

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

In the Matter of Application of)	
)	
Constellation Communications Holdings, Inc.)	File No. 181-SAT-P/LA-97(46)
)	
Concerning Use of the 1990-2025/2165-2200 MHz)	IBFS Nos. SAT-LOA-19970926-00148
and Associated Frequency Bands for a Mobile-)	SAT-AMD-19991230-00134
Satellite System)	SAT-AMD-20001103-00152

ORDER AND AUTHORIZATION

Adopted: July 17, 2001

Released: July 17, 2001

By the Chief, International Bureau and the Acting Chief, Office of Engineering and Technology:

I. INTRODUCTION

1. By this *Order*, we grant the request of Constellation Communications Holdings, Inc. (Constellation) for the use of spectrum in the 2 GHz band for provision of Mobile-Satellite Service (MSS).¹ This action is a significant step in assigning this spectrum for use by MSS providers, and facilitates implementation of Constellation's proposed system's technology and service offerings in the marketplace.

II. BACKGROUND

2. Constellation proposes to construct and launch a mobile-satellite system comprised of 46 operational satellites in non-geostationary satellite orbit (NGSO), using service links² in the 2 GHz MSS band and feeder links³ in the 5, 7, and 15 GHz bands.⁴ Constellation is designing its system to serve the

¹ The term "2 GHz MSS Band" is used in this *Order* to refer to the 1990-2025 MHz (uplink) and 2165-2200 MHz (downlink) frequencies. These frequencies are allocated to the Mobile-Satellite Service (MSS) in the United States. 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), *aff'd on recon.*, Memorandum Opinion and Order and Third Notice of Proposed Rule Making and Order, 13 FCC Rcd 23949 (1998), *further proceedings*, Second Report And Order and Second Memorandum Opinion and Order, 15 FCC Rcd 12315 (2000) (*2 GHz Allocation & Relocation Proceeding*).

² "Service links" are the radio links that transmit a user's messages in both directions between a user's earth terminal and the system's satellite(s).

³ "Feeder links" are the radio links that transmit a user's messages in both directions between the system's satellite(s) and its gateway earth station(s), connecting the MSS network with the public switched telephone network.

United States from the 1990-2025 MHz and 2165-2200 MHz bands, as well as being able to utilize the worldwide MSS allocation at 1980-1990 MHz outside the United States.⁵ Constellation's 2 GHz MSS system will operate in eight circular orbital planes.⁶

3. Constellation's predecessor-in-interest, Constellation Communications, Inc. (CCI) submitted a 2 GHz MSS application on September 26, 1997.⁷ On March 19, 1998, we sought comment on CCI's application, along with other 2 GHz MSS applications.⁸ On September 14, 1999, the Bureau authorized the *pro forma* assignment of a license to launch and operate a satellite system in the 1.6/2.4 GHz bands,⁹ from CCI to CCI International N.V. (CCINV), a corporation organized under the laws of the Netherlands Antilles.¹⁰ On December 22, 1999, the Bureau authorized the *pro forma* assignment of the same license from CCINV to Constellation, a wholly-owned subsidiary of CCINV.¹¹ On December 30, 1999, Constellation amended its 2 GHz MSS application to report these *pro forma* changes to the applicant's ownership.¹² The Commission subsequently adopted service rules for 2 GHz MSS systems,¹³

⁴ The 5, 7, 15 GHz band refers to the Earth-to-space (uplink) frequencies at 5091-5250 GHz (the "5 GHz band") and the 15.43-15.63 GHz band (the "15 GHz band"), and the corresponding space-to-Earth (downlink) frequencies at 6700-7075 MHz (the "7 GHz band").

⁵ Amendment to Application of Constellation Communications Holdings, Inc., File No. SAT-AMD-20001103-00152, at 5 (Conforming Amendment). The Members of the International Telecommunication Union (ITU) have divided the world into three Regions. Generally, Region 1 includes Africa, Europe, Northern and Western portions of Asia; Region 2 includes the Americas and Greenland; and Region 3 includes Southern portions of Asia, Australia and the South Pacific. See ITU Radio Regulations Article S5, Section I. In accordance with ITU Regulations, the 1980-2010 MHz and 2170-2200 MHz bands are allocated to MSS worldwide. *Id.* Article S5, Section IV. Region 2 allocations, however, vary slightly from those of the other regions. In Region 2, the 1980-1990 MHz band does not become available for MSS until January 1, 2005. *Id.* S5.389A. In addition, the 2010-2025 MHz and the 2165-2170 MHz bands, which the ITU already has made available for MSS use in Canada and the United States, will become available for MSS in the rest of Region 2 on January 1, 2002. *Id.* S5.389C & S5.389D.

⁶ One orbital plane is an equatorial ring (zero degree inclination) comprised of 11 operational satellites at an altitude of 1965 kilometers with a period of 126.4 minutes. The other seven orbital planes are comprised of five satellites each, with an inclination angle of 62 degrees, altitude of 2035 kilometers, and period of 128 minutes. Application of Constellation Communications, Inc., File No. 181-SAT-P/LA-97(46), IBFS Nos. SAT-LOA-19970926-00148, at 12 (Constellation Application).

⁷ *Id.* In this document, the term "applicant" and "application" refers to all parties, and their submissions, seeking to operate 2 GHz MSS systems, whether they are applicants for U.S.-licensed systems or letter of intent filers from non-U.S. licensed systems seeking to serve the U.S. market using 2 GHz MSS spectrum.

⁸ See Public Notice, Report No. SPB-119 (rel., March 19, 1998). In response to this Public Notice, 7 comments, 1 reply comment, and 3 responses were filed specifically addressing Constellation's Application. A list of pleadings is attached in Appendix A.

