] We have

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[121] An authorized 2 GHz MSS system seeking expansion spectrum must submit all capacity measurements (e.g., minutes, megabits per second) in a uniform measurement when aggregating capacity. For example, satellite operator A enters into capacity contracts with retail service providers B and C for 10 million minutes each. Satellite operator A does not have any other contracts. B's retail footprint extends 20% into RSAs. Multiplying 10 million minutes by 20% yields 2 million minutes attributable to RSA coverage. C's retail footprint extends 7% into RSAs. Multiplying 10 million minutes by 7% yields 700,000 minutes. Aggregating B and C's attributable RSA minutes sums to 2.7 million minutes. Dividing the aggregate of B and C's RSA minutes by the total contracted-capacity of 20 million minutes produces a 13.5% attributable RSA contracted-capacity for satellite operator A. A qualifies for rural spectrum as it has met the 10% threshold.

[122] We note that as of 1996, approximately 20 percent of the U.S. population lived in RSAs, based on census data indicating that 214 million people live in metropolitan areas (MAs), including MSAs, and a total U.S. population of 265 million people (derived from data published at U.S. Bureau of the Census, State and Metropolitan Area Data Book 1997, table B-1; U.S. Census Bureau, Current Population Reports, 25-311, 25-802, 25-1095 and "Monthly estimates of the United States population: April 1, 1980 to November 1, 1998"). We recognize that MAs, as described by the Census Bureau, may be overinclusive because they include MSAs, consolidated MSAs, and New England county metropolitan areas (NECMAs). This approximation, however, is sufficient for purposes of estimation.

[123] *See* Section III.C.4., *infra*.

[124] We also note that this spectrum has long been identified by the Commission for service to such areas. *See Amendment of the Commission's Rules to Establish New Personal Communications Services*, GEN Docket No. 90-314, Memorandum Opinion and Order, 9 FCC Rcd 4957, 4995-96 ¶¶ 94-97 (1994).

carefully designed this incentive to complement the band arrangement we adopt today. We believe that assigning or designating additional spectrum to authorized 2 GHz MSS systems demonstrating concrete progress toward making satellite capacity available to unserved areas, as verified by reports of the number of subscriber minutes in these areas**,** will advance our objective of achieving universal access to telecommunications services as early as possible.

40. Some commenters urge us not to create incentives for 2 GHz operators to target their services to unserved areas.[125] These commenters believe that the Commission's geographic coverage requirements and multiple licensing scheme already create market-based incentives for providing service to unserved areas.[126] Many of these commenters argue that the earth station or handset licensees, as opposed to the space station operators, are more appropriate entities for incentives because they will be Commercial Mobile Radio Service (CMRS) operators offering service on a non-discriminatory common-carrier basis.[127] These commenters argue that changes to the satellite system designs or business plans will not increase access to 2 GHz MSS in unserved areas. By contrast, Celsat asserts that satellite system operators design the space segment of the network to meet business plan and service pricing objectives.[128] We believe that Celsat's assertion has merit. By providing a spectrum-based incentive beyond a provider's selected assignment, we can encourage systems to consider deployment of service to unserved areas in the early business planning and system design phases. We also note that ICO has recently made a commitment to provide telephone and Internet service to non-commercial locations on Native American tribal lands at a discount of up to 50 percent from applicable retail rates.[129]

41. The commenters that oppose incentives for space segment operators suggest that the Commission may want to take positive steps to encourage access to Universal Service Funds by mobile earth station service providers by forbearing from regulations that make it difficult for these groups to obtain such funds.[130] As described above, the Commission recently adopted two Orders addressing issues regarding deployment of terrestrial and satellite telecommunications services to unserved areas, including tribal and insular areas.[131] In addition to our action here today, we recently adopted an order in which we stated that we will entertain waiver requests as necessary to overcome possible technical and administrative hurdles to facilitate deployment of service to certain unserved areas (i.e., tribal lands).[132] Our recent Order with respect to universal service elaborated on the process of designating eligible telecommunications carriers to receive specific Federal universal service support.[133] Consequently, it is unnecessary to take any further action in this item with respect to Universal Service Funds.

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125 Constellation Comments at 27; Globalstar Comments at 44-45; ICO Comments at 20; IUSG Comments at 44-45; Iridium Comments at 42; MCHI Comments at 26 (not supporting the proposals in the *Notice*); SIA Comments at 2-3 (not supporting the proposals in the *Notice*).

126 Constellation Comments at 28; Globalstar Comments at 44-45; ICO Comments at 19 n.59 & Reply at 23; IUSG Comments at 44 & Reply at 41; Iridium Comments at 41; Boeing Reply at 24.

127 ICO Comments at 20-21 & Reply at 24; IUSG Comments at 44-45 & Reply at 41; Iridium Comments at 42.

128 Celsat Reply at 20.

129 *See* Eagle River/ICO *Ex Parte* Letter.

130 Globalstar Comments at 44-45; MCHI Comments at 26-27; IUSG Comments at 44-45.

131 *See supra* footnote 111 and accompanying text.

132 *Wireless Tribal Order*, FCC 00-209, at ¶ 51.

133 *Universal Service Twelfth R&O*, FCC 00-208, at ¶¶ 61, 109.

42. Several commenters also suggest that the Commission can actively support deployment of MSS to unserved areas by ensuring low-cost entry by minimizing relocation costs of 2 GHz incumbents.[134] Under our relocation policy,[135] the costs to 2 GHz MSS entrants have been reduced to the extent we believed possible, and we have provided maximum flexibility to MSS operators to provide service until the incumbents are relocated through the band arrangement we adopt today. These measures will significantly reduce any costs or burdens to MSS operators and should make availability of 2 GHz MSS capacity for service to unserved areas more economically viable.

43. Because it plans to provide aeronautical services, Boeing is concerned that its system may not qualify for any adopted incentive mechanism, depending on the definition of the term "unserved communities."[136] We cannot guarantee that Boeing would be in the position to satisfy the criterion for expansion spectrum or to be granted it. As described above, however, all authorized 2 GHz MSS systems, including Boeing, will be entitled to file requests demonstrating that they have satisfied the requisite criterion for seeking authority to use the unserved area spectrum. In addition, under the adopted band arrangement, Boeing will be able to obtain its selected spectrum unrelated to eligibility for the unserved area expansion spectrum.

44. Iridium expresses concern that any adopted incentives for service to unserved areas should apply equally to 2 GHz U.S.-licensees and LOI filers and must exclude Big LEO (1.6/2.4 GHz) licensees.[137] In response to Iridium, we clarify that the policies we adopt today for unserved area expansion spectrum apply equally to U.S. and foreign-licensed operators. In addition, we will not adopt any incentives concerning Big LEO spectrum at 1610-1626.5 MHz and 2483.5-2500 MHz as this proceeding is limited to 2 GHz MSS.

e. System Amendments

45. We have repeatedly emphasized that 2 GHz MSS system proponents will be afforded an opportunity to amend their applications and LOIs, if necessary, to bring them into conformity with the requirements and policies adopted for systems in these bands.[138] Although we did not seek comment on amendment procedures, Celsat requests that we dispense with an amendment period entirely to expedite the spectrum authorization process,[139] while MCHI requests a minimum three months to amend applications or LOIs as necessary.[140] Based on our decisions today, system proponents will need to amend their

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134 ICO Comments at 20; IUSG Comments at 45-46; MCHI Comments at 26.

135 *See generally 2 GHz Second R&O and Second MO&O*, FCC 00-233.

136 Boeing asserts that the aviation community should be included in the definition of "unserved communities." Boeing Comments at 17-18. Boeing Reply at 24-25 (Boeing changed its initial support for the Commission's proposal to provide incentives for service to unserved areas in its reply comments due to its concern that the aviation community may not be included in the definition of the term unserved communities).

137 Iridium Comments at 43 n.79.

138 *See Notice*, 14 FCC Rcd at 4848 ¶ 5; Public Notice, Report No. SPB-88, 12 FCC Rcd 10446 (1997).

139 Celsat Comments at 4-5, Reply at 3-4 & Supplemental Comments at 6. Celsat's support for its proposal, the streamlined licensing procedure used in the Ka-band first processing round, is inapposite because the Ka-band proponents came to a mutual agreement and were able to simply file a letter with the Commission stating their intention to construct its system in compliance with that agreement. No such agreement has been reached in the 2 GHz MSS processing round.

140 MCHI Comments at 18.

applications or LOIs in order to receive continued consideration,[141] even if the only amendment is an orbital debris narrative statement.[142] We also believe, however, that a three-month amendment period would unnecessarily delay our goal of expediting authorization of these systems, some of which have been on file since 1994.[143] Therefore, we will provide 30 days after a summary of this *Report and Order* is published in the Federal Register for system proponents to amend their filings, which is comparable to the length of time the Commission gave to the proposed Big LEO systems to file application amendments after release of the *Big LEO Report & Order*.[144]

2. Financial Qualifications

46. Historically, the Commission has fashioned financial requirements for satellite services on the basis of entry opportunities in the particular service being licensed.[145] Under Commission precedent, the purpose of financial qualification rules is to prevent warehousing and ensure quick deployment of service where there may be more applicants than available licenses.[146] In cases where we can accommodate all pending applications and future entry is possible, however, we have not looked to financial ability as a prerequisite to a license grant.[147] In the *Notice*, we tentatively concluded that analysis of financial qualifications would not be necessary in this 2 GHz MSS processing round because we believed the proposed 2 GHz MSS band arrangements could accommodate all proposed systems, and provide opportunities for future entry.[148] In addition, we sought comment on whether strict enforcement of milestones would better serve the goals on which financial qualification requirements are based.[149]

47. Many of the 2 GHz MSS system proponents oppose financial qualifications on the ground that implementation milestones alone will provide adequate assurances of project completion.[150] Several observe that financial standards are inappropriate because they are a barrier to entry, impede innovation, and substitute a flawed method for predicting success for the rigors of the marketplace.[151] Globalstar points out that it is common industry practice to acquire funding over an extended period of time, which suggests that milestones are more meaningful indicators than one-time financial qualifications.[152] Boeing and Inmarsat, however, stress the need for financial qualification standards, in order to eliminate delay caused by applicants not prepared to deploy services rapidly.[153]

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141 *See, e.g., Big LEO Report & Order*, 9 FCC Rcd at 5939 ¶ 2.

142 *See* Section III.B.7., *infra*.

143 *See Notice*, 14 FCC Rcd at 4847 ¶ 5.

144 *See Big LEO Report & Order*, 9 FCC Rcd at 6023 ¶ 230.

145 *See, e.g.*, 47 C.F.R. §§ 25.140(c), 25.142(a)(4).

146 *See, e.g., Big LEO Report & Order*, 9 FCC Rcd at 5948-50 ¶¶ 26-30.

147 *Id.* at 5948 ¶ 26.

148 *Notice*, 14 FCC Rcd at 4856 ¶ 24.

149 *Id.*

150 *See* Celsat Comments at 20-23 & Reply at 24; Constellation Comments at 3-4; Globalstar Comments at 6-8 & Reply at 19; ICO Comments at 5-6; MCHI Comments at 22; *see also* IUSG Comments at 38; Iridium Reply at 24.

151 *See, e.g.*, MCHI Comments at 22; Constellation Comments at 3-4; Celsat Comments at 20-23.

152 Globalstar Comments at 6-7.

153 Boeing Comments at 27-33; Inmarsat Comments at 15-16.

48. We adopt our tentative conclusion not to impose financial qualification requirements for the current 2 GHz MSS processing round. As explained above, our adopted band arrangement accommodates all eligible systems with adequate spectrum to launch service. We also believe that future entry is possible, given our decision today to defer automatic redistribution of spectrum returned to the Commission as a result of missed milestones. Moreover, our decision to impose and strictly enforce milestone requirements will ensure timely construction of systems and deployment of service. BellSouth Corporation (BellSouth) contends that financial qualification requirements are necessary to ensure that MSS system proponents can meet obligations concerning incumbent relocation.[154] We disagree. Paying relocation costs is a necessary prerequisite to beginning service (unless the system's ability to share spectrum exempts it from paying relocation costs). If a 2 GHz MSS system proponent does not have the funds to relocate incumbents, it cannot operate, and thus, the incumbent can continue operating in its original spectrum. We believe that this relocation process provides adequate marketplace incentives for 2 GHz MSS systems to obtain the necessary financing to commence and complete relocation in a timely fashion.

3. Technical Qualifications

49. The Commission traditionally has established threshold technical requirements for satellite systems to maximize use of the limited spectrum/orbit resource.[155] All 2 GHz applicants and LOI filers must meet our threshold qualification criteria to be eligible for licensing or spectrum reservation. In this section, we describe the minimum requirements, if any, for frequency agility, geographic coverage, and provision of Aeronautical Mobile-Satellite Route Service ("AMS(R)S").

50. As we recognized in the *Notice*, the 2 GHz MSS system proponents have proposed different types of satellite system designs.[156] We remain committed to giving satellite system operators the flexibility to design and implement systems that will best meet the needs of their customers. At the same time, we remain committed to facilitating competition by maximizing the number of potential service suppliers. The technical rules adopted here are intended to further both these goals.

a. Frequency Agility

51. In the *Notice*, we proposed to require that 2 GHz MSS satellites and ground terminals be capable of operating across all portions of the 2 GHz MSS band (1990-2025 MHz and 2165-2200 MHz) in order to ensure flexibility in system coordination and operations.[157] TMI agrees with the proposal.[158] ICO and IUSG suggest that we adopt a requirement that NGSO systems should be capable of operating anywhere within 70 percent of the band and GSO operators should be capable of operating anywhere within 70 percent of the regional spectrum.[159] Inmarsat estimates that current technology would permit

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154 Bell South Comments at 4-5 & Reply at 5-6. *Accord* Society of Broadcast Engineers, Inc. (SBE) Reply at 2. *Cf.* BellSouth Comments at 2-3 & Reply at 1-4 (suggesting that the Commission prescribe a competitive bidding licensing mechanism to ensure that the 2 GHz MSS spectrum is assigned to entities with the financial resources to commence service to the public promptly); *but see* TMI Comments at 8 (auctions would distort access to capital); SIA Comments at 3-4 (auctions would inhibit competition among global satellite systems).

155 47 U.S.C. § 308(b).

156 *Notice*, 14 FCC Rcd at 4853 ¶ 16.

157 *Id.* at 4890 ¶ 107.

158 TMI Comments at 4.

159 ICO Comments at 22; IUSG Comments at 7-8.

deployment of equipment that operates over a maximum of 30 megahertz in each direction.[160] Inmarsat opposes any requirement contending that the market will dictate whether manufacturers design their equipment to communicate over large portions of the band. ICO and IUSG also urge the Commission to adopt a rule requiring that system operators design their systems to be capable of unpaired frequency operation between the uplink and the downlink assignment segments;[161] that is, the ability of satellite systems to change frequencies used to transmit from earth stations to the satellite(s) and back.[162] ICO and IUSG argue that this requirement is necessary to facilitate frequency coordination with other MSS operators. These commenters also assert that requiring unpaired operation will reduce the burden of deployment during the transition with terrestrial incumbents.

52. We do not adopt a requirement that 2 GHz MSS systems must be able to operate across the entire 2 GHz MSS band. Such a requirement is unnecessary given that, as a result of our band arrangement, regional allocation variations for international coordination, and incumbent relocation, systems must be capable of operating across large portions of the band anyway.[163] We do adopt a more limited requirement. Based on the comments, we believe that it is appropriate to require operators to be capable of operating across at least 70 percent of the U.S. 2 GHz MSS allocation (1990-2025 MHz and 2165-2200 MHz). We believe that it is important to design and launch 2 GHz MSS systems with sufficient flexibility to address coordination and band arrangement contingencies. This requirement comports with the current technical capabilities of system operators. We encourage system proponents to design their systems to be able to operate across more than 70 percent of the 2 GHz MSS bands in order to be able to provide the maximum amount of flexibility for spectrum use in the future.

53. With regard to unpaired frequency operation, we agree with ICO and IUSG and therefore adopt a requirement that 2 GHz MSS systems must be designed to be capable of changing the frequencies used to operate between the uplink and the downlink frequencies in their systems. This will provide for maximum flexibility in systems designs and assist in coordination of spectrum use among operators and with the transition of terrestrial incumbents in the bands.

54. Constellation requests that the Commission recognize that NGSO systems should be capable of operating in the 1980-1990 MHz band outside of the United States and that we authorize such systems for service outside the United States subject to protection of terrestrial systems in the United States.[164] Although the global systems here may be capable of operating in bands not available in the United States, and the ITU allocations in the 1980-1990 MHz portion of the band may be available in other regions of the world, we do not have the authority to license operations in other Regions. Operators will be required to obtain authorization from administrations in other regions in order to operate in those countries' territories. We recognize that 2 GHz MSS operators, particularly those proposing global systems, may be required to use the 1980-1990 MHz band in other countries and the 2015-2025 MHz band only in Region 2. We remind these operators that they will have to design their systems to be capable of meeting the requirements of spectrum coordination in all parts of the world in which they expect to provide service. We

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160 Inmarsat Comments at 17.

161 Traditional "bent pipe" satellite systems use paired frequencies between the uplink and the downlink bands. The satellite sets the translation frequency between the transmit and receive bands.

162 ICO Comments at 22 & Supplemental Comments at 7-8; IUSG Supplemental Comments at 7-8.

163 *See* Section III.A.I.c., *supra* (band arrangement); Section III.E., *infra* (different regions may require operations on different frequency bands for the purposes of international coordination); *2 GHz Second R&O and Second MO&O*, FCC 00-233 (incumbent relocation).

164 Constellation Comments at 8-9.

do not, however, mandate that systems be capable of operating in the 1980-1990 MHz band outside of the United States.

b. Coverage Requirements

55. *NGSO systems.* In the *Notice*, we proposed adoption of the same coverage requirements for 2 GHz MSS NGSO systems as we did for Big LEO systems.[165] We explained that we believed that the rationale for adopting coverage requirements in the Big LEO proceeding also applies here. We believe that balancing system cost against projected need and alternative service options favors requiring service only to areas sufficient to cover the majority of the populated areas on the Earth. We proposed 2 GHz MSS systems operating NGSO constellations be capable of serving locations as far north as 70º North latitude and as far south as 55º South latitude for at least 75 percent of every 24-hour period in order to cover the majority of the world's population. We also proposed a specific coverage requirement for the United States. Specifically, we proposed that NGSO MSS operators be required to provide continuous coverage throughout all 50 states, Puerto Rico, and U.S. territories and possessions, and specifically that at least one NGSO satellite must be visible above the horizon at an elevation angle of at least five degrees at all times, as we did for Big LEOs.[166]

56. The commenters support our proposed NGSO coverage requirement.[167] We, therefore, adopt our proposals and amend the Big LEO rules to require 2 GHz MSS systems to provide global coverage. This requirement is consistent with our Big LEO rules and will provide sufficient coverage for service to the majority of the populated areas on the Earth. We also amend our rules to require 2 GHz MSS operators to provide continuous coverage of the United States, as described above. This requirement will create service opportunities for all of the United States.[168]

57. Constellation requests that we clarify that the coverage requirements will apply equally to LOI filers.[169] As we have said in *DISCO II* and throughout this proceeding, we will apply our 2 GHz MSS operating requirements to all system operators. Therefore, LOI filers that will serve the United States, whether proposing NGSO or GSO systems, will be required to comply with the U.S. and worldwide coverage requirements.

58. *GSO systems.* In the *Notice*, we explained that individual GSO satellites have a fixed coverage area that is inherently regional.[170] Because of this characteristic, we did not propose a global coverage requirement for systems that use only GSO satellites. While we could have required GSO satellite system operators to provide global coverage such coverage would require additional satellites without providing any additional capabilities or capacity in the United States. Rather, we proposed to

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165 *Notice*, 14 FCC Rcd at 4854 ¶ 18.

166 47 C.F.R. § 25.143(b)(2)(ii)-(iii).

167 Globalstar Comments at 4; ICO Comments at 4; Iridium Comments at 11.

168 Celsat expresses concern that Boeing's system requirement for intra-network priority and preemptive access is inconsistent with our coverage proposal for NGSO systems because Boeing's priority and preemption requirements mean that Boeing would not be able to provide continuous service to all users in its system.[168] We disagree with Celsat. We find that our continuous coverage requirement does not prohibit customer priority or preemption between calls on the same system. In addition, the requirement does not require that systems exceed their inherent design capacity in order to attain uninterrupted service.

169 Constellation Comments at 3.

170 *Notice*, 14 FCC Rcd at 4854 ¶ 19.

require such systems to provide coverage to all 50 states, Puerto Rico, and the U.S. Virgin Islands, unless the system operator can demonstrate that such coverage is technically *infeasible*.

59. We adopt our proposal. We recognize that the commenters may have been confused by slightly different language in the *text* of the *Notice* and the proposed *rule* section of the *Notice*.[171] The proposed rule proposes that operators be required to provide service to all 50 states, Puerto Rico, and the U.S. Virgin Islands, if technically *feasible*.[172] We adopt our proposal as drafted in the proposed rule and require GSO system operators to provide service to all 50 states, Puerto Rico, and the U.S. Virgin Islands, if technically *feasible*. This requirement is the same as our geographic service requirement for direct broadcast satellite operators.[173] This requirement also provides reasonable parity with the NGSO coverage requirement. We recognize that GSO satellites located below a five degree elevation angle may not be capable of providing national coverage and do not require GSO operators to provide the geographic coverage specified above where a GSO satellite is located below a five degree elevation angle.[174]

60. In its comments, Globalstar asserts that the coverage requirements for hybrid NGSO/GSO systems should be aggregated.[175] We disagree with Globalstar. We believe that hybrid NGSO/GSO systems should be required to meet the same coverage requirements established for other satellite systems. For instance, the NGSO portion of a hybrid system will be required to comply with the coverage requirements for NGSO systems and the GSO portion will be required to comply with the coverage requirements for GSO systems.

c. Provision of AMS(R)S

61. Aeronautical Mobile-Satellite Route Service (AMS(R)S) is a radio communication service providing communications between aircraft earth stations via satellite and ground stations or other aircraft stations, reserved for communications pertaining to safety and regularity of flight along civil air routes.[176] Prior to the *Notice*, in the application phase of this proceeding, several parties argued that there are no specific international or national frequency allocations for AMS(R)S in the 2 GHz MSS bands.[177] In the comments, Aeronautical Radio, Inc. (ARINC) contends that an exclusive allocation is required for the

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171 Constellation and Globalstar argue that the proposed rule is less stringent than the description of the proposed rule in the text of the *Notice*, which would require coverage unless technically *infeasible*. Constellation Comments at 3; Globalstar Comments at 4. Celsat and Iridium urge us to adopt the rule as described in the text of the *Notice*. Celsat Comments at 26; Iridium Comments at 11. On the other hand, Inmarsat favors a less stringent standard that it believes was proposed in the rule section of the *Notice*. Inmarsat Comments at 8-9 & Reply at 18-19. We disagree with the commenters who contend that one formulation of the rule is more or less stringent than the other. We do not believe that there is any substantive difference between the phrases "if technically feasible" and "unless technically infeasible."

172 *Notice*, 14 FCC Rcd at 4905-06 (Appendix D, Sec. 25.143(b)(2)(iv)).

173 47 C.F.R. § 100.53 (b).

174 *See* Reduced Domestic Satellite Orbital Spacing at 4/6 GHz, FCC/OST R83-2 4-5 (May 1983) (view of a satellite below five degrees is not reliable due to atmospheric effects).

175 Globalstar Comments at 4.

176 *See* 47 C.F.R. § 2.1.

177 *See, e.g.*, Consolidated Comments and Petition to Deny of Iridium at 9 (filed May 5, 1998); Comments of Aeronautical Radio, Inc. at 4-5 (filed May 4, 1998); Comments of Celsat at 7 (filed May 4, 1998); Comments of Constellation at 20 (filed May 4, 1998); Consolidated Comments of ICO at 17-18 (filed May 4, 1998).

provision of AMS(R)S in generic MSS spectrum.[178] Boeing contends, however, that the Commission's rules and the ITU Radio Regulations permit the provision of AMS(R)S in MSS spectrum.[179] Boeing asserts that domestic and international rules define AMS(R)S as a type of Aeronautical Mobile-Satellite Service (AMSS) and that AMSS is a sub-category of MSS.[180]

62. In the *Notice*, we sought comment on the feasibility of permitting Boeing to provide AMS(R)S in the 2 GHz MSS bands.[181] We stated that although we agree with Boeing's assertion that the absence of a specific AMS(R)S allocation does not prohibit the provision of AMS(R)S in MSS bands, there are additional domestic and international regulatory issues that must be addressed prior to commencing service.[182] We also explained that the domestic and international 2 GHz MSS allocations do not include any regulatory provisions for AMS(R)S, especially for intra-network priority and preemptive access.[183]

63. Constellation, Inmarsat, and Iridium argue that the 2 GHz MSS allocation is for commercial mobile voice and personal communications services and that AMS(R)S is not compatible with this allocation.[184] ICO believes that it is premature to decide whether AMS(R)S should be permitted and that FCC action should be deferred until after the next World Radiocommunication Conference addressing the issue.[185] Constellation believes that the Commission should prohibit AMS(R)S operations in the 2 GHz bands.[186] In response, Boeing states that its system would serve the intended purpose of the allocation because it will serve the rural aviation community and provide global aviation safety benefits.[187]

64. As the Commission has stated in the past, AMSS is an example of MSS.[188] The Commission has also stated that AMSS includes AMS(R)S.[189] Therefore, we believe that Boeing can enter into contracts with members of the aviation community to provide AMS(R)S in the generic MSS allocation, with appropriate intra-network priority and preemption, without the need for any priority and preemption provision in the U.S. Table of Allocations.[190] Therefore, we adopt our decision not to propose

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178 ARINC Comments at 3.

