

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

In the Matter of Application of )
The Boeing Company ) File Nos. 179-SAT-P/LA-97(16)
) 90-SAT-AMEND-98(20)
Concerning Use of the 1990-2025/2165-2200 MHz ) IBFS Nos. SAT-LOA-19970926-00149
and Associated Frequency Bands for a ) SAT-AMD-19980318-00021
Mobile-Satellite System ) SAT-AMD-20001103-00159

ORDER AND AUTHORIZATION

Adopted: July 17, 2001

Released: July 17, 2001

By the Chief, International Bureau:

I. INTRODUCTION

1. By this Order, we authorize The Boeing Company (Boeing) to use spectrum in the 2 GHz band to provide Mobile-Satellite Service (MSS). We also authorize Boeing to use the 19.3-19.7 GHz band for feeder downlinks and the 29.1-29.5 GHz band for feeder uplinks. In addition, we address Boeing's request that we waive certain Part 87 Rules that govern aviation services, and its request to provide Navigation Augmentation Service (NAS) to aircraft in the 1565.42-1585.42 MHz band. This action is a significant step in assigning 2 GHz MSS spectrum for use by MSS providers and facilitates implementation of Boeing's proposed system's technology and service offerings in the marketplace.

II. BACKGROUND

2. Boeing proposes to construct, launch and operate a satellite system comprised of sixteen non-geostationary satellite orbit (NGSO) satellites, each in its own orbital plane. Boeing will deploy the satellites in a circular, 11.96-hour, medium-earth orbit (MEO) at an altitude of approximately 20,181 kilometers (10,898 nautical miles). Boeing proposes to provide MSS using service links in the 2 GHz

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 "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.

band,<sup>3</sup> and feeder links in the Ka-band.<sup>4</sup> Boeing also proposes to provide NAS in the GPS-L1 band.<sup>5</sup> Boeing's system is designed to serve the United States from the 1990-2025 MHz and 2165-2200 MHz bands and, where feasible, to use these frequency bands to serve areas outside the United States.<sup>6</sup> Each orbital plane in Boeing's proposed system is inclined at 53° and separated from neighboring orbital planes by 22.5° of longitude at the equatorial plane. Boeing plans to construct one ground spare as necessary in the event that one or more of the satellites in its constellation fail.

3. Initially, Boeing submitted its application on September 26, 1997,<sup>7</sup> proposing to operate its system's service links in the 2 GHz MSS bands and feeder links in the Ku-band at 11.591-11.7 GHz and 14.391-14.5 GHz.<sup>8</sup> On February 11, 1998, Boeing amended its application to modify its system.<sup>9</sup> On March 19, 1998, we sought comment on Boeing's amended application and other 2 GHz applications that we accepted for filing.<sup>10</sup> Various parties filed comments on Boeing's application and four parties filed petitions to deny or defer Boeing's application. Boeing then filed a technical supplement to its application on January 8, 1999.<sup>11</sup>

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<sup>3</sup> "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).

<sup>4</sup> The "Ka-band" refers to the Earth-to-space (uplink) frequencies at 27.5-30.0 GHz and the corresponding space-to-Earth (downlink) frequencies at 17.7-20.2 GHz. The sub-bands 29.1-29.5 GHz and 19.3-19.7 GHz are allocated on a primary basis to MSS feeder uplinks.

<sup>5</sup> In this order, we use the term "GPS-L1" to refer to the 1565.42-1585.42 MHz band.

<sup>6</sup> 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. In Region 2, 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.

<sup>7</sup> Application of The Boeing Company, File No. 179-SAT-P/LA-97(16); IBFS File No. SAT-LOA-19970926-00149 (Boeing Application), *erratum* Letter from Bruce A. Olcott, Counsel to the Boeing Company to William F. Caton, Acting Secretary, Federal Communications Commission (October 6, 1997). In this document, the term "applicant" and "application" refers to all parties, and their submissions, seeking to operate 2 GHz MSS systems, whether they be 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.

<sup>8</sup> The "Ku-band" refers to the Earth-to-space (uplink) frequencies at 14.0-14.5 GHz and the corresponding space-to-Earth (downlink) frequencies at 11.7-12.2 GHz.

<sup>9</sup> Minor Amendment to Application of The Boeing Company, File No. 90-SAT-AMEND-98(20); IBFS File No. SAT-AMD-19980318-00021 at 1-2 (February 11, 1998) (specifying changes designed "to ensure that Boeing's system does not cause harmful interference" into the Global Positioning System (GPS)) (Boeing First Amendment).

<sup>10</sup> See Public Notice, Report No. SPB-119 (rel., March 19, 1998). For a list of pleadings submitted in response to Boeing's application, see Appendix A.

<sup>11</sup> See Letter from Bruce A. Olcott, Counsel to The Boeing Company to Magalie Roman Salas, Secretary, Federal Communications Commission (Jan. 8, 1999) (Boeing First Technical Supplement).

4. The Commission subsequently adopted service rules for 2 GHz MSS systems.<sup>12</sup> Boeing amended its request to address the requirements adopted in the *2 GHz MSS Order*.<sup>13</sup> Specifically, in the Boeing Second Amendment, Boeing withdrew its request for access to Ku-band spectrum for feeder links and sought to use Ka-band spectrum instead.<sup>14</sup> In response to a public notice,<sup>15</sup> several parties filed comments on the Boeing Second Amendment and two parties filed petitions to deny or defer Boeing's amended application.<sup>16</sup> Among other things, the petitioners opposed Boeing's request to access Ka-band spectrum for feeder links on technical and legal grounds. After the close of an abbreviated comment period, Hughes, Astrolink, PanAmSat and Boeing filed *ex parte* presentations.<sup>17</sup> Later, on May 7, 2001, Boeing filed a second technical supplement to its application, which provided additional technical information and specified that Boeing would use 185 megahertz in the 29.1-29.5 GHz band for feeder uplinks and 185 megahertz in the 19.3-19.7 GHz band for feeder downlinks.<sup>18</sup>

### III. DISCUSSION

5. Under rules adopted in the Commission's *2 GHz MSS Order*, Boeing must demonstrate that its system meets certain technical requirements. We address these requirements first. We then turn to Boeing's request for 2 GHz band service links, feeder links and other frequency assignments. We also address Boeing's request for non-common carrier status, Boeing's implementation milestones, Boeing's orbital debris mitigation showings and issues raised concerning Boeing's proposed aeronautical service.