⁹ *Constellation Communications, Inc.*, Order and Authorization, 12 FCC Rcd 9651 (Int'l Bur./OET 1997).

¹⁰ See Letter from Thomas S. Tycz, Chief, Satellite and Radiocommunication Division, FCC to Robert A. Mazer, Counsel for Constellation Communications, Inc. (September 14, 1999) (File No. SAT-ASG-19990222-00023).

¹¹ See Letter from Thomas S. Tycz, Chief, Satellite and Radiocommunication Division, FCC to Robert A. Mazer, Counsel for Constellation Communications Holdings, Inc. (December 22, 1999) (File No. SAT-ASG-19991028-00105).

¹² FCC Form 312 of Constellation Communications, Inc., File No. SAT-AMD-19991230-00134 (Constellation Ownership Amendment).

and Constellation amended its application once more to address the requirements adopted in the 2 GHz MSS Order.¹⁴

III. DISCUSSION

4. Under rules adopted in the Commission's 2 GHz MSS Order, Constellation must demonstrate that its system meets certain technical requirements. We address these requirements first. We then turn to Constellation's requests for service links in the 2 GHz MSS band and feeder links in the 5 GHz, 7 GHz, and 15 GHz frequencies, followed by a review of Constellation's licensing conditions, implementation milestones, and orbital debris mitigation strategy. Finally, we address Constellation's alien ownership disclosure and dispose of various parties' arguments against granting Constellation's application.

A. Threshold Technical Requirements

1. Frequency Agility

5. Under the Commission's service rules and policies, 2 GHz MSS systems must be capable of operating across at least seventy percent of the United States' 2 GHz MSS allocation in the 1990-2025 MHz and 2165-2200 MHz bands.¹⁵ The Commission also requires that 2 GHz MSS systems be capable of operating without fixed frequency translations between the uplink and downlink frequencies.¹⁶ Constellation's proposed 2 GHz MSS system meets these requirements.¹⁷

2. NGSO Coverage Requirements

6. Section 25.143(b)(2) of the Commission's rules requires NGSO 2 GHz MSS systems to provide continuous coverage throughout all 50 states, Puerto Rico and the U.S. Virgin Islands, *i.e.*, that at least one satellite is visible at an elevation angle of at least five degrees at all times within this geographic area.¹⁸ In addition, at locations as far north as 70 degrees North Latitude and as far south as 55 degrees South Latitude, NGSO MSS systems must operate such that at least one satellite is visible at an elevation angle of at least five degrees for eighteen hours of every day.¹⁹ Constellation's proposed system meets these requirements.²⁰ To the extent that Mobile Communications Holdings, Inc. (MCHI) questions Constellation's intent and ability to establish a system that would provide the requisite global coverage,²¹

¹³ *The Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band*, IB Docket No. 99-81, Report and Order, 15 FCC Rcd 16127 (2000) (2 GHz MSS Order).

¹⁴ Conforming Amendment, footnote 5, *supra*. See Public Notice, Report No. SAT-00061 (rel. November 29, 2000) (2 GHz MSS Amendment PN). No petitions to deny or other objections or comments were filed on Constellation's Conforming Amendment in response to this Public Notice.

¹⁵ 2 GHz MSS Order, 15 FCC Rcd at 16152 ¶ 52.

¹⁶ *Id.* at ¶ 53.

¹⁷ Conforming Amendment at 5.

¹⁸ 47 C.F.R. § 25.143(b)(2)(iii).

¹⁹ 47 C.F.R. § 25.143(b)(2)(ii).

²⁰ Conforming Amendment at 4.

²¹ See Petition to Deny of Mobile Communications Holdings, Inc.

we find that Constellation's affirmation that its proposed 2 GHz MSS system is compliant with the Commission's global build-out requirements is sufficient to meet our licensing criteria.²² Therefore, we deny MCHI's Petition to Deny Constellation's application.

B. Service-Link Spectrum

7. The 2 GHz MSS Order adopted a hybrid band arrangement that divided the 2 GHz MSS uplink (1990-2025 MHz) and downlink (2165-2200 MHz) bands into segments of equal bandwidth based on the number of systems seeking assignments.²³ The Commission determined that providing 3.5 megahertz in each direction for the nine then-pending system proponents would be sufficient to commence operations.²⁴ The Commission provided that, in the event not all system proponents proceed toward authorization, the remaining system proponents would receive more than 3.5 megahertz of spectrum in each direction upon authorization.²⁵ In addition, the Commission reserved one additional spectrum segment in each direction for expansion of system(s) by operator(s) meeting certain criteria for service to unserved areas.²⁶ The following formula expresses the amount of spectrum available for each system in each direction of transmission:

$$35 \text{ megahertz} \div (\text{Number of System Proponents} + \text{One}) = \text{Size of Each Spectrum Segment}^{27}$$

There are currently eight 2 GHz MSS system proponents participating in this processing round.²⁸ We will not at this time, however, implement that portion of the Commission's 2 GHz MSS Order that would give each system proponent access to more than 3.5 megahertz of spectrum in each direction on a primary basis. Subsequent to release of the 2 GHz MSS Order, the Commission has received new proposals for use of the 2 GHz MSS bands.²⁹ Delaying the designation of additional spectrum will give the Commission the opportunity to consider these proposals. Therefore, in this Order, Constellation will receive access to a spectrum segment of 3.5 megahertz, in each direction of transmission, on a primary basis, *i.e.*, a "Selected Assignment."³⁰ Constellation will choose its Selected Assignment such that the band edge of the assignment is an integer multiple of 3.88 megahertz from the band edge of the 2 GHz MSS band, which will allow the Commission to address the proposals before it.