179 *See* Consolidated Opposition of Boeing at 9 (filed June 3, 1998).

180 Boeing Comments at 3.

181 *Notice*, 14 FCC Rcd at 4855-56 ¶ 22.

182 *Id.* at 4855 ¶ 21.

183 *Id.*

184 Constellation Comments at 5; Inmarsat Comments at 13-14; Iridium Comments at 9.

185 ICO Comments at 5.

186 Constellation Comments at 5.

187 Boeing Reply at 6.

188 *See, e.g., Amendment of Part 87 of the Commission's Rules to Establish Technical Standards and Licensing Procedures for Aircraft Earth Stations*, PR Docket No. 90-315, Report and Order, 7 FCC Rcd 5895, 5895 n.3 (1992).

189 *See, e.g., 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 Mobile Satellite Service for the Provision of Various Common Carrier Services*, GEN Docket No. 84-1234, Memorandum Opinion and Order, 4 FCC Rcd 6016, 6025 n.3 (1989).

190 Priority and preemption contractual provisions may require the involvement of other federal agencies.

any rule changes specifically to accommodate Boeing's proposal, and will consider Boeing's proposal as an MSS system in the licensing phase of this proceeding.

65. In addition, the *Notice* explained that the Commission's rules have specific requirements concerning licensing of terminals for aviation distress and safety communications.[191] These rules explicitly state which frequency bands may be used for aircraft-to-satellite AMS(R)S transmissions and do not include the 1990-2025/2165-2200 MHz bands.[192] Iridium and ARINC state that Part 87.187 and the U.S. Table of Frequency Allocations would need to be amended to permit the operation of Boeing's terminals, yet no rulemaking is pending.[193] Boeing states that it intends to file a petition for rulemaking with the Commission seeking a revision of Part 87 to permit aeronautical Earth stations to operate in the 2 GHz MSS frequency bands but does not believe that this should delay licensing of the satellite portion of the proposed system.[194]

66. We agree with the commenters stating that Part 87 will have to be amended or waived to permit Boeing to operate AMS(R)S earth stations in the United States. We do not, however, undertake those regulatory changes here because it involves issues outside the scope of this proceeding and will require a separate notice and comment process.

67. The commenters raise other domestic and international regulatory issues related to Boeing's application.[195] While we recognize that there are remaining issues concerning provision of AMS(R)S in the 2 GHz MSS bands, we believe that the appropriate place to address these system-specific concerns is in the licensing phase of this proceeding. Therefore, we will address such and any public comments on the system application and amendments at that time.

B. Non-Service Link Issues

68. To this point, we have discussed rules and policies regarding the service link portion of an MSS system, *i.e.*, the transmission path between the MSS satellite and a customer's Mobile Earth Terminal (MET). In addition to service links, MSS networks require separate frequencies for feeder links, tracking, telemetry, and command (TT&C), and in some cases, inter-satellite links (collectively, "non-service links"). Feeder links are the radio links that transmit a user's messages in both directions between the system's satellites and its gateway earth station(s) that connect the MSS network with the public switched telephone network.[196] Tracking, telemetry, and command (TT&C) communications provide data on a satellite's functions via a two-way telemetry link between the satellite and a controlling earth station, or control

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191 *Notice*, 14 FCC Rcd at 4855 ¶ 21.

192 *See* 47 C.F.R. § 87.187(q) and § 2.106 U.S. Table of Frequency Allocations.

193 Iridium Comments at 8-9; ARINC Comments at 2.

194 Boeing Comments at 13-14.

195 For example, several commenters are concerned about interference from and to Boeing's system and object to any special coordination status for AMS(R)S in the 2 GHz MSS spectrum. Constellation Comments at 5; Globalstar Comments at 4-6 & Reply at 21-22; Inmarsat Comments at 13 & Reply at 18; Iridium Comments at 8 & Reply at 45-46; National Telecommunications and Information Administration (NTIA) Comments at 18; TMI Comments at 3. As stated above, we will address those concerns when we consider Boeing's application for licensing.

196 Gateway earth stations also perform billing and call-management functions.

center.[197] Some system designs also use frequencies in the inter-satellite service (ISS) to provide links by which satellites in a constellation may communicate with each other. The 2 GHz MSS system proponents seek feeder link, TT&C and ISS frequencies in a variety of bands, and in one case, radionavigation frequencies not germane to the operation of the MSS system.[198]

69. While we are optimistic that sufficient spectrum will be available to support 2 GHz MSS non-service link operations, at this time, we are not certain when that will occur. As described in more detail below, authorization of these requested frequency bands for non-service links remain subject to resolution in other proceedings.[199] We agree with PanAmSat Corporation (PanAmSat) and Society of Broadcast Engineers, Inc. (SBE) that we should not resolve the parties' non-service link requests in this proceeding if such resolution would pre-ordain the outcome of related, pending proceedings.[200] Therefore, this *Report and Order* only identifies the bands we believe will be available for 2 GHz MSS non-service links. Specific issues such as the amount of spectrum each system will be assigned in the relevant band will be decided in the subsequent 2 GHz MSS authorization instruments, and through inter-system coordination.

70. In the *Notice*, we sought comment as to what weight, if any, we should give to non-service link potential delaying factors in developing authorization methods and service rules for the 2 GHz MSS service links, especially with regard to system implementation milestones.[201] We agree with the majority of commenters that we should award 2 GHz MSS licenses as quickly as possible, and thus, the Commission's milestone schedules should commence on the service link grant date.[202] Of the nine system proponents, only Boeing proposes deferral of milestone schedules for 2 GHz MSS operators until the Commission finalizes all critical spectrum allocation decisions.[203] Boeing observes that satellite operators have limited influence over the ITU Radiocommunication Bureau's satellite coordination procedure,[204] or the pace at which the Commission makes non-service link assignments.[205] On the other hand, commenters observe that system proponents could use these inherent delays to warehouse service link spectrum until such time as

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197 TT&C communications are used throughout the satellite's life, including the launch and deployment phase, to monitor the health of the spacecraft. The TT&C function allows the earth station to control the satellite's physical orbital position and internal functioning.

198 *See Notice*, 14 FCC Rcd at 4865-74 ¶¶ 49-70.

199 *See Amendment of Parts 2, 25 and 97 of the Commission's Rules with Regard to the Mobile-Satellite Service Above 1 GHz*, ET Docket No. 98-142, Notice of Proposed Rule Making, 13 FCC Rcd 17107 (1998) (*5, 7, 15 GHz Allocation NPRM*); *Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range*, ET Docket No. 98-206, Notice of Proposed Rule Making, 14 FCC Rcd 1131 (1999) (*NGSO FSS Notice*); *Amendment of the Commission's Rules with Regard to the 3650-3700 MHz Government Transfer Band*, ET Docket No. 98-237, Notice of Proposed Rulemaking and Order, 14 FCC Rcd 1295 (1998) (*3650-3700 MHz Notice*).

200 *See* SBE Comments at 3 & Reply at 1 (requesting that we shelve all feeder link requests as premature pending completion of allocation rulemakings); PanAmSat Reply at 7 (also requesting that our decisions in this docket do not complicate the resolution of NGSO/GSO sharing issues).

201 *Notice*, 14 FCC Rcd at 4865, 4883 ¶¶ 49, 83.

202 Globalstar Comments at 26; IUSG Comments at 38-39; TMI Comments at 10. *See also* Iridium Comments at 36 & Reply at 25-26.

203 Boeing Comments at 25-27 (also arguing that precedent supports its view).

204 *Id.* at 26.

205 Boeing Reply at 20.

requested non-service link spectrum is allocated and assigned.[206] We believe that it is the responsibility of the system operators to seek unencumbered non-service link spectrum, and milestones will provide the necessary incentive for system operators to seek attainable non-service links in a reasonable time or risk the loss of service link spectrum. We find that the benefits to the public of expediting implementation of 2 GHz MSS outweigh the burden this requirement may place on system operators to design systems in accordance with the proposed milestone rules. Therefore, we will initiate milestones upon authorization of service link spectrum, irrespective of the non-service link issues extant.[207]

71. We intend to allow 2 GHz MSS system proponents to modify their non-service link proposals if it becomes apparent, based on the outcome of the relevant rulemakings and proceedings, that the frequencies (or substantial portions of those frequencies) for which they have sought assignment will not be available for timely non-service link use.[208] Furthermore, we will treat such modifications as minor modifications, provided that the alternative frequency band will expedite deployment of that system's service (*i.e.*, the spectrum is usable for non-service links without further administrative proceedings, and the addition of those non-service links to the band will not cause unnecessary congestion, make it difficult to obtain coordination, or otherwise increase the potential for interference to other systems in the frequency bands selected for non-service links).[209] System proponents that do not amend their applications or LOIs so as to utilize accessible non-service link frequencies are advised that they proceed at their own risk that the regulatory issues surrounding their request may delay implementation,[210] resulting in a missed milestone and cancellation of its authorization. Contrary to Globalstar's suggestion,[211] we do not contemplate approval of requests for waiver of milestones based on a system's inability to access non-service link frequencies.

1. Feeder Links

72. As a general rule, because MSS feeder links operate with gateway stations at fixed locations, feeder links use frequencies allocated to the FSS.[212] We tentatively concluded in the *Notice* that there is sufficient feeder link spectrum currently or imminently available to accommodate the spectrum needs of the 2 GHz MSS system proponents.[213] The comments we received on this issue generally support

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206 IUSG Reply at 39 (citing Iridium Comments at 36 (initiating milestones upon authorization of service link spectrum will encourage applicants to pursue presently attainable non-service links, and discourage attempts to delay milestones through the selection of non-service link frequencies that will require lengthy proceedings to resolve)).

207 For a discussion of the milestones that 2 GHz MSS systems must meet, see Section III.C.3., *infra*.

208 *See also Big LEO Reconsideration*, 11 FCC Rcd at 12876 ¶ 42.

209 *Id.* Accordingly, we delegate authority to the International Bureau to waive 47 C.F.R. § 25.116, consistent with this decision.

210 *Accord* Globalstar Comments at 26.

211 *Id.*

212 *See Big LEO Reconsideration*, 11 FCC Rcd at 12875 n.30; *Big LEO Report & Order*, 9 FCC Rcd at 5997 ¶ 163; *accord* Celsat Comments at 24 & n.28 & Reply at 24 & n.44 (MSS feeder links are by definition a type of FSS, citing 47 C.F.R. § 2.1).

213 *See Notice*, 14 FCC Rcd at 4866 ¶ 51 (regarding NGSO MSS feeder links); *id.* at 4868 ¶ 54 (regarding GSO MSS feeder links).

this conclusion.[214] Although the record is inconclusive with regard to any *calculable* relationship between service link spectrum and feeder link spectrum,[215] a relationship does exist.[216] Therefore, in light of the band arrangement we adopt today, which authorizes the 2 GHz MSS systems for significantly less service link spectrum than each has requested, we affirm our finding that there is sufficient feeder link spectrum for the 2 GHz MSS system proponents to provide commercial service. Given our past reliance on MSS operators to coordinate conflicting frequency uses in shared feeder link bands,[217] and based on the record before us,[218] we require the 2 GHz MSS operators, and their associated gateway earth station licensees, to comply with the coordination requirements of Section 25.203(k) of the Commission's rules.[219] This requirement should further enhance the 2 GHz MSS providers' ability to access adequate feeder link spectrum to provide service.

73. The *Notice* also generated considerable comment from the Fixed Wireless Communications Coalition (FWCC) and its membership regarding allocation of MSS feeder links in frequencies that are heavily used by the fixed services.[220] FWCC advocates that, should the Commission license MSS feeder links in FS bands, it must promulgate sharing and coordination rules that adequately

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214 *See* PanAmSat Comments at 1 (existing allocations are sufficient to satisfy the feeder link spectrum requirements of the 2 GHz NGSO MSS applicants); GE American Communications, Inc. (GE Americom) Reply at 3 (same); *accord* Globalstar Comments at 27 (there is sufficient spectrum in the 15.43-15.63 GHz and 6700-7075 MHz bands to accommodate those applicants that desire feeder links in these frequency ranges). *See also* Inmarsat Comments at 14 (with respect to the proposed GSO MSS systems, there is sufficient amount of feeder link spectrum to accommodate all proposals).

215 *See* Constellation Comments at 22 (it is premature for the Commission to consider formulas or algorithms to relate service link assignments with feeder link assignments); Globalstar Comments at 25 & n.26 (an algorithm to scale back feeder link requests is impractical since applicants should be able to assess their feeder link needs after reviewing the service link plan).

216 Hughes and Globalstar acknowledge some quantitative relationship between service link spectrum and the spectrum needed for feeder links. *See* Hughes Comments at 7; Globalstar Comments at 25. *Cf.* Boeing Comments at 23-25 (a reduction in service link spectrum may not warrant a comparable reduction in feeder link requirements); Constellation Reply at 9 (satellite system architectures are too complex to draw a simple relationship between feeder link and service link spectrum requirements).

217 *Notice*, 14 FCC Rcd at 4868 ¶ 55 (citing, *e.g.*, 47 C.F.R. § 25.203(k)).

218 *See* Globalstar Comments at 25 n.27 (47 C.F.R. § 25.203(k) provides sufficient guidance for coordination of feeder link conflicts); Constellation Comments at 22 (2 GHz MSS space station operators should be included within the purview of 47 C.F.R. § 25.203(k)'s requirement to coordinate gateway earth station uses).

219 "An applicant for an earth station that will operate with a geostationary satellite or non-geostationary satellite in a shared frequency band in which the non-geostationary system is (or is proposed to be) licensed for feeder links, shall demonstrate in its applications that its proposed earth station will not cause unacceptable interference to any other satellite network that is authorized to operate in the same frequency band, or certify that the operations of its earth station shall conform to established coordination agreements between the operator(s) of the space station(s) with which the earth station is to communicate and the operator(s) of any other space station licensed to use the band." 47 C.F.R. § 25.203(k).

220 *See* FWCC Comments at 2-7, Reply at 1-4 & Supplemental Comments at 2-3; Association of American Railroads (AAR) Comments at 3-5 & Reply at 1-3; American Petroleum Institute (API) Comments at 4-6; Association of Public-Safety Communications Officials-International, Inc. (APCO) Comments at 2; United Telecom Council (UTC) Comments at 2-3 & Supplemental Comments at 4-5.

protect FS operation and expansion.[221] United Telecom Council (UTC), perceiving a spectrum shortage faced by fixed users, recommends that the Commission initiate a new rulemaking to identify additional spectrum for FS.[222] In response, Inmarsat objects to FWCC's coordination suggestions as being biased on the side of FS,[223] and claims that there is no need to impose spectrum efficiency standards on MSS because the MSS operators are aware of spectrum scarcity, and it is in their best interest to use spectrum as efficiently as technically feasible.[224] Globalstar states that FWCC's proposals regarding protection for terrestrial systems from MSS feeder links in these bands are inappropriate for this proceeding,[225] as are requests to find allocations of additional spectrum for FS.[226] We agree that the allocation and technical matters FWCC and its members raise are not appropriate for this authorization and service rules proceeding, and are more appropriate for discussion in pending proceedings addressing MSS feeder link allocations in FS spectrum,[227] and in a proceeding initiated by FWCC, designated RM-9649.[228]

a. Extended C-band

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221 FWCC Comments at 3. FWCC's sharing proposals include: (a) limiting total numbers of feeder link earth stations; (b) co-locating MSS feeder link earth stations; (c) locating feeder link earth stations away from high-concentration FS areas; (d) requiring feeder link earth stations to use the largest feasible antenna; (e) shielding feeder link earth stations so as to permit FS operations in closer proximity; and (f) setting standards for earth station spectrum efficiency. *Id.* at 4-5. FWCC's coordination proposals include: (a) where there is significant overlap between MSS designations and FS, requiring feeder link earth stations to specify half of the overlap to be left available for FS growth; (b) not requiring FS operators to coordinate within unused azimuths; and (c) once an earth station accepts interference that exceeds the desired objective when coordinating, then allowing a future FS station located in the same area to coordinate at that same higher level. *Id.* at 5-7. *Accord* API Reply at 5; UTC Supplemental Comments at 5.

In addition to supporting FWCC's proposals, AAR recommends that the Commission (a) define "feeder link gateway" narrowly, so that MSS operators cannot deploy gateways that are the functional equivalent to subscriber terminals; and (b) limit the number of gateways for which any single MSS operator may be licensed to no more than six. AAR Comments at 4-5 & Reply at 2; *accord* API Reply at 5. Inmarsat states that its gateway plans are compatible with AAR's proposal limiting the number of gateway earth stations per MSS system. Inmarsat Reply at 16 n.42.

222 UTC Comments at 4 & Supplemental Comments at 5-6. *Accord* API Reply at 6.

223 Inmarsat Reply at 17.

224 *Id.* at 16.

225 Globalstar Reply at 8-13. *Accord* Iridium Reply at 40 (adding that FWCC can also raise these issues in coordination negotiations); Inmarsat Reply at 16 (although FWCC's spectrum sharing suggestions could be employed successfully in order to promote greater spectrum efficiency, FS/MSS feeder link interference matters are better handled on a case-by-case basis during good faith coordination discussions among the parties).

226 Globalstar Reply at 8 n.18.

227 *See, e.g., 5, 7, 15 GHz Allocation NPRM*, 13 FCC Rcd 17107; *NGSO FSS Notice*, 14 FCC Rcd 1131.

228 In its Request for Declaratory Ruling on Partial-Band Licensing of Earth Stations in the Fixed Satellite Service that Share Terrestrial Spectrum and Petition for Rulemaking to Set Loading Standards for Earth Stations in the Fixed Satellite Service that Share Terrestrial Spectrum (filed May 5, 1999), FWCC seeks changes to the FCC's rules and coordination procedures toward what it believes to be "more equitable sharing" between terrestrial FS and satellite services generally. The Commission designated FWCC's filing as RM-9649. *See* Public Notice, Report No. 2334, Mimeo No. 93716 (rel. June 11, 1999).

74. Inmarsat seeks GSO MSS feeder links in the extended C-band frequencies.[229] In the *Notice*, we stated that Inmarsat's requested feeder downlinks in the United States would be limited to potentially available spectrum between 3600-3650 MHz, because the 3550-3600 MHz band is not allocated in the United States for FSS, and the 3650-3700 MHz band is proposed to be reallocated from FSS to FS in an ongoing proceeding.[230] Inmarsat believes that it should be able to access the 3650-3700 MHz band for its feeder links because the reallocation is not yet final, and in any case, its feeder link use of that spectrum would be fully compatible with any new FS services in the band, and its maximum of two gateways in the United States would make terrestrial coordination feasible.[231] Should Inmarsat pursue extended C-band feeder downlinks in the 3650-3700 MHz band, its earth station receive sites must be within close proximity (*i.e.*, 10 miles or less) of an existing extended C-band earth station receive site authorized to use these frequencies.[232] We also reiterate that FSS operations in the United States in the 3600-3700 MHz band are limited by footnote US245 to the U.S. domestic table of allocations,[233] which restricts FSS to international, inter-continental systems, subject to a case-by-case electromagnetic compatibility analysis.[234]

75. Inmarsat's requested feeder uplinks in the United States may also be limited because it potentially would share the 6425-6525 MHz portion of the band on a primary basis with the Local Television Transmission Service (LTTS).[235] Commenters generally object to allowing MSS feeder links in the LTTS band.[236] Inmarsat replies that since its system proposes to use a maximum of two gateways in the United States, it would be feasible to find appropriate locations, with proper shielding if necessary, from which to operate the feeder uplinks without mutual interference.[237] We need not address these issues here. Inmarsat will have the opportunity to make such a showing when applying for its U.S.-based gateway earth station licenses, which require coordination under Part 25 of our rules.

b. 5, 7 and 15 GHz bands

76. The Commission has a pending proceeding proposing to allocate the 5091-5250 MHz ("5 GHz"), 6700-7075 MHz ("7 GHz") and 15.43-15.63 GHz ("15 GHz") frequency bands to NGSO

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229 Specifically, Inmarsat requests the 6425-6575 MHz band for feeder uplinks and the 3550-3700 MHz band for feeder downlinks. *See Notice*, 14 FCC Rcd at 4865 ¶ 50 (feeder link table).

230 *Notice*, 14 FCC Rcd at 4869 ¶ 58 (citing *3650-3700 MHz Notice*, 14 FCC Rcd 1295).

231 Inmarsat Comments at 14-15.

232 *See Amendment of the Commission's Rules With Regard to the 3650-3700 MHz Government Transfer Band*, ET Docket No. 98-237, Memorandum Opinion and Order, FCC 00-181, at ¶ 4 & Appendix A (rel. May 22, 2000).

233 *See Notice*, 14 FCC Rcd at 4869 n.115.

234 47 C.F.R. § 2.106 n.US245.

235 47 C.F.R. § 2.106. LTTS is similar to BAS insofar as TV stations and independent mobile services set up microwave facilities for news gathering, coverage of live events, and program distribution. BAS and cable television relay services licensees share the LTTS spectrum. *See* paragraph 6, *supra*.

236 Century OCN Programming, Inc. Comments at 1-2 (MSS feeder links will exacerbate existing frequency coordination and interference problems in already crowded spectrum); SBE Comments at 2 (Inmarsat's proposal could conflict with the existing LTTS allocation); SBC Comments at 2 (LTTS services have no alternative frequency bands in which to operate). *Cf.* Tim Lynch Comments at 1 (MSS providers will not be inclined to prior coordinate with the LTTS incumbents).

237 Inmarsat Reply at 16.

MSS feeder links (the *5, 7, 15 GHz Allocation Proceeding*).[238] Constellation, Globalstar and MCHI already hold authorizations to operate Big LEO feeder links in these same bands, although Constellation and Globalstar seek different feeder link frequencies for their 2 GHz MSS systems than those authorized for their respective Big LEO systems.[239] Thus, the only 2 GHz MSS system seeking feeder link access in these bands for the first time is ICO.[240] In the *Notice*, we sought comment on whether we could accommodate all of these systems in the potential 5, 7 and 15 GHz feeder link spectrum, as well as other authorized satellite users of the band.[241] Globalstar agrees with the Commission that at least two systems can coordinate with each other to share spectrum for co-directional feeder link transmissions.[242] MCHI states that it can coordinate its requested 2 GHz MSS feeder links with all other authorized Big LEO feeder links, including its own, but is concerned that additional feeder link sharing would require it to incur high costs to prevent interference.[243] Similarly, Constellation requests that Big LEO systems be given priority when accommodating 2 GHz systems in feeder link spectrum.[244] In response, ICO proffers that it is already coordinating its feeder links with other NGSO MSS systems and has encountered no claims that its feeder links cannot be accommodated.[245] Globalstar states that it is premature for the Commission to judge feeder link intersystem sharing issues at least until all of the Big LEO systems are operational.[246] In light of the unresolved issues with the use of these bands, we expect all operational MSS systems proposing feeder links in the 5, 7 and 15 GHz bands to coordinate use of feeder link spectrum,[247] subject to the outcome of any allocation and licensing proceedings related to these frequencies.[248]

77. The National Telecommunications and Information Administration (NTIA) is the Federal spectrum manager and the principal Executive Branch advisor on telecommunications policy. NTIA requests that NGSO MSS feeder uplink and TT&C authorizations in the 5 GHz and 15 GHz bands be

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238 *See 5, 7, 15 GHz Allocation NPRM*, 13 FCC Rcd 17107.

239 Specifically, Constellation requests 2 GHz MSS feeder uplinks in the 5 and 15 GHz bands and 2 GHz MSS feeder downlinks in the 7 GHz band, while its Big LEO feeder links are in the 5 and 7 GHz bands. Globalstar requests 2 GHz MSS feeder uplinks in the 15 GHz band and 2 GHz MSS feeder downlinks in the 7 GHz band, while its Big LEO feeder links are in the 5 and 7 GHz bands. MCHI requests 2 GHz MSS feeder uplinks in the 15 GHz band and 2 GHz MSS feeder downlinks in 7 GHz band, while its Big LEO feeder links are in the same bands. *See Notice*, 14 FCC Rcd at 4869 ¶ 59 (citing Big LEO authorizations) and 4865-66 ¶ 50 (feeder link table).

