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Federal Communications Commission

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

In the Matter of)
)
The Establishment of Policies) IB Docket No. 99-81
and Service Rules for the Mobile) RM-9328
Satellite Service in the 2 GHz Band)

NOTICE OF PROPOSED RULEMAKING

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TABLE OF CONTENTS

<u>Topic</u>	<u>Paragraph Number</u>
I. INTRODUCTION	1
II. BACKGROUND	4
III. DISCUSSION	6
A. Service Link Licensing Procedures	6
1. Avoiding Mutual Exclusivity	6
2. ICO's Petition for Expedited Rulemaking	11
3. Qualification Requirements	16
a. Technical Qualifications	16
i. Orbit Considerations	17
ii. Coverage Requirements	18
iii. Provision of AMS(R)S	20
b. Financial Qualifications	23
4. Processing Alternatives	26
a. The Flexible Band Arrangement	31
i. TDMA Systems	34
ii. CDMA Systems	36
iii. Spectrum Assignments	37
b. Negotiated Entry Approach	40
c. Traditional Band Arrangement	44
d. Competitive Bidding	46
B. Non-Service Link Issues	49
1. Feeder Links	50
a. Extended C-band	58
b. 5, 7 and 15 GHz bands	59
c. Ku-band	61
d. Ka-band	62

2. Tracking, Telemetry, and Command	67
3. Radionavigation Frequencies	68
4. Inter-satellite Links	69
C. Service Rules	71
1. Regulatory Classification	73
2. System License and License Term	79
3. Implementation Milestones	83
4. Reporting Requirements	91
5. Distress and Safety Communications and Enhanced 9-1-1	93
6. Service to Unserved Communities	95
7. Trafficking	96
8. Orbital Debris Mitigation	97
9. Exclusionary Arrangements	103
D. Mobile Earth Station Licensing	104
E. International Coordination	108
F. Interservice Sharing	112
IV. CONCLUSION	120
V. PROCEDURAL MATTERS	121
A. <i>Ex Parte</i> Presentations	121
B. Initial Regulatory Flexibility Analysis	122
C. Initial Paperwork Reduction Act of 1995 Analysis	123
D. Comment Filing Procedures	124
VI. ORDERING CLAUSES	127

Appendix A – Service Link Spectrum Allocations for 2 GHz MSS and Applicants’ Proposals

Appendix B – Flexible Band Arrangement

Appendix C – Draft U.S. Government/Industry Orbital Debris Mitigation Practices

Appendix D – Proposed Rule Changes to 47 C.F.R. Part 25 of the Commission’s Rules

I. INTRODUCTION

1. By this Notice of Proposed Rulemaking (*Notice*), we initiate the process for licensing a new generation of innovative mobile satellite services (MSS).¹ The policies and rules we propose or seek comment on in this *Notice* are designed to serve several goals: promoting competition by creating opportunities for new entrants, expediting the authorization process, and providing incentives for system operators to commence service to the public promptly using state-of-the-art technology. Pursuant to a 2 GHz MSS processing round that we initiated in 1997, there are currently nine proposals to construct, launch and operate MSS systems under consideration by the Commission. These proposed systems would provide regional and global voice, data, and messaging services to mobile terminals in the 1990-2025/2165-2200 MHz frequency bands (2 GHz MSS).² We propose to accommodate all qualified

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.

² 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 (1997) (international allocation of portions of the 2 GHz frequency band for mobile satellite

satellite systems in the band. In doing so, we expect to license spectrum to U.S. applicants and authorize the use of spectrum for non-U.S.-licensed systems to operate in the United States.³ Operations outside the United States will be subject to the regulatory requirements of those countries in which these systems may seek to operate.

2. The 2 GHz MSS allocation provides for further development of the mobile satellite services by providing spectrum to meet the projected demands of new entrants and existing MSS providers.⁴ Other mobile satellite systems are authorized in the geostationary L-band MSS,⁵ the Non-Voice Non-Geostationary MSS below 1 GHz (NVNG MSS),⁶ and MSS Above 1 GHz (Big LEO).⁷ The proposals for 2 GHz MSS systems, like the other systems, promise to provide new and expanded regional and global voice, data, and messaging services. 2 GHz MSS also will enhance competition in mobile satellite and terrestrial communications services, and complement wireless service offerings through expanded geographic coverage. 2 GHz MSS will thereby promote development of regional and global communications to rural and unserved communities in the United States, including Alaska, Hawaii, Native American areas, Puerto Rico, and U.S. territories and possessions, as well as to the rest of the world.

service links adopted for use in the United States) (*2 GHz MSS Allocation Order*), *on recon.*, Memorandum Opinion and Order and Third Notice of Proposed Rule Making and Order, FCC 98-309 (rel. November 27, 1998) (affirming 2 GHz MSS allocation and seeking further comment on relocation issues) (*2 GHz Relocation Third NPRM*). See paragraph 5, *infra*, for a description of the nine 2 GHz MSS applicants and letter of intent filers.

³ In this document, the terms "system proponents" or "system operators" refer to all nine 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 Section III.C., *infra*.

⁴ In 1995, the Radiocommunication Sector of the International Telecommunication Union estimated that up to 206 MHz of additional spectrum would be needed for MSS systems by the year 2005. *Preparation for International Telecommunication Union World Radio Conferences*, IC Docket No. 94-31, Report, 10 FCC Rcd 12783, 12797 ¶ 39 (1995) (*WRC-95 Report*).

⁵ *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, Second Report and Order, 2 FCC Rcd 485 (1987) (*Upper L-band MSS Second Report & Order*), clarified, 2 FCC Rcd 2417 (1987), *recon. denied*, 4 FCC Rcd 6029 (1989), *rev'd and remanded sub nom., Aeronautical Radio, Inc. v. FCC*, 928 F.2d 428 (D.C. Cir. 1991), *tentative decision on remand*, 6 FCC Rcd 4900 (1991), *final decision on remand*, 7 FCC Rcd 266 (1992).

⁶ *Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Non-Voice, Non-Geostationary Mobile-Satellite Service*, CC Docket No. 92-76, Report and Order, 8 FCC Rcd 8450 (1993) (*First Round NVNG MSS Order*).

⁷ *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*).

3. In proposing service rules for the 2 GHz MSS, we intend to use the Big LEO service rules as a starting point. We believe that by amending the existing rules to incorporate the 2 GHz MSS we can avoid the addition of duplicative and unnecessary rules. In this *Notice*, we first address a Petition for Expedited Rulemaking filed by ICO Services Limited (ICO).⁸ We grant ICO's request to the extent we propose to amend the Big LEO service rules to include the 2 GHz MSS rather than developing a completely new set of policies and rules. We deny, however, ICO's request that we propose to license only "new entrants" initially. To accomplish our goal of expediting licensing of the proposed 2 GHz MSS systems, we seek comment on several application and LOI spectrum assignment alternatives that would avoid mutual exclusivity among the qualified proposals. In addition, we seek comment on a competitive bidding approach in the event we find that the approaches that avoid mutual exclusivity are not in the public interest. We also seek comment on several substantial feeder link and inter-satellite link issues. We seek comment on earth station licensing proposals and international coordination requirements. In addition, we seek comment on specific incentives to encourage 2 GHz system operators to provide service to rural and unserved communities.

II. BACKGROUND

4. The 1992 World Administrative Radio Conference (WARC-92) allocated several frequency bands for MSS. Among other actions, WARC-92 adopted primary international allocations of the 1980-2010 MHz (uplink) band and the 2170-2200 MHz (downlink) band to MSS worldwide, and the 2165-2170 MHz band to MSS in Region 2⁹ to be effective January 1, 2000.¹⁰ These MSS allocations were added on a primary basis to bands already allocated to terrestrial mobile and fixed services. In 1994, the Commission allocated portions of the international 2 GHz MSS allocation specifically for domestic terrestrial mobile service use by Personal Communications Services (PCS).¹¹ In doing so, the Commission acknowledged the potential for MSS to serve rural areas that may not be economically served by PCS and stated that it would consider allocating additional spectrum to 2 GHz MSS in the future.¹² Consequently, in 1995, the United States sought additional international spectrum for 2 GHz MSS at the 1995 World Radiocommunication Conference (WRC-95),¹³ and WRC-95 adopted additional spectrum for 2 GHz MSS. Effective January 1, 2000, the 2010-2025 MHz (uplink) band and the 2165-2170 MHz (downlink) band will be available for MSS in the United States and Canada. Effective January 1, 2005, the 2010-2025

⁸ ICO Services Limited, Petition for Expedited Rule Making to Establish Eligibility Requirements for the 2 GHz Mobile Satellite Service (filed July 17, 1998) (ICO Petition).

⁹ The world is divided into three Regions by agreement of the Members of the International Telecommunications Union (ITU). The United States is in Region 2, which encompasses the Americas and Greenland.

¹⁰ Final Acts of the 1992 World Administrative Radio Conference, Malaga-Torremolinos (1992).

¹¹ *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) (allocating, *inter alia*, the 1980-1990 MHz band to terrestrial PCS).

¹² *Id.* at 4995-96 ¶¶ 94-97.

¹³ *WRC-95 Report*, 10 FCC Rcd at 12799 ¶ 43 & 12845-47 (Appendix 1, Section B, USA/ /29, USA/ /33).

MHz (uplink) band will be available for MSS in all of Region 2. In 1997, the Commission allocated the 1990-2025 MHz (uplink) and 2165-2200 MHz (downlink) bands to MSS in the United States.¹⁴

5. The first applications seeking authorization to use the 2 GHz spectrum to provide MSS were filed by Celsat America, Inc. (Celsat) and Personal Communications Satellite Corporation (PCSAT) in 1994, prior to adoption of the 2 GHz MSS allocation in the United States.¹⁵ Following the allocation in 1997, the International Bureau issued a Public Notice establishing a deadline ("cut-off") of September 26, 1997 for additional applications from U.S. companies and letters of intent from non-U.S.-licensed systems.¹⁶ The Commission received six applications (including an amended application from Celsat) and three letters of intent from non-U.S. companies to provide service in the United States.¹⁷ The 2 GHz MSS applicants are the Boeing Company (Boeing), Celsat, Constellation Communications, Inc. (Constellation), Globalstar, L.P. (Globalstar), Iridium LLC (Iridium) and Mobile Communications Holding, Inc. (MCHI); the LOI filers seeking reservation of spectrum to serve the U.S. market from non-U.S.-licensed systems are ICO (a United Kingdom company), Inmarsat Horizons (Inmarsat) (an inter-governmental satellite organization), and TMI Communications and Company, Limited Partnership (TMI) (a Canadian entity).¹⁸ In addition, on July 17, 1998, ICO filed a Petition for Expedited Rulemaking requesting that the Commission expeditiously adopt licensing and service rules for 2 GHz MSS.¹⁹ In response to the ICO

¹⁴ 2 GHz MSS Allocation Order, 12 FCC Rcd at 7393-95 ¶¶ 10-15.

¹⁵ Application of Celsat America, Inc., File Nos. 26/27/28-DSS-P-94 (52139, 52140, 52141); Application of Personal Communications Satellite Corporation, File Nos. 24-DSS-P-94, -95.

¹⁶ Public Notice, Report No. SPB-88, 12 FCC Rcd 10446 (1997) (establishing August 21, 1997 as cut-off date for applications and letters of intent for the 2 GHz MSS systems); Public Notice, Report No. SPB-95 (rel. August 13, 1997) (extending deadline for filing 2 GHz MSS applications and letters of intent from August 21, 1997 to September 5, 1997); Public Notice, Report No. SPB-99 (rel. September 4, 1997) (extending deadline for filing 2 GHz MSS applications and letters of intent from September 5, 1997 to September 26, 1997).

¹⁷ Public Notice, Report No. SPB-119 (rel. March 19, 1998) (2 GHz MSS PN) (providing summary of each of the nine applications and letters of intent filed prior to the cut-off date and establishing deadlines for filing comment/petitions to deny and responsive pleadings). PCSAT subsequently withdrew its application from further consideration. See Letter from Lon C. Levin to Magalie Roman Salas (November 5, 1998).