²² See Conforming Amendment at 4; Consolidated Opposition and Reply Comments of Constellation Communications, Inc. at 3 n.4.

²³ 2 GHz MSS Order, 15 FCC Rcd at 16138 ¶ 16.

²⁴ *Id.* at 16139 ¶ 17.

²⁵ *Id.*

²⁶ *Id.* at 16146-47 ¶¶ 35-39.

²⁷ *Id.* at 16138 ¶ 16.

²⁸ See 2 GHz MSS Amendment PN, Report No. SAT-00061.

²⁹ See *Ex parte* Letter of New ICO Global Communications (Holdings) Ltd., IB Docket No. 99-81 (dated March 8, 2001) (ICO *Ex Parte* Letter); Petition for Rulemaking of the Cellular Telecommunications & Internet Association (filed May 18, 2001) (CTIA Petition).

³⁰ Systems must be implemented consistent with the plans for incumbent relocation adopted in the 2 GHz Allocation & Relocation Proceeding, Second Report And Order and Second Memorandum Opinion and Order, 15 FCC Rcd 12315, including the phased plan for relocation in the 1990-2025 MHz band.

8. Constellation must identify the specific frequencies of its Selected Assignment when the first satellite in its system reaches its intended orbit, and notify the Commission in writing of its selection.³¹ Consistent with the *2 GHz MSS Order*, Constellation may also elect to operate outside its Selected Assignment on a secondary basis with respect to other 2 GHz MSS operators, subject to certain conditions.³²

C. Feeder Links

9. Constellation proposes feeder link operations in the 5091-5250 MHz (5 GHz) and 15.43-15.63 GHz bands (15 GHz) (Earth-to-space) and the 6700-7075 MHz band (7 GHz) (space-to-Earth).³³ In the United States, the frequency bands for which Constellation seeks authority are not currently allocated for commercial NGSO satellite service, and the 6700-7075 MHz band is not allocated in the direction that Constellation proposes. However, the International Telecommunication Union (ITU) has allocated each of these frequencies for feeder link transmissions between earth stations and NGSO MSS satellites.³⁴ Moreover, the Commission has initiated a rulemaking proposing to amend the domestic Table of Frequency Allocations consistent with the international allocation with regard to the 5 GHz, 7 GHz and 15 GHz frequency bands (the “*5, 7, 15 GHz Allocation Rulemaking*”).³⁵ In the interim, we have granted waivers of Section 2.102(a) of the Commission’s rules, which prohibits frequency assignments that differ from the Table of Frequency Allocations,³⁶ to allow NGSO MSS licensees to use portions of these internationally-allocated bands for NGSO MSS feeder links.³⁷

10. Consistent with these actions, we waive Section 2.102(a) of the Commission’s Rules to permit the proposed operation, pending completion of the *5, 7, 15 GHz Allocation Rulemaking*.³⁸ For Constellation’s proposed feeder uplinks, we waive Section 2.102(a) to permit Constellation to operate its feeder uplink transmissions in the 5091-5250 MHz and 15.43-15.63 GHz bands, consistent with the international allocation. Similarly, we waive Section 2.102(a) to permit Constellation to operate its feeder

³¹ *2 GHz MSS Order*, 15 FCC Rcd at 16138 ¶ 16. A satellite’s intended orbit is the final orbit it will occupy to provide commercial service. *Id.* n.75.

³² *Id.* at 16139-40 ¶ 19. The 1990-2025 MHz (Earth-to-space) and 2165-2200 MHz (space-to-Earth) bands are immediately adjacent to the 2025-2110 MHz (Earth-to-space, space-to-space) and 2200-2290 MHz (space-to-Earth, space-to-space) bands, respectively, where the Federal Government has extensive satellite network operations. To avoid the possibility of adjacent band interference, this potential interference situation needs to be considered by both non-Government and Government satellite operators when implementing their respective satellite systems near the band edges.

³³ Conforming Amendment at n.12; Constellation Application at 8-12.

³⁴ ITU Radio Regulations Footnotes S5.444A (among other things, allocating the 5091-5150 MHz band for assignment to NGSO MSS feeder uplinks until January 1, 2008, subject to coordination); S5.447A (allocating the 5150-5250 MHz band to NGSO MSS feeder uplinks, subject to coordination); S5.458B (allocating the 6700-7075 MHz band to NGSO MSS feeder downlinks, subject to coordination); and S5.511A (among other things, allocating the 15.43-15.63 GHz band to NGSO MSS feeder uplinks, subject to coordination).

³⁵ *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).

³⁶ 47 C.F.R. § 2.102(a).

³⁷ *See, e.g., L/Q Licensee, Inc.*, Order and Authorization, 11 FCC Rcd 16410, 16413-14 ¶ 8 (Int’l Bur. 1996).

³⁸ *See WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969).

downlink transmissions in the 6700-7075 MHz band, consistent with the international allocation. We encourage Constellation to operate in the lower portions of the 6700-7075 MHz band to minimize coordination requirements with the broadcast auxiliary service (BAS). In that regard, Constellation's feeder link operations in the 7025-7075 MHz portion of the band will be on an unprotected, non-harmful interference basis relative to BAS pending the outcome of the Commission's domestic allocation proceeding. This will permit broadcasters and cable operators to continue operating on two additional BAS channels while coordination issues are addressed in the pending allocation proceeding.