#### A. Threshold Technical Requirements

##### 1. Frequency Agility

6. 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 and 2165-2200 MHz bands.<sup>19</sup> The Commission also requires that 2 GHz MSS systems be capable of

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<sup>12</sup> *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*).

<sup>13</sup> Amendment to Application of The Boeing Company, File No. SAT-AMD-20001103-00159 (November 3, 2000) (Boeing Second Amendment).

<sup>14</sup> *See id.* at 8. Therefore, we do not address parties' objections to Boeing's request to use Ku-band feeder link spectrum. *See, e.g., FWCC Ex Parte* at 2.

<sup>15</sup> *See* Public Notice, Report No. SAT-00061 (rel. November 29, 2000) (*2 GHz MSS Amendment PN*).

<sup>16</sup> Hughes and PanAmSat petitioned to deny, defer or condition Boeing's amended application. TRW Inc. (TRW), Lockheed Martin Corporation (Lockheed Martin) and Astrolink International LLC (Astrolink) filed comments on Boeing's amendment that questioned portions of Boeing's amended application. *See* Appendix A.

<sup>17</sup> *See id.*

<sup>18</sup> *See* Letter from David A. Nall, Counsel for The Boeing Company, to Magalie Roman Salas, Secretary, Federal Communications Commission (May 7, 2001) (Boeing Second Technical Supplement).

<sup>19</sup> *2 GHz MSS Order*, 15 FCC Rcd at 16152 ¶ 52.

operating without fixed frequency translations between the uplink and downlink frequencies.<sup>20</sup> Boeing's proposed system meets these requirements.<sup>21</sup>

## 2. NGSO Coverage Requirements

7. 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 U.S. Virgin Islands by ensuring that at least one satellite is visible at an elevation angle of at least five degrees within this geographic area at all times.<sup>22</sup> 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.<sup>23</sup> Boeing's proposed system meets these requirements.<sup>24</sup>

### B. Service-Link Spectrum

8. 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.<sup>25</sup> The Commission determined that providing 3.5 megahertz in each direction for the nine then-pending system proponents would be sufficient to commence operations.<sup>26</sup> 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.<sup>27</sup> 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.<sup>28</sup> The following formula expresses the amount of spectrum available for each system in each direction of transmission:

$$35 \text{ megahertz} \div (\text{Number of System Proponents} + \text{One}) = \text{Size of Each Spectrum Segment}^{29}$$

There are currently eight 2 GHz MSS system proponents participating in this processing round.<sup>30</sup> 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

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<sup>20</sup> *Id.* at ¶ 53.

<sup>21</sup> Boeing Second Amendment at 7.

<sup>22</sup> 47 C.F.R. § 25.143(b)(2)(iii).

<sup>23</sup> *Id.* § 25.143(b)(2)(ii).

<sup>24</sup> Boeing Second Amendment at 18; Boeing Application at Attachment 1, subsections 3.1 and 3.4.

<sup>25</sup> *2 GHz MSS Order*, 15 FCC Rcd at 16138 ¶ 16.

<sup>26</sup> *Id.* at 16139 ¶ 17.

<sup>27</sup> *Id.*

<sup>28</sup> *Id.* at 16146-47 ¶¶ 35-39.

<sup>29</sup> *Id.* at 16138 ¶ 16.

<sup>30</sup> See *2 GHz MSS Amendment PN*, Report No. SAT-00061.

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.<sup>31</sup> Delaying the designation of additional spectrum will give the Commission the opportunity to consider these proposals. Therefore, in this Order, Boeing 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.”<sup>32</sup> Boeing 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.

9. Boeing 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 that selection.<sup>33</sup> Consistent with the 2 GHz MSS Order, Boeing 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.<sup>34</sup>

## C. Other Requests for Spectrum Assignments

### 1. Feeder Links

10. Boeing proposes feeder link operations in portions of the Ka-band spectrum designated for NGSO MSS feeder links. Specifically, Boeing proposes to use 185 megahertz in the 29.1-29.5 GHz band (Earth-to-space) and 185 megahertz in the 19.3-19.7 GHz band (space-to-Earth).<sup>35</sup> The Commission established a co-primary allocation for NGSO MSS feeder uplinks in the 29.1-29.5 GHz band that is shared with the Local Multipoint Distribution Service (LMDS) at 29.1-29.25 GHz, and geostationary satellite orbit (GSO) fixed-satellite service (FSS) systems at 29.25-29.5 GHz,<sup>36</sup> subject to the special sharing requirements set forth in Sections 25.257 and 25.258 of the Commission’s rules.<sup>37</sup> In addition,

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<sup>31</sup> 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).

<sup>32</sup> 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.

<sup>33</sup> 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.* at 16138 n.75.

<sup>34</sup> *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.

<sup>35</sup> Boeing Second Technical Supplement at 3.

<sup>36</sup> See *Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, First Report and Order and Fourth Notice of Proposed Rulemaking, 11 FCC Rcd 19005, 19023-38 ¶¶ 41-81 (1996), *modified on recon.*, Memorandum Opinion and Order, CC Docket No. 92-297, FCC 01-164 (rel., May 25, 2001) (*Ka-band Reconsideration Order*).