¹⁸ Application of The Boeing Company, File Nos. 179-SAT-P/LA-97(16), 90-SAT-AMEND-98 (Boeing 2 GHz MSS Application); Application of Celsat America, Inc. File Nos. 26/27/28-DSS-P/LA-97, 88-SAT-AMEND-98 (Celsat 2 GHz MSS Application); Application of Constellation Communications, Inc., File No. 181-SAT-P/LA-97(46); Application of Globalstar, L.P., File Nos. 182-SAT-P/LA-97(64) and 183 through 186-SAT-P/LA-97 (Globalstar 2 GHz MSS Application); Application of Iridium, LLC, File No. 187-SAT-P/LA-97(96) (Iridium 2 GHz MSS Application); Application of Mobile Communications Holdings, Inc., File No. 180-SAT-P/LA-97(26) (MCHI 2 GHz MSS Application); Letter of Intent of ICO Services Limited, File No. 188-SAT-LOI-97 (ICO 2 GHz MSS LOI); Letter of Intent of Inmarsat Horizons, File No. 190-SAT-LOI-97; TMI Communications and Company, Limited Partnership, File No. 189-SAT-LOI-97 (TMI 2 GHz MSS LOI). Comments, petitions to deny, and responsive pleadings were filed in the proceeding for each application. The issues raised by these pleadings will be addressed when the applications are evaluated for authorization.

¹⁹ The Commission placed the ICO Petition on Public Notice on July 28, 1998. Public Notice, Report No. 2287 (July 28, 1998) (designating the ICO Petition as RM-9328). Comments and oppositions were due on August 27, 1998, and reply comments were due on September 11, 1998. The following parties filed comments: ICO USA Service Group (a consortium consisting of British Telecommunications, PLC, Hughes Telecommunications and Space

Petition in part, this *Notice* proposes policies and rules for expedited licensing and operation of these systems in the United States. As stated in the cut-off Public Notice, applicants and LOI filers will be afforded an opportunity to amend their applications and letters of intent, if necessary, to conform with any requirements and policies that may be adopted for the 2 GHz MSS. As we propose in this *Notice*, the Commission will then issue licenses and a Public Notice or Declaratory Ruling regarding the letters of intent to resolve all outstanding issues with respect to the 2 GHz MSS service link bands.

III. DISCUSSION

A. Service Link Licensing Procedures

1. Avoiding Mutual Exclusivity

6. In our satellite service processing rounds, we have traditionally sought to afford all qualified system proponents an opportunity to compete in the marketplace and allow consumer choice to determine the success of individual service offerings, technologies, and competitors. In doing so, we have avoided mutual exclusivity among applicants by encouraging applicants to develop a sharing arrangement by which all proposed systems can be accommodated.²⁰ However, in the *2 GHz MSS Allocation NPRM*, which the Commission adopted in 1995, we sought comment on our intent to award the 2 GHz MSS licenses by competitive bidding.²¹ Section 309(j) of the Communications Act of 1934, as amended (Communications Act),²² requires the Commission to award licenses for use of the electromagnetic spectrum through

Company, Telecomunicaciones de Mexico, and TRW Inc., each of which are investors in ICO's proposed 2 GHz MSS system) (ICO USA), North American GSM Alliance LLC (a group representing the interests of digital PCS providers in the United States and Canada) (GSM Alliance), Celsat, Iridium, Globalstar, and TMI. MCHI and Constellation filed oppositions to the ICO Petition. ICO, ICO USA, GSM Alliance, Iridium and Celsat filed replies. ICO, ICO USA, Celsat, MCHI, the European Commission, ING Baring Furman Selz, LLC, and Donaldson, Lufkin & Jenrette have filed various *ex parte* letters. In addition, on October 13, 1998, ICO filed a motion in which it requested leave to submit contemporaneously-filed surreply comments, which generated responses from Iridium (filed October 28, 1998) and MCHI (filed November 18, 1998). We grant ICO's motion to accept surreply comments and its associated responses in order to ensure a complete record in this proceeding.

²⁰ See, e.g., *Amendment of Part 25 of the Commission's Rules to Establish Rules and Policies Pertaining to the Second Processing Round of the Non-Voice, Non-Geostationary Mobile Satellite Service*, IB Docket No. 96-220, Report and Order, 13 FCC Rcd 9111 (1997) (*Second Round NVNG MSS Order*) (Commission adopts applicants' mutually agreed upon spectrum sharing arrangement); *Rulemaking to Amend Part 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 & Order*) (Commission adopts final Ka-band arrangement, the culmination of discussions with interested parties and filings in the proceeding).

²¹ *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, Notice of Proposed Rule Making, 10 FCC Rcd 3230, 3233 ¶ 17 (1995) (*2 GHz MSS Allocation NPRM*).

²² 47 U.S.C. § 309(j), added by the Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, Title VI, § 6002(a), 107 Stat. 312, 387; amended by the Balanced Budget Act of 1997 (BBA of 1997), Pub. L. No. 105-33, Title III, § 3002, 111 Stat. 251, 258.

competitive bidding, or auctions, where mutually exclusive applications are accepted for filing (unless the applications fall under one of three statutory exemptions not relevant here).²³ Our use of auctions as an assignment method is subject to Section 309(j)(6)(E), which states that the Commission has an "obligation in the public interest to *continue* to use engineering solutions, negotiation, threshold qualifications, service regulations, and other means in order to avoid mutual exclusivity in application and licensing proceedings."²⁴

7. In response to the *2 GHz MSS Allocation NPRM*, all commenters opposed the idea of awarding 2 GHz MSS licenses by auction, citing numerous reasons.²⁵ These commenters said that we should wait until we accepted applications for licenses so as to determine whether there would be conflicting requests for spectrum, and several suggested that engineering solutions, negotiations, licensing qualifications, and service rules can be used to avoid mutual exclusivity.²⁶ Moreover, commenters suggested that auctioning MSS spectrum in the United States could open the door for other countries to require MSS providers to pay for using the same spectrum in each country, thereby delaying service by subjecting each system to subsequent auctions in each country.²⁷ In the *2 GHz MSS Allocation Order*, we decided to defer a decision on whether to license 2 GHz MSS by competitive bidding until after we received the 2 GHz MSS applications and LOIs, and analyzed their proposals to determine whether mutual exclusivity existed.²⁸

8. The nine 2 GHz MSS system proponents propose a mixture of system designs — geostationary orbit (GSO) and non-geostationary orbit (NGSO) systems, as well as different modulation technologies — time division multiple access (TDMA),²⁹ code division multiple access (CDMA),³⁰ and, in some cases, both TDMA and CDMA. Moreover, many of the 2 GHz MSS system proponents request use of the entire available 2 GHz MSS spectrum allocation.³¹ Consequently, the threshold issue in this *Notice* is how to license these systems given that, based on the system proponents' spectrum requests, there is insufficient

²³ 47 U.S.C. § 309(j)(1)-(2).

²⁴ 47 U.S.C. § 309(j)(6)(E) (emphasis added).

²⁵ *2 GHz MSS Allocation Order*, 12 FCC Rcd at 7410-11 ¶ 53.

²⁶ *Id.* & nn.142-143 (citing commenters).

²⁷ *Id.* & n.144 (citing commenters).

²⁸ *Id.* at 7411 ¶ 54.

²⁹ TDMA is a transmission technique in which users of the same frequency band are provided alternating time slots for their transmissions in the system, thereby avoiding mutual interference.

³⁰ CDMA is a transmission technique in which the signal occupies a bandwidth larger than that needed to contain the information being transmitted. The signal is spread over a wide bandwidth, the power is dispersed, and a code is used to send and retrieve the information. The spreading, the variation in the code, and other technical parameters permit a number of users to operate on the same frequency simultaneously without causing mutual harmful interference.

³¹ For ease of reference, the 2 GHz MSS spectrum allocation and our understanding of the system proponents' service link proposals are depicted in table form in Appendix A. Requests for feeder links and related non-service spectrum are addressed in Section III.B., *infra*.

spectrum to accommodate all systems as proposed without causing mutual interference. Based on our policy in previous satellite licensing proceedings to encourage applicants to develop engineering solutions or sharing arrangements by which all proposed systems can be accommodated, and in accordance with our statutory obligation to *continue* to use engineering solutions or negotiation to avoid mutual exclusivity in application and licensing proceedings,³² and for the reasons discussed below, we generally adopt this approach in this proceeding.

9. The authorization of satellite services, due to international concerns (some of which were voiced by the commenters to the *2 GHz MSS Allocation NPRM*), may justify assiduous efforts to avoid mutual exclusivity. Many of the frequencies involved in this proceeding are allocated for MSS on a world-wide basis.³³ As a consequence, how much money entities might bid for a 2 GHz license or reservation, and even their willingness to bid at all, will be affected by the degree of their interest in providing global service and by their expectations concerning licensing requirements and costs in other countries. For example, a satellite system operator proposing to serve only the United States may be willing to bid higher than a satellite system operator proposing to serve multiple regions, because the U.S.-only system would face considerably fewer contingencies. Thus, auctions might prevent entry by transnational systems even though these systems may provide services valued more highly by consumers.

10. Coordinated multinational auctions might properly address the interdependency between national licensing decisions and international provision of service. However, international arrangements for transnational use of such frequency bands currently are premised on coordination — using engineering solutions and other methods to avoid harmful interference — among systems. A coordinated multilateral auction is likely to demand substantial time and resources by multiple administrations, and raise national sovereignty and other access issues.³⁴ Consequently, electing to authorize 2 GHz MSS systems to serve U.S. consumers through a coordinated multinational auction could substantially delay service to the public and thereby contravene our stated objective of facilitating prompt delivery of 2 GHz mobile satellite services to consumers. Therefore, it appears that it would be in the public interest to undertake considerable efforts to develop solutions that would avoid mutual exclusivity among satellite systems. Toward these efforts, we address ICO's proposal that the Commission expeditiously adopt licensing and service rules for 2 GHz MSS, and outline three band sharing proposals below. However, we note that if these (or other) band sharing proposals do not result in lack of mutual exclusivity consistent with the public interest, we will be required to use auctions as a selection mechanism.³⁵

³² 47 U.S.C. § 309(j)(6)(E).

³³ The Commission has held auctions of satellite licenses with regard to the Direct Broadcast Satellite Service (DBS) and the Digital Audio Radio Satellite Service (DARS); in both cases, the spectrum in question had been identified in ITU Region 2 as uniquely within the regulatory authority of the United States. See *Revision of Rules and Policies for the Direct Broadcast Satellite Service*, IB Docket No. 95-168, Notice of Proposed Rulemaking, 11 FCC Rcd 1297, 1304 n.27 (1995); *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, 3 n.2 (1995) (*DARS NPRM*). The 2 GHz MSS frequencies are not similarly identified.

³⁴ While the ITU might be a logical candidate for conducting such an auction, the agreements necessary for such an assignment of responsibility do not exist and likely would take years to develop. Further, there are other issues, such as how the proceeds from such an auction should be distributed amongst the different countries, that would further delay such auctions actually occurring.

³⁵ 47 U.S.C. § 309(j)(1).

2. ICO's Petition for Expedited Rulemaking

11. As a threshold matter, the ICO Petition requests that the Commission expeditiously adopt licensing and service rules for 2 GHz MSS.³⁶ To that end, ICO suggests that the Commission bifurcate the licensing process for the nine entities seeking to provide 2 GHz MSS service.³⁷ Specifically, ICO proposes that the Commission conditionally license "new entrants" immediately, subject to intersystem coordination and various rules patterned on the Big LEO service rules,³⁸ and later authorize additional 2 GHz MSS system proponents after finalizing the 2 GHz MSS technical and band sharing rules.³⁹ ICO USA, GSM Alliance, and Celsat fully support the ICO Petition,⁴⁰ while Iridium, Globalstar, and TMI support ICO's request for an expedited licensing and service rules proceeding, but oppose ICO's substantive requests regarding a new entrant preference.⁴¹ MCHI and Constellation generally oppose the ICO Petition,⁴² although neither party specifically objects to the Commission moving forward on 2 GHz MSS licensing *per se*.