240 ICO requests feeder uplinks in 5 GHz band and feeder downlinks in 7 GHz band. *See Notice*, 14 FCC Rcd at 4865 ¶ 50 (feeder link table).

241 *Notice*, 14 FCC Rcd at 4870 ¶ 60 & n.122 (citing two DARS systems authorized in the upper portion of the 7 GHz band). WCS Radio, Inc. withdrew an application for a DARS license to use these bands. *See* Public Notice, Report No. SAT-00020, Mimeo No. 94323, at 3 (rel. July 22, 1999).

242 Globalstar Comments at 27 (citing *Notice*, 14 FCC Rcd at 4869 ¶ 59).

243 MCHI Comments at 25.

244 Constellation Comments at 21-22.

245 ICO Reply at 19.

246 Globalstar Reply at 9 n.21.

247 *See* Constellation Comments at 21 & Reply at 9 (recommending "suitable" or "appropriate" coordination agreements); MCHI Comments at 25 n.62 (suggesting "a good faith coordination negotiation requirement").

248 *See* paragraph 69, *supra*. *Accord* SBE Comments at 2-3 (the proposals to operate feeder downlinks in the 7 GHz band could impact the 6875-7125 MHz TV BAS band, and need to await resolution of the *5, 7, 15 GHz Allocation Proceeding*).

conditioned to protect aeronautical radionavigation services (ARNS).[249] The Commission has proposed such protections in the *5, 7, 15 GHz Allocation Proceeding*,[250] and therefore, we will address NTIA's request in that proceeding. In addition, NTIA requests that gateways using the 5 GHz and 15 GHz bands be subject to coordination through the Frequency Assignment Subcommittee (FAS) of the Interdepartment Radio Advisory Committee (IRAC) to ensure that harmful interference between the MSS feeder links and government operations is minimized.[251] IRAC coordination is standard procedure in such circumstances. Thus, if feeder link earth stations are authorized to operate in the 5 GHz or 15 GHz bands, IRAC coordination would be required. NTIA also recommends that, to the extent practicable, any 2 GHz MSS operator using the 5091-5150 MHz band for feeder links locate its TT&C signal at the upper edge of the band, to reduce the likelihood of interference to the adjacent International Civil Aviation Organization (ICAO) Standard Microwave Landing System (MLS) operations at 5030-5091 MHz.[252] Assuming that MSS operators are authorized to operate feeder links in the 5 GHz band, they likely would choose TT&C frequencies in accordance with NTIA's recommendation on their own accord, to ease coordination with MLS operations and reduce constraints placed on feeder link earth station transmissions. Therefore, we do not need to regulate placement of the TT&C signal in the 5 GHz band at this time.

c. Ku-band

78. *NGSO MSS Feeder Links.* The "conventional Ku-band" refers to the Earth-to-space (uplink) frequencies at 14.0-14.5 GHz and the corresponding space-to-Earth (downlink) frequencies at 11.7-12.2 GHz. The "lower Ku-band" refers to the space-to-Earth (downlink) frequencies at 10.7-11.7 GHz.[253] Boeing requests NGSO MSS feeder links in these bands,[254] and the Commission has a pending proceeding proposing to allocate these bands to NGSO FSS systems.[255] In the *Notice*, we sought comment as to whether NGSO MSS feeder links would be an efficient use of the proposed Ku-band NGSO FSS

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249 NTIA Comments at 6-9. *Accord* ICO Reply at 20. ARNS is a radionavigation service intended for the benefit and for the safe operation of aircraft. *See* 47 C.F.R. § 87.5.

250 *5, 7, 15 GHz Allocation NPRM*, 13 FCC Rcd at 17115 ¶ 16.

251 NTIA Comments at 7-8. The Commission submits non-Government frequency assignment applications for consideration by the FAS, a subcommittee of IRAC. IRAC is an advisory committee within NTIA composed of the 20 most active Federal users of Federal spectrum and a liaison member from the Commission. The primary functions of IRAC are to assist in assigning frequencies to Government spectrum users and in developing and executing policies, programs, procedures and technical criteria pertaining to the allocation, management, and use of the spectrum.

252 NTIA Comments at 9. The ICAO Standard MLS is an all-weather precision approach and landing system that will eventually replace the Instrument Landing System as the international standard. MLS operates on 200 channels in the 5030-5091 MHz band. A MLS station supports navigation and guidance for suitably-equipped aircraft out to a range of 43 kilometers (23 nautical miles) and an altitude of 6096 meters (20,000 feet).

253 The 10.7-11.7 GHz band is allocated domestically to the FSS on a co-primary basis with the terrestrial FS, and allocated internationally to the FSS, FS, and mobile services. *See* 47 C.F.R. § 2.106. The Commission's rules permit FSS use of this portion of the band on an international basis only. 47 C.F.R. § 25.202(a)(1), n.2 ("[u]se of this band by the fixed-satellite service is limited to international systems, *i.e.*, other than domestic systems"). *See also* 47 C.F.R. § 2.106, NG104.

254 Specifically, Boeing requests its feeder links in the upper-most portions of the bands, *i.e.*, 14.391-14.5 GHz and 11.591-11.7 GHz. *See Notice*, 14 FCC Rcd at 4865 ¶ 50 (feeder link table).

255 *See NGSO FSS Notice*, 14 FCC Rcd 1131; Public Notice, Report No. SAT-00013, Mimeo No. 92541 (rel. March 23, 1999) (accepting NGSO FSS Ku-band applications for filing).

spectrum.[256] Boeing claims it has demonstrated that its proposed NGSO feeder links would not cause unacceptable interference to GSO satellites and terrestrial networks in the band, and that it can operate its feeder links on a shared basis with other proposed NGSO FSS systems.[257] PanAmSat and GE American Communications, Inc. (GE Americom) express concern over the feasibility of NGSO/GSO sharing in the Ku-band.[258] In addition, PanAmSat suggests there is no need to act on Boeing's feeder link request at least until the NGSO/GSO sharing issues are resolved, because fundamental policy questions pertaining to Boeing's proposed AMS(R)S service likely will delay Boeing's ability to operate in the 2 GHz band.[259] We agree that Boeing's feeder link request is intertwined with the issue of whether NGSO FSS links can operate co-frequency with GSO FSS and terrestrial systems in these Ku-band frequencies. Therefore, as proposed in the *Notice*,[260] we will address Boeing's feeder link request in the pending rulemaking and application proceedings addressing the NGSO/GSO sharing issue.[261]

79. *GSO MSS Feeder Links.* As the Commission has indicated, GSO MSS feeder links operating on frequencies and at orbital locations that are extensively used could preclude conventional FSS services and inhibit the use of these GSO locations for future FSS assignments.[262] Consequently, the Commission has determined that GSO MSS operators should seek to operate feeder links at frequency bands other than those "conventional" bands that are heavily used for domestic and international FSS services.[263] Nevertheless, the Commission reserves the option of considering GSO MSS feeder link requests in FSS bands on a case-by-case basis, using such factors as existing use of spectrum, orbital locations, potential adverse impact on FSS operations, and the benefits of successfully using these assignments to introduce new and needed satellite services to the public.[264] In the *Notice*, we sought comment on whether we should consider granting authority for MSS feeder links in the frequencies allocated for FSS where, for example, a 2 GHz MSS system proponent reaches an agreement with an

256 *Notice*, 14 FCC Rcd at 4871 ¶ 61.

257 Boeing Comments at 22-23 & Reply at 13-14.

258 PanAmSat Comments at 4; GE Americom Reply at 4.

259 PanAmSat Comments at 5 & Reply at 2.

260 *Notice*, 14 FCC Rcd at 4871 ¶ 61.

261 *See NGSO FSS Notice*, 14 FCC Rcd 1131; Public Notice, Report No. SAT-00013, Mimeo No. 92541 (rel. March 23, 1999) (accepting NGSO FSS Ku-band applications for filing). *See also* National Academies' Committee on Radio Frequencies Comments at 4 (requesting that the Commission protect Radio Astronomy Service (RAS) and Earth Exploration-Satellite Service (EESS) users at 10.6-10.7 GHz from MSS feeder downlink operations at 10.7-11.7 GHz through out-of-band emission limitations similar to those proposed by the Commission for NGSO FSS gateway downlinks in the *NGSO FSS Notice*, 14 FCC Rcd at 1173-74 ¶ 82).

262 *See Notice*, 14, FCC Rcd at 4866 ¶ 52. *See also Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band*, IB Docket No. 95-91, Notice of Proposed Rulemaking, 11 FCC Rcd 1, 22 ¶ 71 (1995) (citing *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 No. 84-1234, Memorandum Opinion, Order and Authorization, 4 FCC Rcd 6041, 6050 ¶¶ 61-62 (1989) (*AMSC Order*), *tentative decision on remand*, 6 FCC Rcd 4900 (1991), *final decision on remand*, 7 FCC Rcd 266 (1992), *aff'd sub nom., Aeronautical Radio, Inc. v. FCC*, 983 F.2d 275 (D.C. Cir. 1993)).

263 *Id.* at 4866 n.99. The "conventional" bands used to provide FSS in the United States are the 3700-4200 MHz/5925-6425 MHz bands (C-band) and the 11.7-12.2 GHz/14.0-14.5 GHz bands (Ku-band).

264 *See, e.g., AMSC Order*, 4 FCC Rcd at 6052-53 ¶¶ 76-78.

existing FSS licensee to use its licensed spectrum, or if the requested location is in an uncongested portion of the arc.[265]

80. Globalstar is the only 2 GHz MSS applicant that seeks to use "conventional" FSS spectrum for GSO MSS feeder links. Specifically, Globalstar seeks authority to operate GSO MSS feeder links in the conventional Ku-band FSS frequencies from four GSO satellites, including one at the 80° W.L. orbital location.[266] Under our case-by-case analysis, we note numerous obstacles to this request. First, FSS already uses the conventional Ku-band intensively.[267] Second, Globalstar does not indicate how it plans to access its suggested Ku-band orbital locations, whether it be through a processing round,[268] or an agreement with an existing FSS licensee.[269] Most significantly, Globalstar's proposed feeder link operations at the 80° W.L. orbital location are not in conformance with the Commission's GSO orbit location two-degree spacing policy.[270] Therefore, we expect Globalstar to explain how it intends to coordinate the proposed Ku-band GSO MSS feeder links with existing FSS operations, and the public interest benefit of such an assignment, before we would further entertain this request. If Globalstar cannot provide an adequate showing in this regard, we expect it to seek alternative feeder link spectrum.[271]

d. Ka-band

81. The Ka-band refers to the Earth-to-space (uplink) frequencies at 27.5-30.0 GHz (the "28 GHz band") and the corresponding space-to-Earth (downlink) frequencies at 17.7-20.2 GHz (the

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265 *Notice*, 14 FCC Rcd at 4866 ¶ 52.

266 Globalstar 2 GHz MSS Application at 30-31.

267 PanAmSat and GE Americom argue that the Commission should not allow 2 GHz MSS systems to operate GSO feeder links in the conventional Ku-band because these bands are already congested, with more congestion imminent from NGSO FSS systems seeking access to GSO FSS spectrum and the inherent difficulties involved in NGSO/GSO sharing. *See* PanAmSat Comments at 1-3 & Reply at 4; GE Americom Reply at 3.

268 *See* GE Americom Reply at 6 (claiming that Globalstar cannot be awarded a Ku-band orbital location outside a processing round).

269 GE Americom believes that the Commission should permit such agreements, since the FSS provider could determine whether it could accommodate MSS feeder link capacity consistent with other FSS traffic on the satellite. *Id*. On the other hand, PanAmSat believes the Commission should not allow such agreements, as it would allow FSS licensees to "convert the public benefit of FSS spectrum to private gain." PanAmSat Comments at 3. *But see id.* at n.7 (should the Commission allow such private agreements between FSS licensees and MSS operators, the Commission "should require that (i) the MSS proponent reaches agreement with an existing FSS licensee to use its licensed spectrum; (ii) the MSS proponent can operate on a non-interference basis with respect to all other FSS users and facilities, both terrestrial and in-orbit; and (iii) the MSS system's operations will not unreasonably constrain the future development of FSS networks (including VSAT networks).").

270 GE Americom's Ku-band GE-5 satellite is assigned to 79° W.L., and Nahuelsat, S.A. intends to use the 81° W.L orbit location pursuant to authority granted by the Comision Nacional de Communicaciones of the Republic of Argentina. *See* GE Americom Reply at 6; Letter from Thomas S. Tycz, Chief, Satellite and Radiocommunication Division, to Karis A. Hastings, Esq., Hogan & Hartson L.L.P. (March 28, 2000). For more information regarding the Commission's two-degree spacing policy, see *Licensing Space Stations in the Domestic Fixed-Satellite Service*, 48 Fed. Reg. 40233, 54 Rad. Reg. 2d (P&F) 577 (1983) and *Televisa International, LLC.*, Order and Authorization, 13 FCC Rcd 10074, 10076-77 ¶¶ 7-9 (Int'l Bur. 1997).

271 Globalstar states that its requested feeder link requirements can be accommodated in the alternative GSO MSS feeder link spectrum suggested by the Commission, with a caveat that it could modify its feeder links if the Ku-band feeder links are available. Globalstar Comments at 28-29. *See also* PanAmSat Reply at 4.

"18 GHz band"). These bands have been segmented for, and shared by, several types of communications systems, including NGSO MSS feeder links, terrestrial FS, FSS, and the Local Multipoint Distribution Service (LMDS), pursuant to an extensive rulemaking proceeding and the efforts of a negotiated rulemaking committee.[272] We recently modified the sharing arrangements in the 18 GHz band.[273]

82. *NGSO MSS Feeder Links.* In the *Ka-Band First Report and Order*, the Commission adopted a band sharing arrangement that designates spectrum for NGSO MSS system feeder links.[274] In the 28 GHz band, the Commission established a co-primary allocation for NGSO MSS feeder uplinks at 29.1-29.5 GHz, subject to the special sharing requirements set forth in Sections 25.257 and 25.258 of the rules.[275] In the 18 GHz band, the Commission designated 19.3-19.7 GHz for NGSO MSS feeder downlinks on a co-primary basis with FS,[276] subject to site and frequency coordination.[277] Globalstar proposes to operate NGSO MSS feeder uplinks on a reverse-band working basis in the 19.3-19.6 GHz band segment, as an alternative to its NGSO MSS feeder uplink request in the 15 GHz band.[278] The Commission stated in the *Ka-Band First Report and Order*, that requests for reverse-band working operation in this band would be examined on a case-by-case basis.[279] We are not changing any policies concerning this band at this time. In the *Ka-Band First Report and Order*, the Commission further stated that the 19.3-19.7 GHz band should be able to accommodate at least two systems' feeder links.[280] Therefore, this band may be available to alleviate congestion in other NGSO MSS feeder link bands.

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272 *See Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, CC Docket No. 92-297, First Report and Order and Fourth Notice of Proposed Rulemaking, 11 FCC Rcd 19005 (1996) (*Ka-Band First Report and Order*).

273 *See Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use*, IB Docket No. 98-172, Report and Order, FCC 00-212 (rel. June 22, 2000) (*18 GHz Report and Order*). U.S. Government satellite systems also operate in the 17.8-20.2 GHz band, and the standard process of coordination between Government and non-Government operations continues to remain in effect. *See id.* at ¶ 4; NTIA Comments at 20. The U.S. Government systems operate in accordance with footnote US334 in the United States Table of Frequency Allocations, 47 C.F.R. § 2.106 n.US334. *See generally Amendment of Part 2 of the Commission's Rules to Allocate Spectrum for the Fixed-Satellite Service in the 17.8-20.2 GHz Band for Government Use*, Memorandum Opinion and Order, 10 FCC Rcd 9931 (1995).

274 *Ka-Band First Report and Order*, 11 FCC Rcd at 19023-38 ¶¶ 41-81.

275 47 C.F.R. §§ 25.257, 25.258.

276 We retained the NGSO MSS and FS co-primary designation in the 19.3-19.7 GHz band in the *18 GHz Report and Order*, FCC 00-212, at ¶¶ 53-54.

277 47 C.F.R. § 2.106.

278 *See Notice*, 14 FCC Rcd at 4865 ¶ 50 (feeder link table); *id.* at 4872 ¶ 65. Reverse-band working involves authorizing satellite communications links in a direction opposite to the direction for which the band is allocated. Thus, in the 19.3-19.6 GHz band, which is allocated for downlinks, uplinks would operate on a "reverse-band working" basis.

279 *Ka-Band First Report and Order*, 11 FCC Rcd at 19031-32 ¶ 63.

280 *Id.* at 19037 ¶ 80.

83. *GSO MSS Feeder Links.* Celsat seeks GSO MSS feeder link bandwidth anywhere in the Ka-band.[281] Although the Commission has not specifically designated Ka-band spectrum for GSO MSS feeder links, we tentatively concluded in the *Notice* that the GSO FSS designations in the Ka-band are appropriate for GSO MSS feeder link use.[282] GE Americom, Hughes Communications Galaxy, Inc./Hughes Communications, Inc. (Hughes), PanAmSat, and Pegasus Development Corporation (Pegasus) request that the Commission reverse its tentative conclusion in the *Notice* and not accommodate GSO MSS feeder links within what they call the "core," "conventional" or "primary" GSO FSS Ka-band spectrum.[283] PanAmSat states that the Ka-band faces the same problems of spectrum and orbital location scarcity as do the conventional C- and Ku-bands.[284] Pegasus adds that GSO MSS feeder link use of this spectrum would be a highly inefficient use of the Ka-band orbital resource in the CONUS arc.[285] In addition, Hughes asks us to reject those portions of the 2 GHz MSS applications that are inconsistent with the 28 GHz band plan and Hughes' licensed and proposed Spaceway systems.[286] Celsat claims that the concerns surrounding GSO MSS feeder link use of the conventional C- and Ku-band FSS allocations are not present in the Ka-band, because the Ka-band is not currently heavily used for FSS services.[287] Hughes and PanAmSat reject

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281 *See* Celsat Reply at 22; Celsat Amendment to Application, IBFS File No. SAT-AMD-19980123-00009, File No. 88-SAT-AMEND-98 (filed January 23, 1998); Public Notice, Report No. SAT-00012 (rel. March 16, 1999).

282 *Notice*, 14 FCC Rcd at 4872 ¶ 64. GSO FSS systems may operate uplinks in the following 28 GHz sub-bands: 27.50-28.35 GHz (850 MHz, secondary with respect to LMDS);
28.35-28.60 GHz (250 MHz, exclusive primary);
28.60-29.10 GHz (500 MHz, secondary with respect to NGSO FSS);
29.25-29.50 GHz (250 MHz, co-primary with respect to NGSO MSS feeder links); and
29.50-30.00 GHz (500 MHz, exclusive primary).
See Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services, CC Docket No. 92-297, Third Report and Order, 12 FCC Rcd 22310, 22326-27 ¶¶ 40-42 (1997).

In the recently-released *18 GHz Report and Order*, we eliminated all secondary designations in the 18 GHz band, and thus, GSO FSS systems may operate downlinks in the following 18 GHz sub-bands on a primary or co-primary basis:
18.30-18.58 GHz (280 MHz, co-primary with respect to FS);
18.58-18.80 GHz (220 MHz, exclusive primary); and
19.70-20.20 GHz (500 MHz, exclusive primary).
See 18 GHz Report and Order, FCC 00-212, at ¶ 28.

283 GE Americom Reply at 6; Hughes Comments at 6 & Reply at 2; PanAmSat Comments at 6 & Reply at 5; Pegasus Comments at 3-4. Although not specified in its filings, we believe Hughes is referring to the pairing of 19.7-20.2 GHz and 29.5-30.0 GHz as the "core" GSO FSS spectrum. Hughes Comments at 5 (citing *Ka-Band First Report and Order*, 11 FCC Rcd at 19036 ¶ 78).

284 PanAmSat Comments at 6 & Reply at 5. *See also* Hughes Comments at 2-3 & Reply at 4-5.

285 Pegasus Comments at 3 (Ka-band GSO FSS will provide more ubiquitous services directly to consumers vs. feeder link service to limited number of gateways); *accord* GE Americom Reply at 7.

286 Hughes Comments at 2. *Accord* PanAmSat Comments at 6 (reject any application that proposes a frequency use that deviates from the Ka-band plan).

287 Celsat Comments at 24-25 (citing *Notice*, 14 FCC Rcd at 4872 ¶ 64).

Celsat's argument, claiming it ignores the near-future roll-out of broadband GSO FSS service, and thus, does not justify Commission departure of precluding feeder link use of conventional FSS spectrum.[288]

84. We see no reason to adopt any rules or policies prohibiting GSO MSS feeder links in Ka-band GSO FSS spectrum in this *Report and Order*. At this time, the Ka-band does not carry the same heavy level of FSS traffic that the conventional C- and Ku-bands carry. As to Celsat, however, we highlighted in the *Notice* that Celsat's use of the Ka-band spectrum for feeder links depends on its ability to obtain successfully an appropriate GSO orbital location in the domestic arc, many of which already are assigned.[289] Commenters suggest that Celsat use portions of the GSO FSS allocation where no geostationary orbital slots are currently occupied by first-round Ka-band licensees,[290] or attempt to coordinate the 111° W.L. orbital position with the Canadian administration, which has an ITU filing at that location.[291] This issue, and thus, the related authorization of Celsat's feeder links, will need to be resolved in the context of the Ka-band second processing round.[292]

85. We note that Celsat is committed to cooperating with all interested parties in the Ka-band second processing round to develop an agreeable orbital assignment plan that will accommodate its feeder link request.[293] Furthermore, Celsat's spectrum choices for its feeder links must be consistent with the limitations and related coordination requirements adopted to resolve Ka-band spectrum sharing issues. Thus, should Celsat seek feeder uplink spectrum in the 27.5-28.35 GHz sub-band (designated as primary to LMDS),[294] it only could do so on an unprotected, non-interference basis to LMDS,[295] with LMDS priority applied in all respects to any existing or future use of the band as currently allocated,[296] and no requirement that LMDS licensees coordinate use of this band for MSS feeder links.[297] Should Celsat seek its feeder downlink spectrum in the 18.3-18.58 GHz sub-band (co-primary with FS operators), it only could do so subject to coordination.[298] Finally, should Celsat seek feeder uplink spectrum in the 29.25-29.5 GHz sub-band (designated as co-primary with NGSO MSS feeder links), it would need to comply with the spectrum sharing and coordination rules set forth at Section 25.258 of the Commission's rules.[299]

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288 Hughes Comments at 4 & Reply at 3; PanAmSat Reply at 5 n.17.

289 *See Notice*, 14 FCC Rcd at 4872 ¶ 64; *see also* GE Americom Reply at 7 (claiming that all Ka-band orbital locations in the range identified by Celsat have been assigned).

290 Hughes Comments at 7; Celsat Reply at 23 n.43.

291 Hughes Comments at 8 & n.25; *but see* KaStar Satellite Communications Corp. Reply at 3-4 (Hughes' suggestion does not comply with the Commission's two-degree spacing requirements for GSO satellites).

292 *Accord* Globalstar Comments at 26 n.28 (Commission should defer Celsat's feeder link requests until resolution of the Ka-band second processing round).

293 Celsat Reply 24.

294 Celsat Comments at 25; Hughes Comments at 6; Pegasus Comments at 4.

295 WinStar Communications, Inc. (WinStar) Comments at 2-4 & Reply at 1-3; Bosch Telecom, Inc. Comments at 1; Personal Communications Industry Association Comments at 2-3; Wireless Communications Association International, Inc. (WCA) Reply at 5.

296 WinStar Comments at 3 and Reply at 4 (MSS operator would have to turn off its feeder link even if the LMDS licensee installs equipment after a MSS provider begins operations); *accord* WCA Reply at 5.

297 WinStar Reply at 4; FWCC Comments at 6 n.15.

298 Hughes Comments at 6-7; Pegasus Comments at 4-5.

299 47 C.F.R. § 25.258.

2. Non-U.S.-Based Gateway Operations

86. In *DISCO II*, the Commission concluded that systems serving the United States using foreign satellites must meet the same technical requirements as systems using U.S.-licensed satellites.[300] TMI presents a unique situation among the nine 2 GHz MSS systems proponents. Specifically, TMI proposes to serve the United States from a Canadian-licensed satellite, using a Canadian gateway for feeder links and TT&C operations.[301] By contrast, the other system proponents intend to use at least one U.S. gateway for feeder links and TT&C. TMI plans to use frequencies outside its proposed feeder links for TT&C operations,[302] a system design that does not comport with Section 25.202(g) of the Commission's rules.[303] PanAmSat argues that, to be authorized in the United States under the *DISCO II* LOI process, TMI must comply with the Commission's Part 25 technical rules applicable to U.S.-licensed systems, including Section 25.202(g).[304] Because we do not have jurisdiction over system operations wholly outside of the United States, the *DISCO II* rule regarding technical requirements only applies to specific system components that operate in the United States. Thus, because TMI's feeder link and TT&C operations will be limited to transmissions between TMI's Canadian-licensed satellite and a Canadian gateway, and will not operate in the United States, the *DISCO II* rule regarding technical requirements does not apply to TMI's feeder links and TT&C transmissions.[305] Notwithstanding the foregoing, any system proposing to handle communications originating or terminating from mobile terminals in the United States via gateways located outside the United States may need to address law enforcement and national security concerns before licensing or spectrum authorization can be effected.[306]

87. TMI's system design prompted our proposal to require that 2 GHz MSS operators perform TT&C operations within their assigned feeder link frequencies, or within bands allocated to space

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300 *See DISCO II Order*, 12 FCC Rcd at 24161 ¶ 156.