<sup>37</sup> 47 C.F.R. § 25.257; *id.* § 25.258, as modified by *Ka-band Reconsideration Order*, FCC 01-164.

the Commission designated the 19.3-19.7 GHz band for NGSO MSS feeder downlinks on a co-primary basis with the terrestrial fixed service (FS), subject to site and frequency coordination.<sup>38</sup>

11. To address sharing with GSO FSS systems in the 29.25-29.5 GHz band, Boeing relies on the interference mitigation techniques it originally described in an earlier proposal to use Ku-band frequencies.<sup>39</sup> Because these mitigation techniques generally rely on the orbital mechanics of any given NGSO satellite in Boeing's system, Boeing asserts that the original interference mitigation technique statement it provided for the Ku-band, as supplemented, should suffice for its newly proposed Ka-band feeder links. In response to commenters' concerns, moreover, Boeing provides an additional technical showing to demonstrate that Boeing's proposed feeder links can share with other primary users of the Ka-band frequencies.<sup>40</sup>

**a. Required Showings**

12. While Boeing claims that it can share with GSO FSS and other NGSO MSS satellite systems in the Ka-band, Astrolink, Lockheed Martin, Hughes and TRW claim that various portions of Boeing's technical showing under Section 25.258 of our rules are inadequate. Astrolink states that Boeing has "not provided the necessary technical information concerning its proposed Ka-band feeder link operations and earth station complexes" to ensure adequate coordination under Section 25.258(a) of our rules.<sup>41</sup> In addition, TRW notes that Boeing's use of both polarizations in the 29.25-29.5 GHz band "may pose some obstacles."<sup>42</sup> Astrolink also claims that Boeing has not adequately demonstrated how it complies with the technical requirements that Section 25.258(c) imposes.<sup>43</sup> Moreover, Astrolink, TRW, Lockheed Martin and Hughes all assert that Boeing has failed to demonstrate that its system can share with authorized GSO FSS systems operating in the 29.25-29.5 GHz band as Section 25.258(d) of our rules requires.<sup>44</sup>

13. In a technical supplement filed January 8, 1999, Boeing provided a sharing analysis for NGSO MSS feeder links and GSO FSS satellite networks that relies on a wide range of techniques to mitigate interference. Under Boeing's GSO FSS arc-avoidance mitigation technique, neither the Boeing satellites nor associated earth stations will transmit when the spacecraft are within  $\pm 8.6^\circ$  latitude of the

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<sup>38</sup> See *Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use*, IB Docket No. 98-172, Report and Order, 15 FCC Rcd 13430, 13456 ¶¶ 53-54 (2000) (*18 GHz Report and Order*), petition for review pending, *Teledesic LLC v. FCC*, D.C. Cir. No. 00-1466 (filed November 6, 2000).

<sup>39</sup> Boeing Opposition at 4 (noting that the same mitigation techniques proposed for the Ku-band feeder links "are fully adaptable to spectrum sharing with GSO FSS systems in the Ka-band").

<sup>40</sup> Boeing Second Technical Supplement at 6-13.

<sup>41</sup> Astrolink Comments at 6. Section 25.258(a) provides that "Operators of NGSO MSS feeder link earth stations and GSO FSS earth stations in the band 29.25 to 29.5 GHz where both services have a co-primary allocation shall cooperate fully in order to coordinate their systems. During the coordination process both service operators shall exchange the necessary technical parameters required for coordination." 47 C.F.R. § 25.258(a).

<sup>42</sup> TRW Comments at 3; see also Lockheed Martin Comments at 3.

<sup>43</sup> Astrolink Comments at 3.

<sup>44</sup> TRW Comments at 3; Lockheed Martin Comments at 1-2.

equator.<sup>45</sup> Rather, Boeing will switch traffic to a second satellite that lies outside of the exclusion zone.<sup>46</sup> Boeing's choice of Ka-band, rather than Ku-band frequencies for its feeder links does not compromise the effectiveness of these mechanical mitigation techniques. In addition, Boeing's system will employ both uplink and downlink power control for its Ka-band links.<sup>47</sup>

14. Boeing filed a second technical supplement after Astrolink, TRW, Lockheed Martin and Hughes raised objections to Boeing's first technical supplement. Boeing's second technical supplement provides additional information to demonstrate that Boeing's MSS feeder links can operate in the Ka-band with other co-primary services, including existing and planned GSO FSS systems, Local Multipoint Distribution Service (LMDS) systems and Fixed Service (FS) systems.<sup>48</sup> For GSO FSS systems, Boeing performed analyses purporting to demonstrate that its Ka-band feeder links can share with GSO FSS operations.<sup>49</sup> For LMDS and NGSO MSS feeder links that operate in the same band, Boeing represents that it will identify gateway locations sufficiently far away from terrestrial LMDS and NGSO MSS facilities to prevent unacceptable interference.<sup>50</sup> Finally for FS systems, Boeing represents that it will operate a very limited number of gateway facilities in the United States and that appropriate geographic separation will require only minimal coordination with FS operators.<sup>51</sup>

15. PanAmSat, however, finds Boeing's second technical supplement inadequate to demonstrate that Boeing's NGSO MSS system can share with other primary services in the band.<sup>52</sup> PanAmSat also claims to have found technical deficiencies in Boeing's latest technical showing and various deviations from Boeing's prior analyses.<sup>53</sup>

16. We do not authorize Boeing to conduct Earth-to-space transmissions in Ka-band at this time; however, we grant Boeing authority to configure its space stations to receive feeder-link transmissions from earth stations in the 29.1-29.5 GHz band. Boeing must request authority for earth-to-space transmissions in an earth-station application.<sup>54</sup> At that time, Boeing will need to demonstrate that

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<sup>45</sup> In other words, Boeing proposes an exclusion zone on transmissions from its NGSO satellites between 8.6° North and 8.6° South of the geostationary satellite orbit.

<sup>46</sup> Boeing First Technical Supplement at 3.