11. This authorization of feeder link spectrum is subject to any applicable restrictions or modifications that may be promulgated in the *5, 7, 15 GHz Allocation Rulemaking*. In addition, this authorization should not be construed as a license for Earth-to-space transmission in the 5091-5250 MHz and 15.43-15.63 GHz bands. Such authority must be requested in the context of an earth station application filed pursuant to Section 25.130 of the Commission's rules.³⁹ As stated in the *2 GHz MSS Order*, Constellation must coordinate with any other licensees authorized to use the same spectrum for feeder links.⁴⁰ Constellation must also coordinate its proposed NGSO satellite system operations with respect to licensed non-government and authorized Federal Government terrestrial systems, as necessary, in accordance with Section 25.272 of the Commission's rules.⁴¹

12. The 5091-5250 MHz and 15.43-15.63 GHz bands also are allocated to the aeronautical radionavigation services (ARNS) on a primary basis in the United States,⁴² and throughout the world. In particular, the 5091-5150 MHz band is allocated to the Microwave Landing System (MLS).⁴³ To facilitate sharing of the 5091-5250 MHz band between ARNS/MLS stations and gateways transmitting to NGSO MSS satellites worldwide, ITU Recommendation ITU-R S.1342 provides a methodology to determine the coordination distance between ARNS/MLS stations and NGSO MSS gateways.⁴⁴ To facilitate sharing of the 15.43-15.63 GHz band between ARNS stations and gateways transmitting to NGSO MSS satellites worldwide, ITU Recommendation ITU-R S.1340 limits ARNS and gateway earth station equivalent isotropically radiated power (e.i.r.p.) and establishes minimum coordination distances between ARNS and gateway stations.⁴⁵ We expect Constellation's operations to comply with the limits set forth in ITU Recommendations ITU-R S.1342 and ITU-R S.1340. Prior to authorization of an earth station, Constellation's feeder link operations in the 5091-5250 MHz and 15.43-15.63 GHz bands must be coordinated through the Frequency Assignment Subcommittee of the Interdepartment Radio Advisory Committee of the National Telecommunication and Information Administration (NTIA). In that regard, NTIA recommends that, to the extent practicable, any 2 GHz MSS operator using the 5091-5250 MHz

³⁹ 47 C.F.R. § 25.130.

⁴⁰ See *2 GHz MSS Order*, 15 FCC Rcd at 16159 ¶ 72 (citing 47 C.F.R. § 25.203(k)).

⁴¹ 47 C.F.R. § 25.272.

⁴² 47 C.F.R. § 2.106, footnote US260.

⁴³ 47 C.F.R. § 2.106, footnote S5.444. MLS currently operates in the 5030-5091 MHz band. However, prior to January 1, 2010, MLS requirements that can not be met in the 5030-5091 MHz band can be met in the 5091-5150 MHz band. See *ITU Radio Regulations*, Resolution 114 (WRC-95) (Use of the band 5091-5150 MHz by the fixed-satellite service (Earth-to-space) (limited to feeder links of the non-geostationary mobile-satellite service)).

⁴⁴ See ITU Recommendation ITU-R S.1342 (Method for determining coordination distances, in the 5 GHz band, between the international standard microwave landing system in the aeronautical radionavigation service and non-geostationary mobile satellite service stations providing feeder uplink services).

⁴⁵ See ITU Recommendation ITU-R S.1340 (Sharing between feeder links for the mobile-satellite service and the aeronautical radionavigation service in the Earth-to-space direction in the band 15.4-15.7 GHz).

band for feeder links locate its tracking, telemetry, and command (TT&C) signal in the middle or at the upper end of the 5091-5250 MHz band, to reduce the likelihood of interference to the adjacent Microwave Landing System operations in the adjacent 5030-5091 MHz band.⁴⁶ NTIA also has stated its concern about protecting Government passive service operations in the 6650-6675.2 MHz band from NGSO MSS space station transmissions in the 6700-7075 MHz band.⁴⁷ As this is an active issue in the *5, 7, 15 GHz Allocation Rulemaking*, Constellation will be subject to any applicable rules that may be promulgated on this issue. Until such time, we expect the Executive Branch and NGSO MSS entities to work together to address the needs of both services.⁴⁸

D. Pre-operational Authority

13. Under Commission rules, the fifteen-year license term for a 2 GHz MSS system begins upon a certification by the system operator that the first satellite in its system has begun operations consistent with the terms and conditions specified in its authorization.⁴⁹ The Commission indicated in the *2 GHz MSS Order* that it would “authorize system operators to conduct pre-operational testing in the license grant, to the extent that applicants include such information in their applications.”⁵⁰ Constellation did not request such authority. Accordingly, this authorization does not include authority for operations except at the orbits and on the frequencies specified in the application, as amended. Authority for any other radio transmissions in any frequency or satellite orbit will need to be obtained by filing a request for a license modification or special temporary authorization, as appropriate.

E. Regulatory Classification

14. Constellation states that it will operate its 2 GHz MSS system on a non-common carrier basis.⁵¹ Under the Communications Act, Commission Rules, and consistent with our *2 GHz MSS Order*, we treat Constellation’s space station operations as non-common carrier.⁵² We will address the regulatory

⁴⁶ See *2 GHz MSS Order*, 15 FCC Rcd at 16162-63 ¶ 77. Section 25.202(g) of the Commission’s rules states that TT&C functions for U.S. domestic satellites “shall be conducted at either or both edges of the allocated band(s),” *i.e.*, at either or both edges of a frequency band assigned to a satellite licensee for communication. 47 C.F.R. § 25.202(g).

⁴⁷ See Letter from Associate Administrator, Office of Spectrum Management, NTIA, to Acting Chief, Office of Engineering and Technology, FCC (May 7, 2001).