12. To the extent that ICO requests that we expedite this processing round of the 2 GHz MSS licensing proceeding so as to facilitate prompt delivery of these new services, we agree that it is in the public interest to do so.⁴³ Ideally, 2 GHz mobile satellite service could begin in the United States on or about the time that the 2 GHz MSS allocation goes into effect — January 1, 2000. Nonetheless, given the potential for mutual exclusivity among the system proposals, and the complexity of the issues that the parties' proposals raise, it is our obligation to take the time necessary to achieve the best results.⁴⁴ We therefore address ICO's primary concern of expedition in authorizing systems by proposing spectrum assignment options designed to facilitate rapid initiation of 2 GHz MSS service.⁴⁵

13. The ICO Petition and its responsive pleadings also present excellent suggestions regarding how best to expedite this processing round. Many of the issues raised by the 2 GHz MSS system

³⁶ ICO Petition at 6-8; ICO Reply at 2, 5.

³⁷ ICO Petition at 4; ICO Reply at 8.

³⁸ ICO Petition at 5-8; ICO Reply at 6.

³⁹ ICO Petition at 8-9.

⁴⁰ ICO USA Comments at 2-5; GSM Alliance Comments at 2-3; Celsat Comments at 1-2.

⁴¹ Globalstar Comments at 1-2, 10; Iridium Comments at 2; TMI Comments at 1-2.

⁴² MCHI Opposition at 3-8 (arguing that the ICO Petition is procedurally defective); Constellation Opposition at 2-3 (same).

⁴³ See ICO Petition at 1-2. Accord ICO USA Comments at 2-3; Globalstar Comments at 1; Iridium Reply at 2.

⁴⁴ Cf. TMI Comments at 5 (incomplete licensing in the United States is unlikely to halt ICO's global system development and implementation).

⁴⁵ See Section III.A.4., *infra*.

proposals are similar to those the Commission addressed in the Big LEO service rules proceeding.⁴⁶ The issues are similar because the mobile satellite services proposed are essentially the same as those provided by the Big LEOs (*i.e.*, voice, data and fax via MSS), and because the proposed 2 GHz MSS system designs are similar to those used by the Big LEOs (*i.e.*, CDMA and TDMA system architectures). We believe that the Big LEO policies and rules can serve as a logical starting point for the development of the policies and rules for the 2 GHz mobile satellite service. Therefore, as ICO suggests, we propose to use the Big LEO rules as a template for the 2 GHz MSS rules by applying appropriate provisions of the Big LEO rules to both Big LEO licensees and 2 GHz MSS system operators.⁴⁷ Streamlining the regulations for these mobile satellite services in the 1-3 GHz range would reduce confusion and uncertainty for users, lessen regulatory burdens on system operators, and appropriately conserve Commission resources.

14. We now turn to ICO's "new entrant" proposal. ICO bases its proposal on a Commission proposal to adopt a preference in the NVNG MSS second processing round for applicants that were not already NVNG MSS licensees or their affiliates,⁴⁸ and on the policies underlying the Commission's pioneer's preference rules.⁴⁹ We find that neither basis justifies establishing the preference for new entrants sought by ICO. In the NVNG MSS second processing round, we did not adopt the proposed preference because our ability to accommodate all applicants via spectrum sharing alleviated any concern that existing operators would obtain additional spectrum to the exclusion of potential new entrants.⁵⁰ Similarly, our approach to licensing in this proceeding is to encourage the applicants to develop engineering solutions or sharing arrangements by which all nine proposed systems can be accommodated,⁵¹ and therefore, the unadopted proposal in the NVNG MSS second processing round provides no support for ICO's new entrant proposal. With regard to the Commission's pioneer's preference rules, the Commission originally established this policy in 1991 to provide a means of extending preferential treatment in licensing processes to parties that demonstrated their responsibility for developing new

⁴⁶ See *Big LEO Report & Order*, 9 FCC Rcd 5936; *Big LEO Reconsideration*, 11 FCC Rcd 12861.

⁴⁷ See also ICO USA Comments at 5; Globalstar Comments at 1.

⁴⁸ ICO Petition at 5 (citing *Amendment of Part 25 of the Commission's Rules to Establish Rules and Policies Pertaining to the Second Processing Round of the Non-Voice, Non-Geostationary Mobile Satellite Service*, IB Docket No. 96-220, Notice of Proposed Rule Making, 11 FCC Rcd 19841, 19846-53, *erratum*, 11 FCC Rcd 19891 (1996)).

⁴⁹ ICO Reply at 8 (citing *Establishment of Procedures to Provide a Preference to Applicants Proposing an Allocation for New Services*, GEN Docket No. 90-217, Report and Order, 6 FCC Rcd 3488 (1991) (*Pioneer's Preference Report & Order*), *recon. granted in part*, Memorandum Opinion and Order, 7 FCC Rcd 1808 (1992), *further recon. denied*, Memorandum Opinion and Order, 8 FCC Rcd 1659 (1993)). *But see 2 GHz MSS Allocation Order*, 12 FCC Rcd at 7413-14 ¶¶ 60-63 (Commission rejected Celsat's pioneer's preference request for the 2 GHz MSS allocation as insufficiently innovative).

⁵⁰ *Second Round NVNG MSS Order*, 13 FCC Rcd at 9117-18 ¶¶ 12-14. See also Globalstar Comments at 5-6; Iridium Comments at 8-9; Constellation Opposition at 3-4.

⁵¹ See Section III.A., *supra*.

communications services and technologies.⁵² We no longer have authority, however, to award pioneer's preferences because Congress terminated this authority in August 1997.⁵³

15. We also find ICO's request for a bifurcated rulemaking with a "new entrant" component problematic. It would be difficult to develop a workable definition of "new entrant," including such matters as what the market definition should be (domestic versus international; voice versus non-voice; mobile or only mobile satellite), what affiliation standards should apply and other related criteria necessary to adopt such an approach.⁵⁴ Developing and applying proper definitions and criteria would slow licensing and spectrum reservation considerably.⁵⁵ Furthermore, as we indicated in our Big LEO proceeding, there are inherent competitive safeguards in a policy of accommodating multiple MSS systems, and potential benefits can flow from authorizing companies that have experience in related areas of communications.⁵⁶ Therefore, pursuant to Section 1.407 of the Commission's rules,⁵⁷ we grant ICO's request for expedited rulemaking in part, to the extent it comports with the proposals made herein, and deny ICO's request in all other respects.

3. Qualification Requirements

a. Technical Qualifications

16. It has been our policy to afford service providers the ability to use a diverse array of technologies.⁵⁸ We are confident that allowing satellite operators maximum flexibility to design their satellite systems would promote innovative system design and create additional public interest benefits by allowing operators to tailor their systems to best meet the needs of consumers. We recognize that there are several technologically distinct approaches for providing MSS at 2 GHz that can fulfill public interest objectives. We therefore seek to establish technical rules that can maximize the number of service providers, and offer each one of them sufficient flexibility to implement a state-of-the-art satellite communications system that will meet the demands of the marketplace. We also propose requirements to insure efficient use of assigned spectrum.

⁵² See *Pioneer's Preference Report & Order*, 6 FCC Rcd at 3490 ¶¶ 18-22.

⁵³ BBA of 1997, § 3002(a)(1)(F), 111 Stat. at 259. See *Dismissal of All Pending Pioneer's Preference Requests*, ET Docket No. 93-266, Order, 12 FCC Rcd 14006 (1997).

⁵⁴ Compare ICO Surreply at 2-4 with Iridium Response to ICO Surreply at 2-6 (debating the potential definition of "new entrant" and how to treat ownership affiliations under that definition).

⁵⁵ Accord Iridium Comments at 2; Constellation Opposition at 6; MCHI Comments on Iridium Response to ICO Surreply at 3.

⁵⁶ See *Big LEO Reconsideration*, 11 FCC Rcd at 12872 ¶ 30.

⁵⁷ 47 C.F.R. § 1.407.

⁵⁸ 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.").

i. Orbit Considerations

17. The 2 GHz MSS system proponents propose both NGSO and GSO systems. There are inherent differences between NGSO and GSO satellite systems. A single NGSO satellite can pass over all of the Earth. As a result, NGSO satellite systems can be designed to provide complete, and, with a sufficient number of satellites, continuous global coverage. A single GSO satellite, in contrast, operates from a fixed point relative to the Earth and consequently the coverage from a single GSO satellite, while continuous, allows for regional service at most. Each type of system has certain technical advantages in comparison to the other, and we anticipate that neither system will be superior for all uses.⁵⁹ Our goal is to provide an opportunity for technology trade-offs to be tested in the marketplace.⁶⁰ Therefore, we propose to authorize both NGSO and GSO MSS systems for operations in relevant portions of the 1990-2025/2165-2200 MHz bands, and seek comment on this proposal.

ii. Coverage Requirements

18. *NGSO systems.* In the *Big LEO Report & Order*, we acknowledged the need to balance NGSO MSS system cost against geographical service area coverage, and established that it is sufficient, given projected need and alternative service options, to require service only to populated areas.⁶¹ We believe that it is appropriate to apply the same rationale here, and propose to adopt the same coverage requirements for 2 GHz MSS systems operating NGSO constellations. Specifically, we propose to require that systems operating NGSO satellites be capable of serving locations as far north as 70° North latitude and as far south as 55° South latitude for at least 75 percent of every 24-hour period. This would provide coverage to virtually all of the world's permanently populated areas. We also are certain that the public interest would be served if the 2 GHz MSS NGSO systems provide efficient and ubiquitous communication services to users throughout the United States. We, therefore, propose to require continuous coverage, *i.e.*, that at least one NGSO satellite must be visible above the horizon at an elevation angle of at least 5 degrees at all times throughout all 50 states, Puerto Rico, and U.S. territories and possessions. We request comment on these proposals.

19. *GSO systems.* A single GSO satellite, unlike a single NGSO satellite, has a fixed coverage area, and is thus inherently regional in its coverage. Consistent with the regional technical feature of GSOs, we do not propose global coverage requirements for systems that use only GSO satellites. We do propose, however, to require such systems to provide coverage to all 50 states, Puerto Rico, and the U.S. Virgin Islands, unless the system demonstrates that such coverage is technically infeasible. We seek comment on this proposal.

⁵⁹ For example, because LEO satellites orbit closer to the earth's surface, time delays during radio transmissions from the Earth to the satellite and back are shorter. Conversely, because, GSO satellites are at high altitudes, a single GSO satellite has a very large potential coverage area, compared to a single LEO satellite.

⁶⁰ In the Big LEO proceeding, we limited eligibility in the 1.6/2.4 GHz bands to NGSO systems, because of a *de facto* limitation in other MSS bands to GSO services, so as to foster LEO development, and enhance consumer choice. *Big LEO Reconsideration*, 11 FCC Rcd at 12871 ¶ 29. There is no reason to adopt a similar limitation in the 2 GHz frequency bands, because there is adequate spectrum within the 2 GHz band to accommodate both NGSO and GSO systems.

⁶¹ *Big LEO Report & Order*, 9 FCC Rcd at 5947-48 ¶¶ 21-25.

iii. Provision of AMS(R)S

20. In its application, Boeing seeks authority to provide Aeronautical Mobile-Satellite Route Service (AMS(R)S) in the 2 GHz MSS bands.⁶² AMS(R)S is a radio communication service linking aircraft earth stations via satellite to ground stations or other aircraft stations, reserved for communications pertaining to safety and regularity of flight along civil air routes.⁶³ In response to the 2 GHz MSS PN, several parties filed comments concerning Boeing's proposal, arguing that there are no specific international or national frequency allocations for AMS(R)S in the 2 GHz MSS bands.⁶⁴ Conversely, Boeing contends that the Commission's rules and ITU regulations permit the provision of AMS(R)S in MSS spectrum.⁶⁵ 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.