<sup>47</sup> Boeing Second Amendment at 9. Boeing does not provide information concerning equivalent power flux density (EPFD); however, an NGSO MSS licensee with Ka-band feeder links need not comply with the EPFD that we have adopted for some other satellite services to control the level of signal energy on the earth's surface. Cf., e.g., *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, First Report and Order and Further Notice of Proposed Rule Making, 16 FCC Rcd 4096, 4109-4141 ¶¶ 22-108 (2000) (requiring NGSO FSS providers in the Ku-band to observe various EPFD limits).

<sup>48</sup> Boeing Second Technical Supplement at 6-14.

<sup>49</sup> *Id.* at 9-13 (performing a static analysis and two types of dynamic analysis to demonstrate the ability of Boeing's proposed system to share with GSO FSS systems).

<sup>50</sup> *Id.* at 14.

<sup>51</sup> *Id.*

<sup>52</sup> See Second PanAmSat *Ex Parte* at 2-3.

<sup>53</sup> See *id.* at 4-5.

<sup>54</sup> See 47 C.F.R. § 25.130.

its system can share the spectrum with other authorized services in the band.<sup>55</sup> As a part of its sharing analysis, Boeing states that it will provide repeating sub-satellite ground tracks for operations in the 29.25-29.5 GHz band under Section 25.258(c) of our rules.<sup>56</sup> The Commission recently eliminated this rule requirement.<sup>57</sup> While operation with repeating ground tracks could facilitate coordination under some circumstances, the Commission did not find repeating ground tracks indispensable for coordinated sharing between NGSO MSS feeder links and GSO FSS systems in the 29.25-29.5 GHz band.<sup>58</sup> Thus, Boeing may, but is not required to, use sub-satellite ground tracks to meet its sharing obligations, as long as Boeing complies with the provisions pertaining to coordination in Subsections 25.203(h) and 25.203(k) of the Commission's rules,<sup>59</sup> and demonstrates that coordination with authorized GSO FSS operations in the band is feasible in its earth-station application.<sup>60</sup>

17. In the 19.3-19.7 GHz band, Boeing has met the requirements set forth in Section 25.208(c) of our rules.<sup>61</sup> Therefore, we grant Boeing authority to use the 19.3-19.7 GHz band for feeder downlinks and telemetry, tracking and control (TT&C).<sup>62</sup> Prior to using these bands, Boeing must coordinate with the U.S. Government systems operating in the 19.3-19.7 GHz frequency band, in accordance with footnote US334 to the Table of Frequency Allocations.<sup>63</sup> This footnote requires coordination of commercial systems with U.S. Government systems in the 17.8-20.2 GHz frequency band. We note that Government GSO and NGSO FSS networks are presently operating in the frequency

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<sup>55</sup> See 47 C.F.R. §§ 25.257, 25.258.

<sup>56</sup> See Boeing Second Technical Supplement at 6; Boeing Second Amendment at 6; Boeing Application, Attachment 1 at 5-9.

<sup>57</sup> 47 C.F.R. § 25.258(c) (as modified by the *Ka-band Reconsideration Order*, FCC 01-164, at ¶ 7).

<sup>58</sup> *Ka-band Reconsideration Order*, FCC 01-164, at ¶ 7.

<sup>59</sup> Subsection 25.203(h) requires any applicant for an earth-station license authorizing operation in a frequency band allocated on a co-primary basis for NGSO and GSO uplinks to select a site, or sites, where mainlobe-to-mainlobe coupling will not occur with respect to satellites of other systems and to pre-coordinate the proposed site and spectrum use with existing earth-station licensees and applicants. 47 C.F.R. § 25.203(h). Subsection 25.203(k) requires an applicant for an earth-station license in a band designated for sharing by GSO and NGSO systems to show that the proposed operation will not cause unacceptable interference to any satellite system licensed for operation in the same band or else certify that the proposed operation would comport with established coordination agreements with the licensees of the affected satellite systems. 47 C.F.R. § 25.203(k).

<sup>60</sup> 47 C.F.R. § 25.258(c) (as modified by the *Ka-band Reconsideration Order*, FCC 01-164).

<sup>61</sup> See 47 C.F.R. § 25.208(c) (establishing power flux density limits to observe in certain bands, including the 19.3-19.7 GHz band).

<sup>62</sup> While Boeing's technical supplement indicates that Boeing will require 185 megahertz of spectrum in each direction of transmission, Boeing asks that we authorize its space station to operate in a broader spectrum range to facilitate spectrum-sharing negotiations with other users of the spectrum. See Boeing Second Technical Supplement at 3. At this time, we do not anticipate granting an earth station authorization for more than 185 megahertz in each direction of transmission. Rather, we plan to require Boeing to identify the specific 185 megahertz of spectrum that it wishes to use in each direction once Boeing completes spectrum-sharing negotiations with other spectrum users.

<sup>63</sup> See 47 C.F.R. § 2.106 US334.



band 17.8-20.2 GHz, and plan to operate in accordance with the power flux-density (PFD) limits contained in the current International Telecommunication Union (ITU) Radio Regulations.<sup>64</sup>

**b. Other Technical Requirements**

18. We dismiss three contentions from Astrolink concerning Boeing's showing. First, Astrolink asserts that Boeing has not included the Ka-band frequency and polarization plans as required under Section 25.114(c)(5) of our rules.<sup>65</sup> Boeing's second technical supplement, however, provides frequency and polarization plans for its proposed Ka-band feeder links.<sup>66</sup> Second, Astrolink claims that unless Boeing identifies the number, type, location or technical characteristics of its proposed Ka-band feeder link/TT&C earth station complexes, the Commission will lack the necessary information to determine whether Boeing's proposal complies with Section 25.257 of our rules, which establishes certain limits on how NGSO MSS earth stations can use the 29.1-29.25 GHz band.<sup>67</sup> This argument is premature; we will address any concerns about Boeing's showing under Section 25.257 of our earth-station licensing rules once Boeing applies for an earth station license. Third, Astrolink alleges that Boeing should have demonstrated its compliance with Section 25.203(j).<sup>68</sup> By its terms, however, Section 25.203(j) of our rules applies only to Big LEO NGSO MSS and radiodetermination-satellite systems, not to 2 GHz MSS applicants.<sup>69</sup> Thus, Boeing's application contains no technical deficiencies that prevent licensing at this time.