301 *See* TMI 2 GHz MSS LOI, at Attachment 2, Table 1. TMI's proposed GSO feeder link frequencies are subject to Appendix 30B of the ITU Radio Regulations, which contains a GSO FSS plan allotting the given frequency bands to each Administration at specific orbital locations. We note that Canada has completed the Appendix 30B procedures for an orbital location at 106.5° W.L., where TMI proposes to locate its 2 GHz MSS system. TMI states that should a U.S.-located gateway be contemplated, it will complete the required Appendix 30B procedures to accommodate feeder link stations in the United States being able to access TMI's satellite. *See* TMI Comments at 8.

302 Although space station applicants generally seek TT&C frequencies within their requested feeder link bands, TMI describes its Canadian-licensed MSS system as using feeder links within the 10.7-10.95 GHz, 11.2-11.45 GHz, and 12.75-13.25 GHz bands, and TT&C links within the 11.7-11.75 GHz, 12.15-12.2 GHz, 14.0-14.05 GHz and 14.45-14.5 GHz bands. *See* TMI 2 GHz MSS LOI, at Attachment 2, Table 1.

303 Section 25.202(g) states that TT&C functions for U.S. domestic satellites "shall be conducted at either or both edges of the allocated band(s)," *i.e.*, at either or both edges of a frequency band assigned to a satellite licensee for communication. 47 C.F.R. § 25.202(g).

304 PanAmSat Reply at 6.

305 For the same reason, we have no jurisdiction to address NTIA's requests to adopt power and out-of-band emission limits on TMI's potential use of the 10.7-10.95 GHz and 11.2-11.45 GHz bands for MSS feeder downlinks, or TMI's potential use of the 12.75-13.25 GHz band for MSS feeder uplinks. *See* NTIA Comments at 19-20 & 21-22.

306 *See, e.g.*, *SatCom Systems, Inc. and TMI Communications and Company, L.P.*, Order and Authorization, 14 FCC Rcd 20798, 20823-24 ¶¶ 55-58, 20829-45 Appendix A (1999); *Airtouch Communications, Inc. and Vodafone Group, PLC.*, Memorandum Opinion and Order, DA 99-1200, 16 Communications Reg. (P&F) 125, at ¶¶ 20-24 & Appendix A (WTB 1999).

operations, pursuant to Section 25.202(g) of the Commission's rules.[307] Commenters generally support this proposal,[308] and we adopt this requirement with regard to all 2 GHz MSS operators performing TT&C operations from control centers located in the United States. Should TMI seek Commission authority to operate TT&C from a U.S.-based earth station control center, we would require TMI to perform TT&C operations in compliance with Section 25.202(g).[309]

307 *Notice*, 14 FCC Rcd at 4873 ¶ 67.

308 NTIA Comments at 8-9; Globalstar Comments at 30; PanAmSat Comments at 6.

309 *Cf. U.S. Electrodynamics, Inc.*, Order and Authorization, DA 99-1249, at ¶ 18 (Int'l Bur. rel. June 24, 1999) (provisionally allowing TT&C communications in the United States for ICO's proposed 2 GHz MSS system in frequency bands well inside the bands specified for feeder links, rather than at the edges of the band, to facilitate ICO's global TT&C operations and coordination with Globalstar's Big LEO system also operating in the band).

3. Inter-Satellite Service (ISS) Links

88. Section 25.279 of the Commission's rules sets forth the obligation to coordinate proposed commercial use of the ISS bands with Government agencies in bands co-allocated to Government and non-Government use, as well as existing non-Government permittees and licensees.[310] In the *Notice*, we proposed that Section 25.279 would apply to the 2 GHz MSS system proponents.[311] NTIA and Globalstar support of our proposal,[312] and we received no objections. We therefore adopt this proposal, so that all parties cooperate fully and make every reasonable effort to resolve technical problems and conflicts that may inhibit effective and efficient use of the radio spectrum. Globalstar notes that Section 25.279 refers to ISS links between only NGSO satellites and other space stations,[313] and should be amended to apply to communications between any space stations.[314] The Commission promulgated Section 25.279 in the *Big LEO Report & Order*,[315] a processing round limited to NGSO satellites.[316] Since that time, satellite systems are being designed to include inter-satellite communications between GSO satellites,[317] or between satellites in a system incorporating GSO and NGSO architectures.[318] Therefore, we revise Section 25.279 so that it will apply to any space station communicating with another space station using frequencies in the ISS bands.

89. Globalstar seeks ISS links in the 59-64 GHz bands.[319] Currently, the 59-64 GHz bands are available for Government and non-Government ISS.[320] In July 1999, however, we proposed deleting the non-Government ISS allocation from the 59-64 GHz bands, and allocating the 65-71 GHz band for exclusive non-Government ISS use.[321] We made these proposals because there is a well-established and pressing demand for commercial inter-satellite link spectrum and because NTIA asserts that Government ISS operations in the 59-64 GHz bands are not compatible with proposed commercial ISS users of this

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310 47 C.F.R. § 25.279(b). Pursuant to Section 25.279, we require all relevant entities to cooperate fully and make every reasonable effort to coordinate and resolve technical problems and conflicts that may inhibit effective and efficient use of the radio spectrum. *Id.* § 25.279(b)(2).

311 *Notice*, 14 FCC Rcd at 4874 ¶ 70.

312 *See* NTIA Comments at 17. *See also* Globalstar Comments at 30 (stating its willingness to coordinate use of its ISS links with Government and non-Government users).

313 47 C.F.R. § 25.279(a) ("Any non-geostationary satellite communicating with other space stations may use frequencies in the inter-satellite service as indicated . . . .").

314 Globalstar Comments at 30.

315 *See Big LEO Report & Order*, 9 FCC Rcd at 6000 ¶ 170.

316 *Id* at 5945 ¶ 15.

317 *See, e.g., Lockheed Martin Corporation*, Order and Authorization, 12 FCC Rcd 23014, 23021-22 ¶ 24 (Int'l Bur. 1997) (Astrolink, a Ka-band satellite system, plans to use inter-satellite links between adjacent GSO satellites).

318 *See, e.g.*, Globalstar 2 GHz MSS Application at 37.

319 Globalstar 2 GHz MSS Application at 31.

320 47 C.F.R. §§ 25.203, 101.103.

321 *See Amendment of Part 2 of the Commission's Rules to Allocate Additional Spectrum to the Inter-Satellite, Fixed, and Mobile Services and to Permit Unlicensed Devices to Use Certain Segments in the 50.2-50.4 GHz and 51.4-71.0 GHz Bands*, ET Docket No. 99-261, Notice of Proposed Rule Making, 14 FCC Rcd 12473, 12481-82 ¶¶ 9-10 (1999) (*Millimeter Wave Notice*).

band.[322] In the event that we adopt these proposals in an upcoming order, Globalstar may amend its proposed ISS frequencies to operate consistent with the U.S. allocation.[323]

4. Radionavigation Frequencies

90. In addition to requesting service and feeder link spectrum for its 2 GHz MSS system, Boeing seeks Commission authority to use the 1565.42-1585.42 MHz band (the "GPS L1 band") to provide a Navigation Augmentation Service (NAS) for aircraft utilizing the Global Positioning System (GPS).[324] In the *Notice*, we sought comment on Boeing's proposed use of this band, which is allocated for the Radionavigation Satellite Service (RNSS) and used by the Government for its GPS system within NTIA's jurisdiction.[325] NTIA states that "[d]etailed discussion of the technical parameters of the proposed system will be necessary" with the Department of Defense and the Federal Aviation Administration to ensure protection of GPS "before NTIA could concur on the Boeing proposal."[326] Boeing therefore requests that the FCC authorize its proposed GPS augmentation service conditioned on the agreement of U.S. government users of the band.[327]

91. Boeing's ability to provide MSS is not dependent on receipt of authorization to use the GPS L1 band.[328] There are multiple technical and national policy issues to be resolved before we could authorize any GPS augmentation service in the RNSS. For example, NTIA requests that the Commission conform its rules to reflect the fact that the bandwidth for GPS has been amended to 1563.42-1587.42 MHz,[329] and Boeing asks the Commission to adopt rules requiring that any RNSS operating in the GPS L1 band must provide global coverage.[330] We will address these issues, as well as a similar application submitted by Lockheed Martin Corporation,[331] in a future action.

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322 *Id* at 12481 ¶ 9. *See also* NTIA Comments at 17 (requesting that, within the 54.25-71 GHz range, the Commission require that NGSO ISS links be limited to the 65-71 GHz bands).

323 Globalstar Comments at 30.

324 Boeing 2 GHz MSS Application at 3-6 & Attachment Two.

325 *Notice*, 14 FCC Rcd at 4873 ¶ 68.

326 NTIA Comments at 19. *Accord* Iridium Comments at 30 (opposing operations of any kind that would compromise the integrity and accuracy of the GPS system).

327 Boeing Reply at 12

328 *See also* Iridium Comments at 30 (arguing that Boeing's GPS augmentation request is beyond the scope of this proceeding). Indeed, Boeing describes its proposed NAS system separately from its proposed 2 GHz MSS system. *See* Boeing 2 GHz MSS Application, Attachment 1 (description of proposed 2 GHz MSS system) and Attachment 2 (description of proposed NAS system).

329 NTIA Comments at 4-6 (citing, *e.g.*, 47 C.F.R. § 25.213(b)).

330 Boeing Comments at 14.

331 Application of Lockheed Martin Corporation, File Nos. SAT-LOA-19990427-0045 through SAT-LOA-19990427-0050 (filed April 27, 1999). *See* Public Notice, Report No. SAT-00018 (rel. May 27, 1999).

C. Service Rules

1. Regulatory Classification of Providers

92. *Space Station Providers*. In the *Notice*, we sought comment on our interpretation that certain provisions of the Communications Act grant us the discretion to impose, or refrain from imposing, common-carrier regulation in the provision of space segment capacity in the 2 GHz MSS.[332] We explained that, in our view, Section 332(c)(5) of the Communications Act, which relates to CMRS, authorizes the Commission "to determine whether the provision of space segment capacity to providers of commercial mobile services shall be treated as common carriage."[333] In addition, we noted that Section 3(44) of the Communications Act states that "the Commission shall determine whether the provision of fixed and mobile satellite service shall be treated as common carriage."[334] We tentatively concluded that we would treat the space segment component of 2 GHz MSS as non-common carriage.[335]

93. We adopt our tentative conclusion. The commenters support our tentative conclusion that the space segment component of the 2 GHz MSS does not have to be regulated on a common carrier basis.[336] In the *Notice*, we explained that the Commission has used the two-part analysis enunciated by the D.C. Circuit in *National Association of Regulatory Utility Commissioners v. FCC*, 525 F.2d 630, 642 (D.C. Cir. 1976), *cert. denied*, 425 U.S. 999 (*NARUC I*) to determine whether a space station operator offering service to another entity that then offers service to end users should be regulated as a common carrier.[337] *NARUC I* requires a determination of whether: (1) there is or should be any legal compulsion to serve the public indifferently; or (2) whether the service is such that the provider is likely to hold itself out to serve indifferently all eligible users.

94. We tentatively concluded that, based on the *NARUC I* analysis, it did not appear that we needed to impose common carrier requirements on 2 GHz MSS space station operators. We explained in the *Notice* that, with respect to the first prong of the *NARUC I* analysis, in the context of satellite space station operators, there only would be a need for a legal requirement to serve the public indifferently if there were an insufficient amount of satellite capacity available. Specifically, we explained that the Commission has found that if the barriers to entry for new satellite operators are low and alternative competitive sources of satellite services are available to consumers through service providers, space segment operators will have incentive to offer space segment services efficiently at low wholesale rates.[338] Under these circumstances, the Commission has determined that there is no need to compel operators to offer space segment capacity to service providers or the public indifferently.[339] We also concluded that, under the

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332 *Notice*, 14 FCC Rcd at 4875 ¶ 73.

333 47 U.S.C. § 332(c)(5).

334 47 U.S.C. § 153(44).

335 *Notice*, 14 FCC Rcd at 4875-76 ¶ 74.

336 Constellation Comments at 23; Globalstar Comments at 31; ICO Comments at 15; Inmarsat Comments at 16; Iridium Comments at 31-32 & Reply at 26-27; TMI Comments at 9.

337 *Notice*, 14 FCC Rcd at 4875-76 ¶ 74.

338 *Domestic Fixed Satellite Transponder Sales*, CC Docket No. 82-45, Memorandum Opinion, Order and Authorization, 90 F.C.C.2d 1238, 1254-55 (1982), *aff'd, Wold Communications, Inc. v. FCC*, 735 F.2d 1465 (D.C. Cir. 1984), *modified, Martin Marietta Communications Systems*, Memorandum Opinion and Order, 60 Rad. Reg. (P&F) 2d 779 (1986).

339 *Notice*, 14 FCC Rcd at 4876 ¶ 75.

second prong of the *NARUC I* analysis, based on the fact that 2 GHz MSS space station applicants propose to offer space segment-only services, they would not be holding themselves out to serve the public indifferently to all eligible users. In this regard, the 2 GHz MSS operators will be in a similar position as Big LEO space station licensees and, thus, we see no reason to treat 2 GHz MSS space segment operators differently than Big LEO space segment licensees.

95. The commenters agree with our *NARUC I* analysis. Globalstar notes that, with respect to the first prong of the *NARUC I* analysis, space segment providers will not serve end users directly and that satellite operators offering space segment capacity to other carriers have operated in a competitive environment for many years qualifying as private carriers.[340] As to the second prong of the *NARUC I* analysis, ICO asserts that there is nothing inherent in the 2 GHz MSS to require that space segment capacity be offered indifferently to the public.[341] ICO and Iridium both assert that because 2 GHz MSS and Big LEO operations are similar, the services should be treated the same for regulatory classification purposes.[342] Based on our analysis and the comments received, we adopt our tentative conclusion and will not require the space segment component of the 2 GHz MSS to be regulated as common carrier service.

96. *Earth Station Providers.* In the *Notice* we also sought comment on our tentative conclusion that, to the extent that 2 GHz MSS earth stations, including mobile earth terminals,[343] gateways,[344] and tracking, telemetry and control earth stations,[345] are used to make service available to the public for profit and for interconnection with the public switched network, the service must be regulated as common carriage.[346] We explained that if the service is offered to the public as described in the Communications Act,[347] service to the end user of the service would fall within the statutory definition of CMRS.[348] In addition, we explained that the Commission has determined that each mobile satellite service must be evaluated to determine whether the service offering is CMRS or private mobile radio service (PMRS).[349] More specifically, we pointed out that in discussing Section 332(c)(5) of the Communications

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340 Globalstar Comments at 31-32. *See also* Iridium Comments at 31-32; TMI Comments at 9.

341 ICO Comments at 15.

342 ICO Comments at 15-16 (arguing that any other treatment would place ICO at a competitive disadvantage *vis-à-vis* Big LEOs); Iridium Comments at 31.

343 Mobile earth terminals are mobile earth stations intended to be used while in motion or during halts at unspecified points. 47 C.F.R. § 25.201.

344 Gateways are earth stations located at a specified fixed point or within a specified area on land to provide a feeder link for the mobile satellite service. 47 C.F.R. § 25.201.

345 Tracking, telemetry and control earth stations are earth stations that operate in either the feeder link or service link bands for determination of orbit, velocity or instantaneous position of an object in space by means of radiodetermination, transmission of measurements made in the space station, including functioning of the space station, and transmission of signals to a space station to initiate, modify or terminate function of the equipment on a space station. 47 C.F.R. § 25.201.

346 *Notice*, 14 FCC Rcd at 4877-78 ¶¶ 77-78.

347 Section 332(d)(1) of the Communications Act defines "commercial mobile service" as "any mobile service . . . that is provided for profit and makes interconnected service available (A) to the public or (B) to such class of eligible users as to be effectively available to a substantial portion of the public, as specified by regulation of the Commission." 47 U.S.C. § 332(d)(1).

348 *Notice*, 14 FCC Rcd at 4877-78 ¶ 77.

349 *CMRS Second Report &* Order, 9 FCC Rcd at 1457 ¶ 108. PMRS is defined as any service that does not meet the definition of CMRS or is not the functional equivalent of CMRS. *Id.* at 1447 ¶ 179.

Act, Congress indicated that the provision of earth segment capacity to users of CMRS, including by MSS terminals, shall be treated as common carriage. In the *Notice*, we said, however, that we would reserve the right to review individual applications on a case-by-case basis to determine if this classification is appropriate. We also noted that the Commission has forborne from applying certain provisions of Title II to CMRS providers.[350] We tentatively concluded that under the statutory and *NARUC I* standards, gateway earth stations and stations that may be used for tracking, telemetry and control should not be required to be licensed for common carriage because those services generally are not used to provide service to the public but rather for backhaul of large amounts of communications traffic and control of the space segment of satellite systems, respectively.

97. We adopt our tentative conclusions with respect to earth station regulatory classifications. We believe, and the commenters agree,[351] that the reasons we provided in the *Notice* for treating mobile earth terminals differently than gateway and tracking, telemetry and control earth stations for regulatory classification purposes under the statutory definition of CMRS are valid. We will treat the mobile earth terminal component of the 2 GHz MSS as common carriage for regulatory purposes. We will, however, reserve the right to review individual applications on a case-by-case basis to determine if this regulatory classification is appropriate. We note that Globalstar agrees with our conclusion that we should reserve the right to review each application on a case-by-case basis to determine whether a particular classification is appropriate and whether forbearance may be in order.[352]

98. As for gateway and tracking, telemetry and control earth stations, several of the commenters agree with our preliminary analysis and explain that because these services are not offered directly to the public there is no need to regulate these components of the systems as common carriers.[353] We adopt our tentative conclusions with respect to the regulatory classification of earth station terminals in the 2 GHz MSS and will not require that gateways or tracking, telemetry and control earth stations be regulated on a common carrier basis.

2. System Licenses and Terms

99. As we explained in the *Notice*, the applicants in the 2 GHz MSS propose systems that include non-geostationary constellations of technically identical satellites, geostationary satellites, and a hybrid system with satellites in geostationary and non-geostationary orbits.[354] The *Notice* proposed granting "blanket" launch and operation licenses[355] for systems of technically identical satellites, which probably will include most NGSO constellations.[356] We proposed to license 2 GHz MSS geostationary satellites by issuing a separate license for each orbital position to account for variations in system design,

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350 *See* 47 C.F.R. § 20.15. *See also* 47 U.S.C. § 332(c)(1)(A).

351 Constellation Comments at 23-24; Globalstar Comments at 31; Inmarsat Comments at 15; Iridium Comments at 31; TMI Comments at 9.

352 Globalstar Comments at 31.

353 Constellation Comments at 23-24 (non-common carrier treatment for gateway earth stations is appropriate because they will be use as a private network for TT&C and system control operations); Inmarsat Comments at 16; Iridium Comments at 31; TMI Comments at 9.

354 *Notice*, 14 FCC Rcd at 4854 ¶ 17.

355 This follows the single-step processing and licensing policy that has been used for satellites since 1980. *See Assignment of Orbital Locations to Space Stations in the Domestic Fixed-Satellite Service*, Order and Authorizations, 11 FCC Rcd 13788 (1996).

356 *Id.* at 4878-79 ¶ 79.

such as beam patterns, at each geostationary satellite orbital position. We proposed this distinction in licensing between NGSO and GSO satellites because of the design differences between the systems, the beam coverage variations, and our experiences licensing both types of systems.

100. We adopt this proposal. ICO, the only commenter on this issue, supports our proposal.[357] We believe that design differences among GSO satellites in a system affirm the value of our practice of licensing each GSO satellite individually. In addition, each GSO satellite must be internationally coordinated and technical concerns may arise unique to each satellite based on the operations of adjacent satellites. For GSO/NGSO hybrid systems, we will adopt our proposal to license the GSO component on an individual satellite basis and the NGSO constellation portion of the system on a "blanket" license basis.

101. In the *Notice*, we proposed a ten-year license term for 2 GHz MSS operators in addition to a pre-operational testing authority.[358] We proposed that, like the Big LEO license term, the license term for 2 GHz MSS would end ten years following commencement of satellite operations. Thus, given construction time, the length of the authorization actually would exceed ten years. We also proposed that systems with both NGSO and GSO satellite components would have separate license terms for the NGSO portion of the system and for each GSO satellite. Finally, recognizing statutory authority for the FCC to be able to award a longer license period,[359] as well as the investment required to construct and launch these systems, combined with the development of satellite technology, specifically developments that have given satellites longer life spans – up to 15 or more years in some cases for geostationary satellites – we sought comment on whether the license term should exceed ten years. We also proposed that the license would include a separate pre-operational testing authority. In addition, we proposed to permit the licensee to replace any satellites lost during launch and older satellites retired before the end of the license period with technically identical satellites.

102. The commenters support our proposal to extend the license term to 15 years. The commenters argue that longer license terms will enhance system proponents' ability to attract the large investments required to start a global MSS system.[360] Boeing, Inmarsat and IUSG point out that longer license terms more accurately reflect the improvements in satellite life span.[361] These commenters agree that the Commission has the statutory authority to extend license terms.[362]

103. We adopt a 15-year license term for the 2 GHz MSS space segment for NGSO constellations, individual GSO satellites, and the equivalent terms for the NGSO constellation and individual GSO satellite portions of hybrid systems. We agree with the commenters that state that the extremely large amount of capital investment required to construct a global MSS system, particularly NGSO systems, is facilitated by the increased degree of certainty provided by a longer license term.[363] We

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357 ICO Comments at 16.

358 *Notice*, 14 FCC Rcd at 4879 ¶ 80.

359 The Telecommunication Act of 1996 amended the Communications Act to modify the statutory license term limit of ten years by granting the Commission authority to "prescribe the period or periods for which licenses shall be granted and renewed . . . ." Telecommunication Act of 1996, Pub. L. No. 104-104, Title II, § 203, 110 Stat. 56, 112 (1996) (amending Section 307 of the Communications Act to eliminate ten-year term and creating new Section 307(c)(1) granting the Commission authority to determine license terms for particular classes of stations, including satellite space and earth stations).

360 Boeing Comments at 37; IUSG Comments at 41; ICO Comments at 23; Iridium Comments at 27.

361 Boeing Comments at 37; IUSG Comments at 41; Inmarsat Comments at 17.

362 Boeing Comments at 38; Inmarsat Comments at 17; Iridium Comments at 33 & Reply Comments at 28.

363 Boeing Comments at 37; IUSG Comments at 41; ICO Comments at 23; Iridium Comments at 27.

also recognize that GSO satellites are being constructed with longer life-spans of 15 years or more. In this regard, we believe that it is appropriate to have a license term that is more commensurate with the life of geostationary satellites. We also adopt our proposal to start the license term once operations commence and the licensee certifies to the Commission that the first satellite in the system has been successfully placed into orbit and the first transmission to or from that satellite in the authorized frequency bands has occurred, as we required for Big LEO licensees. In addition we will authorize system operators to conduct pre-operational testing in the license grant, to the extent that applicants include such information in their applications.

104. We also adopt our proposal to permit replacement satellites to be launched within the license term of the satellite being replaced without distinction between GSO and NGSO systems. ICO agrees with our proposal and suggests that we adopt a rule to require replacement satellites to conform identically to their operational counterparts.[364] We have found that requiring that replacement satellites launched during the initial license term be technically identical to the authorized satellite has worked well as a policy for Big LEO licensees and will continue this requirement. Most NGSO constellations require satellites to be technically identical. Requiring GSO satellites to be technically identical will assure continued compatibility of the systems with other users of the spectrum. We also adopt our proposal that the technically identical replacement satellite requirement apply to all 2 GHz MSS system designs – NGSO, GSO and hybrid systems. As such, we will treat any non-conforming satellites as requests for license modification, as the Commission does with respect to Big LEO satellites.[365] In addition, as to spare satellites, we adopt our proposal to allow system operators to request authority to deploy technically identical in-orbit spare satellites in the case of NGSO constellations and collocated spares for GSO systems.[366] System operators can activate spare satellites as necessary, but will be required to notify the Commission, within ten days after activation, that activation of the satellite did not cause the licensee to exceed the total number of authorized space stations. As proposed, the license term for activated spare satellites will expire with the overall system's authorization term.