21. Although we agree with Boeing's assertion that the absence of a specific AMS(R)S allocation does not bar the provision of AMS(R)S in MSS bands, there are additional relevant domestic and international regulatory issues that must be addressed in connection with its provision of service. First, 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. As a domestic matter, Boeing could contract with members of the aviation community to provide AMS(R)S in the generic MSS Allocation, with appropriate intra-network priority and preemption, but without the need for any priority and preemption provision in the U.S. Table of Allocations. Nevertheless, we are concerned that because Boeing intends to provide a world-wide service, it will be required to implement priority and preemptive access throughout the world. It may not be practical to coordinate its operations with other satellite systems and aviation authorities in other countries without the necessary supporting international regulatory provisions in the 2 GHz MSS bands. Second, the Commission's rules have specific requirements concerning licensing of terminals for aviation distress and safety communications. 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.⁶⁶

22. We solicit comment on the feasibility of providing AMS(R)S service in the 2 GHz MSS bands. We invite the aviation community in particular to detail the international and domestic regulatory framework required for the implementation of the AMS(R)S service in the 1990-2200/2165-2200 MHz bands. We are not, however, proposing any rule changes at this time to accommodate specifically Boeing's AMS(R)S proposal. Instead, we are considering Boeing's proposal as an MSS proposal in the context of this proceeding. We are not aware of any specific international or domestic aviation community requirements in these bands. Consequently, we seek comment on the extent to which we can

⁶² See Boeing 2 GHz MSS Application at 2.

⁶³ See 47 C.F.R. § 2.1.

⁶⁴ 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).

⁶⁵ See Consolidated Opposition of Boeing at 9 (filed June 3, 1998).

⁶⁶ See 47 C.F.R. § 87.187(q) and § 2.106 U.S. Table of Frequency Allocations.

and should provide for Boeing's operations in the proposed band arrangement for use of the 2 GHz MSS frequencies in the United States.⁶⁷

b. Financial Qualifications

23. Historically, the Commission has adopted financial qualification requirements for satellite services.⁶⁸ This policy is designed to make efficient use of spectrum by preventing underfinanced applicants from depriving another fully capitalized applicant of the opportunity to provide service to the public.⁶⁹ Where more applicants have applied for spectrum than is available to accommodate reasonably each proposed system, we have invoked strict financial qualifications.⁷⁰ Alternatively, in cases where we can accommodate all pending applications and future entry is possible, we have not imposed financial requirements, but instead, have sought to ensure timely construction of systems and deployment of service by requiring implementation milestones.⁷¹

24. We believe that the 2 GHz MSS allocation can accommodate reasonably all nine of the proposed systems, if modified, without mutual interference. As explained in detail below, we have fashioned three band sharing options that would authorize all of the system proponents to initiate service, while leaving open the possibility of future entry in the 2 GHz MSS bands. Therefore, we tentatively conclude that analysis of financial qualifications prior to licensing and spectrum reservation will not be necessary in this 2 GHz MSS processing round. We seek comment on this tentative conclusion, and on whether our policy goal of spectrum use efficiency is better served by enforcing strict milestones after licensing and spectrum reservation, as compared to applying financial qualifications prior to licensing and spectrum reservation.

25. If, in the process of this rulemaking, we determine that all proposed systems cannot be accommodated, we propose to revisit the issue of a financial showing prior to licensing, as we have in the past. Should that need arise, we propose that the Commission would apply the same financial standard to 2 GHz MSS system proponents as the one applied to the Big LEO systems and the domestic fixed-satellite service.⁷² Thus, should we find financial qualifications necessary, we propose that each 2 GHz MSS proponent would be required to demonstrate internal assets or committed financing sufficient to cover construction, launch, and first year operating costs of its entire system. We seek comment on this

⁶⁷ See Section III.A.4., *infra*.

⁶⁸ See 47 C.F.R. §§ 25.140(c), 25.142(a)(4), 25.143(b)(3).

⁶⁹ This consideration stems from repeated experiences that under-financed applicants have significant difficulty in the capital markets in raising the funds needed to construct and launch a satellite system even with a license in hand. See, e.g., *National Exchange Satellite, Inc.*, 7 FCC Rcd 1990 (Com. Car. Bur. 1992); *Rainbow Satellite Inc.*, Mimeo No. 2584 (Com. Car. Bur., rel. February 14, 1985); *United States Satellite Systems, Inc.*, Mimeo No. 2583 (Com. Car. Bur., rel. February 14, 1985) (domestic satellite licenses declared null and void for failure to begin implementation as required by license).

⁷⁰ See, e.g., *Big LEO Report & Order*, 9 FCC Rcd at 5948-50 ¶¶ 26-30 & n.38.

⁷¹ *Id.* at 5948 ¶ 26 & n.37.

⁷² *Id.* at 5949-50 ¶¶ 28-30 (citing *Licensing Space Stations in the Domestic-Fixed Satellite Service*, CC Docket No. 85-135, Report and Order, 50 Fed. Reg. 36071 (September 5, 1985)).

proposal, and whether there are any alternative mechanisms we can use to ensure that those system proponents granted licenses will be able to proceed with construction, launch and timely commencement of service to the public. For example, should we require only a demonstration of partial financing adequate to construct part of the system and commence service within two years of license grant, the revenues of which would be used to fund the remainder of the system's construction and operating expenses?⁷³ We also invite commenters to compare the appropriateness and potential impact of imposing — or not imposing — financial qualifications prior to licensing under the various processing options described below.

4. Processing Alternatives

26. The issues before us are unique and highly complex. We recognize that there is not enough spectrum in the 1990-2025/2165-2200 MHz bands to accommodate all proposed 2 GHz MSS systems if each system were to use the full amount of spectrum it has requested. Nevertheless, based on our experience in the Big LEO proceeding, we tentatively conclude that there is sufficient spectrum in the 2 GHz MSS allocation to accommodate reasonably all nine 2 GHz MSS system proposals.⁷⁴ To that end, we seek comment on four distinct spectrum assignment options: (1) the Flexible Band Arrangement; (2) the Negotiated Entry Approach; (3) the Traditional Band Arrangement; and (4) Competitive Bidding. Most of our proposed options are premised on the following threshold assumptions and issues.

27. First, we believe that it is most efficient to assign the MSS service link spectrum in multiples of 1.25 MHz. Our experience, based on filings in the Big LEO processing round, is that 1.25 MHz spectrum segmentation, or bandwidth in multiples of 1.25 MHz segments, is a common industry practice.⁷⁵ In addition, 1.25 MHz channel bandwidth is a common denominator for several 2 GHz MSS system proposals.⁷⁶ We therefore seek comment on this proposed channelization.

28. Second, given that portions of the 2 GHz MSS spectrum allocation are not uniformly available throughout the world,⁷⁷ certain options propose to group GSO systems primarily 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). We do so under the assumption that the service area of a single GSO satellite is inherently restricted to serving a particular geographic area, and thus, GSO systems may be better suited than NGSO systems to operate in spectrum allocated on a regional basis. Conversely, due to their global service coverage and discrete channel plans, NGSO systems may benefit most from a global

⁷³ *But see id.* at 5951 ¶ 54 (a system that relies too heavily on operating income from its first satellites for its completion could easily become stalled before it is able to provide service that meets our requirements).

⁷⁴ For example, given the 70 MHz of total spectrum available, we could assign to each of the nine system proponents approximately 7.7 MHz (3.88 MHz in each direction), an amount that exceeds the amount of spectrum licensed on average to existing Big LEO systems.

⁷⁵ *See Big LEO Report & Order*, 9 FCC Rcd at 5959 ¶ 53.

⁷⁶ *See* ICO 2 GHz MSS LOI at 15; MCHI 2 GHz MSS Application at 22; Globalstar 2 GHz MSS Application at 12; Iridium 2 GHz MSS Application at A-5; TMI 2 GHz MSS LOI at Sect 5; Celsat 2 GHz MSS Application at AP4-3S-A1.

⁷⁷ *See supra* footnote 9 and accompanying text.

spectrum assignment. We seek comment on these proposed groupings of GSO and NGSO systems based on regional spectrum allocations.⁷⁸

29. Third, even though we are hopeful that all authorized systems will be built, we recognize that this may not occur. We therefore seek comment on whether unused spectrum, as determined by failure to meet milestones, should be subject to a second processing round, and if so, when such a processing round would take place (e.g., five years from initial authorization; immediately after each loss of authorization). We also seek comment on whether the pool of eligible entities for that round should be limited to those entities that have implemented or are still in the process of implementing their systems, or broadened to include future applicants. In this regard, we seek comment on whether the systems' designs are sufficiently flexible to make use of additional spectrum and the effect this may have on operations of all other systems in the band. For example, can spectrum originally assigned to a CDMA system be used by a TDMA system?

30. Finally, commenters asserting that any of our proposed options do not provide sufficient spectrum capacity for a particular system must specify the minimum spectrum required to support such a system, and to substantiate this assertion with concrete technical and economic analyses. While we are prepared to move forward expeditiously with any of these spectrum assignment proposals, we reserve the option of adopting an alternative engineering solution or band sharing arrangement, including any hybrid solution arising from the options described below, negotiated by the system proponents and presented to us in comments filed in response to this *Notice*. Interested parties will have an opportunity to comment on any such alternative proposal in reply comments.

a. The Flexible Band Arrangement

31. One option for sharing the 2 GHz MSS band, which we call the Flexible Band Arrangement, would segment the band to accommodate the various proposals and provide flexibility for system implementation and expansion. Under this option, we would segment the available spectrum into three "core" and two "expansion" spectrum bands, with each core band to be used by systems using similar technologies to commence operations, and each expansion band held in reserve for systems' expansion. Similar to the Big LEO spectrum-sharing arrangement, this proposal assumes that TDMA systems must operate on discrete frequencies, while CDMA systems can, under certain technical constraints, share the spectrum co-frequency. Therefore, we would divide the core TDMA spectrum into two distinct segments, GSO TDMA and NGSO TDMA, with the CDMA core spectrum placed between the two TDMA core bands, which would allow CDMA operators to aggregate their assigned spectrum into a contiguous spectrum segment, if advantageous to do so. Utilizing our assumptions regarding grouping systems based on spectrum allocation constraints, we would place the GSO TDMA core at the top of the uplink band and the bottom of the downlink band (i.e., generally in the spectrum allocated to 2 GHz MSS in Region 2 only). We would therefore place the NGSO TDMA core at the bottom of the uplink band and the top of the downlink band (i.e., generally in the spectrum allocated to 2 GHz MSS globally). The concept of the core and expansion bands is depicted in graph form in Appendix B, and described in more detail below.

32. *Core spectrum bands.* Under this option, we propose that each of the core spectrum bands would be comprised of primary spectrum segments. We would assign a primary spectrum segment to each

⁷⁸ Suggestions to this effect arose in the pleadings filed on the ICO Petition. See ICO Petition at 7-9; ICO Reply at 6-7; see also ICO USA Comments at 5-6; GSM Alliance Reply at 2-3; Celsat Reply at 5-7. But see TMI Comments at 2-3 (arguing that GSO MSS systems should have access to the entire 2 GHz MSS allocation).

of the eligible system operators. Each operator would be guaranteed the exclusive use of its primary spectrum segment upon commencement of operations, to ensure the immediate availability of spectrum for each system to begin operations. We are concerned, however, that because the 2 GHz MSS systems have different implementation schedules and some may not proceed with implementation, this primary spectrum segment could remain unused for several years, resulting in inefficient spectrum utilization.⁷⁹ Consequently, we propose that, in addition to the primary spectrum segment, we would authorize systems to operate across their respective core spectrum band, subject to coordination with other systems that have commenced operations in that core band. In such coordination, each operational system would have priority in coordination of its primary spectrum and equal rights in coordination of the remaining core spectrum.