**c. Procedural Issues**

19. Several parties assert that Boeing's amendment specifying Ka-band feeder links violates our procedural rules.<sup>70</sup> These parties assert that Boeing's request for additional feeder link spectrum qualifies as a "major amendment" to Boeing's 2 GHz MSS application. If Boeing has filed a "major amendment," our rules could require Boeing's amended application to be treated as a newly filed application that could not be considered during the current 2 GHz MSS processing round.<sup>71</sup> As explained below, however, we consider Boeing's application under provisions that the Commission adopted in the *2 GHz MSS Order*.

20. In the *2 GHz MSS Order*, the Commission decided to treat amended feeder-link requests as minor amendments, provided that the alternative frequency band would expedite deployment of that

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<sup>64</sup> See *18 GHz Report and Order*, 15 FCC Rcd at 13473 ¶ 90. The PFD limits in the 18.3-18.6 GHz band are -115/-105 dB (W/m<sup>2</sup>) in any one megahertz, depending upon the angle of arrival. There are currently no PFD limits in the 19.7-20.2 GHz band. See Letter from William T. Hatch, National Telecommunications and Information Administration, to Dale Hatfield, Chief, Office of Engineering and Technology, Federal Communications Commission (March 29, 2000).

<sup>65</sup> Astrolink Comments at 5.

<sup>66</sup> Boeing Second Technical Supplement at 2-5.

<sup>67</sup> Astrolink Comments at 5.

<sup>68</sup> *Id.* at 6.

<sup>69</sup> See 47 C.F.R. § 25.203(j).

<sup>70</sup> See Hughes Petition at 3-7; PanAmSat 2000 Petition at 3; see also Astrolink Comments at 2-3.

<sup>71</sup> See generally 47 C.F.R. § 25.116.

system's services.<sup>72</sup> The 2 GHz MSS Order stated a test by which amendments would be evaluated. The Commission required a demonstration from the applicant that it could implement and use its proposal without further administrative proceedings and that grant of the amendment would not cause "unnecessary congestion," make coordination difficult or "otherwise increase the potential for interference."<sup>73</sup>

21. Boeing observes that spectrum sharing may prove significantly less complicated in the Ka-band than in the Ku-band.<sup>74</sup> Hughes, PanAmSat and Astrolink, however, assert that we cannot consider Boeing's request for Ka-band feeder link spectrum during the ongoing second Ka-band processing round. These parties note that we established a cut off date of December 22, 1997 for applications for Ka-band spectrum. Space-station applicants that wanted feeder link spectrum in the current Ka-band processing round were encouraged to apply before the cut-off date and, indeed, two current 2 GHz NGSO MSS applicants – Globalstar and Iridium – filed feeder link applications in the ongoing Ka-band processing round before the 1997 cut-off date.<sup>75</sup> Hughes also notes that when Boeing wanted to use Ku-band frequencies for its feeder links, Boeing filed a timely request for Ku-band feeder links during an open Ku-band filing window.<sup>76</sup> Now that Boeing has proposed to use Ka-band spectrum for feeder links rather than Ku-band spectrum, Hughes reasons that Boeing's own actions suggest that Boeing should request Ka-band spectrum in the context of a new, Ka-band processing round.<sup>77</sup>

22. Because we have granted the pending second-round NGSO MSS feeder-link requests,<sup>78</sup> the second Ka-band processing round is complete in relevant part. Thus, Boeing can implement its Ka-band feeder link proposal without further administrative proceedings. Moreover, although a conclusive determination that Boeing's Ka-band feeder link earth stations can share with other operation is neither necessary nor advisable prior to Boeing's submission of separate earth station applications for its 2 GHz MSS system, nothing in Boeing's Second Amendment precludes the possibility of sharing in the Ka-band.<sup>79</sup> On the contrary, Boeing's Second Amendment indicates a reasonable likelihood that Boeing can and will make such a showing once it submits earth-station applications for its 2 GHz MSS system.<sup>80</sup> Furthermore, the 2 GHz MSS applicants seeking authority to use feeder-link spectrum in these bands – Iridium and Globalstar – did not object to Boeing's amendment.

23. For these reasons, we find that Boeing's amendment of its feeder-link request qualifies as a minor amendment under the Commission's 2 GHz MSS Order. Boeing can implement and use its

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<sup>72</sup> 2 GHz MSS Order, 15 FCC Rcd at 16158 ¶ 71.

<sup>73</sup> *Id.* (emphasis added).

<sup>74</sup> Boeing Opposition and Response at 10.

<sup>75</sup> See Public Notice, Report No. SPB-106, 13 FCC Rcd 8020, 8021-22 (1997).

<sup>76</sup> Hughes Petition at 2 (citing Public Notice, Report No. SPB-141 (rel., November 2, 1998)).

<sup>77</sup> *Id.* at 2.

<sup>78</sup> *Application of Globalstar, L.P. For Authority to Launch and Operate a Mobile-Satellite Service System in the 2 GHz Band*, Order and Authorization, DA 01-1634 (Int'l Bur./OET, rel. July 17, 2001); *Application of Iridium LLC Concerning Use of the 1990-2025/2165-2200 MHz and Associated Frequency Bands for a Mobile-Satellite System*, Order and Authorization, DA 01-1636 (Int'l Bur., rel. July 17, 2001).

<sup>79</sup> See Section III.C.1.a., *supra*.