105. Where licensees wish to utilize next generation systems, or individual next generation satellites in the case of GSO operators, after the initial license term, they must file applications no earlier than three months before and no later than one month after the end of the twelfth year of the existing license.[367] As we explained in the *Notice*, this proposal, which is the same as the Big LEO rule, is designed to allow the Commission and the public adequate time to evaluate and act upon replacement applications, as well as sufficient time for the licensee to implement its next generation system. We proposed not to adopt a formal renewal expectancy for 2 GHz MSS licensees, but to proceed on a case-by-case basis as we have in other satellite services.[368] We adopt our proposal. Specifically, we will generally grant system operators the authority to implement replacement systems/satellites if the orbit location and/or frequencies remain available for use by U.S. systems.[369] This recognizes that changed circumstances, including intervening international agreements, may affect our ability to assign or renew orbit and spectrum resources

364 ICO Comments at 16.

365 Technically identical satellites must have identical satellite antenna footprints and transmission parameters. They need not, however, have the identical physical structure or microelectronics. 47 C.F.R. § 25.143(c).

366 *Notice*, 14 FCC Rcd at 4879-80 ¶ 81.

367 *Id.* at 4880 ¶ 82.

368 *See Big LEO Reconsideration*, 11 FCC Rcd at 12878 ¶ 51.

369 *See, e.g., Assignment of Orbital Locations to Space Stations in the Domestic Fixed-Satellite Service*, Memorandum Opinion and Order, 3 FCC Rcd 6972, 6976 n.31 (1988).

to U.S. systems. IUSG, ICO, and Iridium argue for the grant of a license renewal expectancy in order to provide for greater investment attraction,[370] to assured continuity of service to consumers,[371] to provide a reduction in the burden associated with the grant of *ad hoc* extensions and to acknowledge the great expense of procuring the initial license.[372] We agree with these commenters' concerns but believe that the 15-year license term we are granting to 2 GHz MSS operators will serve the same objectives. We recognize, however, the enormous investment necessary to launch and operate 2 GHz MSS satellite systems and therefore will grant extensions for satellites that continue to operate beyond their license term, replacement authorizations, and renewals, if appropriate, unless extraordinary circumstances require a denial. Thus, we will continue to review renewal applications on a case-by-case basis. We also adopt our proposal that these policies apply to earth station renewals.

3. Implementation Milestones

106. In the *Notice*, consistent with Commission precedent, we proposed to adopt an implementation milestone schedule for 2 GHz MSS systems. Under that precedent, we seek to ensure speedy delivery of service to the public and prevent warehousing of valuable orbital locations and spectrum. To that end, we require systems to begin operation within a prescribed time. We continue to believe that milestone requirements promote efficient use of limited spectrum resources. As we emphasized in the *Notice*, milestone requirements are especially important because we are declining to adopt financial qualifications as an entry criterion for 2 GHz MSS systems.[373] Commenters generally agreed with our conclusions. We therefore adopt the following implementation milestone schedules for 2 GHz MSS systems, which will be incorporated as conditions to licensing and spectrum reservation:

- *Non-geostationary satellite systems* must enter into a non-contingent satellite manufacturing contract for the system within one year of authorization, complete critical design review ("CDR") within two years of authorization, begin physical construction of all satellites in the system within two and a half years of authorization, and complete construction and launch of the first two satellites within three and a half years of grant.[374]
- *Geostationary satellite systems* must enter into a non-contingent satellite manufacturing contract within one year, complete CDR within two years, begin physical construction of all satellites in the system within three years, and complete construction of, and launch, one satellite of its constellation into its assigned orbital location within five years of authorization.
- *Hybrid satellite systems* (containing NGSO and GSO components) must follow the non-geostationary milestones for the non-geostationary portion of the system and comply with the geostationary milestones for the geostationary portion of the proposed system.
- The entire system, whether NGSO, GSO, or hybrid, will have to be launched and operational within six years of authorization.

Non-compliance with implementation milestones will result in cancellation of the authorization.[375]

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370 ICO Comments at 23.

371 Iridium Comments at 33.

372 IUSG Comments at 41.

373 *Notice*, 14 FCC Rcd at 4881 ¶ 83.

374 *Id.* at 4882 ¶ 86.

375 *Accord Advanced Communications Corporation v. FCC*, 84 F.3d 1452 (D.C. Cir. 1996) (per curiam) (unpublished disposition; text available at 1996 WL 250460); *Norris Satellite Communications, Inc.*,

Consistent with our practice in other services, we will require operators to submit certifications of milestone compliance, or filing disclosure of non-compliance, within 10 days following a milestone specified in the system authorization. Failure to file a timely certification of milestone compliance, or filing disclosure of non-compliance, will result in automatic cancellation of an operator's system authorization with no further action required on the Commission's part.[376]

107. As proposed in the *Notice*, and generally supported by commenters,[377] milestones will begin to run upon award of a service link license to U.S.-based applicants, or upon issuance of a Public Notice or Declaratory Ruling designating spectrum for LOI filers.[378] We will assess compliance with the adopted milestone schedules through review of the annual reports operators must file, which include detailed information about satellite system implementation.[379] In addition, operators must, within ten days after a required implementation milestone, certify to the Commission by affidavit that the system has (or has not) met the milestone.[380] IUSG and ICO recommend that all filers be required to make milestone reports public to all interested parties.[381] We agree with these commenters. While we will permit filers to request confidential treatment of information that may be proprietary, we strongly urge filers to limit the scope of confidentiality requests. Finally, we retain discretion to seek additional information from system proponents concerning any aspect of system progress.

108. The milestone schedule we adopt incorporates a number of elements of the European Milestone Review Committee ("MRC") criteria for system implementation, as suggested by Globalstar.[382] In particular, we are adopting CDR as a new, intermediate milestone. CDR is the stage in the spacecraft implementation process at which the design and development phase ends and the manufacturing phase starts. System proponents certifying completion of this milestone must support their certification with a declaration by the satellite manufacturing company stating the date on which the CDR was completed.[383] This new milestone will address commenters' concerns, which we share, with there being a three-year gap between the first and second milestones. The CDR milestone will aid us in assessing that prospective operators are taking immediate, concrete steps toward system implementation after meeting the first milestone, and allows us to identify any failure in system progress. This approach also will require

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Memorandum Opinion and Order, 12 FCC Rcd 22299 (1997); *National Exchange Satellite, Inc.*, Memorandum Opinion and Order, 8 FCC Rcd 636 (1993); *NetSat 28 Company, L.L.C.*, Memorandum Opinion and Order, DA 00-1264 (Int'l Bur., June 26, 2000); *Morning Star Satellite Company, L.L.C.*, Memorandum Opinion and Order, DA 00-1265 (Int'l Bur., June 26, 2000); *PanAmSat Licensee Corp.*, Memorandum Opinion and Order, DA 00-1266 (Int'l Bur., June 26, 2000).

376 *See* 47 C.F.R. §§ 25.161, 25.163.

377 Globalstar Comments at 40; ICO Comments at 17-18; Iridium Comments at 35-36; IUSG Comments at 39; TMI Comments at 19.

378 *See Notice*, 14 FCC Rcd at 4882 ¶ 88. As discussed in Section III.B., *supra*, we will initiate milestones upon authorization of service link spectrum, whether or not a system has obtained adequate feeder link or inter-satellite link assignments, to encourage the pursuit of attainable feeder links and discourage *de facto* milestone delays.

379 47 C.F.R. § 25.143(e)(1), as amended herein. *See* Appendix D. *See also* Section III.C.4, *infra*.

380 47 C.F.R. § 25.143(e)(3), as amended herein. *See* Appendix D.

381 IUSG Comments at 40 & Reply at 39; ICO Comments at 17.

382 Globalstar Comments at 37-39.

383 *See* 47 C.F.R. § 1.16.

prospective operators to identify any system modifications needing prior FCC approval well in advance of the CDR milestone.

109. Note, however, that we adopt Globalstar's suggestion that licensees meet the MRC milestones only in part, declining to adopt several suggestions for making milestone requirements stricter. We are sympathetic to concerns that milestone requirements must be effective so that spectrum does not lie fallow, and have carefully considered these requests. We believe the MRC milestones are a reasonable method for evaluating system progress, and one that complements our own efforts. The information provided to the MRC is very similar to that provided to the FCC in annual construction progress reports. We believe the more limited set of milestone requirements we adopt today will provide adequate warning if a system is not progressing toward provision of service. Similarly, we do not adopt IUSG's suggestion that we impose a separate milestone schedule to track the progress of in-orbit spares and ground segments.[384] While progress with respect to spare satellites and ground segment may be relevant to overall system progress, in the typical case, a system making no progress on ground segment or spare construction also will exhibit non-compliance with other milestone requirements.

110. We also reject suggestions that we relax milestone requirements for space stations. In particular, we reject Constellation's proposal that companies already licensed to construct first generation MSS systems in other frequency bands, should begin their 2 GHz MSS milestones periods on a date that would permit them to launch a second generation system including both frequency bands.[385] If we were to adopt this proposal, such systems might not be required to begin 2 GHz MSS operation before 2010. This is an unreasonably long period of time in which to preclude spectrum from potential use by other parties, including any new entrants that develop system plans in the next few years, and thereby delay deployment of service for U.S. customers. Modifications of currently licensed systems, of the type described by Constellation, are more appropriately considered at a later date.

111. As we noted in the *Notice*, the Communications Act states that "[w]ith respect to any other station or class of station [including space and earth stations], the Commission shall not waive the requirement for a construction permit unless the Commission determines that the public interest, convenience, and necessity would be served by such a waiver."[386] Consistent with our statutory authority, and with our treatment of other satellite services, we will waive the requirement that 2 GHz MSS operators obtain construction permits for space and earth stations prior to commencing construction. We will, however, require that 2 GHz MSS system operators notify the Commission in writing that they intend to begin construction at their own risk of satellites and earth stations.[387]

4. Reporting Requirements

384 IUSG Comments at 39.

385 Constellation Comments at 25.

386 47 U.S.C. § 319(d). Under this statutory authority, the Commission has eliminated the requirement that applicants be granted construction permits for space stations and earth stations under Part 25, Sections 25.113(f), (b). *Streamlining the Commission's Rules and Regulations for Satellite Application and Licensing Procedures*, IB Docket No. 95-117, Report and Order, 11 FCC Rcd 21581, 21584-85, 21590-91 ¶¶ 8, 23 (1996) (elimination of the construction permit requirement for space stations and MSS earth stations, respectively, will accelerate the provision of satellite-delivered services, and eliminate administrative burdens and potential delays).

387 47 C.F.R. § 25.113(f).

112. The *Notice* proposed applying the same annual reporting requirements to 2 GHz MSS operators as we currently apply to other satellite systems.[388] The reporting rules require system operators to file reports specifying satellite system implementation, anticipated launch dates, system utilization, and system outages or malfunctions. The reports also are used to determine annual regulatory fees for each system. We proposed to amend Section 25.143(e) of the Commission's rules to apply these requirements to 2 GHz MSS operators.[389]

113. We adopt the reporting requirements as proposed in the *Notice*, with the addition of requiring satellite operators receiving expansion spectrum to report on the actual number of subscriber minutes originating or terminating in unserved areas as a percentage of the actual U.S. system use.[390] The commenters agree with this proposal, with some minor exceptions.[391] We note that under this requirement we are not requiring foreign-licensed systems to file separately information already provided to the licensing administration. As ICO points out in its comments, because it is licensed by the United Kingdom, the Commission has determined not to subject it or other similarly foreign-authorized systems to redundant licensing requirements in the United States.[392] We require, however, that foreign-licensed system operators file any information required by our rules but not already filed with the licensing administration. We also require foreign-licensed operators to file copies with the Commission of information submitted to the foreign-licensing administration that is required of U.S.-licensees for purposes of monitoring compliance with our rules and the terms of entry into the U.S. market.

114. The *Notice* also proposed to apply to 2 GHz MSS operators the requirement that system operators file affidavits certifying whether milestone requirements are met.[393] As we explained in the *Notice*, the Commission will retain the right to request additional information to ensure compliance with milestones. These requirements are consistent with the U.S. commitments in the World Trade Organization Agreement on Basic Telecommunications because the Commission requires this information to determine whether system implementation milestones of both U.S. and foreign operators have been met and to ensure network operational status.

115. In the *Notice*, we proposed to change the deadline for filing annual reports from June 30th to October 10th. The purpose of this proposed change is to provide additional information about system operators and to coincide with the end of the Commission's fiscal year, September 30th, for more accurate determination of annual regulatory fees.[394] Iridium filed comments supporting this change.[395] We adopt this proposal.

116. We also sought comment on our proposal to allow parties to request confidential treatment for any portion of an annual report.[396] Iridium suggests that the Commission delete the requirement to

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388 *Notice*, 14 FCC Rcd at 4884 ¶ 91.

389 47 C.F.R. § 25.143 (e).

390 *See* Section III.A.1.d., *supra*.

391 *Cf.* Iridium Comments at 38 (suggesting that the Commission not require system utilization reporting) and ICO Comments at 19 (supporting non-duplicative reporting requirements).

392 ICO Comments at 18.

393 *Notice*, 14 FCC Rcd at 4884 ¶ 92.

394 These fees are now assessed based on system status as of September 30. The Commission does not currently have statutory authority to assess annual regulatory fees in connection with non-licensed systems.

395 Iridium Comments at 38.

396 47 C.F.R. § 0.459.

report on system utilization and to provide confidential treatment of reports from operational systems but not of reports related to progress in meeting implementation milestones, that Iridium contends should be publicly available.[397] We decline to implement Iridium's suggestions. As required under our Big LEO rules, 2 GHz MSS operators will be required to file affidavits certifying that milestones have been met and operators will be permitted to request confidential treatment of an annual report pursuant to Section 0.459 of the Commission's rules.[398] We believe that this policy has not been burdensome for operators in the past and that it sufficiently provides for the disclosure of individual system proponents' progress toward system implementation and of operational status.

5. Distress and Safety Communications and Enhanced 9-1-1

117. *Distress and Safety Communications.* As we stated in the *Notice*, many of the 2 GHz MSS systems proposed would be capable of providing distress and safety communications services.[399] In addition to voice and data services, several of the applicants propose position determination features. We noted that 2 GHz MSS systems cannot be used in place of distress beacons, such as satellite emergency position indicating radiobeacons (EPIRBs) that are required by international agreement and statute to be carried by passenger ships and certain cargo ships. [400] Like Big LEO operators, however, 2 GHz MSS systems will have certain statutory obligations related to maritime distress communications. In the *Notice*, we explained that in the *Big LEO Report & Order*, the Commission stated that, although the Big LEO applicants did not have plans for extensive distress and safety service, to the extent they provided such services, the licensees would have to meet certain statutory obligations and coordinate with the appropriate safety and rescue organizations.[401] In the *Notice*, we sought comment on our tentative conclusion that because the services being proposed by 2 GHz MSS systems are similar to those proposed by Big LEO licensees, the distress and safety rules adopted for Big LEO licensees also should be adopted for 2 GHz MSS systems.[402]

118. The comments support our proposal to adopt safety and distress rules for the 2 GHz MSS. The commenters state that the application of the Big LEO rules to 2 GHz MSS operators would be equitable because the rule already applies to the Big LEO licensees.[403] NTIA states that 2 GHz MSS operators providing safety and rescue services should coordinate with the National Search and Rescue Committee (NSARC)[404] and all other similar domestic and international search and rescue organizations, as

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397 Iridium Comments at 38.

398 47 C.F.R. § 0.459.

399 *Notice*, 14 FCC Rcd at 4884-85 ¶ 93.

400 Compulsory equipment carriage requirements are established in portions of the Commission's rules as well as by statute. *See, e.g.*, 47 C.F.R. §§ 80.801, *et seq.*; Ch. IV, International Convention on the Safety of Life at Sea, 32 U.S.T. 47, T.I.A.S. 9700 (1974).

401 The Commission explained that Big LEO operators providing safety and rescue services should coordinate with the Interagency Committee on Search and Rescue (ICSAR) and all other similar domestic and international search and rescue organizations. *Big LEO Report & Order*, 9 FCC Rcd at 6013 ¶ 200.

402 47 C.F.R. § 25.143(f).

403 IUSG Comments at 42; ICO Comments at 19; NTIA Comments at 17; TMI Comments at 10; Globalstar Reply at 17.

404 The United States Coast Guard (USCG) points out that the NSARC was formerly known as the Interagency Committee on Search and Rescue (ICSAR). USCG explains that NSARC is a federal interagency standing committee chartered to oversee the National Search and Rescue Plan, coordinate development of

required by Section 25.143(f)(2).[405] NTIA supports our tentative conclusion to modify Section 25.143(f) of the rules, to require 2 GHz MSS operators to comply with ship distress and safety requirements.[406] The United States Coast Guard (USCG) proposes that we adopt the International Maritime Organization's (IMO) "Criteria for use when Providing Inmarsat Shore-based Facilities" for use in the Global Maritime Distress and Safety Service (GMDSS) to address reliability of delivering emergency messages over satellite systems (IMO Inmarsat criteria) for the 2 GHz MSS systems.[407]

119. We agree with the commenters that it is appropriate to apply the Big LEO distress and safety rules to the 2 GHz MSS, which will offer similar services. Therefore, we adopt the distress and safety rules as proposed and amend Section 25.143(f) of our rules[408] to include the 2 GHz MSS service. We agree with NTIA's recommendation that the 2 GHz MSS operators providing safety and rescue services coordinate their service with NSARC. We decline, however, to adopt the USCG's recommendation that we apply the IMO Inmarsat criteria to 2 GHz MSS because of the delay that would result in adapting the requirements specifically for 2 GHz MSS. This could place unnecessary and onerous requirements on mobile satellite operators. We find that our current network reliability reporting requirements are sufficient for 2 GHz MSS systems. If a 2 GHz MSS operator wants to be recognized as part of the GMDSS or offer specialized Maritime Mobile Satellite Distress Service, we will reexamine the application of these requirements to 2 GHz MSS operators.[409]

120. *Enhanced 911*. In the *Notice*, we explained that in the *Big LEO Report & Order*, the Commission also considered and denied requests that Big LEO operators be required to provide caller ID, standardized position information and automatic call routing for distress and safety communications or disaster response communications, stating that it would address the issue in a separate rulemaking on enhanced 911 (E911).[410] We explained that, in the 1996 *E911 Report & Order*,[411] the Commission

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interagency policies and positions on search and rescue matters, provide a forum for coordinated development of compatible procedures and equipment to increase the effectiveness and standardization of search and rescue. USCG states that NSARC formed the Commercial Satellite Services Working Group (CMSS) to enable MSS providers to better understand the needs of search and rescue and disaster support operations and for the search and rescue and disaster support communities to learn more about the capabilities of MSS for their communications needs. USCG Comments at 3.

405 NTIA Comments at 18.

406 *Id.*

407 USCG Comments at 10, attachment 2.

408 47 C.F.R. § 25.143(f), as amended herein. *See* Appendix D.

409 On November 25, 1999, the International Maritime Organization adopted Resolution A.888(21), Criteria for the Provision of Mobile Satellite Communication Systems in the Global Maritime Distress and Safety System which describes the requirements for operators to be recognized as part of the GMDSS. This resolution is available from the International Maritime Organization at 4 Albert Embankement, London SE1 7SR, United Kingdom. *See also* http://www.imo.org.

410 *Notice*, 14 FCC Rcd at 4885-86 ¶ 94. *See also Big LEO Report & Order*, 9 FCC Rcd at 6012-13 ¶ 199.

411 *Revision of the Commission's Rules To Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, CC Docket No. 94-102, Report and Order and Further Notice of Proposed Rulemaking, 11 FCC Rcd 18676 (1996) (*E911 Report & Order*) (imposing Basic 911 and E911 transmission requirements on certain covered CMRS carriers), *aff'd on recon.*, Memorandum Opinion and Order, 12 FCC Rcd 22665 (1997) (*E911 Reconsideration*). Basic 911 requires covered carriers to transmit all wireless 911 calls without validation to a Public Safety Answering Point (PSAP), thereby providing any 911 wireless caller with a voice connection to request emergency response services in localities that provide such services. 47 C.F.R. § 20.18(b). E911 requires

exempted MSS carriers from 911 obligations because MSS was still in the early development stages and faced more technological and international hurdles than terrestrial carriers.[412] Therefore, the Commission did not include MSS in the list of covered CMRS carriers.[413] The Commission stated, however, that it expected mobile satellite operators to eventually provide appropriate access to emergency services in future systems as they are deployed.[414]

121. In the *Notice*, we sought comment on whether 2 GHz MSS systems, particularly those at an early stage of development, should be required to implement their systems with E911 capabilities.[415] We noted that because four of the 2 GHz MSS applicants are Big LEO licensees proposing essentially second generation or expansion systems, it appeared appropriate to consider whether E911 capabilities should be incorporated into these expansion systems. Several commenters support adoption of E911 requirements for the 2 GHz MSS.[416] Specifically, commenters explain that having automatic number identification (ANI) and automatic location identification (ALI) would provide an important public safety function and assist agencies responsible for search and rescue operations in remote locations, including rural, wilderness, unserved, and maritime situations.[417] The USCG points out that this information is important to identify the person seeking assistance and also for prosecution and deterrence of hoax calls.[418] The USCG believes that it is essential for every MSS system to provide a means to reach a real person, not an automated system, 24 hours a day to ensure that the proper Public Safety Answering Points (PSAPs) are identified.[419]

122. The USCG explains that there is also an international component to the E911 discussion. The USCG requests that the Commission closely coordinate any compatibility requirements and standards with international regulatory bodies.[420] The USCG states that standards are needed to allow these wireless systems to transmit ALI, ANI, priority and routing information to emergency service providers in other

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that, in addition to Basic 911, covered carriers transmit certain information with 911 calls to help the PSAP find the location of the caller. 47 C.F.R. § 20.18(d)-(k). For purposes of this *Report and Order*, E911 includes Basic 911.

412 *E911 Report & Order*, 11 FCC Rcd at 18718 ¶ 83.

413 47 C.F.R. § 20.18(a).

414 *E911 Report & Order*, 11 FCC Rcd at 18718 ¶ 83; *E911 Reconsideration*, 12 FCC Rcd at 22706-08 ¶¶ 87-89. The E911 requirements are imposed in two phases and are not triggered until the PSAP requests service and is capable of utilizing the information. In Phase I, which began April 1, 1998, covered carriers are to transmit the 911 caller's callback number and cell site or base station location. In Phase II, which begins October 1, 2001, covered carriers are to provide the location of a 911 call by longitude and latitude in accordance with certain accuracy standards and timetables that depend on the technology used. *Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, CC Docket No. 94-102, Third Report and Order, 14 FCC Rcd 17388, 17420-21 ¶ 72 (1999) (*E911 Third Report & Order), modified on recon.*, Second Memorandum Opinion and Order, 14 FCC Rcd 20850, 20866-67 ¶¶ 38-40 (1999).

415 *Notice*, 14 FCC Rcd at 4885 ¶ 94.

416 APCO Comments at 2; BellSouth Comments at 6 & Reply at 8; Celsat Comments at 30 & Reply at 27-28; NTIA Comments at 16; USCG Comments at 4-5.

417 APCO Comments at 2-3; BellSouth Comments at 6; NTIA Comments at 16; USCG Comments at 4-5.

418 USCG Comments at 8.

419 *Id.* at 9.

420 *Id.* at 5.

countries.[421] The USCG states further that the International Maritime Organization is working to resolve international access for emergency calls from ships over MSS.

123. We also explained in the *Notice* that several of the 2 GHz MSS applicants are proposing systems that may complement terrestrial wireless communications networks, which are required to provide E911 capabilities. Because of the potential for seamless use of the 2 GHz MSS systems, we sought comment as to whether we should require 2 GHz MSS operators to provide a seamless network with similar emergency services for users as terrestrial systems. Some commenters point out that the public's expectations of the capabilities of 2 GHz MSS handsets, especially those designed for seamless roaming, may be that the handset will have the same capabilities as terrestrial systems.[422] Commenters explain that because 2 GHz MSS has yet to be implemented, the 2 GHz MSS rulemaking is the best time for the Commission to set standards and avoid the delays in implementation faced by the cellular and Personal Communications Service industries.[423] The USCG and NTIA request that if the Commission does not require all consumer wireless equipment to have E911 capability, that any equipment not capable of providing emergency calling functions be labeled clearly to indicate that it cannot be used for emergency purposes.[424]

124. Other commenters oppose the adoption of E911 requirements for the 2 GHz MSS.[425] They argue that E911 requirements would be inappropriate at this time because the MSS industry is still in the nascent stages of development and is facing unique global technological and regulatory hurdles.[426] Some argue that because of MSS technological characteristics and coverage requirements, it is more difficult for MSS operators to provide E911 service than for terrestrial wireless providers to do so.[427]

125. We appreciate the comments received on these issues and value the concerns raised including those regarding public safety. We recognize that whether terrestrial wireless- or satellite-based, deployment of E911 features can save lives and improve the efficiency and effectiveness of emergency police, fire, and medical services across the country. We also note that, since the adoption of the *E911 Report & Order*, there have been significant strides in the development of GPS-based location technology.[428] We further note some commenters' position that, because 2 GHz MSS has yet to be implemented, this rulemaking is the best time for the Commission to adopt E911 obligations. We find, however, that there is insufficient information in the record in this proceeding to mandate specific requirements. We believe, therefore, that it is better to address the E911 issue in the forthcoming Global

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421 *Id.* at 5-6.