33. *Expansion bands.* The purpose of the expansion bands is to meet the needs of systems with commercial operations exceeding the capacity of their given core band. Therefore, we propose to authorize systems to operate in the adjacent expansion band (or bands) — conditioned upon coordination with other systems permitted to expand in that band (*i.e.*, systems with commercial operations in the same or adjacent core bands) — and only after a system's customer traffic requirements grow beyond the capacity of the primary spectrum segment and the core spectrum band. Systems would be authorized for expansion only within the expansion bands that are adjacent to their respective core spectrum bands. Thus, the maximum amount of spectrum available for any particular system would be limited by the boundaries of the adjacent core spectrum for other system types. We further propose to use a phased-in approach to spectrum expansion, *i.e.*, systems would expand in blocks of 1.25 MHz at a time, with customer traffic requirements being the criterion for determining the amount of spectrum that operators eventually would use beyond their respective core spectrum assignments. We fully expect system operators to coordinate the use of the core and expansion spectrum in good faith.⁸⁰ The Commission, however, would be available to facilitate coordination if a dispute were to arise. We seek comment and recommendations on whether, in addition to customer traffic requirements, there are technical criteria, operational requirements or any other factors we should consider in resolving disputes, particularly with regard to use of the expansion bands. If so, how should these factors be considered?

i. TDMA Systems

34. Based on the initial 2 GHz applications and LOIs, it appears that there may be as many as six systems proposing some form of TDMA operations. We propose to assign a 2.5 MHz primary spectrum segment to each 2 GHz MSS TDMA system in the core TDMA spectrum (or a total of 5 MHz when adding uplink and downlink together). This proposal is based on our experience with the Big LEO TDMA system that is currently operating under an authorization for a total of 5.15 MHz of service link spectrum. Our experience suggests that 5 MHz of spectrum assigned to one system is sufficient for commencement of service.⁸¹ We note that Iridium, Globalstar, TMI and Celsat propose to use both

⁷⁹ Section 303 of the Communications Act requires the Commission to "generally encourage the larger and more effective use of radio [frequencies] in the public interest." 47 U.S.C. § 303(g).

⁸⁰ For guidance on Commission consideration of whether parties are negotiating in good faith, see *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).

⁸¹ See *Big LEO Report & Order*, 9 FCC Rcd at 5955 ¶ 44.

TDMA and CDMA techniques.⁸² Under this option, if adopted, we propose not to assign more spectrum to dual technology proposals (*i.e.*, CDMA and TDMA). Since none of these parties propose co-frequency CDMA-TDMA operations within one system, we would apportion equally Iridium's, Globalstar's, TMI's and Celsat's total primary spectrum assignments between the two techniques, *i.e.*, the nominal 2.5 MHz TDMA primary assignment in each direction will be split into 1.25 MHz of TDMA core spectrum and 1.25 MHz of CDMA core spectrum. As a result, we would assign no more than 10.0 MHz uplink and 10.0 MHz downlink of core spectrum to TDMA operators as a starting point.

35. Boeing proposes an Aviation Traffic Information Service requiring 600 kHz of TDMA downlink spectrum only.⁸³ Because Boeing's request for spectrum is unbalanced, it would result in inefficient use of service link spectrum (unpaired 600 kHz in the service uplink spectrum). Therefore, we are not proposing any TDMA spectrum for Boeing's Aviation Traffic Information Service, but we seek comment on whether Boeing's requirements can be met in CDMA spectrum, or on any other method for meeting this requirement within the standard framework for MSS systems. We also seek comment on the domestic and international regulatory framework required for the implementation of this component of Boeing's system.⁸⁴

ii. CDMA Systems

36. Based on the initial 2 GHz applications and LOIs, it appears that there may be as many as seven proposals for CDMA systems, including Iridium, Globalstar, TMI and Celsat. In the Big LEO proceeding, we found that four CDMA systems could share an 11.35 MHz uplink band assignment, including guard bands.⁸⁵ This assignment represented approximately two 1.25 MHz channels per system. We propose a similar primary spectrum designation for each 2 GHz MSS CDMA system: two 1.25 MHz channels for the uplink and two 1.25 MHz channels for the downlink. Taking into account Iridium's, Globalstar's, TMI's and Celsat's dual CDMA-TDMA systems, we propose to provide for half of these system requirements in CDMA core spectrum (*i.e.*, one 1.25 MHz channel up and down for each of these four systems). Thus, we envision CDMA core spectrum to accommodate no more than ten 1.25 MHz channels for uplinks and ten 1.25 MHz channels for downlinks as a start. We propose CDMA systems' core spectrum band of 12.5 MHz for the uplink and 12.5 MHz for the downlink.

iii. Spectrum Assignments

37. There are three proposed GSO TDMA systems and three proposed NGSO TDMA systems. We propose to designate 5 MHz in each direction to GSO TDMA systems and 5 MHz in each direction to NGSO TDMA systems. Furthermore, in order to ensure adequate access to the expansion spectrum for all qualified applicants and filers, we would designate an equal amount of spectrum for the expansion bands between the TDMA GSO and CDMA core spectrum segments, and the TDMA NGSO and CDMA

⁸² See Iridium 2 GHz MSS Application, Appendix at A-2; Globalstar 2 GHz MSS Application at 6; TMI 2 GHz MSS LOI at Attachment 2, Section 8; CelSat 2 GHz MSS Application, Amendment at 4.

⁸³ See Boeing 2 GHz MSS Application, Attachment 1 at 5.

⁸⁴ See Section III.A.3.a.iii., *supra*.

⁸⁵ See *Big LEO Report & Order*, 9 FCC Rcd at 5955 ¶ 44. To ensure the integrity of TDMA and CDMA transmissions, it may be desirable to separate the transmissions by setting aside a defined amount of spectrum (*i.e.*, guard band).

core spectrum segments. Although the eventual boundaries of the spectrum segments may shift based on applicants' and LOI filers' amendments, we delineate the proposed spectrum assignments, based on our understanding of the applications before us, immediately below:

2 GHz MSS Uplink Spectrum (1990-2025 MHz)

1990.00-1995.00 MHz	TDMA NGSO Core Spectrum
1995.00-2001.25 MHz	Expansion Spectrum for TDMA NGSO and CDMA
2001.25-2013.75 MHz	CDMA Core Spectrum
2013.75-2020.00 MHz	Expansion Spectrum for CDMA and TDMA GSO
2020.00-2025.00 MHz	TDMA GSO Core Spectrum

2 GHz MSS Downlink Spectrum (2165-2200 MHz)

2165.00-2170.00 MHz	TDMA GSO Core Spectrum
2170.00-2176.25 MHz	Expansion Spectrum for TDMA GSO and CDMA
2176.25-2188.75 MHz	CDMA Core Spectrum
2188.75-2195.00 MHz	Expansion Spectrum for CDMA and TDMA NGSO
2195.00-2200.00 MHz	TDMA NGSO Core Spectrum

38. The Flexible Band Arrangement would not provide guard bands to mitigate the effects of interference from systems operating in adjacent bands, particularly between CDMA and TDMA technologies. We seek comment on whether and the extent to which guard bands are necessary with the Flexible Band Arrangement. Should we rely on the system operators to negotiate guard band agreements once the technical parameters of their system proposals are finalized, or should we provide for guard bands as a part of the Flexible Band Arrangement?

39. We expect the 2 GHz MSS operators to have spectrum requirements that will be modest initially, but that will increase following the commencement of operations. We also recognize that further modifications to the 2 GHz MSS band arrangement may be appropriate if one or more operators do not proceed successfully to provide commercially viable service. The Flexible Band Arrangement option is premised on these assumptions. It would provide a flexible structure for system operators to adapt to system growth, while creating sufficient certainty to proceed with system implementation. At the same time, the Flexible Band Arrangement permits a dynamic spectrum assignment commensurate with operators' actual requirements and ability to implement service to meet market demands. On the other hand, the Flexible Band Arrangement may have disadvantages. For example, designating spectrum assignments by technology and modulation schemes, using the current 2 GHz MSS proposals, may limit the ability of system operators to embrace new technologies when implementing their systems. The Flexible Band Arrangement may also limit our ability to consider the possibility of adopting a transitional relocation policy for incumbent licensees in the 2 GHz MSS bands.⁸⁶ We seek comment on all aspects of the Flexible Band Arrangement option.

b. Negotiated Entry Approach

40. Our second proposed band sharing alternative is the Negotiated Entry Approach. In this proposal, we would issue all qualified entities conditional authorizations to provide service anywhere in the 2 GHz MSS band. This authorization would be conditioned on negotiation among the system proponents as to which frequencies each system would utilize ("spectrum location"), and technical coordination among the system proponents as to the operational parameters of each system so as not to

⁸⁶ See, e.g., *2 GHz MSS Relocation Third NPRM*, FCC 98-309, at ¶ 40.

cause harmful interference to any other authorized 2 GHz MSS system. The system proponents could complete negotiation of spectrum location and technical coordination prior to any of them beginning to operate, or the first system to commence service could operate anywhere in the band, subject to negotiation and coordination with later arrivals. Under the latter scenario, the Negotiated Entry Approach would recognize that some of the proposed systems may not succeed for any variety of reasons (e.g., financing, strategic development, cost, market demand, licensing difficulties), and would defer spectrum location and technical coordination issues until the need actually arises, that is, when the next system is ready to launch service. In that regard, we seek comment on whether there should be a threshold requirement that would trigger a system's right to negotiate spectrum location and coordinate technically with operational systems, such as complete construction of the first satellite, or execution of an unconditional launch contract.

41. We seek comment on our Negotiated Entry Approach, and whether relying on good faith negotiation and coordination among the systems is preferable to establishing a structured band sharing arrangement. In particular, we seek comment on whether the Negotiated Entry Approach might give system proponents the flexibility to initiate service to the public based on business needs and market forces, and to implement or update their systems to include new technologies. Commenters should also address whether the Negotiated Entry Approach provides system proponents with appropriate flexibility to abide by the Commission's ultimate rules for relocation of incumbent users of the 2 GHz MSS frequencies.⁸⁷ On the other hand, we are concerned that problems could arise when up to nine separate entities attempt to negotiate and coordinate with each other. For example, the Negotiated Entry Approach might give earlier entrants a strategic advantage in using the spectrum, mitigating their desire to negotiate in good faith with subsequent entrants, and consequently, slowing entry by other system operators.

42. We also seek comment on whether each system should be provided a guaranteed amount of spectrum to which it would be entitled upon commencement of service. If so, we propose that all systems would have priority use of 2.5 MHz of spectrum in both directions, for the reasons discussed in the Flexible Band Arrangement, and that as systems forfeit authorizations through missed milestones, that system's guaranteed spectrum would be available for reauthorization through a second processing round. We also seek comment on whether to divide the band between TDMA/CDMA modulation schemes or GSO/NGSO orbital designs, which may increase the probability of successful long term coordination by reducing the number of system proponents with which operators would have to negotiate.

43. As with the Flexible Band Arrangement, we fully expect that the operators would negotiate spectrum location of the 2 GHz MSS band in good faith, and successfully complete technical coordination.⁸⁸ If good faith negotiations and coordination were unsuccessful, the Commission could be available to facilitate resolution of disputes, and we seek comment on what factors should be considered to resolve coordination disputes between operators. Commenters also should address the effect of the Negotiated Entry Approach on international coordination. Specifically, we seek comment on whether it would be feasible for the United States to coordinate U.S. satellite systems internationally before determining exactly on which frequencies each system will be operating domestically. We further ask commenters to address the financial implications of the Negotiated Entry Approach, *i.e.*, whether such a licensing arrangement provides adequate certainty in the viability of the license to encourage investment, or whether the potential for a protracted coordination process among the licensees might significantly deter investment.