⁴⁸ See 47 C.F.R. § 2.106, footnote S5.458A (“In making assignments in the band 6700-7075 MHz to space stations of the fixed-satellite service, administrations are urged to take all practicable steps to protect spectral line observations of the radio astronomy service in the band 6650-6675.2 MHz from harmful interference from unwanted emissions.”).

⁴⁹ *2 GHz MSS Order*, 15 FCC Rcd at 16175-76 ¶ 103; 47 C.F.R. § 25.121(a) (“Licenses for facilities governed by this part will be issued for a period of 10 years, except that licenses and authorizations in the 2 GHz Mobile-Satellite Service will be issued for a period of 15 years.”).

⁵⁰ *2 GHz MSS Order*, 15 FCC Rcd at 16176 ¶ 103.

⁵¹ Constellation Application, Exhibit 1 at 7.

⁵² 47 U.S.C. §§ 153(44), 332(c)(5); 47 C.F.R. § 20.9(a)(10); *2 GHz MSS Order*, 15 FCC Rcd at 16173 ¶ 95.

classification of earth stations operating as part of Constellation's system in connection with earth station licensing.⁵³

F. Implementation Milestones

15. The 2 GHz MSS Order adopted milestones for implementation that apply to 2 GHz MSS systems.⁵⁴ Consistent with the 2 GHz MSS Order, therefore, Constellation must observe the following milestone requirements:

Milestone	Deadline
Enter Non-contingent Satellite Manufacturing Contract	12 months after authorization
Complete Critical Design Review (CDR)	24 months after authorization
Begin Physical Construction of All Satellites	30 months after authorization
Complete Construction and Launch First Two Satellites in System	42 months after authorization
Certify Entire System Operational	72 months after authorization

16. Constellation must describe the status of system construction and operation in its annual reports, and file a certification with the Commission within ten days following each of the milestones specified above.⁵⁵

G. Orbital Debris Mitigation

17. Currently, the FCC addresses issues regarding orbital debris and satellite systems on a case-by-case basis, under the general "public interest, convenience and necessity" standard in the Communications Act.⁵⁶ To facilitate our orbital debris analysis, under Section 25.143(b)(1) of our rules, 2 GHz MSS system proponents are required to "describe the design and operational strategies that they will use, if any, to mitigate orbital debris."⁵⁷ This rule also requires 2 GHz MSS system proponents to "submit

⁵³ We also note that the Commission will address issues concerning protection for aeronautical radionavigation in the 1559-1610 MHz band from the out-of-band emissions of 2 GHz MSS mobile earth terminals (METs) in the pending Global Mobile Personal Communications by Satellite (GMPCS) rulemaking, and the 2 GHz MSS METs will be subject to applicable rules and policies the Commission will adopt in that proceeding. 2 GHz MSS Order, 15 FCC Rcd at 16196-97 ¶ 163 (citing Amendment of Parts 2 and 25 to Implement the Global Mobile Personal Communications by Satellite (GMPCS) Memorandum of Understanding and Arrangements, IB Docket No. 99-67, Notice of Proposed Rule Making, 14 FCC Rcd 5871 (1999)).

⁵⁴ 2 GHz MSS Order, 15 FCC Rcd at 16177-78 ¶ 106.

⁵⁵ See 47 C.F.R. § 25.143(e)(1) (requiring satellite space-station operators to file annual reports with the Commission every October 15); *Id.* § 25.143(e)(3) (requiring satellite space-station operators to file a certification with the Commission within 10 days of a system implementation milestone).

⁵⁶ 47 U.S.C. § 303.

⁵⁷ 47 C.F.R. § 25.143(b)(1), as amended by the 2 GHz MSS Order, 15 FCC Rcd at 16205. The Commission also stated that it intends to commence a rulemaking proceeding proposing to explore orbital debris mitigation issues. 2 GHz MSS Order, 15 FCC Rcd at 16188 ¶ 138.

a casualty risk assessment if planned post-mission disposal involves atmospheric re-entry of the spacecraft.”⁵⁸

18. In adopting this requirement, the Commission indicated that applicants may wish to consult the National Aeronautics & Space Administration (NASA)/Department of Defense (DoD) Guidelines on Debris Mitigation, as well as the ITU Recommendation on disposal of geostationary satellites.⁵⁹ The NASA/DoD Guidelines identify four main objectives: 1) controlling debris released during normal operations; 2) minimizing debris generated by accidental explosions; 3) selecting safe flight profiles and operational configurations; and 4) providing for post-mission disposal of space structures.

19. Under the NASA/DoD Guidelines, these objectives are accomplished by a number of means.⁶⁰ The first objective – controlling debris released during normal operations – is addressed by minimizing the amount of debris released in a planned manner during normal operations. The second objective – minimizing debris generated by accidental explosions – is addressed by limiting the risk to other space systems from accidental explosions both during mission operations and after completion of mission operations. For mission operations, this is accomplished through analysis of credible failure modes and development of methods to limit the probability they will occur. Post-mission, this is accomplished through depletion of all sources of stored energy on board the spacecraft when they are no longer required for mission operations or post-mission disposal. The third objective – selecting a safe flight profile and operational configuration – is addressed through estimating and limiting the probability of collision with large objects during orbital lifetime, and the probability of disabling collisions with small debris during mission operations.