<sup>80</sup> See, e.g., Boeing Second Amendment at 9.

proposal without further administrative proceedings and granting its feeder-link amendment will not cause congestion, make coordination difficult or otherwise increase the potential for interference.<sup>81</sup>

## 2. Other Requests for Frequency Assignments

24. Boeing also has requested twenty megahertz of spectrum in the 1565.42-1585.42 MHz band to provide NAS for aircraft using GPS.<sup>82</sup> Boeing asserts that NAS will provide a necessary correction signal to improve GPS navigation accuracy, integrity and availability.<sup>83</sup> Like Boeing, Lockheed Martin has proposed to use a similar band, the 1554.92-1595.92 MHz band, to provide Radionavigation Satellite Service. Boeing's proposal to use the 1565.42-1585.42 MHz band may potentially conflict with Lockheed Martin's proposal to use 1554.92-1595.92 MHz band for satellite-based GPS augmentation system. Thus, we defer action on Boeing's request to provide NAS in the GPS-L1 band.<sup>84</sup>

## D. Pre-operational Authority

25. Under Commission rules, the fifteen-year license term for a 2 GHz MSS system begins once the licensee certifies that the first satellite in its system has begun operations consistent with the terms and conditions specified in its authorization.<sup>85</sup> 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."<sup>86</sup> Boeing 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. For any radio transmissions in any other frequency or satellite orbit, Boeing must seek additional authority by filing a license modification application or special temporary authority, as appropriate.

## E. Regulatory Classification

26. Boeing requests that its satellite operations not be regulated as a common carrier.<sup>87</sup> Under the Communications Act, Commission Rules, and consistent with our *2 GHz MSS Order*, we grant Boeing's request and treat its space-station operations as non-common carrier.<sup>88</sup> We will address the

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<sup>81</sup> *2 GHz MSS Order*, 15 FCC Rcd at 16158 ¶ 71.

<sup>82</sup> Boeing Application, Attachment 2 at 4.

<sup>83</sup> *Id.* at 5-6.

<sup>84</sup> *See generally Ashbacker Radio Corp. v. FCC*, 326 U.S. 327 (1945) (holding that the Commission could not grant one mutually exclusive application without holding the comparative hearing required by the Communications Act).

<sup>85</sup> *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.").

<sup>86</sup> *2 GHz MSS Order*, 15 FCC Rcd at 16176 ¶ 103.

<sup>87</sup> *See* Boeing Application at 15.

<sup>88</sup> 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.

regulatory classification of earth stations operating as part of Boeing's system in connection with earth-station licensing.<sup>89</sup>

#### F. Implementation Milestones

27. The *2 GHz MSS Order* adopted milestones for implementation that apply to 2 GHz MSS systems.<sup>90</sup> Consistent with the *2 GHz MSS Order*, therefore, Boeing 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

28. Boeing 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.<sup>91</sup>

#### G. Orbital Debris Mitigation

29. 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.<sup>92</sup> 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."<sup>93</sup> This rule also requires 2 GHz MSS system proponents to

<sup>89</sup> 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)).

<sup>90</sup> *2 GHz MSS Order*, 15 FCC Rcd at 16177-78 ¶ 100.

<sup>91</sup> See 47 C.F.R. §§ 25.143(e)(1) (requiring satellite space station operators to file annual reports with the Commission every October 10), 25.143(e)(3) (requiring satellite space-station operators to file a certification with the Commission within 10 days of a system implementation milestone).

<sup>92</sup> 47 U.S.C. § 303.

<sup>93</sup> 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.

“submit a casualty risk assessment if planned post-mission disposal involves atmospheric re-entry of the spacecraft.”<sup>94</sup>

30. 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.<sup>95</sup> 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.

31. Under the NASA/DoD Guidelines, these objectives are accomplished by a number of means.<sup>96</sup> 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.

32. 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*,<sup>97</sup> the ITU has developed a recommendation concerning operations in the GSO.<sup>98</sup>

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<sup>94</sup> 47 C.F.R. § 25.143(b)(1), as amended by the *2 GHz MSS Order*, 15 FCC Rcd at 16205.

<sup>95</sup> See *2 GHz MSS Order*, 15 FCC Rcd at 16118 ¶ 138.

<sup>96</sup> 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).

<sup>97</sup> *2 GHz MSS Order*, 15 FCC Rcd at 16118 ¶ 138.

<sup>98</sup> 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

33. 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.<sup>99</sup> 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.<sup>100</sup>

34. In its Second Amendment, Boeing addressed orbital debris mitigation issues pertinent to operations, including debris release, accidental explosions, and collision with large objects.<sup>101</sup> Concerning collisions with large objects, Boeing indicated “prior to the launch of the first satellite, Boeing will conduct an analysis to ensure that the probability of collision with any known spaceborne objects during its normal operational lifetime is minimal.”<sup>102</sup> In addition to this analysis, we expect Boeing and other 2 GHz MSS systems to develop appropriate operational plans and procedures to minimize the possibility of collision with large, known objects.<sup>103</sup>

35. Boeing also addressed end-of-mission orbital debris mitigation issues including defining a system disposal strategy and depletion of stored energy sources. However, in order to permit assessment of Boeing’s disposal plan and to provide adequate information for potentially effected parties, we require Boeing to supplement its narrative statement by providing greater specificity regarding the range of storage orbit parameters selected for disposal of its satellites. This information should 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 Boeing’s license.

## H. Other Issues

### 1. Aviation Services

36. Boeing indicates that it will provide Aeronautical Mobile-Satellite (Route) Service (AMS(R)S) from its 2 GHz MSS system. AMS(R)S is a type of MSS that uses mobile earth stations aboard aircraft to provide communications for domestic and international air traffic and air traffic control.<sup>104</sup> AMS(R)S is also used to transmit aeronautical communications necessary to ensure safe and

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

<sup>99</sup> The United States licensing authority for commercial launches is the Federal Aviation Administration. See 14 C.F.R. § 400 *et seq.*

<sup>100</sup> 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).

<sup>101</sup> Boeing Second Amendment at 17.