⁸⁷ See *id.* at ¶¶ 30-53; see also Section III.F., *infra.*

⁸⁸ See *supra* footnote 80 and accompanying text.

c. Traditional Band Arrangement

44. The third band sharing proposal is the Traditional Band Arrangement. Under this approach, the Commission would provide a specific spectrum band for each qualified system. We propose that we would provide for each of the nine systems a total of 7.5 MHz: 3.75 MHz for the uplink and 3.75 MHz for the downlink.⁸⁹ Spectrum not assigned to systems would be used to provide 0.625 MHz guard bands between TDMA and CDMA operations to mitigate the potential adjacent band interference between systems with different technological configurations. At this time, due to the ambiguity of some 2 GHz MSS proposals, we are unable to establish the exact CDMA-TDMA boundary locations.⁹⁰ We do, however, propose the following 2 GHz MSS spectrum arrangement, again based on our assumptions regarding placement of system designs as a function of spectrum allocation constraints:

	<u>Uplink</u>	<u>Downlink</u>
System 1(TDMA/NGSO)	1990.000-1993.750	2196.250-2200.000
System 2(TDMA-CDMA/NGSO)	1993.750-1997.500	2192.500-2196.250
System 3(TDMA-CDMA/NGSO)	1997.500-2001.250	2188.750-2192.500
Guardband	2001.250-2001.875	2188.125-2188.750
System 4 (CDMA/NGSO)	2001.875-2005.625	2184.375-2188.125
System 5 (CDMA/NGSO)	2005.625-2009.375	2180.625-2184.375
System 6 (CDMA/NGSO)	2009.375-2013.125	2176.875-2180.625
Guardband	2013.125-2013.750	2176.250-2176.875
System 7 (TDMA-CDMA/GSO)	2013.750-2017.500	2172.500-2176.250
System 8 (TDMA-CDMA/GSO)	2017.500-2021.250	2168.750-2172.500
System 9 (TDMA/GSO)	2021.250-2025.000	2165.000-2168.750

45. We request comment on all aspects of this band sharing proposal. We are especially concerned that a rigidly structured approach such as this one might fail to optimize spectrum use and might not adequately accommodate the anticipated, long-term requirements of all the system operators. For example, some 2 GHz MSS operators, CDMA or TDMA, may find it desirable to adjust their spectrum use by agreement. Should we allow such adjustments, subject to coordination with all other affected parties, to mitigate the rigidity of the Traditional Band Arrangement?

d. Competitive Bidding

46. In the event that, based on the record, we determine it is in the public interest to assign the 2 GHz MSS spectrum at issue here by competitive bidding rather than any of the other approaches described in the *Notice*, we seek comment on a general auction design to be used. First, we propose to provide assignments in paired units of 1.25 MHz, with uplinks paired in ascending order beginning at 1990 MHz with downlinks in descending order beginning at 2200 MHz. We propose 1.25 MHz units because this design appears to be most consistent with current proposals.⁹¹ In addition, this pairing would ensure that MSS spectrum allocated only in Region 2 is paired with like spectrum to the greatest extent

⁸⁹ Thus, assuming channel bandwidth of 1.25 MHz, each system would be able to implement three uplink and three downlink channels.

⁹⁰ As mentioned in the Flexible Band Arrangement discussion, Iridium, Globalstar, TMI and Celsat propose to use both TDMA and CDMA technologies in this proceeding.

⁹¹ This proposal is similar to our proposal in the *Big LEO Report & Order*, 9 FCC Rcd at 5972 ¶¶ 88-89.

possible. We solicit comment on this proposal, as well as any alternatives. For any alternative recommended, commenters should also provide the basis for that recommendation.

47. Second, we seek comment on whether we should impose a limit on the number of licenses awarded to a single entity. One reason for such a limit is that an entity might acquire so much of the "capacity" or spectrum available to provide a service that it may reduce competition or deter entry by other suppliers. We seek comment on the applicability of this rationale to the MSS proposed by system proponents in this proceeding, and the extent to which such services already face competition from services operating in other frequency bands. Another rationale for imposing limits on the amount of 2 GHz MSS spectrum assigned to a single entity is that some of the system proponents in this proceeding may have an advantage in bidding on new licenses because of their better access to capital.⁹² On the other hand, if a single entity is willing to bid more because that entity can use the frequencies in question for higher valued uses, then it may be inefficient to prevent it from acquiring all frequencies up for auction. Consequently, we seek comment on whether or not we should impose a limit on the amount of spectrum acquired by a single entity for the above licensees. Further, if a limit is recommended, we seek comment on what limit is deemed appropriate and why.

48. Finally we propose that, should we decide to adopt a competitive bidding licensing approach, the auction would be conducted in conformity with the general competitive bidding rules in Part 1, Subpart Q of the Commission's rules, as revised.⁹³ We also propose that Commission staff, acting on delegated authority, would address specific auction procedures not established by Commission rules pursuant to public notice and comment in advance of the auction.⁹⁴ Nevertheless, we want to solicit comment on one issue that may impact the auction design should it be necessary. There may be a value, separate from the value of individual licenses, to being licensed for contiguous frequencies because of the possibility for spectrum aggregation and co-frequency sharing allowed by technologies such as CDMA. Allowing separate licensees of individual spectrum blocks to aggregate their licenses into a larger block would facilitate co-frequency sharing. Should we recognize this possibility by allowing such licensees, as a group, to bid on combinations of licenses?⁹⁵

⁹² There are several reasons why some applicants in this proceeding may have better access to capital than others. See Charles Zheng, *High Bids and Broke Winners* (University of Minnesota Working Paper, December 28, 1998). The implications of financial constraints in auctions are discussed in a number of papers. See, e.g., Yeon-Koo Che & Ian Gale, *Standard auctions with financially constrained bidders*, 65 Rev. Econ. Stud. 1, 1-21 (1998).

⁹³ See 47 C.F.R. §§ 1.2101 *et seq.*

⁹⁴ See *Amendment of Part 1 of the Commission's Rules — Competitive Bidding Procedures*, WT Docket No. 97-82, Third Report and Order and Second Further Notice of Proposed Rule Making, 13 FCC Rcd 374, 447-49 ¶¶ 123-125 (1997) (delegating such authority consistent with BBA of 1997, § 3002(a)(1)(B)(iv), 111 Stat. at 259 (codified as 47 U.S.C. § 309(j)(3)(E)).

⁹⁵ See BBA of 1997, § 3002(a)(1)(B)(i), 111 Stat. at 259 (amending 47 U.S.C. § 309(j)(3)) (requirement to test combinatorial bidding approaches to auction design).

B. Non-Service Link Issues

49. In addition to service links, the parties to the 2 GHz MSS proceeding seek feeder links in a variety of bands, inter-satellite service frequencies, and in one case, radionavigation frequencies.⁹⁶ Even if 2 GHz MSS service link issues are resolved, important authorization issues remain concerning many of these other frequency bands. Resolution of these issues may affect implementation of some of the proposed systems. We seek comment on the approach we should follow concerning such contingencies. For example, there are some contingencies that may be so significant and insurmountable that they might effectively preclude implementation of a system or delay compliance with implementation milestones. We seek 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. In the following sections, we discuss the various non-service link requests, associated issues, and specific proposals.

1. Feeder Links

50. The following table outlines our understanding of the feeder link frequency bands requested by 2 GHz MSS participants:

System Proponent	Feeder Uplink Spectrum Request	Feeder Downlink Spectrum Request
Boeing	109 MHz in 14.391-14.5 GHz (Ku band)	109 MHz in 11.591-11.7 GHz (Ku band)
Celsat	850 MHz in 27.5-28.35 GHz (Ka band)	850 MHz in 17.7-18.35 GHz (Ka band)
Constellation II	159 MHz in 5091-5250 MHz & 200 MHz in 15.45-15.65 GHz (5 and 15 GHz bands)	375 MHz in 6700-7075 MHz (7 GHz band)
Globalstar	GSO: 250 MHz in 14.0-14.4 GHz (Ku band) NGSO: 200 MHz in 15.45-15.64 GHz or 19.3-19.6 GHz (15 GHz band or Ka band)	GSO: 250 MHz in 11.7-12.2 GHz (Ku band) NGSO: 100 MHz in 6700-6875 MHz (7 GHz band)
ICO	100 MHz in 5150-5250 MHz (5 GHz band)	100 MHz in 6975-7075 MHz (7 GHz band)
Iridium Macrocell	400 MHz in 29.1-29.5 GHz (Ka band)	400 MHz in 19.3-19.7 GHz (Ka band)
Inmarsat Horizons	75 MHz in 6425-6575 MHz (Extended C band)	75 MHz in 3550-3700 MHz (Extended C band)

⁹⁶ Each system requires feeder link frequencies separate from the service link frequencies in order to operate. Feeder links are the connections between central earth stations at which the system typically interconnects with the public switched network, and the satellites used for mobile satellite services. In addition, some system designs also use inter-satellite links to provide communication between the various satellites in a MSS system without connecting through an earth station.

MCHI Ellipso 2G	300 MHz in 15.4-15.7 GHz (15 GHz band)	300 MHz in 6775-7075 MHz (7 GHz band)
TMI Cansat-M3	500 MHz in 12.75-13.25 GHz (Ku band)	500 MHz in 10.7-10.95 GHz and 11.2-11.45 GHz (Ku band)

51. With respect to feeder links for NGSO systems, the United States already has undertaken substantial work to obtain adequate spectrum at WRC-95 for NGSO MSS feeder links in the C-, Ku- and Ka-bands.⁹⁷ We sought this spectrum in order to accommodate feeder links for Big LEO systems, as well as for future 2 GHz MSS systems. These international allocations are currently, or are proposed to be, allocated domestically.⁹⁸ We tentatively conclude that this spectrum should be sufficient to accommodate virtually all of the NGSO MSS feeder link spectrum needs of 2 GHz MSS applicants. We seek comment on this tentative conclusion.

52. Regarding GSO MSS feeder links, the Commission has in the past precluded use of the conventional FSS C- and Ku-bands for MSS feeder links.⁹⁹ As the Commission has indicated, feeder links operating on frequencies and at orbital locations that are intensively used would not be an efficient use of the geostationary satellite orbit and FSS spectrum.¹⁰⁰ Use of these frequency bands for MSS feeder links would preclude conventional FSS services and inhibit the fungibility of these orbit locations for future FSS assignments. We seek comment on application of this policy to 2 GHz MSS systems. The Commission's previous policies have been formed based on the intensively-used domestic arc. We seek comment on whether this policy of precluding use of conventional C- and Ku-bands for MSS feeder links deserves wider applicability. Alternatively, we seek comment on whether we should entertain exceptions to this policy if a 2 GHz MSS applicant reaches an agreement with an existing FSS licensee to use its licensed spectrum, or if the requested location is in an uncongested portion of the arc.

⁹⁷ Specifically, WRC-95 allocated the 5091-5250 MHz, 6700-7075 MHz, 15.4-15.7 GHz, 19.3-19.6 GHz and 29.1-29.4 GHz bands to FSS limited to NGSO MSS feeder links. See Final Acts of the 1995 World Radiocommunication Conference, Geneva (1995). The 1997 World Radiocommunication Conference (WRC-97) further refined several of the allocations by reducing 15.4-15.7 GHz to 15.43-15.63 GHz, and expanding the Ka-band allocations to 19.3-19.7 GHz and 29.1-29.5 GHz. See Final Acts of the 1997 World Radiocommunication Conference, Geneva (1997).

⁹⁸ 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).

⁹⁹ See *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 (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). The FSS frequency bands of 3700-4200 MHz/5925-6425 MHz (C-band) and 11.7-12.2 GHz/14.0-14.5 GHz (Ku-band) are heavily used for domestic and international FSS operations. Consequently, the Commission determined that MSS feeder links should operate at frequency bands other than those already used by fixed satellites to provide domestic service from the U.S. domestic arc.

¹⁰⁰ *DARS NPRM*, 11 FCC Rcd at 7 ¶ 21.

53. We have identified the following alternative spectrum outside of the conventional C- and Ku-bands for possible use by GSO MSS feeder uplinks: 5850-5925 MHz,¹⁰¹ 6425-6725 MHz, 12.75-13.25 GHz and 13.75-14.0 GHz; and the following for GSO feeder downlinks: 3600-3650 MHz and 10.7-11.7 GHz bands. Many of these bands are shared with terrestrial services.¹⁰² In bands shared with terrestrial services, we would require coordination under Part 25 of our rules. In the 3600-3650 MHz and 5850-5925 MHz bands, footnote US245 restricts FSS use to international, inter-continental systems.¹⁰³ Similarly, in the 10.7-11.7 GHz and 12.75-13.25 GHz bands, footnote NG104 restricts use to systems other than domestic systems.¹⁰⁴ One purpose of these footnotes is to avoid ubiquitous deployment of FSS earth stations in these bands. We have authorized feeder links in some of these bands previously,¹⁰⁵ and in the recent *SkyBridge NPRM*, we sought comment on whether to modify NG104 to allow an increase in the number of earth stations operating with FSS systems in these bands, subject to certain conditions, including exclusion zones for a limited number of years, surrounding the top 50 populated U.S. cities.¹⁰⁶ However, the *SkyBridge NPRM* did not specifically address feeder links for GSO MSS systems. Typically, the number of GSO MSS feeder link earth stations is small, and may present fewer constraints for terrestrial systems than NGSO FSS systems, or systems proposing a large number of gateways, such as the *SkyBridge* proposal.¹⁰⁷ For these reasons, we seek comment on whether we should continue our current case-by-case approach with respect to MSS feeder links in the 3600-3650 MHz, 5850-5925 MHz, and 10.7-11.7 GHz bands. In addition, portions of these bands are subject to Appendix 30B of the ITU Radio Regulations.¹⁰⁸ The Appendix 30B FSS Plan allots these bands at 101° W.L. to the United States.¹⁰⁹

¹⁰¹ Future use of the 5850-5925 MHz band for Intelligent Transportation Systems is under consideration in a separate proceeding. See *Amendment of Parts 2 and 90 of the Commission's Rules to Allocate the 5.850-5.925 GHz Band to the Mobile Service for Dedicated Short Range Communications of Intelligent Transportation Services*, ET Docket No. 98-95, Notice of Proposed Rule Making, 13 FCC Rcd 14321 (1998). Use of this band for MSS feeder links may be affected by the outcome of that proceeding.