20. The fourth objective in the NASA/DoD Guidelines – providing for post-mission disposal of space structures – is met by planning for disposal of a spacecraft at the end of mission life to minimize impact on future space operations. This is accomplished through one of two options relevant here. The first option is atmospheric reentry, *i.e.*, leaving the structure in an orbit in which it will remain in orbit for no longer than 25 years after mission completion. Under this option, it is also necessary to address the casualty risk from any portions of the spacecraft that may survive atmospheric reentry. The second option is maneuvering to a storage orbit. There are three suggested storage orbits. The first is between low and middle Earth orbit, *i.e.*, satellite perigee altitude above 2,000 kilometers and apogee altitude below 19,700 kilometers. The second is between middle and geosynchronous Earth orbit, *i.e.*, perigee altitude above 20,700 kilometers and apogee altitude below 35,300 kilometers. The third is above geosynchronous Earth orbit, *i.e.*, perigee altitude above 36,100 kilometers (or approximately 300 kilometers above geosynchronous altitude). In addition to the NASA/DoD guidelines, and as the Commission observed in the *2 GHz MSS Order*,⁶¹ the ITU has developed a recommendation concerning operations in the GSO.⁶²

⁵⁸ 47 C.F.R. § 25.143(b)(1), as amended by the *2 GHz MSS Order*, 15 FCC Rcd at 16205.

⁵⁹ See *2 GHz MSS Order*, 15 FCC Rcd at 16118 ¶ 138.

⁶⁰ See *The Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band*, IB Docket No. 99-81, 14 FCC Rcd 4843, 4901-03 (1999) (Appendix C).

⁶¹ *2 GHz MSS Order*, 15 FCC Rcd at 16118 ¶ 138.

⁶² Recommendation ITU-R S.1003. The recommendation suggests, in pertinent part, that a geostationary satellite at the end of its life should be transferred before complete exhaustion of its propellant, to a “supersynchronous graveyard orbit that does not intersect the GSO,” with GSO defined as the mean earth radius of 42,164 kilometers plus or minus 300 kilometers. The recommendation also notes that what constitutes “an effective graveyard orbit” requires further studies. In this regard, we note that orbital perturbations due to solar and lunar gravitation, solar pressure, or other sources, may, over time, result in an inactive satellite’s orbit

21. Each of the 2 GHz MSS systems submitted a narrative statement concerning orbital debris mitigation. We note that, to the extent that the statements address debris mitigation issues involving launch vehicle operations, we have neither reviewed nor concluded the plans disclosed are appropriate.⁶³ We also note that, to the extent debris mitigation plans for MSS systems change, the system proponents should evaluate those changes to determine whether disclosure and/or prior approval is required.⁶⁴

22. In its Conforming Amendment, Constellation addressed orbital debris mitigation issues pertinent to operations, including debris release, accidental explosions, and collision with large objects.⁶⁵ Specifically, Constellation indicates it will minimize the probability of accidental explosions by requiring “its spacecraft vendor to examine its design to identify subsystems that might have failure modes involving accidental explosions, such as the satellite on-board propulsion system and fuel tanks and battery subsystem, and to adopt design approaches that minimize the risk of accidental explosions over the design lifetime of the satellites.”⁶⁶ Constellation also specifically addressed the potential for collisions with large objects by stating that “Constellation system operators will monitor tracking data provided by the government on orbital objects ... that might approach the Constellation satellites during their normal operations, and, if necessary, will use stationkeeping maneuvers to avoid any potential collisions that might be identified.”⁶⁷ These statements are consistent with our expectation that Constellation and other 2 GHz MSS systems will develop appropriate operational plans and procedures to minimize the possibility of collision with large, known objects.⁶⁸

23. Constellation also defined a system disposal strategy addressing end-of-mission orbital debris mitigation issues. Constellation states that it will “maneuver its satellites into storage orbits with perigees significantly above the 2,000 km storage orbit specified in the draft U.S. Government/Industry recommendation.”⁶⁹ However, in order to permit assessment of Constellation’s disposal plan and provide adequate information for potentially effected parties, we require Constellation to supplement its narrative statement by providing greater specificity regarding the range of storage orbit parameters selected for satellite disposal. Constellation also did not address the depletion of stored energy sources as part of system disposal. We require Constellation to supplement its narrative statement by stating its intent in this regard. Each of these required supplements to Constellation’s orbital debris narrative statement are to be submitted no later than six months prior to the CDR milestone. We also note that this *Order* does not authorize the relocation of operational satellites to storage orbits at end-of-life. Such authorization will need to be obtained through a request for modification of Constellation’s license.

intersecting the GSO, as defined by the ITU recommendation, even if the initial disposal altitude does not intersect the GSO.

⁶³ The United States licensing authority for commercial launches is the Federal Aviation Administration. See 14 C.F.R. § 400 *et seq.*

⁶⁴ See 47 C.F.R. §§ 1.65, 25.117(a). See also *2 GHz MSS Order*, 15 FCC Rcd at 16179 ¶ 108 (system modifications requiring prior FCC approval should be identified well in advance of the CDR milestone).

⁶⁵ Conforming Amendment at 6-7.

⁶⁶ *Id.* at 7.

⁶⁷ *Id.*

⁶⁸ See, e.g., Amendment to Pending Application of Iridium LLC, SAT-AMD-20001103-00156 (November 3, 2000) at Exhibit 1, p.2.

⁶⁹ Conforming Amendment at 7.