422 APCO Comments at 2-3; NTIA Reply at 8-9.

423 APCO Comments at 3; BellSouth Comments at 6; Celsat Comments at 30.

424 USCG Comments at 10; NTIA Reply at 11.

425 Boeing Comments at 19; IUSG Comments at 43; Constellation Comments at 26; Globalstar Comments at 40; ICO Comments at 19; Iridium Comments at 38-40; SIA Comments at 2; TMI Comments at 10; and Inmarsat Reply at 20. Celsat initially supported the adoption of E911 requirements but states in its reply comments that the issue may be more appropriate for a Further NPRM and Report and Order to avoid delay in authorizing the 2 GHz MSS. Celsat Reply at 27-28.

426 IUSG Comments at 43; Constellation Comments at 27; Globalstar Comments at 43; Iridium Comments at 38-40; Inmarsat Reply at 20.

427 Constellation Comments at 26-27; Globalstar Comments at 42; ICO Comments at 19; TMI Comments at 10 (complex cost recovery and potential liability issues); SIA Comments at 2 (increase cost, handset size, and reduced operating time due to presence of GPS hardware and interference); Inmarsat Reply at 19.

428 *See E911 Third Report &* Order, 14 FCC Rcd 17388, 17397-98 ¶ 18.

Mobile Personal Communications by Satellite (GMPCS) rulemaking (*GMPCS Proceeding*).[429] To that end, we direct the International Bureau to issue a Public Notice in the *GMPCS Proceeding* seeking additional information regarding the technological, regulatory, and international aspects of Basic 911 and E911 for satellite services. Addressing this issue in the *GMPCS Proceeding*, moreover, will allow us to simultaneously consider the full scope of technical and other issues on a wide-scale basis for the entire satellite industry, including all MSS and FSS services, rather than only the 2 GHz MSS at issue here.

126. In the interim, we are concerned that in an emergency situation consumers may have difficulty distinguishing between services provided by satellite and those provided by terrestrial wireless networks, which are required to offer Basic 911 services, and E911 services under certain conditions.[430] As a result, consumers likely will expect 911 services to be available whether they are on terrestrial systems or roaming on a satellite network. Until the Commission adopts an order in the *GMPCS Proceeding*, we require any handset used for 2 GHz MSS that does not have the capability of providing basic 911 or E911, to clearly indicate that it cannot provide those functions in the form of a sticker or label affixed to the handset. In addition, we strongly encourage the 2 GHz MSS industry to design the space segment portion of their networks with sufficient flexibility to be capable of accommodating earth station operators providing 911 services and to be able to provide basic and E911 services upon commencement of service to the public. We also recognize that MSS operators may be compelled by market forces to provide such 911 services in order to compete with terrestrial providers. In addition, we encourage continued development of international standards for emergency calling capabilities.

127. Finally, manufacturers of 2 GHz MSS equipment and service providers whose equipment and service do not have the capability of providing emergency calling functions and have not been fully coordinated with NSARC are prohibited from marketing their equipment and services to ships for distress or safety functions. In order to be eligible to market or operate such equipment and services, manufacturers of MSS equipment and service providers are required to notify the FCC that their service has been fully coordinated with NSARC.

6. Trafficking

128. In the *Notice*, we sought comment on whether we should adopt an anti-trafficking rule for 2 GHz MSS licensees.[431] We explained that the Commission adopted an anti-trafficking rule to govern the transfer of Big LEO licenses, which were not granted through competitive bidding.[432] We also explained that the purpose of the anti-trafficking rule is to prevent unjust enrichment of those who had obtained a license only for speculation and would not implement systems.[433] We cautioned that it is not our intent to adopt an anti-trafficking rule that would prevent debt or equity transactions, but rather to ensure that licensees do not sell bare licenses for profit.

129. ICO and IUSG oppose the adoption of anti-trafficking rules. ICO believes that the anti-trafficking prohibition on license sales is inappropriate in the volatile global telecommunications

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429 *See Amendment of Parts 2 and 25 to Implement the Global Mobile Personal Communications by Satellite (GMPCS) Memorandum of Understanding and Arrangements*, IB Docket No. 99-67, Notice of Proposed Rule Making, 14 FCC Rcd 5871 (1999) (*GMPCS Notice*).

430 *See* 47 C.F.R. § 20.18 (b)-(e).

431 *Notice*, 14 FCC Rcd at 4887 ¶ 96.

432 47 C.F.R. § 25.143(g).

433 *Cf.* 47 U.S.C. § 309(j)(3)(c).

marketplace.[434] ICO would allow trafficking and would address the associated spectrum speculation issue through the use of milestones and inter-system coordination procedures that only recognize operational systems.[435] IUSG argues that anti-trafficking rules are not necessary because the complex licensing procedures will deter any party from applying for a 2 GHz authorization in order to transfer it purely for profit.[436] IUSG believes that licensees are also deterred from speculative trafficking practices because they are likely to have other vital interests before the Commission.[437]

130. We are not convinced by ICO and IUSG's arguments. As we have stated, we do not intend our anti-trafficking rule to be an impediment to legitimate investments in 2 GHz MSS systems. We agree with these commenters that licensing procedures and milestones also will protect against speculative applications. These rules, however, do not cover the entire licensing process. For instance, without an anti-trafficking rule, a successful licensee/spectrum designee with no intention to provide service could transfer its authorization for significant profit.

131. We adopt the anti-trafficking rule as proposed in the *Notice*. We believe that the policies of deterring speculation and unjust enrichment are well-served by this rule in other services, without hampering a licensees' ability to raise capital.[438] We will review transfer and assignment applications in 2 GHz MSS under the same criteria we have used in other satellite services.[439]

132. We also sought comment on whether, if adopted, an anti-trafficking rule should apply to foreign systems for which a spectrum reservation has been made and how we would retain the discretion to address our unjust enrichment policy concerns in connection with spectrum reservations for foreign-licensed satellites. In its comments, Iridium states that it supports anti-trafficking rules but only if equally applied to foreign-licensed systems with special attention to the ICO/Inmarsat relationship.[440] Iridium suggests that the Commission place special restrictions on transfers between Inmarsat and ICO because of their affiliated ownership and control. Iridium believes that any ICO/Inmarsat transfers should be allowed only if the Commission determines that: (1) all other global MSS systems are able to obtain access to markets and spectrum in every country where ICO or Inmarsat have access; and (2) an ICO/Inmarsat transfer is in the public interest.[441]

133. ICO and Inmarsat object to Iridium's suggestion that restrictive transfer rules should apply only to ICO and Inmarsat. These commenters argue that such a rule would unfairly predicate transfers of spectrum upon conditions over which neither company has any control.[442] ICO also points out that an ICO/Inmarsat specific rule would violate the Commission's own principles as outlined in *DISCO II*.[443]

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434 ICO Comments at 21.

435 *Id. See also* paragraph 9, *supra*.

436 IUSG Comments at 46.

437 *Id.*

438 *See, e.g., KaStar 73 Acquisition, LLC, and KaStar 109.2 Acquisition, LLC*, Memorandum Opinion and Order, 15 FCC Rcd 1615 (Int'l Bur. 1999).

439 47 C.F.R. § 25.143 (g) (Big LEO trafficking rule); 47 C.F.R. § 25.145 (d) (Ka-Band trafficking rule).

440 Iridium Comments at 43.

441 *Id.* at 43-44.

442 ICO Reply at 24-25; Inmarsat Reply at 13.

443 ICO Reply at 24-25.

Inmarsat also argues that Iridium does not show why its proposed rules should not apply to all applicants.[444]

134. As we have said before, our service rules will apply equally to U.S.-licensed and foreign-licensed systems, including our anti-trafficking rule.[445] If a foreign-licensed spectrum designee's ownership undergoes a change prior to the issuance of an earth station authorization for use of any spectrum reserved in a space station processing round, that designee must file a notification with the FCC so that we may ensure that the circumstances continue to warrant a spectrum reservation. For example, we will need to know whether the transferee's licensing administration is a WTO member country for purposes of our market access analysis. Once we receive notification of the change, we will determine if we need additional information to conduct an anti-trafficking analysis. We will not adopt an ICO/Inmarsat specific rule. We believe that our licensing and spectrum designation process combined with the *DISCO II* analysis and prohibition on exclusionary arrangements are sufficient to address Iridium's market access concerns.

7. Orbital Debris Mitigation

135. In the *Notice*, we outlined the steps undertaken by Executive Branch agencies to develop guidelines for orbital debris mitigation, and asked whether the Commission should take any complementary steps.[446] In particular, we sought comment on whether some or all elements of the National Aeronautics & Space Administration (NASA)/Department of Defense (DoD) draft debris mitigation standard practices should be incorporated in the Commission's rules.[447] We asked, in the alternative, whether we should require submission, in connection with satellite licensing, of narrative information concerning debris mitigation.[448]

136. A number of commenters stated they considered it their responsibility to mitigate orbital debris generated by their operations.[449] Several commenters agreed with our observation in the *Notice* that debris issues are not unique to satellites operating at 2 GHz, and suggested that any debris mitigation requirements should be addressed in a separate proceeding concerning all commercial communications satellites.[450]

137. The DoD, through the Office of the Assistant Secretary of Defense, Command, Control, Communications, and Intelligence, filed comments stating its concern with "what may appear to be a desire to make mandatory all aspects of the DoD/NASA voluntary debris mitigation standards," especially that portion involving disposal of spacecraft at the end-of-life.[451] DoD offered several specific comments to aid the Commission in determining "what aspects of the voluntary guidelines are mature for consideration as regulations."[452] DoD emphasized that the NASA/DoD guidelines are voluntary, and must be analyzed in

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444 Inmarsat Reply at 13.

445 *DISCO II Order*, 12 FCC Rcd at 24158 ¶ 149, 24162-63 ¶ 159, 24168-69 ¶ 173.

446 *Notice*, 14 FCC Rcd at 4887-88 ¶¶ 97-102.

447 *Id.* at 4887-88 ¶¶ 98-100 & 4901-03 (Draft U.S. Government/Industry Orbital Debris Mitigation Practices).

448 *Id.* at 4888 ¶ 100.

449 TMI Comments at 11; Boeing Comments at 40-41.

450 *See e.g.*, PanAmSat Comments at 7.

451 DoD Comments at 1.

452 *Id.*

individual cases in light of impact on mission objectives and cost.[453] DoD observes that "[t]he current state of knowledge on orbital debris does not support a regulation requiring the mandatory deorbit or deboost of satellites."[454] DoD noted, however, that "requiring documentation of debris mitigation design strategies and end-of-life plans may not be unreasonable."[455]

138. Currently, the FCC addresses concerns regarding orbital debris and satellite systems on a case-by-case basis, typically in response to concerns raised by potentially affected third parties. Any such concerns are analyzed under the general "public interest, convenience, and necessity," standard in the Communications Act. Based on the comments received, and giving particular weight to the expertise of DoD on this matter, at this time we will continue to address orbital debris concerns for all systems, including 2 GHz MSS, on a case-by-case basis. In order to ensure an adequate opportunity for comment by potentially affected entities, however, parties to our 2 GHz MSS processing round must submit a narrative statement describing the debris mitigation design and operational strategies, if any, that they will use. System proponents must include this narrative statement in the amendments to applications or LOIs to be filed no later than 30 days after a summary of this *Report and Order* is published in the Federal Register. Applicants are specifically required to submit a casualty risk assessment if planned post-mission disposal involves atmospheric re-entry of the spacecraft. In preparing such exhibits, parties may find helpful the NASA/DoD guidelines and the ITU Recommendation concerning end-of-life maneuvers by geostationary satellites.[456] We intend to commence a rulemaking proceeding proposing to adopt filing requirements for all FCC-licensed satellite services. In addition, the rulemaking will explore other orbital debris mitigation issues, including selection of safe flight profiles and operational configurations, and post-mission disposal practices.

8. Exclusionary Arrangements

139. In the *Notice*, we sought comment on our proposal to apply to 2 GHz MSS our rule applicable to other satellite services prohibiting exclusionary arrangements for traffic between the United States and foreign countries.[457] As explained in the *Notice*, exclusionary arrangements are arrangements that offer a particular satellite system as the only permissible facility through which to obtain a particular satellite service between the United States and another country.[458] We reiterated in the *Notice* that it is our policy to prohibit exclusionary arrangements in other satellite services to facilitate competition.[459] We also explained that prior to the DISCO II decision, the Commission applied this prohibition to U.S. licensees and that the *DISCO II Order* extended this policy to non-U.S. systems.[460] Under this policy, if a provider

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453 *Id.*

454 *Id.*

455 *Id.*

456 Recommendation ITU-R S.1003.

457 *Notice*, 14 FCC Rcd at 4889 ¶ 103.

458 Exclusionary arrangements, as defined in our rules, can take the form of concessions, contracts, understandings, or working arrangements, to which a licensee or any persons or companies controlling or controlled by the licensee are parties.

459 47 C.F.R. § 25.142 (d) (Non-voice, non-geostationary MSS prohibition of certain agreements); 47 C.F.R. § 25.143 (h) (Big LEOs prohibition of certain agreements); 47 C.F.R. § 25.145 (e) (Ka-band prohibition of certain agreements).

460 *DISCO II Order*, 12 FCC Rcd at 24166 ¶ 166. A policy that prohibits exclusive agreements promotes the goal of fair and effective competition and is consistent with the WTO commitments made by the United States

(U.S. or non-U.S.) has an exclusionary arrangement, we will not authorize service by the provider between the United States and the country with which the provider has such an exclusionary arrangement.[461]

140. Congress has recently enacted a statutory bar to exclusionary arrangements in the ORBIT Act.[462] Because there is now a statutory prohibition against such arrangements, we do not believe that it is necessary to adopt our proposal to apply to 2 GHz MSS our rule applicable to other satellite services. Therefore, we do not adopt our proposal on exclusionary arrangements. We note, however, that there are additional statutory requirements for intergovernmental satellite organizations and their affiliates with respect to exclusionary arrangements that we will evaluate in the licensing and spectrum reservation phase of this proceeding.[463]

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because it is applied equally to U.S. and non-U.S.-licensed systems. *DISCO II Order*, 12 FCC Rcd at 24165-66 ¶¶ 166-167.

[461] As stated in the *Notice* and the *DISCO II Order*, we recognize that certain countries may not yet have mechanisms in place by which to authorize competitive systems. In these cases, consistent with the *DISCO II Order*, we will allow non-U.S.-licensed systems to access the U.S. market but will prohibit service between the U.S. and the country with which it has the exclusionary arrangement.

[462] ORBIT Act at Section 648. Section 648 of the ORBIT Act states as follows:

> (a) IN GENERAL.—No satellite operator shall acquire or enjoy the exclusive right of handling telecommunications to or from the United States, its territories or possessions, and any other country or territory by reason of any concession, contract, understanding, or working arrangement to which the satellite operator or any persons or companies controlling or controlled by the operator are parties.
>
> (b) EXCEPTIONS.—In enforcing the provisions of this section, the Commission—
>
> (1) shall not require the termination of existing satellite telecommunications services under contract with, or tariff commitment to, such satellite operator; but
>
> (2) may require the termination of new services only to the country that has provided the exclusive right to handle telecommunications, if the Commission determines the public interest, convenience, and necessity so requires.

[463] ORBIT Act, Section 624 (1) creating specific additional licensing criteria with respect to Inmarsat privatization with respect to ties between Inmarsat and ICO, including a prohibition on exclusive arrangements.

D. Mobile Earth Station Licensing

141. Even though the 2 GHz MSS ground segment proposals are unique in their design, they all are comprised of three principal elements: mobile earth stations operating in the 2 GHz MSS frequency bands, fixed earth "gateway" stations operating in the feeder link frequency bands, and TT&C earth stations operating in either the feeder link or other space frequency bands. Furthermore, the proposed 2 GHz MSS systems' ground segments are analogous in their functionality to Big LEO systems' ground segments. Recognizing these common aspects of MSS ground segment design in the Notice, we proposed to amend the existing Big LEO licensing procedure and rules for the mobile earth stations to include the 2 GHz MSS systems and to license 2 GHz gateways and TT&C stations as fixed-satellite earth stations under Part 25.[464] In addition, we sought comment on whether, in conjunction with the GMPCS certification procedure, we need to adopt new requirements beyond those already proposed or applicable for the operations of the 2 GHz mobile earth terminals, such as position determination, out-of-band emissions, transponder's operational frequency range or radiation hazard standard.

142. The commenters generally support our proposal to extend the Big LEO earth station licensing procedure to the 2 GHz MSS systems.[465] Under these procedures, each 2 GHz MSS service provider will be required to obtain blanket licenses to cover multiple user transceiver units.[466] Because of the similarity of services offered by Big LEOs and 2 GHz MSS systems, and because these procedures have been proven to ensure safe and secure communications for the public and other licensees while reducing the regulatory burden, we adopt these rules as proposed in the *Notice*.

143. Several parties support the application of the GMPCS certification procedure for 2 GHz MSS Mobile Earth Terminals (MET) and associated additional requirements.[467] Other commenters assert that in order to promote free cross-border circulation of METs, the Commission should adopt even more stringent technical standards that are consistent with the international standards.[468] Conversely, TMI points out that global circulation is not required for systems that will provide only regional service. Therefore, TMI argues, the Commission should not mandate GMPCS certification as part of the 2 GHz MSS service rules.[469]

144. Although the current interim FCC certification process for GMPCS equipment is voluntary, it may become an essential part of the Commission's blanket licensing process for mobile earth stations. We currently are conducting a rulemaking to integrate the GMPCS certification into our existing regulatory framework.[470] We expect this rulemaking to finalize the technical requirements and procedures associated with the GMPCS certification. We, therefore, defer consideration of GMPCS requirements for the 2 GHz mobile earth stations pending completion of the *GMPCS Proceeding*, and plan to address the comments filed on the issue of GMPCS certification in the *GMPCS Proceeding*.

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464 *See Notice*, 14 FCC Rcd at 4889-90 ¶ 104.

465 *See* Constellation Comments at 29; TMI Comments at 11.

466 47 C.F.R. § 25.115(d). This authorization would include authority for operation of transceivers owned by both Government and non-Government customers.

467 *See* Constellation Comments at 29; Inmarsat Comments at 17; Iridium Comments at 47-48.

468 *See* Constellation Comments at 29; Globalstar Comments at 48-50; ICO Comments at 22-23.

469 *See* TMI Comments at 11.

470 *See GMPCS Notice*, 14 FCC Rcd 5871.

E. International Coordination

145. As we stated in the *Notice*, all proposed 2 GHz MSS systems require some degree of international coordination. In this regard, we sought comment on the policies we should adopt for international coordination of the U.S.-licensed 2 GHz MSS systems. We also sought comment on the coordination policies that we should adopt toward the non-U.S. licensed systems that we may authorize to operate in the United States in accordance the with *DISCO II Order*.[471] Lastly, recognizing the public benefit of ensuring compatibility between varying 2 GHz MSS spectrum band plans around the world, we asked for comment on our spectrum sharing proposals.

146. The 2 GHz MSS applicants urge the Commission to ensure that U.S.-licensed 2 GHz MSS systems are not denied access to provide service in other countries due to inability to coordinate spectrum with non-U.S. systems or incompatibility of spectrum band plans. There is no clear consensus on what these measures should be. Some applicants argue that access to U.S. spectrum by non-U.S. licensed systems should be conditioned on cooperation in international spectrum coordination.[472] Others state that the Commission should work to encourage other administrations to follow the U.S. band plan and to ensure that U.S. licensed systems are provided the means (*i.e.*, spectrum) to access foreign markets.[473] The European Community (EC) and ICO argue that conditioning access to U.S. spectrum on completion of international coordination would delay or deny entry to non-U.S. licensed systems, and strongly oppose any such proposals.[474] ICO also notes that to require other countries to accept the U.S. spectrum sharing arrangement would be in violation of the U.S. commitments under the WTO Basic Telecom Agreement.[475]

147. In responding to assertions that non-U.S. licensed operators should be required to facilitate international spectrum coordination, we rely on the ITU coordination procedure. All 2 GHz MSS systems are subject to the ITU coordination procedure. This procedure assures that worldwide coordination is accomplished in a manner that requires both the administration proposing the system and the administration that is affected by the proposed system's frequency use to cooperate in resolving any coordination difficulties. We expect all administrations, and administrations representing the interests of the non-U.S. licensed 2 GHz MSS systems in particular, to collaborate in the coordination of the U.S. licensed systems in accordance with the procedure prescribed by the ITU. We have no reason to believe that other administrations will act in bad faith. We, therefore, conclude that it is neither necessary nor appropriate to condition non-U.S. licensed systems' access to U.S. spectrum on cooperation in international coordination process. We do, however, require all operators to meet their international coordination obligations defined by the ITU Radio Regulations (ITU RR). We also retain discretion to address any unfair gaming of the U.S. spectrum reservation process.

148. In accordance with ITU RR, the U.S. administration will effect coordination for the U.S.-licensed 2 GHz MSS systems with other administrations under the provisions of ITU RR, Article S9. Before the frequency assignments for the U.S. licensed satellite network can be recorded in the Master International Frequency Register, a coordination agreement must be reached with each administration identified in accordance with Article S9. In the past, our policy has been that completion of international coordination is not a prerequisite for licensing, launching and operating MSS systems.[476] We note,

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471 *See DISCO II Order*, 12 FCC Rcd at 24173 ¶ 185.

472 MCHI Comments at 19; Boeing Reply at 17-18.

473 Iridium Comments at 48-51 & Reply at 7-8; Globalstar Comments at 48; MCHI Comments at 19-21.

474 EC Reply at 3-4; ICO Reply at 27.

475 ICO Reply at 27.

476 *See Big LEO Report & Order*, 9 FCC Rcd at 6018 ¶ 211.

however, until completion of the international coordination, the U.S. licensed systems have no protection from interference caused by radio stations authorized by other administrations.[477] We find no reason to deviate from this policy. Furthermore, we intend to follow the coordination procedure prescribed by the ITU and will work with the global community to promote mobile satellite services through the development of sharing techniques and the exploration of other technical issues.

149. We recognize the concern expressed by commenters that other administrations may deny U.S. licensed systems access to provide service on its territory subject to completion of international coordination with existing or planned space networks, in most cases other 2 GHz MSS systems. A coordination agreement that allows an operator to provide 2 GHz MSS service to another country on an exclusive basis, particularly given the limited amount of available spectrum, would appear to be contrary to the goal of maximizing competition. We, however, believe that there is no demonstrated need for the Commission to adopt rules to address this concern. Instead we will address any such concerns on a case-by-case basis. In the event a satellite operator in this processing round is prevented from providing service to another country because the administration of that country requires as a prerequisite completion of coordination and this operator has been unable to complete coordination due to unresolved concerns raised by another participant in this 2 GHz MSS processing round, we would examine such situation in light of our rules and policies prohibiting exclusionary arrangements.[478]

150. We also decline to require as a condition of reserving spectrum that other administrations adopt the U.S. 2 GHz MSS band plan. It is not clear at present that operating constraints developed to accommodate 2 GHz MSS service in the United States will be effective in other jurisdictions, particularly given the regional differences in 2 GHz MSS allocations and incumbent users. At this time, we find no requirement to take special measures with regard to the Pan-European 2 GHz spectrum-use plan adopted in 1997.[479] The ERC Decision designates 2 GHz MSS spectrum for systems that will enter service by January 1, 2001. Based on developments since the *Notice*, however, it appears unlikely that any MSS system will commence operations in 2 GHz spectrum prior to January 1, 2001, and, therefore, the current ERC Decision is of limited applicability.

F. Interservice Sharing

1. Sharing in 1990-2025 MHz and 2165-2200 MHz bands (In-band sharing)

151. In the *Notice*, we recognized that 2 GHz MSS systems would be required to share the 1990-2025 MHz and 2165-2200 MHz bands with existing services. In this regard we noted that in the *2 GHz MSS Allocation Order*, the Commission found that incumbents affected by new 2 GHz MSS systems would be treated in accordance with our *Emerging Technologies* policy.[480] In particular, the Commission concluded that MSS and BAS could not share spectrum without unacceptable mutual interference. The Commission, therefore, determined that it is necessary to relocate BAS in order to accommodate MSS in the 1990-2025 MHz band. The Commission also concluded that it would provide for MSS sharing with, and any necessary relocation of, FS. The Commission decided that MSS cannot

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477 47 C.F.R. § 25.111.

478 47 C.F.R. § 25.143(h) and *DISCO II Order*.

479 *See* Conference of European Postal And Telecommunications Administrations: European Radiocommunications Committee Decision on the Harmonized Use of Spectrum for Satellite Personal Communication Services (S-PCS) operating within the bands 1610-1626.5 MHz, 2483.5-2500 MHz, 1980-2010 MHz, and 2170-2200 MHz, ERC/DEC/(97/03) ("ERC Decision").