¹⁰² Specifically, the 6425-6725 MHz, 12.75-13.25 GHz and 10.7-11.7 GHz bands.

¹⁰³ 47 C.F.R. § 2.106 n.US245.

¹⁰⁴ 47 C.F.R. § 2.106 n.NG104.

¹⁰⁵ For instance, we waived NG104 for feeder links for AMSC in the 10.7-10.95 GHz and 13.0-13.15/13.2-13.25 GHz frequency bands. See *AMSC Order*, 4 FCC Rcd at 6051 ¶ 68.

¹⁰⁶ See *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 Rulemaking, FCC 98-310 (rel. November 24, 1998) (*SkyBridge NPRM*). See also Optel Petition for Rulemaking, RM-9257, filed April 1, 1998. On April 16, 1998, the Commission issued a Public Notice inviting comment on the Optel petition and is currently reviewing the comments filed in response to the Public Notice. Public Notice, Report No. 2267 (rel. April 16, 1998).

¹⁰⁷ See *SkyBridge Application*, File No. 48-SAT-P/LA-97, February 28, 1997; Amendment, File No. 89-SAT-AMEND-97, July 2, 1997. *SkyBridge* anticipates operating between 30 and 40 earth stations in the United States in these frequency bands. In contrast, a GSO MSS system would likely require between one and six earth stations based on applications filed with the Commission.

¹⁰⁸ Specifically, the 10.7-10.95 GHz, 11.2-11.45 GHz and 12.75-13.25 GHz bands. See Appendix 30B to the ITU Radio Regulations. Appendix 30B contains a GSO FSS allotment plan, which allots the given frequency bands to each Administration at specific orbital locations.

To the extent we will need to use these Appendix 30B frequency bands, we will need to use the current U.S. allotments or seek additional assignments in accordance with the ITU Appendix 30B Plan procedure. We seek comment on this proposal and what actions we should take, if any, to obtain additional feeder link spectrum in these bands.

54. We also request comment on the feasibility of using each of the alternative frequency bands identified in the previous paragraph for GSO MSS feeder links, particularly in light of constraints imposed on their use by government operations.¹¹⁰ We tentatively conclude that, considering the alternative bands we have identified, there is a sufficient amount of GSO MSS feeder link spectrum to accommodate all proposed 2 GHz GSO MSS systems. We seek comment on this conclusion.

55. Given the relatively small number of earth stations typically involved for MSS system feeder links, we have in the past relied on coordination among satellite operators to resolve potentially conflicting frequency uses in feeder link bands. For Big LEO systems this requirement to coordinate is codified in Section 25.203(k) of the Commission's rules.¹¹¹ We seek comment on whether Section 25.203(k) continues to be sufficient with the anticipated entry by 2 GHz MSS systems. We also seek comment on the relationship between current requests for feeder link spectrum and requests for service link spectrum. Assuming that authorizations are granted for less service link spectrum than requested, what effect will there be on requirements for feeder link spectrum? We seek comment on a formula or algorithm we could use, if necessary to resolve conflicting spectrum requirements, to convert from the assigned service link spectrum to the required amount of feeder link spectrum, taking into account frequency re-use.

56. We seek comment on the procedures for treatment of feeder link requests. Under what circumstances should system proponents be allowed to amend their feeder link requests if it were not possible for the Commission to grant the current requests because of a lack of spectrum? In addition, to what extent should system proponents be permitted to amend their feeder link requests if other issues, for example, inter-satellite links, need to be resolved in other proceedings? At what point, if any, should applicants lose the opportunity for amendments?

57. In the following paragraphs, we address other feeder link issues specific to the frequency bands requested by MSS system proponents.

¹⁰⁹ In regard to TMI's feeder link request, 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. However, if TMI intends to locate feeder link earth stations in the United States, it may have to further modify its Appendix 30B allotment at 106.5° W.L. See Appendix 30B to the ITU Radio Regulations.

¹¹⁰ See, e.g., 47 C.F.R. § 2.106 n.US245 (3600-3650 and 5850-5925 MHz bands), n.S5.444A (5091-5150 MHz), nn.S.5.502, S5.503 (13.75-14.0 MHz). There may also be electromagnetic compatibility issues between MSS feeder link operations in these bands and government operations in these and adjacent bands. Potentially affected government operations include radiolocation and radionavigation services, some involving multi-function high power radars for land based search, shipborne air traffic control, airborne air and surface surveillance, air interception, target tracking, ground mapping, target illumination, intelligence gathering and ship self defense.

¹¹¹ 47 C.F.R. § 25.203(k).

a. Extended C-band

58. Inmarsat has applied to operate GSO MSS feeder links in the extended C-band frequencies.¹¹² Portions of Inmarsat's request are subject to an on-going rulemaking in the 3650-3700 MHz band.¹¹³ In that proceeding, the Commission proposes to add a fixed service allocation to the 3650-3700 MHz band, and no longer to accept applications for new FSS earth stations or major modifications to existing FSS earth stations.¹¹⁴ In addition, frequencies from 3550-3600 MHz are not allocated in the United States for FSS. Accordingly, feeder link earth stations located in the United States would be limited to 50 MHz of potentially available spectrum from 3600 to 3650 MHz.¹¹⁵ We seek comment on how we should take this proposal for a reduced amount of available FSS spectrum into account in this rulemaking.

b. 5, 7 and 15 GHz bands

59. Constellation, Globalstar, ICO, and MCHI have applied to operate NGSO MSS feeder links within the 5091-5250 MHz ("5 GHz"), 6700-7075 MHz ("7 GHz") and 15.4-15.65 GHz ("15 GHz") frequency bands.¹¹⁶ There is an ongoing proceeding to address allocation of the 5, 7 and 15 GHz frequency bands to NGSO MSS feeder links.¹¹⁷ The Commission authorized Globalstar's Big LEO system to operate both space and earth stations in the 5 and 7 GHz bands,¹¹⁸ and Constellation's and MCHI's Big LEO systems to operate space and earth stations in the 5 and 7 GHz bands, and 7 and 15 GHz bands, respectively.¹¹⁹ As we indicate in the *5, 7, 15 GHz Allocation NPRM* addressing the allocation of these bands to MSS feeder links, computer simulation studies conducted prior to WRC-95 indicate that at least two NGSO MSS systems could feasibly share spectrum for co-directional feeder link transmissions, but

¹¹² See feeder link table Section III.B.1., *supra*.

¹¹³ See *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, FCC 98-337 (rel. December 18, 1998).

¹¹⁴ *Id.* at ¶¶ 1-2.

¹¹⁵ The FSS allocation in this band is shared on a co-primary basis with the Government Radiolocation and Aeronautical Radionavigation Services. The FSS allocation is restricted to international intercontinental systems and subject to a case-by-case electromagnetic compatibility analysis. See 47 C.F.R. § 2.106 n.US245.

¹¹⁶ See feeder link table Section III.B.1., *supra*.

¹¹⁷ *5, 7, 15 GHz Allocation NPRM*, 13 FCC Rcd 17107. The pleading cycle has closed for this proceeding. Use of these bands will be subject to limitations designed to protect existing and potential future government operations. See, e.g., ITU Radio Regulations S5.444A (FSS secondary in the 5091-5150 MHz band after 2010), S5.511A.

¹¹⁸ *L/Q Licensee, Inc.*, Order and Authorization, 11 FCC Rcd 16410 (Int'l Bur./OET 1996).

¹¹⁹ *Constellation Communications, Inc.*, Order and Authorization, 12 FCC Rcd 9651 (Int'l Bur./OET 1997) (*Constellation Big LEO Order*); *Mobile Communications Holdings, Inc.*, Order and Authorization, 12 FCC Rcd 9663 (Int'l Bur./OET 1997) (*MCHI Big LEO Order*).

insufficient data are available to support sharing among three or more systems.¹²⁰ Sharing among NGSO systems is also being addressed in the *SkyBridge NPRM*, where we have requested information on how many NGSO FSS systems can share co-frequency.¹²¹ We note, however, that there are differences between feeder links used in NGSO FSS systems and NGSO MSS systems. We expect that there will be a limited number of NGSO MSS feeder link earth stations with large earth station antennas, thus facilitating accommodation of multiple systems. As the number of earth stations is limited, earth station geographic diversity could also be employed to further facilitate sharing. Based on known technology, it appears that a minimum of two, and possibly three or more, NGSO MSS systems could use the same frequencies for co-directional feeder link transmissions without causing mutual interference. We ask for additional comment on the ability of more than two NGSO MSS systems to share the same frequencies for co-directional feeder link transmissions.

60. In the 7 GHz band, the Commission already has licensed three NGSO MSS systems in the upper portion of the band,¹²² and has received four more applications.¹²³ In their comments on the *5, 7, 15 GHz Allocation NPRM*, Globalstar and ICO state that the Commission should facilitate the flexible application of coordination procedures to accommodate multiple NGSO MSS systems in the 5/7 GHz bands.¹²⁴ We agree that it is best, in general, to permit maximum flexibility during inter-system coordination. We seek comment on the adequacy of our current approach of conditioning feeder link licenses on the requirement that licensees coordinate with other licensees in the same bands prior to commencing operations.¹²⁵ Several applicants request the same feeder link spectrum for their proposed 2 GHz MSS systems in which they already hold a license for feeder links for their Big LEO systems. In these cases, are there self-coordination methods (e.g., within one licensee's system(s)) that may allow us to accommodate more systems in the same spectrum? If so, how should we take these factors into account? We seek comment and specific recommendations from commenters on these issues.

¹²⁰ *5, 7, 15 GHz Allocation NPRM*, 13 FCC Rcd at 17114 ¶ 12. We also indicated that the 7 GHz band likely could be used by up to four NGSO MSS systems, with two of the systems cross-polarized from the other two.

¹²¹ See *SkyBridge NPRM*, FCC 98-310, at ¶¶ 67-74.

¹²² Constellation (6875-7025 MHz), Globalstar (6875-7075 MHz), and MCHI (6875-7075 MHz) currently are all licensed in the upper portion of the 7 GHz band. *5, 7, 15 GHz Allocation NPRM*, 13 FCC Rcd at 17118 n.53. The Commission has also licensed two DARS systems in the upper portion of the 7 GHz band (7025-7075 MHz). See *Satellite CD Radio, Inc.*, Order and Authorization, 13 FCC Rcd 7971 (Int'l Bur. 1997); *American Mobile Radio Corporation*, Order and Authorization, 13 FCC Rcd 8829 (Int'l Bur. 1997).

¹²³ Applications have been received from ICO, Globalstar, MCHI and Constellation. An application has also been received from WCS Radio, Inc. for a DARS license to use these bands. Application of WCS Radio, Inc., File Nos. SAT-LOA-19981113-00085, -86 (filed November 13, 1998).

¹²⁴ Comments of Globalstar at 3-4 (filed September 21, 1998); Reply of ICO at 11 (filed October 13, 1998).