H. Other Issues

24. *Timing of Licensing.* AT&T Wireless Services, Inc., Cingular Wireless LLC, Sprint PCS, and Verizon Wireless (Wireless Carriers) in a recent joint letter requested the Commission to defer grant of the pending 2 GHz MSS applications until (1) public comment is sought and received on the implications of New ICO Global Communications (Holdings) Ltd.'s (ICO's) March 8, 2001 *ex parte* letter proposing amendment of the 2 GHz MSS service rules to permit licensees to incorporate an "ancillary terrestrial component" into their 2 GHz MSS networks; and (2) the Commission considers a petition for rule making submitted by the Cellular Telecommunications & Internet Association (CTIA) requesting that the 2 GHz MSS bands be reallocated for other uses, such as terrestrial wireless services.⁷⁰ For the reasons set forth in the ICO *Order* issued contemporaneously with this *Order and Authorization*, we deny the Wireless Carriers' request to defer action on the 2 GHz MSS applications.⁷¹

25. *Alien Ownership.* One hundred percent of Constellation's capital stock is held by CCINV, a private Netherlands Antilles corporation.⁷² Section 310 of the Communications Act contains restrictions on non-United States ownership of certain types of licenses.⁷³ According to the Constellation Ownership Amendment, U.S. citizens hold 100% of the shares of CCINV capital stock and constitute one hundred percent of CCINV's officers and directors.⁷⁴ Because there is no foreign government ownership in CCINV, and because Constellation proposes to operate the satellites authorized herein on a non-common carrier basis, further inquiry into alien ownership issues is unnecessary.

26. *Financial Qualifications.* The Boeing Company (Boeing) and Iridium LLC (Iridium) filed Petitions to Hold in Abeyance or Deny Constellation's application, stating that we should require Constellation to demonstrate financial qualifications to hold a 2 GHz MSS license.⁷⁵ The Commission decided not to impose financial qualifications for the current 2 GHz MSS processing round,⁷⁶ and therefore, we deny Boeing's and Iridium's Petitions against Constellation's application.

⁷⁰ Letter to Michael K. Powell, Chairman, Federal Communications Commission from Douglas Brandon, AT&T Wireless Services, Inc., Brian F. Fontes, Cingular Wireless, LLC, Luisa L. Lancetti, Sprint Corporation, and John T. Scott, III, Verizon Wireless, IB Docket No. 99-81 (dated June 13, 2001) (citing the ICO *Ex Parte* Letter and CTIA Petition). *Accord Ex parte* Letter of CTIA, IB Docket No. 99-81 (dated July 12, 2001). *But see Ex parte* Letter of Globalstar, L.P., IB Docket No. 99-81 (dated July 2, 2001) (objecting to the Wireless Carriers' request); *Ex parte* Letter of Celsat America, Inc., IB Docket No. 99-81 (dated June 25, 2001) (same).

⁷¹ See *ICO Services Limited, Letter of Intent to Provide Mobile-Satellite Service in the 2 GHz Bands*, Order, DA 01-1635, at ¶¶ 29-31 (Int'l Bur./OET, rel. July 17, 2001).

⁷² Constellation Ownership Amendment, Exhibit 1 at 1.

⁷³ 47 U.S.C. § 310(a)-(b). Section 310(a) provides that a license shall not be granted to or held by any foreign government or the representative thereof. *Id.* § 310(a). Section 310(b), which extends this prohibition to any corporation organized under the laws of any foreign government, applies only to common carrier, broadcast or certain aeronautical licenses. *Id.* § 310(b).

⁷⁴ Constellation Ownership Amendment, Exhibit 1 at 1.

⁷⁵ See Petition to Hold in Abeyance of the Boeing Company at 5-11; Consolidated Comments and Petition to Deny of Iridium LLC at 10-11; Consolidated Reply of Iridium LLC at 11-12. *Accord* Consolidated Comments of ICO Services Limited at 10-11.

⁷⁶ *2 GHz MSS Order*, 15 FCC Rcd at 16150 ¶ 48.

IV. ORDERING CLAUSES

27. Accordingly, IT IS ORDERED that the Application File No. 181-SAT-P/LA-97(46); IBFS Nos. SAT-LOA-19970926-00148, SAT-AMD-19991230-00134 and SAT-AMD-20001103-00152 IS GRANTED to the extent indicated herein and Constellation Communications Holdings, Inc. IS AUTHORIZED to construct, launch and operate its proposed mobile-satellite system to provide service in the United States in the 1990-2025 MHz and 2165-2200 MHz frequency bands, in accordance with the technical specifications set forth in its application, as amended, and consistent with our rules unless specifically waived herein, and subject to the following conditions:

- a. Constellation Communications Holdings, Inc. must choose a Selected Assignment in the 1990-2025 MHz and 2165-2200 MHz frequency bands upon launch of one satellite into its authorized satellite orbit, and commencement of operations by that satellite;
- b. The Selected Assignment shall give Constellation Communications Holdings, Inc. access to 3.5 megahertz in each direction of transmission on a primary basis;
- c. The Selected Assignment shall be chosen such that the band edge of the assignment is an integer multiple of 3.88 megahertz from the band edge of the 2 GHz MSS band; and
- d. Operations in frequencies in these bands outside the Selected Assignment shall be on a secondary basis to operations of other 2 GHz MSS systems.

28. IT IS FURTHER ORDERED that Constellation Communications Holdings, Inc. IS AUTHORIZED to operate its proposed mobile-satellite system in the 1980-2025 MHz and 2165-2200 MHz frequency bands outside the United States subject to the following conditions:

- a. In International Telecommunication Union (ITU) Regions 1 and 3, operations shall be limited to the 1980-2010 MHz and 2170-2200 MHz bands and shall comply with footnote S5.389F of the ITU Radio Regulations.⁷⁷
- b. In ITU Region 2, operations shall comply with footnotes S5.389A, S5.389B, S5.389C, S5.389D, S5.389E, and S5.390 of the ITU Radio Regulations.⁷⁸
- c. Constellation Communications Holdings, Inc. is obligated to comply with the applicable laws, regulations, rules, and licensing procedures for those countries it proposes to serve.

⁷⁷ ITU Radio Regulations Footnote S5.389F (placing limitations on MSS use of the 1980-2010 MHz and 2170-2200 MHz bands in Algeria, Benin, Cape Verde, Egypt, Mali, Syria and Tunisia).