480 *See 2 GHz MSS Allocation Order*, 12 FCC Rcd at 7406 ¶ 42 (citing *Emerging Technologies Proceeding*).

begin operations in the 2165-2200 MHz band until that spectrum is cleared of all FS licensees who would receive harmful interference from MSS licensees, but that MSS licensees will not be required to relocate any FS incumbent with whom they can successfully share spectrum.[481] In the *2 GHz Second R&O and Second MO&O*, the Commission specified that 2 GHz MSS ability to share with the FS in the 2165-2200 MHz band must be analyzed in accordance with the Telecommunications Industry Association's Technical Service Bulletin 86 (TSB-86). TSB-86 provides technical methodologies and criteria for assessing MSS/FS sharing.

152. In the *Notice*, we suggested that it was not necessary to adopt additional rules or policies to address sharing between 2 GHz MSS systems and other services in the 1990-2025 MHz and 2165-2200 MHz frequency bands. It was our view that the policies the Commission adopted in the *2 GHz MSS Allocation Proceeding* should adequately address all aspects of the 2 GHz MSS in-band sharing.[482] The commenters agree with our proposed approach. American Petroleum Institute (API) specifically requests the Commission to ensure that the band plan it adopts does not frustrate or limit relocation rights of FS incumbents.[483] Others, however, urge the Commission to take into account relocation and sharing issues in adopting a final 2 GHz MSS band arrangement so as to ensure that the band arrangement is competitively neutral and does not favor certain operators in the band.[484]

153. Recently the Commission adopted the *2 GHz Second R&O and Second MO&O* in which we finalized the rules and policies that govern the sharing with or relocation of incumbent services in the 2 GHz MSS bands.[485] These rules and policies establish comprehensive in-band sharing and/or relocation criteria and form the basis of the band arrangement we adopt in this *Order*. We find that the commenters have not raised any new issues that were not addressed by the *2 GHz MSS Allocation* proceeding. We, therefore, affirm our tentative conclusion in the *Notice* that there is no need to adopt additional rules to address in-band sharing issues between incumbent services and MSS in this proceeding.

2. Adjacent Band Sharing

154. As with any radio transmitting device, the 2 GHz MSS systems' transmitters are expected to emit certain amount of power outside of their assigned frequency band. These "out-of-band" or "unwanted" emissions may cause interference to services operating in adjacent frequency bands. For this reason, in the *Notice*, we noted the general unwanted emissions limits for satellite space and earth stations specified in the Commission's Rules,[486] but sought comment on whether these limits are sufficient to eliminate the potential for interference between 2 GHz MSS and existing services in adjacent bands.[487] We specifically noted that in the 2025-2110 MHz band, the U.S. Government operates high power Earth-to-space transmitters that may cause unwanted emission interference to 2 GHz MSS service uplinks in the 1990-2025 MHz band. We also noted that in the 2200-2290 MHz band, the U.S. Government operates high gain space-to-Earth receivers that may be susceptible to out-of-band emissions interference from 2 GHz MSS service downlinks in the 2165-2200 MHz. We sought comment on whether any additional 2

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481 *Id.* at 7406-07 ¶¶ 42-43.

482 *See Notice*, 14 FCC Rcd at 4892 ¶ 113.

483 *See* API Reply at 7.

484 *See* Iridium Comments at 52-53; MCHI Comments at 23.

485 *2 GHz Second R&O and Second MO&O*, FCC 00-233.

486 *See* 47 C.F.R. § 25.202(f).

487 *See Notice*, 14 FCC Rcd at 4892 ¶ 114.

GHz MSS service rules are needed to mitigate these potential interference issues. Furthermore, in response to comments from Wireless Communications Association International, Inc. (WCA) regarding the potential for interference to 2 GHz MSS service downlinks from Multipoint Distribution Service (MDS) operations in the 2150-2165 MHz band, we asked commenters to assess this adjacent band sharing situation. Lastly, noting NTIA's petition for the need to protect the reception of aeronautical radionavigation signals in the 1559-1605 MHz band from MSS terminals operating in the 1610-1660.5 MHz band, we proposed to extend the same requirement to 2 GHz MSS terminals.[488]

155. Most commenters favor the application of the existing out-of-band emission limits specified in Section 25.202(f) to all 2 GHz MSS systems and the adoption of additional requirements for the protection of aeronautical radionavigation service.[489] NTIA expresses concern regarding the potential for out-of-band interference into Government operations in the 2200-2290 MHz band from MSS downlink transmissions in the 2165-2200 MHz band.[490] NTIA states that interference to adjacent band Government space systems must be taken into consideration when the Commission adopts power limits and out-of-band emission limits for the 2 GHz MSS systems. NTIA further notes that 2 GHz MSS systems design should account for extensive government operations in the 2025-2110 MHz band that is immediately adjacent to the 1990-2025 MHz MSS uplink band.[491] Boeing notes that out-of-band emissions interference with U.S. Government users in the 2025-2110 MHz and 2200-2290 MHz bands cannot be solved by guardbands due to the scarcity of spectrum, but will require close cooperation and coordination.[492]

156. We note NTIA's concerns regarding potential for adjacent band interference between the Government space operations and 2 GHz MSS systems. We also recognize that the potential for adjacent band interference is highly dependent on systems design and that all proposed 2 GHz systems designs are unique. Thus, we are concerned that adopting a general requirement to address this issue may not be sufficient but is likely to unnecessarily restrict the implementation of MSS systems.

157. Recently, we initiated a proceeding to establish appropriate limits on unwanted emissions from satellite networks.[493] In that proceeding, we intend to address the technical and regulatory aspects of unwanted emissions and, if necessary, revise relevant Commission's rules. Until completion of satellite network unwanted emissions proceeding, however, we rely on a presumption that 2 GHz MSS and Government operators are motivated to cooperate on the resolution of adjacent band interference issues on a system-by-system basis. We expect all 2 GHz MSS operators to account for existing Government's space operations in the adjacent bands and emphasize that, in addition to the Commission's technical and service rules, each 2 GHz MSS authorization will be subject to other public interest requirements. For these reasons, we find that adopting additional restrictions on 2 GHz MSS emissions in order to facilitate spectrum sharing with Government operations in the 2025-2110 MHz and 2200-2290 MHz bands is unwarranted at this time.

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488 In response to petition form NTIA, we proposed in the *GMPCS Notice* to impose certain limits on out-of-band emissions from MSS terminals transmitting in the L-band in order to protect aircraft reception of aeronautical radionavigation signal in the 1559-1605 MHz band. *See GMPCS Notice*, 14 FCC Rcd at 5896-97 ¶¶ 61-62.

489 *See* ARINC Comments at 7; Boeing Comments at 38; ICO Reply at 7-8; Iridium Comments at 53.

490 *See* NTIA Comments at 20.

491 *See id.* at 23.

492 *See* Boeing Comments at 38-39.

493 *See* FCC Proceeding RM-9740.

158. WCA reiterates its concern that 2 GHz MSS operators may deploy interference-prone receivers that may suffer out-of-band interference from Multipoint Distribution Service operations in the 2150-2162 MHz band. WCA urges the Commission to clarify that 2 GHz MSS systems are required to accept unwanted emissions interference from current and future MDS operations that comply with the Commission's MDS spectral mask and EIRP limitations. WCA also suggests that 2 GHz MSS satellite systems be required to limit their power flux density (pfd) levels at the earth's surface to –190 dBW/m^2/Hz. WCA explains that the Commission adopted this limit to protect MDS response station hubs from co-channel interference. In response, Globalstar and Inmarsat advocate that WCA's recommendations lack the necessary technical justification and, therefore, should be rejected.

159. On the issue of interference to 2 GHz MSS downlinks from MDS facilities operating in the 2150-2162 MHz band, first we accept WCA's assertion that there is nothing in the record to suggest that the Commission's prior conclusion with respect to Big LEO downlinks is not transferable to 2165-2200 MSS downlinks.[494] We also note that for the case of MSS spread spectrum systems this conclusion was operationally validated when Globalstar initiated provision of commercial MSS service in the 2483.5-2500 MHz band without reported instances of interference from MDS operations. We, therefore, do not expect 2 GHz MSS systems to experience interference from the out-of-band emissions of MDS operations. Nonetheless, we clarify for the record that we expect the 2 GHz MSS receivers to be designed to accept levels of unwanted emissions interference from MDS that are specified in our rules.[495]

160. With regard to WCA's recommendation to limit MSS power flux density at the earth's surface, we note that the -190 dBW/m^2/Hz level at station hub receivers was deemed acceptable interference only from neighboring, co-channel transmitting MDS stations.[496] Furthermore, in case of adjacent channel interference, the protection level was set at -151 dBW/m^2/Hz, with a 20 dB reduction in either case when the interference signal is cross-polarized.[497] We agree with commenters that WCA's explanation of why this specific, in-service sharing criteria should be extrapolated to space-based transmitters operating in the entirely different frequency band lacks the necessary technical basis.[498] Moreover, as discussed above, operational experience to date demonstrates that adjacent frequency band operations of MSS and MDS are feasible under current Commission's rules.[499] We, therefore, find no requirement to adopt additional rules in this regard.

161. Commenters are divided as to the requirements the Commission should adopt to protect aeronautical radionavigation satellite (ARNS) service in the 1559-1610 MHz band from out-of-band emissions of 2 GHz MSS terminal transmissions in the 1990-2025 MHz band. ARINC and Iridium support the out-of-band ARNS service protection limits proposed in the *Notice*.[500] NTIA supports the Commission's proposal for a wide band equivalent isotropically radiated power (EIRP) limit of –70 dBW/MHz and a narrow band EIRP limit of –80 dBW in the 1559-1610 MHz band but rejects the proposed limit of –70 dBW/MHz at 1605 MHz and –10 dBW/MHz at 1610 MHz with the levels in

494 *See* WCA Comments at 5.

495 *See* 47 C.F.R. §§ 21.904, 21.908 for definition of MDS spectral mask.

496 *See Amendment of Parts 21 and 74 to Enable Multipoint Distribution Service and Instructional Television Fixed Service Licensees to Engage in Fixed Two-Way Transmissions*, MM Docket No. 97-217, Report and Order, 13 FCC Rcd 19112, 19138 ¶ 49 (1998).

497 *Id.*

498 *See* WCA Comments at 8-9.

499 *See* 47 C.F.R. §§ 21.904, 21.908, 35.202(f).

500 *See* ARINC Comments at 7; Iridium Comments at 53.

between determined by linear interpolation. NTIA argues that because it is less challenging for the 2 GHz MSS systems to suppress emissions in the 1559-1610 MHz band than for the L-band systems, the 2 GHz systems should be held to a higher standard.[501] Furthermore, NTIA recommends that in order to facilitate GMPCS certification, the Commission should harmonize the 2 GHz MSS out-of-band emission standards with established international standards. Based on adopted international standards, NTIA recommends that the Commission adopt a wide band limit of –70 dBW/MHz and a narrow band EIRP limit of –80 dBW in the 1559-1625 MHz band for MSS terminals operating in the 1990-2025 MHz band. NTIA also argues that for 2 GHz MSS terminals employing TDMA technology, the proposed out-of-band emission limits averaged over a 20 msec time interval are inadequate to protect FAA's GPS augmentation system such as the Wide Area Augmentation System (WAAS). The 20 msec time interval proposed in the *Notice* is based on the 50 bit per second data rate of the GPS navigation message. The WAAS has a much higher data rate than GPS, with a much shorter symbol duration of 2 msec. As a result of the shorter symbol duration, WAAS systems are more vulnerable to disruption by long duration pulsed signals. To provide protection for these augmentation systems, NTIA recommends that the unwanted emissions of MSS terminals employing TDMA technology should be averaged over a time interval of duration that is equal in length to the transmission time slot and not 20 msec as proposed in the Notice.[502] Furthermore, noting that at any one time the majority of MSS terminals will be in the carrier-off state, NTIA recommends that the Commission account for the cumulative power effect and, consistent with international standards, adopt carrier-off limits for the 2 GHz MSS terminals that are 10 dB lower than the proposed carrier-on limits.

162. Globalstar and ICO support NTIA's recommendation to adopt out-of-band emission limits in the 1559-1626.5 MHz band of –70 dBW/MHz for broadband signals consistent with established international standards, but disagree with the proposed –80 dBW narrow band limit.[503] Globalstar and ICO explain that, contrary to NTIA's assertion, the narrow band limit is not part of international standards and is unnecessary. Inmarsat questions NTIA's assertions given that there are no ARNS operations above 1610 MHz.[504]

163. On the issue of protection of aeronautical radionavigation operations from 2 GHz MSS out-of-band emissions, we recognize the support and interest expressed by the commenters. In the *Notice* and in the *GMPCS Proceeding*, with respect to suppression of unwanted emissions to protect aeronautical radionavigation, we stated our intent to adopt requirements for 2 GHz MSS that are analogous to the L Band MSS requirements.[505] In doing so, the Commission recognized that the *GMPCS Proceeding* would establish guiding principles for the protection of aeronautical radionavigation from MSS out-of-band emissions. At this time, however, we have not completed consideration of the issues in that proceeding. We, therefore, will address the comments and resolve the issues concerning protection for aeronautical radionavigation in the 1559-1610 MHz band from 2 GHz MSS mobile earth terminals (METs) in the *GMPCS Proceeding*. In this regard, we emphasize that the 2 GHz MSS METs will be subject to applicable rules and policies the Commission will adopt in the *GMPCS Proceeding*.

IV. CONCLUSION

501 *See* NTIA Comments at 10. TDMA systems divide the radio frequency spectrum into time slots in which at any one time only one terminal can transmit.

502 *See id.* at 12.

503 *See* Globalstar Reply at 24-25; ICO Reply at 26.

504 *See* Inmarsat Reply at 15.

505 *See Notice*, 14 FCC Rcd at 4893-94 ¶ 116; *GMPCS Notice*, 14 FCC Rcd at 5906-07 ¶¶ 94-96.

164. This *Report and Order* opens the way for rapid deployment of 2 GHz mobile satellite services in the United States by establishing service and technical rules based on the public interest. We have devised an innovative methodology for authorizing spectrum that provides incentives for system operators to initiate service as quickly as possible, and promote development of regional and global communications to unserved communities in the United States, while providing enough certainty to encourage investment in the proposed systems. We apply the system service rules equally to U.S.-licensed and non-U.S.-licensed systems, with strict milestones for implementing service to ensure that spectrum is not warehoused. Our adopted band arrangement is flexible enough to accommodate the divergent satellite and radio communications technologies envisioned by the 2 GHz MSS system proponents without preferring one technology or service over another. We anticipate that these MSS systems, once authorized, will provide competitive voice and data services, and in some cases, additional seamless world-wide capacity, for MSS providers and terrestrial systems.

V. PROCEDURAL MATTERS

165. *Final Regulatory Flexibility Analysis.* The Final Regulatory Flexibility Analysis for this *Report and Order*, pursuant to the Regulatory Flexibility Act, 5 U.S.C. § 604, is contained in Appendix B.

166. *Final Paperwork Reduction Act Analysis.* The requirements adopted in this Rulemaking have been analyzed with respect to the Paperwork Reduction Act of 1995 (the "1995 Act") and found to impose new or modified information collection requirements on the public. Implementation of any new or modified requirements will be subject to approval by the Office of Management and Budget ("OMB") as prescribed by the 1995 Act's emergency processing provisions. OMB approval is requested to be granted no later than 30 days from the date of publication of this Rulemaking in the Federal Register. The Commission, as part of its continuing effort to reduce paperwork burdens, invites the general public to comment on the information collections contained in this *Report and Order*, as required by the Act 1995. Public comments are due 21 days from date of publication of this *Report and Order* in the Federal Register. Comments should address: (a) whether the proposed collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility; (b) the accuracy of the Commission's burden estimates; (c) ways to enhance the quality, utility, and clarity of the information collected; and (d) ways to minimize the burden of the collection of information on the respondents, including the use of automated collection techniques or other forms of information technology.

167. Written comments by the public on the new or modified information collection requirements are due 21 days after publication of this Rulemaking in the Federal Register. Comments on the information collections contained herein should be submitted to Judy Boley, Federal Communications Commission, 445 Twelfth Street, S.W., Room 1-C804, Washington, D.C. 20554, or over the Internet to jboley@fcc.gov and to Edward C. Springer, OMB Desk Officer, Room 10236 NEOB, 725 17th Street, N.W., Washington, DC 20503 or via the Internet to edward.springer@omb.eop.gov. For additional information on the information collection requirements, contact Judy Boley at (202) 418-0214 or via the Internet at the above address.

168. For further information concerning this proceeding, contact Chris Murphy at (202) 418-2373/cmurphy@fcc.gov, Howard Griboff at (202) 418-0657/hgriboff@fcc.gov, or Alex Roytblat at (202) 418-7501/aroytbla@fcc.gov, International Bureau, Federal Communications Commission, Washington, DC 20554.

VI. ORDERING CLAUSES

169. IT IS ORDERED that, pursuant to Sections 4(i), 7, 302, 303(c), 303(e), 303(f) and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. Section 154(i), 157, 302, 303(c), 303(e), 303(f) and 303(r), this *Report and Order* IS ADOPTED and that Part 25 of the Commission's Rules IS AMENDED, as specified in Appendix C, effective 30 days after publication in the Federal Register, except that amendments to §§ 25.143(b)(1), (e)(1)(iii), and (e)(3) SHALL become effective upon approval by the Office of Management and Budget.

170. IT IS FURTHER ORDERED that the applicants and LOI filers will be required to file conforming amendments and all necessary fees no later than 30 days after a summary of this *Report and Order* is published in the Federal Register for continued consideration in this processing round.

171. IT IS FURTHER ORDERED that the Regulatory Flexibility Analysis, as required by Section 604 of the Regulatory Flexibility Act and as set forth in Appendix B, IS ADOPTED.

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

FEDERAL COMMUNICATIONS COMMISSION

Magalie Roman Salas
Secretary

APPENDIX A

LIST OF PARTIES

Comments

Aeronautical Radio, Inc.
Association of Public-Safety Communications Officials-International, Inc.
Association of American Railroads
BellSouth Corporation
Boeing Company
Bosch Telecom, Inc.
Celsat America, Inc.
Century OCN Programming, Inc.
Constellation Communications, Inc.
Fixed Wireless Communications Coalition
Globalstar, L.P.
Hughes Communications Galaxy, Inc. and Hughes Communications, Inc.
ICO Services Limited
ICO USA Service Group (BT North America Inc., Hughes Telecommunications and Space Company, Telecomunicaciones de Mexico, TRW Inc.)
Inmarsat Ltd.
Iridium LLC
Lynch, Timothy H.
Mobile Communications Holdings, Inc.
National Academies' Committee on Radio Frequencies
National Telecommunications and Information Administration
PanAmSat Corporation
Pegasus Development Corporation
Personal Communications Industry Association
Satellite Industry Association
SBC Communications Inc.
Society of Broadcast Engineers, Inc.
TMI Communications and Company, Limited Partnership
United States Coast Guard
UTC, The Telecommunications Association
WinStar Communications, Inc.
Wireless Communications Association International, Inc.

Reply Comments

American Petroleum Institute
Association of American Railroads
Association for Maximum Service Television, Inc. and the National Association of Broadcasters BellSouth Corporation
Boeing Company
Celsat America, Inc.
Constellation Communications, Inc.
European Union/Delegation of the European Commission
Fixed Wireless Communications Coalition
GE American Communications, Inc.
Globalstar, L.P.
Hughes Communications Galaxy, Inc. and Hughes Communications, Inc.

ICO Services Limited
ICO USA Service Group (BT North America Inc., Hughes Telecommunications and Space Company, Telecomunicaciones de Mexico, TRW Inc.)
Inmarsat Ltd.
Iridium LLC
KaStar Satellite Communications Corp.
Mobile Communications Holdings, Inc.
National Telecommunications and Information Administration
PanAmSat Corporation
Satellite Industry Association
Society of Broadcast Engineers, Inc.
Titan Wireless
United Telecom Council (formerly UTC, The Telecommunications Association)
WinStar Communications, Inc.
Wireless Communications Association International, Inc.

Supplemental Comments

Association for Maximum Service Television, Inc. and the National Association of Broadcasters
Boeing Company
Celsat America, Inc.
Constellation Communications Holding, Inc. (formerly Constellation Communications, Inc.)
Fixed Wireless Communications Coalition
Globalstar, L.P.
ICO Services Limited
ICO USA Service Group (BT North America Inc., Telecomunicaciones de Mexico, TRW Inc.)
Inmarsat Ltd.
Iridium LLC
Mobile Communications Holdings, Inc.
TMI Communications and Company, Limited Partnership
United Telecom Council (formerly UTC, The Telecommunications Association)

Ex Parte Presentations

Association for Maximum Service Television, Inc. and the National Association of Broadcasters
AT&T Wireless Services, Inc.
BellSouth Corporation
Boeing Company
Celsat America, Inc.
Department of Defense
Final Analysis Inc.
Fixed Wireless Communications Coalition
Globalstar, L.P.
ICO Services Limited
Eagle River Investments LLC
ICO USA Service Group
Inmarsat Ltd.
Iridium LLC
Mobile Communications Holdings, Inc.
STM Wireless, Inc.
Teledesic LLC
Wireless Communications Association International, Inc.

APPENDIX B

Final Regulatory Flexibility Analysis

As required by the Regulatory Flexibility Act (RFA),[1] an Initial Regulatory Flexibility Analysis (IRFA) was incorporated into the *Notice of Proposed Rulemaking* (*Notice*) in this docket, IB Docket No. 99-81.[2] The Commission sought written public comment on the possible significant economic impact on small entities by the policies and rules proposed in the *Notice*, including on the IRFA. This Final Regulatory Flexibility Analysis (FRFA) conforms to the RFA.[3]

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

This *Report and Order* establishes a spectrum authorization approach to accommodate all proposed 2 GHz MSS systems, and service rules to govern the 2 GHz MSS systems. These actions are designed to assign the 2 GHz MSS spectrum to applicants, or reserve the 2 GHz MSS spectrum in the case of letter of intent filers, in an efficient manner. At the same time, these rules are designed to ensure systems implement their proposals in a manner that serves the public interest and results in the continued deployment of mobile satellite services to the public, with minimal disruption to existing 2 GHz band permittees and licensees.

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

There were no comments which solely discussed or addressed the IRFA. The Commission has nonetheless considered any potential significant economic impact of the rules on small entities, and has designed its rules to reduce regulatory burdens on these entities accordingly.

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

The Commission has not developed a definition of small entities applicable to geostationary or non-geostationary orbit fixed-satellite or mobile satellite service operators. Therefore, the applicable definition of small entity is the definition under the Small Business Administration (SBA) rules applicable to Communications Services, Not Elsewhere Classified. This definition provides that a small entity is one with $11.0 million or less in annual receipts.[4] According to Census Bureau data, there are 848 firms that fall under the category of Communications Services, Not Elsewhere Classified, which could potentially fall into the 2 GHz MSS category. Of those, approximately 775 reported annual receipts of $11 million or less and qualify as small entities.[5] The rules adopted in this *Report and Order* apply only to entities providing 2 GHz mobile satellite service. At least one of the 2 GHz MSS system proponents may be considered a small business at this time. Small businesses often do not have the financial ability to become 2 GHz MSS system operators because of the high implementation costs associated with satellite systems and services.

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1 *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).

2 *The Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band*, IB Docket No. 99-81, 14 FCC Rcd 4843, 4895-97 (1999) (*Notice*).

3 *See* 5 U.S.C. § 604, as amended by the CWAAA.

4 13 C.F.R. § 121.201, Standard Industrial Classification (SIC) Code 4899.

5 U.S. Bureau of Census, U.S. Department of Commerce, 1992 Census of Transportation, Communications, Utilities, UC92-S-1, Subject Series, Establishment and Firm Size, Table 2D, Employment Size of Firms: 1992, SIC Code 4899 (issued May 1995).

By the time of system implementation, we expect that the one small entity will no longer be considered a small business due to the capital requirements for launching and operating its proposed system. Therefore, because of the high implementation costs of providing 2 GHz MSS, we believe that this *Report and Order* will have no significant impact on small entities.

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

The rules adopted in the *Report and Order* affect those entities applying for 2 GHz MSS space station and earth station authorizations and those participating in assignment of 2 GHz MSS spectrum. As an initial matter, the nine 2 GHz MSS system proponents under consideration in this *Report and Order* are required to submit amendments to their previously-filed applications or letters of intent, to conform their proposed systems to the spectrum authorization and service rules adopted herein, including an orbital debris statement. The adopted rules also require each authorized 2 GHz MSS system to notify the Commission that it has met construction milestones, notify the Commission as to which spectrum block it chooses as its preferred spectrum block at the time that the first satellite in its system reaches its intended orbit, and, if it desires additional spectrum under the rural service initiative, notify the Commission of how it has achieved the required rural service criteria. Once operational, the 2 GHz MSS systems may need to coordinate with each other the use of spectrum outside of its preferred spectrum block. These negotiations are likely to require the skills of engineers to evaluate the technical requirements of co-frequency spectrum sharing and/or adjacent frequency operation on a non-interference basis.