<sup>102</sup> *Id.*

<sup>103</sup> See, e.g., Amendment to Pending Application of Iridium LLC, SAT-AMD-20001103-00156 (November 3, 2000) at Exhibit 1, p.2.

<sup>104</sup> See 47 C.F.R. § 2.1.

regular flights, primarily along national and international civil air routes. As discussed in the *2 GHz MSS Order*, we permit AMS(R)S in any MSS band.<sup>105</sup> The priority and preemption requirements that apply to AMS(R)S within the MSS in portions of the L-band do not extend to providing AMS(R)S to other portions of the frequency spectrum.<sup>106</sup>

37. Several parties objected to Boeing's proposal to provide AMS(R)S in the 2 GHz band.<sup>107</sup> To a large extent, the Commission rendered these objections moot in the *2 GHz MSS Order* where it observed that AMS(R)S is a form of MSS and, therefore, is a permitted service in the 2 GHz bands.<sup>108</sup> Some parties, such as Celsat and ARINC, claim that Boeing has not adequately coordinated with other relevant government and inter-governmental authorities that oversee AMS(R)S.<sup>109</sup> The fact that the Commission is addressing the merits of Boeing's pending space-station application, however, does not relieve Boeing of its independent obligation to obtain all necessary approvals from other relevant government agencies prior to offering AMS(R)S to the public.

38. The parties objecting to Boeing's AMS(R)S proposal also assert that authorizing Boeing's proposed AMS(R)S threatens to greatly complicate the sharing environment among MSS applicants and to require unwarranted restraints on other licensees' MSS operations in this band.<sup>110</sup> Indeed, Hughes asks that we condition Boeing's provision of AMS(R)S in any 2 GHz authorization on the existence of an intra-network system of priority and preemption and on the absence of any special coordination rights for Boeing by virtue of its provision of AMS(R)S.<sup>111</sup> Boeing also seeks a waiver of three rule provisions under Part 87 of the Commission's rules: (i) Section 87.145, which requires

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<sup>105</sup> *2 GHz MSS Order*, 15 FCC Rcd at 16155 ¶ 64.

<sup>106</sup> While Part 87 of our rules defines the rights and obligations of AMS(R)S licensees in the L-band and other frequencies, Part 87 does not currently address AMS(R)S operations in the 1990-2025 MHz and 2165-2200 MHz bands. *See* 47 C.F.R. § 87.1(b). Therefore, the Commission's *2 GHz MSS Order* noted that the current Part 87 rules "must be amended or waived to permit Boeing to operate AMS(R)S earth stations in the United States." *See 2 GHz MSS Order*, 15 FCC Rcd at 16155 ¶ 65 (citing 47 C.F.R. §§ 2.106, 87.187(q)).

<sup>107</sup> *See, e.g.*, ICO Comments at 71 (asserting that Boeing's AMS(R)S applications "should not be available in the 2 GHz MSS band because these are aeronautical safety services rather than purely commercial services"); Iridium Petition at 7 ("[b]ecause neither the International Table of Allocations nor the U.S. allocation . . . contains a specific allocation for AMS(R)S use, Iridium hereby petitions the Commission to deny the Boeing application"); Globalstar Reply at 6 (asserting that Boeing's application should be denied because no specific AMS(R)S allocation is present in the 2 GHz band).

<sup>108</sup> *2 GHz MSS Order*, 15 FCC Rcd at 16155 ¶ 64.

<sup>109</sup> *See* ARINC Comments at 4-5; *see also* Celsat Comments at 8 (asserting that we should defer consideration of Boeing's application because obtaining the necessary approvals from air traffic control agencies would require a lengthy and complicated process).

<sup>110</sup> *See, e.g.*, Iridium Petition at 9 ("Boeing's spectrum priority underscores the fundamental incompatibility" between Boeing's AMS(R)S proposal and the other 2 GHz MSS applicants); Constellation Comments at 20 ("the technical constraints that will be needed to accommodate the proposed applications in the 2 GHz MSS bands will make it impractical to offer the priority preemptive access that a safety of life system will require"); *see also* Globalstar Reply at 6.

<sup>111</sup> Hughes *Ex Parte* at 11-12. We note that Boeing has indicated that its system will provide priority and preemption for safety messages, consistent with Article S.44 of the ITU Radio Regulations. Boeing Second Amendment at 14, citing ITU Radio Regulations Article S.44 (order of priority for communications in the aeronautical mobile service and the aeronautical mobile-satellite service).

technical certification for transmitting aeronautical earth stations; (ii) Section 87.173, which defines the frequency bands available for AMS(R)S use; and (iii) Section 87.187(q), which indicates the frequency bands in which AMS(R)S has received special priority and preemption rights over other signals.<sup>112</sup>

39. The Commission's Part 87 Rules govern aviation services and, among other things, addresses licensing of earth stations aboard aircraft where a satellite service is involved. We are considering Boeing's space-station application; therefore, Boeing's requests that we waive several Part 87 earth-station licensing rules is premature. Accordingly, we dismiss Boeing's Part 87 waiver requests without prejudice. In the event our Part 87 rules have not been amended by the time Boeing files its earth-station application, Boeing may request a waiver in its earth station application. Of course, to the extent Boeing seeks status superior to other 2 GHz MSS operators, any grant of such status would appear to directly contradict the Commission's expressed intent in the *2 GHz MSS Order*. To address the commenters' concerns that Boeing seeks rights superior to other 2 GHz MSS licensees, we will include a condition in Boeing's license that provides that AMS(R)S operations shall not give Boeing's system any status superior to that of other 2 GHz MSS systems.