⁷⁸ ITU Radio Regulations Footnotes S5.389A (allocating the 1980-2010 MHz and 2170-2200 MHz bands to MSS, subject to coordination, effective January 1, 2000, except for the use of the 1980-1990 MHz band in Region 2, which is effective January 1, 2005); S5.389B (placing limitations on MSS use of the 1980-1990 MHz band in Argentina, Brazil, Canada, Chile, Ecuador, the United States, Honduras, Jamaica, Mexico, Peru, Suriname, Trinidad & Tabago, Uruguay and Venezuela); S5.389C (allocating the 2010-2025 MHz and 2165-2170 MHz bands to MSS in Region 2, subject to coordination, effective January 1, 2002); S5.389D (permitting MSS use of the 2010-2025 MHz and 2165-2170 MHz bands in the United States and Canada, effective January 1, 2000); S5.389E (placing limitations on MSS use of the 2010-2025 MHz and 2165-2170 MHz bands in Region 2 with respect to other services' operations in these bands in Regions 1 and 3); and S5.390 (placing limitations on MSS use of the 2010-2025 MHz and 2165-2170 MHz bands in Argentina, Brazil, Chile, Columbia, Cuba, Ecuador and Suriname).

29. IT IS FURTHER ORDERED that Constellation Communications Holdings, Inc. IS AUTHORIZED to construct, launch and operate its proposed mobile-satellite system capable of operating in the 5091-5250 MHz and the 15.43-15.63 GHz bands (Earth-to-space) and the 6700-7075 MHz band (space-to-Earth) for feeder link operations, in accordance with the technical specifications set forth in its application, as amended, and consistent with our rules unless specifically waived herein, and subject to the following conditions:

- a. Section 2.102(a) of the Commission's rules, 47 C.F.R. § 2.102(a), IS WAIVED to permit Constellation Communications Holdings, Inc. to operate its feeder uplink transmissions in the 5091-5250 MHz and the 15.43-15.63 GHz bands, and its feeder downlink transmissions in the 6700-7075 MHz band, in accordance with the terms of this *Order*, and subject to any applicable rules that may be promulgated in ET Docket No. 98-142, *Amendment of Parts 2, 25 and 97 of the Commission's Rules with Regard to the Mobile-Satellite Service Above 1 GHz*.
- b. Constellation Communications Holdings, Inc. shall coordinate its feeder uplink operations in the 5091-5150 MHz and 15.43-15.63 GHz bands through the Frequency Assignment Subcommittee of the Interdepartment Radio Advisory Committee of the National Telecommunication and Information Administration.

30. IT IS FURTHER ORDERED that this authorization shall be become NULL and VOID with no further action required on the Commission's part in the event the space stations are not constructed, launched and placed into operation in accordance with the technical parameters and terms and conditions of the authorization by the following dates:

Milestone	Deadline
Enter Non-contingent Satellite Manufacturing Contract	July 17, 2002
Complete Critical Design Review	July 17, 2003
Begin Physical Construction of All Satellites	January 17, 2004
Complete Construction and Launch First Two Satellites in System	January 17, 2005
Certify Entire System Operational	July 17, 2007

31. IT IS FURTHER ORDERED that the Petition to Hold in Abeyance of The Boeing Company, the Petition to Deny of Iridium LLC, and the Petition to Deny of Mobile Communications Holdings, Inc. (each filed May 4, 1998) ARE DENIED.

32. IT IS FURTHER ORDERED that Constellation Communications Holdings, Inc. will prepare any necessary submissions to the ITU to initiate and complete the advance publication, international coordination, and notification process for the space stations authorized by this *Order*, in accordance with the ITU Radio Regulations. No protection from interference caused by radio stations authorized by other Administrations is guaranteed unless coordination procedures are timely completed or, with respect to individual Administrations, by successfully completing coordination agreements. Any radio station authorization for which coordination has not been completed may be the subject of additional terms and conditions as required to effect coordination of the frequency assignments of other Administrations. 47 C.F.R. § 25.111(b).

33. IT IS FURTHER ORDERED that this *Order* is subject to change by summary order of the Commission on 30 days' notice and does not confer any permanent right to use the orbit and spectrum.

34. IT IS FURTHER ORDERED that Constellation Communications Holdings, Inc. may decline this authorization as conditioned within 30 days of the date of the release of this *Order and Authorization*. Failure to respond within that period will constitute formal acceptance of the authorization as conditioned.

35. This *Order and Authorization* is issued pursuant to Sections 0.241 and 0.261 of the Commission's rules on delegations of authority, 47 C.F.R. §§ 0.241, 0.261, and is effective upon release.

FEDERAL COMMUNICATIONS COMMISSION

Donald Abelson
Chief, International Bureau

Bruce A. Franca
Acting Chief, Office of Engineering and Technology

APPENDIX A**LIST OF PLEADINGS ADDRESSING
CONSTELLATION COMMUNICATIONS HOLDINGS, INC.'S APPLICATION****Filed May 4, 1998**

Petition to Hold in Abeyance of The Boeing Company
Comments of Celsat America, Inc.
Comments of Constellation Communications, Inc.
Consolidated Comments of ICO Services Limited at 10-11
Consolidated Comments and Petition to Deny of Iridium LLC at 10-11
Petitions to Deny of Mobile Communications Holdings, Inc.
Comments of Wireless Communications Association International, Inc.

Filed June 3, 1998

Consolidated Opposition and Reply Comments of Constellation Communications, Inc.

Filed June 18, 1998

Reply of Constellation Communications, Inc.
Consolidated Reply of Iridium LLC at 11-12
Response of Wireless Communications Association International, Inc. at 2 n.4