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

In developing the rules and policies adopted in this *Report and Order*, the Commission has attempted to minimize the burdens on all entities in order to allow maximum participation in the 2 GHz MSS market, while achieving the item's other objectives. The Commission considered band arrangements that would have assigned specified blocks of spectrum based on modulation technology (*i.e.*, code division multiple access or time division multiple access). Similarly, the Commission considered Globalstar's suggested band arrangement that would have required all systems to pre-negotiate a sharing architecture.[6] The Commission rejected these alternatives, in part because these alternatives would have required all 2 GHz MSS operators to choose their technological parameters immediately, rather than allowing systems to optimize designs in order to promote innovation and reduce the economic impact of system build-out. In addition, to reduce the 2 GHz MSS operators' incumbent relocation costs, the Commission will exempt any 2 GHz MSS operator from relocation obligations if it is capable of sharing spectrum on a non-interference basis with the existing incumbent operations. *See* Section III.A.1., *supra*.

Report to Congress: The Commission will send a copy of this *Report and Order*, including this FRFA, in a report to be sent to Congress pursuant to the SBREFA. *See* 5 U.S.C. § 801(a)(1)(A). In addition, the Commission will send a copy of this *Report and Order*, including this FRFA, to the Chief Counsel for Advocacy of the Small Business Administration. A copy of the *Report and Order* and FRFA (or summaries thereof) will also be published in the Federal Register. *See* 5 U.S.C. § 604(b).

[6] Globalstar Comments at 12 & n.14.

APPENDIX D

Final Rules

Title 47 of the Code of Federal Regulations, Part 25, is amended as follows:

1. The authority citation for Part 25 is amended to read as follows:

Authority: 47 U.S.C. 701-744. Interprets or applies Section 4, 301, 302, 303, 307, 309 and 332 of the Communications Act, as amended, 47 U.S.C. Sections 154, 301, 302, 303, 307, 309 and 332, unless otherwise noted.

2. Section 25.114 is amended by revising paragraph (c) to read as follows:

Section 25.114 Applications for space station authorizations.

* * * * *

(c) The following information in narrative form shall be contained in each application:

* * *

(6) * * *
(iii) if applicable, the feeder link and inter-satellite service frequencies requested for the satellite, together with any demonstration otherwise required by this chapter for use of those frequencies (see, e.g., Sec. 25.203 (j) and (k));

* * *

(21) Applications for authorizations in the 1.6/2.4 GHz Mobile-Satellite Service or 2 GHz Mobile-Satellite Service shall also provide all information specified in Sec. 25.143.

* * * * *

3. Section 25.115 is amended by revising paragraph (d) to read as follows:

Section 25.115 Application for earth station authorizations.

* * * * *

(d) User transceivers in the NVNG, 1.6/2.4 GHz Mobile-Satellite Service, and 2 GHz Mobile-Satellite Service need not be individually licensed. Service vendors may file blanket applications for transceivers units using FCC Form 312, Main Form and Schedule B, and specifying the number of units to be covered by the blanket license. Each application for a blanket license under this section shall include the information described in Sec. 25.136.

* * * * *

4. Section 25.121 is amended by revising paragraph (a) to read as follows:

Section 25.115 License term and renewals.

(a) *License term.* Licenses for facilities governed by this part will be issued for a period of 10 years, except that licenses and authorizations in the 2 GHz Mobile-Satellite Service will be issued for a period of 15 years.

* * * * *

5. Section 25.133 is amended by revising paragraph (b) to read as follows:

Section 25.133 Period of construction; certification of commencement of operation.

* * * * *

(b) Each license for a transmitting earth station included in this part shall also specify as a condition therein that upon the completion of construction, each licensee must file with the Commission a certification containing the following information: The name of the licensee; file number of the application; call sign of the antenna; date of the license; a certification that the facility as authorized has been completed and that each antenna facility has been tested and is within 2 dB of the pattern specified in Sec. 25.209, Sec. 25.135 (NVNG MSS earth stations), or Sec. 25.213 (1.6/2.4 GHz Mobile-Satellite Service and 2 GHz Mobile-Satellite Service earth stations); the date on which the station became operational; and a statement that the station will remain operational during the license period unless the license is submitted for cancellation. For stations authorized under Sec. 25.115(c) of this part (Large Networks of Small Antennas operating in the 12/14 GHz bands) and Sec. 25.115(d) of this part (User Transceivers in the Mobile-Satellite Service), a certificate must be filed when the network is put into operation.

* * * * *

6. Section 25.136 is amended in its entirety to read as follows:

Section 25.136 Operating provisions for earth station networks in the 1.6/2.4 GHz mobile-satellite service and 2 GHz mobile-satellite service.

In addition to the technical requirements specified in Sec. 25.213, earth stations operating in the 1.6/2.4 GHz Mobile-Satellite Service or 2 GHz Mobile-Satellite Service are subject to the following operating conditions:

(a) User transceiver units associated with the 1.6/2.4 GHz Mobile-Satellite Service or 2 GHz Mobile-Satellite Service may not be operated on civil aircraft unless the earth station has a direct physical connection to the aircraft Cabin Communication system.

(b) No person shall transmit to a space station unless the user transceiver is first authorized by the space station operator or by a service vendor authorized by that operator, and the specific transmission is conducted in accordance with the operating protocol specified by the system operator.

(c) Any user transceiver unit associated with this service will be deemed, when communicating with a particular 1.6/2.4 GHz Mobile-Satellite Service or 2 GHz Mobile-Satellite Service system pursuant to paragraph (b) of this section, to be temporarily associated with and licensed to the system operator or service vendor holding the blanket earth station license awarded pursuant to Section 25.115(d). The domestic earth station licensee shall, for this temporary period, assume the same licensee responsibility for the user transceiver as if the user transceiver were regularly licensed to it.

7. Section 25.137 is amended by adding new paragraph (d) to read as follows:

Section 25.137 Application requirements for earth stations operating with non-U.S. licensed space stations.

* * * * *

(d) Earth station applicants requesting authority to operate with a non-U.S. licensed space station must demonstrate that the space station the applicant seeks to access has complied with all applicable Commission milestones, reporting requirements, and any other applicable service rules required for non-U.S. licensed systems to operate in the United States.

* * * * *

8. Section 25.143 is amended by revising paragraphs (a), (b)(1), (b)(2), (e) and (f)(1) to read as follows:

Section 25.143 Licensing provisions for the 1.6/2.4 GHz mobile-satellite service and 2 GHz mobile-satellite service.

(a) *System License*: Applicants authorized to construct and launch a system of technically identical satellites will be awarded a single "blanket" license. In the case of non-geostationary satellites, the blanket license will cover a specified number of space stations to operate in a specified number of orbital planes. In the case of geostationary satellites, as part of a geostationary-only satellite system or a geostationary/non-geostationary hybrid satellite system, an individual license will be issued for each satellite to be located at a geostationary orbital location.

(b) *Qualification Requirements*.

(1) *General Requirements*: Each application for a space station system authorization in the 1.6/2.4 GHz Mobile-Satellite Service or 2 GHz Mobile-Satellite Service shall describe in detail the proposed satellite system, setting forth all pertinent technical and operational aspects of the system, and the technical, legal, and financial qualifications of the applicant. In particular, each application shall include the information specified in Sec. 25.114. Non-U.S. licensed systems shall comply with the provisions of Sec. 25.137. System proponents seeking authorization in the 2 GHz Mobile-Satellite Service also shall describe the design and operational strategies that they will use, if any, to mitigate orbital debris. Applicants must submit a casualty risk assessment if planned post-mission disposal involves atmospheric re-entry of the spacecraft.

(2) *Technical Qualifications*: In addition to providing the information specified in paragraph (b)(1) of this section, each applicant and letter of intent filer shall demonstrate the following:

(i) That a proposed system in the 1.6/2.4 GHz MSS frequency bands employs a non-geostationary constellation or constellations of satellites;

(ii) That a system proposed to operate using non-geostationary satellites be capable of providing mobile satellite services to all locations as far north as 70 deg. North latitude and as far south as 55 deg. South latitude for at least 75% of every 24-hour period, i.e., that at least one satellite will be visible above the horizon at an elevation angle of at least 5 deg. for at least 18 hours each day within the described geographic area;

(iii) That a system proposed to operate using non-geostationary satellites be capable of providing mobile satellite services on a continuous basis throughout the fifty states, Puerto Rico and the U.S. Virgin Islands, i.e., that at least one satellite will be visible above the horizon at an elevation angle of at least 5 deg. at all times within the described geographic areas; and

(iv) That a system only using geostationary orbit satellites, at a minimum, be capable of providing mobile satellite services on a continuous basis throughout the 50 states, Puerto Rico, and the U.S. Virgin Islands, if technically feasible.

(v) That operations will not cause unacceptable interference to other authorized users of the spectrum. In particular, each application in the 1.6/2.4 GHz frequency bands shall demonstrate that the space station(s) comply with the requirements specified in Sec. 25.213.

* * *

(e) *Reporting requirements*.

(1) All operators of 1.6/2.4 GHz Mobile-Satellite Service systems and 2 GHz Mobile-Satellite Service systems shall, on October 15 of each year, file with the International Bureau and the Commission's Columbia Operations Center, Columbia, Maryland, a report containing the following information current as of September 30 of that year:

* * *

(iii) A detailed description of the utilization made of the in-orbit satellite system. That description should identify the percentage of time that the system is actually used for U.S. domestic or transborder transmission, the amount of capacity (if any) sold but not in service within U.S. territorial geographic areas, and the amount of unused system capacity. 2 GHz Mobile Satellite systems receiving expansion spectrum as part of the unserved areas spectrum incentive must provide a report on the actual number of subscriber minutes originating or terminating in unserved areas as a percentage of the actual U.S. system use.

***

(3) All operators of 2 GHz Mobile-Satellite Service systems must begin system construction upon award of a service link license to U.S.-based applicants, or upon designation of spectrum for non-U.S.-based systems, in accordance with milestones set forth in the respective system's authorization. All operators of 2 GHz Mobile-Satellite Service systems shall, within 10 days after a required implementation milestone as specified in the system authorization, certify to the Commission by affidavit that the milestone has been met or notify the Commission by letter that it has not been met. At its discretion, the Commission may require the submission of additional information (supported by affidavit of a person or persons with knowledge thereof) to demonstrate that the milestone has been met. Failure to file timely certification of milestones, or filing disclosure of non-compliance, will result in automatic cancellation of the authorization with no further action required on the Commission's part.

(f) *Safety and distress communications*.

(1) Stations operating in the 1.6/2.4 GHz Mobile-Satellite Service and 2 GHz Mobile-Satellite Service that are voluntarily installed on a U.S. ship or are used to comply with any statute or regulatory equipment carriage requirements may also be subject to the requirements of sections 321(b) and 359 of the Communications Act of 1934. Licensees are advised that these provisions give priority to radio communications or signals relating to ships in distress and prohibits a charge for the transmission of maritime distress calls and related traffic.

* * * * *

9. Section 25.201 is amended by adding the following definition in alphabetical order to read as follows:

Section 25. 201 Definitions.

* * * * *

2 GHz Mobile-Satellite Service. A mobile-satellite service that operates in the 1990-2025 MHz and 2165-2200 MHz frequency bands, or in any portion thereof.

* * * * *

10. Section 25.202 is amended by redesignating paragraph (a)(4) as paragraph (a)(4)(i), and adding new paragraph (a)(4)(ii) to read as follows:

Section 25. 202 Frequencies, frequency tolerance and emission limitations.

(a) * * *

* * *

(4)(i) The following frequencies are available for use by the 1.6/2.4 GHz Mobile-Satellite Service:

1610-1626.5 MHz: User-to-Satellite Link
1613.8-1626.5 MHz: Satellite-to-User Link (secondary)
2483.5-2500 MHz: Satellite-to-User Link

(ii) The following frequencies are available for use by the 2 GHz Mobile-Satellite Service:

1990-2025 MHz: User-to-Satellite Link
2165-2200 MHz: Satellite-to-User Link

* * * * *

11. Section 25.203 is amended by revising paragraph (c) to read as follows:

Section 25.203 Choice of sites and frequencies.

* * * * *

(c) Prior to the filing of an application, an earth station applicant shall coordinate the proposed frequency usage with existing terrestrial users and with applicants for terrestrial station authorizations with previously filed applications in accordance with the following procedure:

* * * * *

12. Section 25.279 is amended by revising paragraph (a) to read as follows:

Section 25.279 Inter-satellite service.

(a) Any satellite communicating with other space stations may use frequencies in the inter-satellite service as indicated in Sec. 2.106. This does not preclude the use of other frequencies for such purposes as provided for in several service definitions, *e.g.*, FSS. The technical details of the proposed inter-satellite link shall be provided in accordance with Sec. 25.114(c).

* * * * *

SEPARATE STATEMENT OF CHAIRMAN WILLIAM E. KENNARD

Re: The Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band, FCC 00-302, IB Docket No. 99-81 (rel. August 25, 2000).

I am pleased that the Commission has adopted licensing and service rules for the 2 GHz mobile satellite service. This action should enhance competition and new service offerings, such as voice, data, and Internet services, in the mobile communications markets, to the benefit of consumers. The rules adopted are technologically neutral, and will facilitate deployment of a wide range of innovative systems.

I am particularly encouraged by this action because it involves one of the Commission's most important responsibilities – making service available "to all the people of the United States," including those in rural and geographically remote areas. Congress has made the importance of this mandate eminently clear, for both traditional telecommunications services, and for emerging advanced services.

While satellite services have played an important role in bringing services to remote areas, there remain significant unmet needs for communications services in these areas. It is vitally important that the unique capabilities of satellite systems be used to address these needs. Because the cost of satellite communications is essentially the same, whether the particular user is in the largest city, or the most isolated area, satellite technologies present a unique opportunity to address unmet needs.

The newly adopted regulations include a significant incentive for companies to address this concern. This incentive puts the market to work to meet unmet needs, not through a specific command to perform in a certain way, but by providing a small but palpable incentive. Specifically, 2 GHz systems that offer satellite capacity to service providers that are capable of providing service to consumers in unserved areas will be eligible to receive additional 2 GHz spectrum. Our incentive recognizes that most 2 GHz providers will be selling wholesale capacity to retail providers and that 2 GHz providers will want additional spectrum. Therefore, the incentive is structured to encourage 2 GHz providers to enter into capacity arrangements with carriers that are serving rural areas.

This incentive is the product of an open process in which the Commission sought broad comment on service to rural areas, and on licensing mechanisms to foster such service. I look forward to the next step in this process -- working cooperatively with industry to implement this incentive promptly.

I strongly support this incentive, as an important step in pursuing all possible means for providing service to all the people of the United States.

SEPARATE STATEMENT OF COMMISSIONER SUSAN NESS

Re: *The Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band*, FCC 00-302, IB Docket No. 99-81 (rel. August 25, 2000).

I support our adoption today of rules governing the provision of Mobile Satellite Service ("MSS") in the 2 GHz Band. These rules implement a creative band plan that should result in the expeditious licensing of new satellite providers of voice, data, and messaging services.

Satellite technologies have long held the promise of providing communications services to rural areas in this country. Compared with terrestrial systems, there is relatively little incremental cost for satellites to reach customers located in high-cost areas, since providers do not have to extend network infrastructure across vast stretches of sparsely populated terrain. Our Order creates an extra incentive for MSS licensees to fulfill this promise by making available additional spectrum for service providers who market service to our nation's rural and remote areas.

I fully support the rural service incentive, but I write separately to suggest a willingness to entertain additional comments on the details of our mechanism for assigning this additional spectrum. I also would have preferred to establish a procedure for redistributing spectrum that is abandoned by licensees that do not meet their operational milestones. Given the unique nature of the band plan we adopt today, I believe that we should consider seriously whether to adopt a method for reassigning abandoned spectrum among existing licensees.

That having been said, I do not wish to see further delay in adopting the 2GHz MSS framework while we address the issues. Prospective licensees need authorization to begin their long-awaited service offerings. Adjustments to the mechanism for assigning additional spectrum and consideration of how best to reassign abandoned spectrum can be adequately addressed in further proceedings or on reconsideration.

Separate Statement of Commissioner Gloria Tristani

Re: *The Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band*, FCC 00-302, IB Docket No. 99-81 (rel. Aug. 25, 2000).

I am pleased to support this decision, which creates an innovative band plan for the next generation of the mobile satellite service (MSS) systems. The rules we adopt here account for the evolving nature of the MSS marketplace and set the stage for licensing and service deployment. I write separately to express my support for the expansion spectrum policy and our commitment to further examine 911 issues in the satellite context.

The 2 GHz MSS system proponents offer the promise of new and innovative services, particularly in rural and unserved areas. Our action here is yet another step in fulfilling our mandate to make nationwide and worldwide communications available to all Americans.[1] The expansion spectrum policy we adopt creates an incentive-based mechanism to encourage MSS rollout in unserved communities. The triggering criterion offers any MSS licensee the opportunity to gain additional spectrum if meaningful capacity is available for consumers in unserved areas. As a result, I support the policy.

In addition, I am pleased that as part of this decision the Commission commits to further examine 911 policies in the MSS context. Emergencies can and do occur just about everywhere, including locations where phone lines do not reach.[2] A mobile phone can mean the difference between isolation and help-on-the-way, and in such instances consumers should not have to be concerned about whether their handset is terrestrial- or satellite-based. They simply need access to public safety assistance.

The Commission previously concluded that enhanced 911 (E911) policies should not extend to the MSS industry in its early stages, but recent developments suggest that earlier technology hurdles may no longer be a barrier to E911 location capability in satellite services.[3] Because this proceeding lacks an adequate record on E911, however, we direct the International Bureau to issue a public notice seeking input on E911 capability in satellite services, which we will consider as part of the upcoming Global Mobile Personal Communications by Satellite (GMPCS) proceeding.[4] With a more fully developed record, I look

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[1] *See* 47 U.S.C. § 151 (mandating that the Commission "make available, so far as possible, to all the people of the United States . . . a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges."). The Commission has taken other notable action this summer to increase access to telecommunications services in unserved areas. *See Federal-State Joint Board on Universal Service: Promoting Deployment and Subscribership in Unserved and Underserved Areas, Including Tribal and Insular Areas*, 12th Report and Order and Memorandum Opinion and Order, FCC 00-208 (rel. June 30, 2000); *Extending Wireless Telecommunications Services to Tribal Lands*, Report and Order and Further Notice of Proposed Rulemaking, FCC 99-266 (rel. June 30, 2000).

[2] The Cellular Telecommunications Industry Association (CTIA) reports that there were 43 million wireless 911 calls made in 1999, nearly 120,000 each day. *See* < http://www.wow-com.com/statsurv/e911/>.

[3] *See Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, Third Report and Order, 14 FCC Rcd 17388 (1999) (revising our location rules to allow handset-based technologies to compete with network-based technologies).

[4] *See Amendment of Parts 2 and 25 to Implement the Global Mobile Personal Communications by Satellite*

forward to examining E911 issues in the MSS context and moving quickly in the GMPCS proceeding.

(GMPCS) Memorandum of Understanding and Arrangements, Notice of Proposed Rulemaking, 14 FCC Rcd 5871 (1999).

JOINT SEPARATE STATEMENT OF COMMISSIONERS HAROLD FURCHTGOTT-ROTH AND MICHAEL POWELL
Approving in part, Dissenting in part

Re: The Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band, FCC 00-302, IB Docket No. 99-81, *Report and Order* (Rel. August 25, 2000).

We support today's decision to promulgate service rules for Mobile Satellite Service (MSS) in the 2 GHz band. Many of the proposed service providers in this band have been waiting years to get underway. We are pleased that these providers will soon be competing in the marketplace.

We are concerned, however, about the decision to adopt a specific mechanism for determining eligibility for spectrum set-aside for service to rural areas. Conceptually, we are intrigued by the possibility of making additional spectrum available to providers who can demonstrate a meaningful commitment to providing service in underserved areas.[1] However, the United States has never before pursued a satellite licensing approach that rewards a provider with additional spectrum based on a service commitment. In assessing such a new initiative, it seems to us that the Commission has an obligation to weigh carefully the policy implications of any particular approach and to vet fully our proposals with the public. Here, we are concerned that the majority has rushed to judgment in an effort to proclaim that the FCC is "doing something" for underserved areas – in reality that "something" appears to be almost nothing.

This decision to adopt specific qualifying criteria for the set-aside spectrum is based on a virtually non-existent record. The gap in the record is understandable, since the parties were never provided with a clear opportunity to comment on any specific qualifying criteria. Instead, the Notice only sought "guidance" on "any policies or rules we could implement (or forebear from) to encourage 2 GHz MSS service to [unserved, rural, insular, or economically isolated] areas."[2] While the Notice did seek comments relating to providing incentives for service to rural and unserved communities,[3] it did not even address the idea of having a spectrum set-aside, how much the set-aside should be or how providers could qualify for the "extra" spectrum. As a policy matter, we do not believe that such a vague request provided sufficient notice to the parties that such a specific and detailed decision would be forthcoming.[4] The American people would be better served by promulgating a further notice to assess the efficacy of any particular approach. This agency is embarking in a potentially transformative new policy direction – more spectrum in exchange

[1] *See* 47 U.S.C. § 151; *Order* at ¶¶ 31-35.

[2] *See The Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band, Notice of Proposed Rulemaking*, IB Docket No. 99-81, 14 FCC Rcd 4843, ¶ 95 (1999).

[3] *See id*.

[4] It is also not completely clear that the Notice was legally sufficient. *See Fertilizer Inst. v. EPA*, 935 F.2d 1303, 1311 (D.C.Cir.1991) (holding 5 U.S.C. 553(b)(3) to mean that "an agency's notice must provide sufficient detail and rationale for the rule to permit interested parties to comment meaningfully."); *Horsehead Resource Development Company, Inc. v. Browner*, 16 F.3d 1246, 1268 (D.C. Cir. 1994) (stating that an agency is obligated to "describe the range of alternatives being considered with reasonable specificity. Otherwise, interested parties will not know what to comment on, and notice will not lead to better-informed agency decision-making.") (internal quotation marks and citation omitted).

for service commitment quotas to targeted areas. We owe it to all the parties and the public to develop a full record before we proceed.[5]

We are also concerned that the qualifying criteria in the Order will not actually achieve the Commission's stated goals.[6] Under the Order, when a service provider demonstrates to the Commission that it has reserved and contracted to use 10 percent of its U.S. capacity to serve rural and underserved areas, the Commission will notify other service providers that it will begin accepting applications for the set-aside expansion spectrum.[7] Once all the applications are filed, the set-aside spectrum is to be divided evenly among the qualifying licensees. The "demonstration" requires only service contracts. There is no requirement that the system initially provide any service to rural areas. Nor is there any requirement that the qualifying system provide any particular level of service in the future. The only requirement is that 10 percent of the capacity on the system be reserved and contracted for this use. Under this standard, it appears that a ubiquitously available service, such as one that could be received on aircraft, would qualify based on its service to rural areas. In short, it appears that virtually every licensee will qualify for a sliver of the set aside spectrum, without anyone necessarily providing the desired amount of service to rural and underserved areas.

We applaud the Commission's efforts to explore how satellite services can be used to meet the communications demands of underserved and unserved areas. However, in embarking on this mission, we believe we have an obligation to ensure that our press release promises meaningfully correspond to our promulgated policies.

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[5] Certainly, we are sensitive to the need of making use of the spectrum as quickly as possible. By addressing the set-aside and eligibility in a further notice, however, even under the majority's approach the Commission could still provide immediate access to almost 90 percent of the spectrum, but could also ensure that the last piece of "expansion" spectrum is distributed fairly without undue regulatory constraints or requirements. Indeed, the majority is not even accepting applications for the expansion spectrum until one year after the first 2 GHz MSS authorization is issued; plenty of time to provide adequate notice. There are also readily available alternatives that would make all of the spectrum available for licensing immediately, while allowing us to consider meaningful incentives for service to rural areas. For example, a further notice could have explored the use of rural service incentives for the redistribution of "abandoned" spectrum. As the Order provides, "there is a probability that additional spectrum will become available as some authorized systems are not able to implement service." *Order* at ¶ 18. But the item does not establish a policy for the redistribution of abandoned or forfeited spectrum. It seems to push that off to a further proceeding. A further notice would have had at least two additional benefits: (1) it would get the ball rolling on establishing a policy for the redistribution of abandoned spectrum, with the potential of making it available to those truly motivated to serve rural areas; and (2) even if only one applicant dropped out, this process would consider more spectrum (3.88 MHz vs. 3.5 MHz) than the majority's set aside approach. This would also avoid holding hostage the sliver of "expansion" spectrum for a second processing round involving an uncertain and prolonged review of service contracts by the FCC more than a year from now. And, based on the comments about their current business plans, almost all applicants could eventually get the spectrum anyway since they are planning to serve these areas. *See id.* at ¶ 33.

[6] *See, e.g., id.* at ¶ 32.

[7] *See id.* at ¶¶ 35-38. However, requests for expansion spectrum will not be accepted until one year after the first 2 GHz system is authorized. *Id*. at ¶ 38.