¹²⁵ Specifically, we conditioned Constellation's and MCHI's feeder link licenses as follows: "before commencing operation[, licensee] must demonstrate that it can feasibly share that spectrum with all other persons or organizations with full or conditional authority to use any part of it for feeder-link transmission to gateway stations in the United States." *Constellation Big LEO Order*, 12 FCC Rcd at 9658 ¶ 20; *MCHI Big LEO Order*, 12 FCC Rcd at 9678 ¶ 33.

c. Ku-band

61. In their system proposals, Boeing seeks to operate NGSO MSS feeder links using the Ku-band frequencies, while Globalstar and TMI request GSO MSS feeder links on the Ku-band frequencies.¹²⁶ On the issue of feeder links for NGSO systems, in November 1998 the Commission issued the *SkyBridge NPRM* proposing use of Ku-band frequencies by NGSO FSS systems.¹²⁷ In addition, the Commission released a Public Notice establishing January 8, 1999 as the cut-off date for additional applications for NGSO FSS systems in the Ku-band.¹²⁸ We propose to address Boeing's feeder link request for NGSO MSS operations in the *SkyBridge NPRM* and NGSO FSS application proceedings. We note, however, that there are various bands designated specifically for NGSO MSS feeder links. We seek comment as to whether NGSO MSS feeder links would be an efficient use of Ku-band NGSO FSS spectrum and, if not, what, if any, frequency bands should be made available for the Boeing system's feeder links. With respect to GSO systems, our current policy prohibits feeder link use of conventional C- and Ku-band GSO FSS allocations.¹²⁹ Globalstar's request appears to be inconsistent with this policy. TMI's proposal appears consistent with existing Commission policy. We seek comment on these issues.

d. Ka-band

62. In their 2 GHz MSS applications, Globalstar and Iridium seek to operate NGSO MSS feeder links using Ka-band frequencies, and Celsat requests to operate GSO MSS feeder links on Ka-band frequencies.¹³⁰ In 1996, the Commission adopted service rules for use of Ka-band frequencies.¹³¹ In particular, the Commission adopted a band sharing arrangement that designates specific spectrum for feeder links for NGSO MSS systems.¹³² It also adopted rules for sharing between NGSO MSS feeder links and other co-primary services, and rules for sharing between NGSO MSS feeder links.¹³³ The Commission licensed Iridium to operate feeder links for its Big LEO system in a portion of the designated

¹²⁶ See feeder link table Section III.B.1., *supra*.

¹²⁷ *SkyBridge NPRM*, FCC 98-310.

¹²⁸ Public Notice, Report. No. SPB-141 (rel. November 2, 1998) (cut-off established for additional applications and letters of intent in the 12.75-13.25 GHz, 13.75-14.4 GHz, 17.3-17.8 GHz and 10.7-12.7 GHz frequency bands).

¹²⁹ See paragraph 52, *supra*.

¹³⁰ See feeder link table Section III.B.1., *supra*.

¹³¹ *Ka-band First Report & Order*, 11 FCC Rcd 19005.

¹³² The 29.1-29.25 GHz and 29.25-29.5 GHz bands are designated for NGSO MSS feeder uplinks on a co-primary basis with the Local Multipoint Distribution Service ("LMDS") and GSO FSS, respectively. In addition, the 19.3-19.7 GHz band is designated for NGSO MSS feeder downlinks on a co-primary basis with the fixed service. *Id.* at ¶ 77.

¹³³ See, e.g., 47 C.F.R. §§ 25.257, 25.258.

feeder link spectrum as part of the first Ka-band processing group.¹³⁴ In addition, the Commission recently released a Notice of Proposed Rulemaking regarding further refinement of the downlink band sharing arrangement.¹³⁵

63. In 1997, the Commission established cut-off dates for comments or petitions to deny and additional applications for use of the Ka-band, and thereafter received fifteen further applications.¹³⁶ We propose to consider these applications, including the current requests of Iridium and Globalstar for NGSO feeder links for their proposed 2 GHz MSS systems, in a second Ka-band processing round, and we seek comment on this proposal.

64. In regard to Celsat's GSO feeder link request, some commenters assert that the 28 GHz band sharing arrangement does not provide for GSO MSS feeder link spectrum. However, we tentatively conclude that the GSO FSS designations are appropriate bands to accommodate Celsat's request. We ask if our policy prohibiting feeder link use of the conventional C- and Ku-band FSS allocations within the domestic arc should also apply to Ka-band GSO feeder link requests. We note that much of Celsat's requested spectrum falls within secondary GSO FSS designations, and that unlike the C- and Ku-band FSS allocations, the Ka-band is currently not heavily used by domestic fixed satellites. We propose to allow Celsat to pursue its Ka-band feeder link request. However, we highlight that Ka-band GSO FSS frequencies at many orbital locations in the domestic arc already are assigned and it may be very difficult for Celsat to obtain its requested 850 MHz of spectrum. There also may be extensive international coordination requirements for any new Ka-band orbital location.

65. Globalstar proposes to operate NGSO feeder uplinks in the 19.3-19.6 GHz band. Currently, the 19.3-19.6 GHz band is not allocated domestically for FSS in the Earth-to-space direction. Globalstar's proposal is referred to as "reverse-band working" ("RBW"). We indicated in the *Ka-band First Report & Order* that we would consider requests for RBW on a case-by-case basis.¹³⁷

66. Iridium requests a waiver of Section 25.258(c) of the Commission's rules,¹³⁸ the section which requires that NGSO MSS feeder link systems in the 29.25-29.5 GHz band maintain constant, successive ground tracks in order to facilitate sharing with GSO FSS. Motorola has filed a Petition for Partial

¹³⁴ *Motorola Satellite Communications, Inc.*, Order and Authorization, 11 FCC Rcd 13952 (Int'l Bur. 1996) (licensing Iridium's Big LEO system to use the 19.4-19.6 GHz band for feeder downlinks, and the 29.1-29.3 GHz band for feeder uplinks).

¹³⁵ *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, Notice of Proposed Rulemaking, 13 FCC Rcd 19923 (1998) (proposing to designate the 17.7-18.3 GHz band, requested by Celsat, as primary exclusively for the fixed service).

¹³⁶ Public Notice, Report No. SPB-106 (rel. October 15, 1997).

¹³⁷ *Ka-band First Report & Order*, 11 FCC Rcd at 19031-32 ¶ 63.

¹³⁸ 47 C.F.R. § 25.258(c).

Reconsideration of this provision,¹³⁹ and we will address this waiver request and Petition for Partial Reconsideration in a separate proceeding.

2. Tracking, Telemetry, and Command

67. In general, applicants request tracking, telemetry, and command (TT&C) frequencies within their requested feeder link bands. TMI, however, requests 1 MHz for uplinks at the upper or lower edge of the 14 GHz FSS allocation (either within the 14.0-14.05 or 14.45-14.5 GHz band) and 300 kHz of downlink spectrum in the upper or lower edge of the 12 GHz FSS allocation (either within the 11.7-11.75 GHz or 12.15-12.2 GHz band) instead of within its requested feeder link bands. In accordance with our rules,¹⁴⁰ we propose to require that 2 GHz MSS operators perform TT&C operations within their assigned feeder link frequencies, or within bands allocated to space operations. Performing TT&C operations within the band in which service is provided prevents other heavily-used frequency bands from becoming encumbered with auxiliary operations not associated with the services that are actually provided within those bands. We seek comment on this proposal.

3. Radionavigation Frequencies

68. Boeing proposes to operate its planned Navigation Augmentation Service payload in the 1565.42-1585.42 MHz GPS L1 band.¹⁴¹ This band is allocated for the Radionavigation Satellite Service in which Government satellites operate (*i.e.*, the GPS system uses this allocation). The National Telecommunications and Information Administration (NTIA) has primary jurisdiction over U.S. Government use of spectrum in this band. Thus, authorizing additional use of this band will require resolution of various technical and national policy issues. We seek comment on Boeing's proposed use of this band.

4. Inter-satellite Links

69. Globalstar applied for 100 MHz of inter-satellite service (ISS) link spectrum in the 59-64 GHz bands to interconnect satellites within its constellation. There appear to be significant interference situations associated with potential GSO and NGSO operations and Government operations at 59-64 GHz.¹⁴² These bands, therefore, will not be available for non-Government ISS use.¹⁴³ Due to the limited inter-satellite link spectrum available to meet the non-Government requirements in the 59-64 GHz range, the United States made proposals at WRC-97 to, among other things, allocate the band 64-71 GHz to the ISS. WRC-97 modified the International Table of Frequency Allocations in the

¹³⁹ Motorola Petition for Partial Reconsideration (filed September 27, 1996) of the *Ka-band First Report & Order*, 11 FCC Rcd 19005.

¹⁴⁰ 47 C.F.R. § 25.208(g).

¹⁴¹ The GPS L1 band is 1565.42-1585.42 MHz.

¹⁴² See Letter from Richard Parlow, Associate Administrator, NTIA to Richard Smith, Chief, Office of Engineering and Technology, FCC (May 4, 1995).

¹⁴³ NTIA has requested that the FCC delete the non-Government ISS allocation in the 59-64 GHz bands from the National Table of Frequency Allocation. See Letter from William T. Hatch, Acting Associate Administrator, NTIA to Richard Smith, Chief, Office of Engineering and Technology, FCC (May 18, 1998).

frequency range 50.2-71 GHz consistent with the U.S. proposals. The Commission intends to commence a rulemaking to modify the National Table of Frequency Assignments to reflect these changes. Among other things, the Commission will propose to adopt a non-Government ISS allocation at 65-71 GHz. This allocation can be used to meet ISS requirements for 2 GHz MSS systems and systems in other services.

70. We propose that Section 25.279 of the Commission's rules also apply to 2 GHz MSS system proponents.¹⁴⁴ This rule requires that system proponents coordinate with existing permittees and licensees whose facilities could be affected by a new proposal in terms of frequency interference or restrictions on system capacity. In accordance with the terms of Section 25.279, and our application of the rule in other bands, we propose to require 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. In addition, in bands shared on a co-equal basis with Government operations, we propose that any 2 GHz MSS system authorized to operate inter-satellite service links in these bands would be required to coordinate with Government systems and non-Government operators.¹⁴⁵ We seek comment on these proposals.

C. Service Rules

71. We next propose service rules for the use of the 2 GHz MSS frequency bands. We propose to use the Big LEO service rules as the starting point. Because, however, several of the 2 GHz MSS system proponents are proposing geostationary systems, or GSO components, we also propose applying our GSO policies and service rules where applicable. This section of the *Notice* proposes rules for classifying the services that will be provided by 2 GHz MSS operators for regulatory purposes. The section also proposes licensing rules, implementation milestones, annual reporting requirements and distress and safety rules. We also seek comment on policies we could implement to promote service to unserved areas and practices operators could incorporate into their system designs to reduce orbital debris. The section also proposes extending the Big LEO rule to prevent trafficking of licenses in certain situations and extension of our policy designed to open markets by discouraging exclusionary market arrangements.

72. The 2 GHz MSS is the first processing round in which we have received letters of intent to serve the U.S. market with non-U.S.-licensed MSS systems. We adopted the "letter of intent" process in our *DISCO II Order*, to implement the U.S. commitments in the World Trade Organization (WTO) Agreement on Basic Telecommunications (WTO Basic Telecom Agreement).¹⁴⁶ In the *DISCO II Order*, we established a public interest analysis and access procedure for non-U.S.-licensed satellite systems seeking access to the United States, including inter-governmental organizations and their affiliates. Under the *DISCO II Order*, non-U.S.-licensed satellite systems seeking future access to U.S. spectrum may request, through a letter of intent, that the Commission "reserve" spectrum for the system when adopting

¹⁴⁴ 47 C.F.R. § 25.279.

¹⁴⁵ *Id.* § 25.279(b).

¹⁴⁶ *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 (1997) (*DISCO II Order*). ABC, Inc., GE American Communications, PanAmSat Corporation, ICO Global Communications, and IDB Mobile Communications, Inc., filed Petitions for Reconsideration on January 5, 1998. Comsat Corporation filed a Petition for Review in the United States Court of Appeals for the District of Columbia Circuit on January 12, 1998 (Case No. 98-1011).