40. Boeing also requested a blanket waiver "of any other sections of the Commission's rules that are deemed necessary for the grant of Boeing's application."<sup>113</sup> As an example, Boeing mentions the possibility of waiving Section 25.136(a),<sup>114</sup> which seeks to prevent portable, hand-carried transmitters from being used aboard aircraft.<sup>115</sup> Waiver applicants must "plead with particularity the facts and circumstances" necessary to justify a waiver request.<sup>116</sup> Thus, we dismiss Boeing's generalized waiver request without prejudice to refiling another request with the specific information necessary to support a waiver.

## 2. Additional Showings

41. Celsat asks us to defer Boeing's application on grounds that Boeing has not adequately demonstrated its ability to serve rural Americans.<sup>117</sup> Nothing in the *2 GHz MSS Order* imposes such a requirement on MSS systems and we refuse to defer Boeing's application on that ground.

42. In its comments, Celsat also notes that many of the applicants in the 2 GHz proceeding – including Boeing – either directly or through what Celsat terms "affiliates," already hold licenses in different bands that permit them to provide MSS.<sup>118</sup> Celsat asks that we deny MSS incumbents access to new MSS spectrum until new entrants are accommodated.<sup>119</sup> We believe that all of the 2 GHz MSS applicants can be accommodated within the 2 GHz MSS spectrum. Thus, Celsat's request that we grant spectrum to new entrants over incumbents is dismissed as moot.

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<sup>112</sup> Boeing Second Amendment at 10.

<sup>113</sup> Boeing Second Amendment at FCC Form 312, Exhibit 1.

<sup>114</sup> 47 C.F.R. § 25.136(a).

<sup>115</sup> Boeing Second Amendment at FCC Form 312, Exhibit 1.

<sup>116</sup> *WAIT Radio v. FCC*, 418 F.2d 1153, 1157 (D.C. Cir. 1969).

<sup>117</sup> Celsat Comments at 7.

<sup>118</sup> *See id.* at 2 n.1, 3, 7-8.

<sup>119</sup> *Id.* at 7 (asserting "Boeing should receive no spectrum at 2 GHz" due to its alleged affiliation with another applicant); *see also* ICO Comments at 11-12 (raising a similar argument with respect to incumbent Big LEO licensees).



### 3. Timing of Licensing

43. 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.<sup>120</sup> 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.<sup>121</sup>

## IV. ORDERING CLAUSES

44. Accordingly, IT IS ORDERED that the Application File Nos. 179-SAT-P/LA-97(16), 90-SAT-AMEND-98(20); IBFS File Nos. SAT-LOA-19970926-00149, SAT-AMD-19980318-00021, SAT-AMD-20001103-00159 IS GRANTED and The Boeing Company IS AUTHORIZED to construct, launch and operate a sixteen-satellite system capable of operating in the 1990-2025/2165-2200 MHz bands in the United States, in accordance with the technical specifications set forth in its application and subsequent amendments, and the conditions set forth in the preceding paragraphs and consistent with our rules, unless specifically waived herein, and subject to the following conditions:

- a. The Boeing Company must choose a Selected Assignment in the 1990-2025 MHz and 2165-2200 MHz frequency bands upon launch of one satellite into its authorized orbit, and commencement of operations by that satellite;
- b. The Selected Assignment shall give The Boeing Company 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;
- 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; and
- e. Provision of Aeronautical Mobile-Satellite (Route) Service as a type of Mobile-Satellite Service shall not grant The Boeing Company any status superior to the status of other 2 GHz Mobile-Satellite Service systems.

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<sup>120</sup> 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).

<sup>121</sup> *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).

45. IT IS FURTHER ORDERED that The Boeing Company IS AUTHORIZED to operate its proposed mobile-satellite system in the 1990-2025 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 1990-2010 MHz and 2170-2200 MHz bands and shall comply with footnote S5.389F of the ITU Radio Regulations.<sup>122</sup>
- 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.<sup>123</sup>
- c. The Boeing Company is obligated to comply with the applicable laws, regulations, rules, and licensing procedures for those countries it proposes to serve.

46. IT IS FURTHER ORDERED that The Boeing Company IS AUTHORIZED to construct, launch and operate a sixteen-satellite system capable of operating in the 29.1-29.5 GHz band (Earth-to-space) and the 19.3-19.7 GHz band (space-to-Earth) for feeder link operations, in accordance with the technical specifications set forth in its application and consistent with our rules unless specifically waived herein.

47. IT IS FURTHER ORDERED that The Boeing Company must coordinate its Ka-band feeder downlink operations with the U.S. Government systems, in accordance with footnote US334 to the Table of Frequency Allocations, 47 C.F.R. § 2.106.

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

<b>Milestone</b>	<b>Deadline</b>
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

<sup>122</sup> See ITU Radio Regulations n.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).

<sup>123</sup> See ITU Radio Regulations nn.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 2160-2170 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 2160-2170 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 2160-2170 MHz bands in Region 2 with respect to other services' operations in these bands in Regions 1 and 3), S5.390 (placing limitations on MSS use of the 2010-2025 MHz and 2160-2170 MHz bands in Argentina, Brazil, Chile, Columbia, Cuba, Ecuador and Suriname).

49. IT IS FURTHER ORDERED that The Boeing Company's request for waivers of the Commission's rules, including Sections 25.136(a), 87.145, 87.173 and 87.187(q) of the Commission's rules, IS DISMISSED.

50. IT IS FURTHER ORDERED that the Consolidated Comments and Petition to Deny of Iridium LLC; the Consolidated Petition to Deny, Petition to Defer, and Comments of GE American Communications, Inc.; the Petition for Partial Denial or Deferral of Processing of PanAmSat; the Joint Petition for Partial Denial or Deferral of Processing of the Satellite Coalition; the Petition to Deny or Defer of Hughes Electronics Corporation; and the Consolidated Petition to Deny of PanAmSat Corporation ARE DENIED.

51. IT IS FURTHER ORDERED that The Boeing Company 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).

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

53. IT IS FURTHER ORDERED that The Boeing Company 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.

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

FEDERAL COMMUNICATIONS COMMISSION

Donald Abelson  
Chief, International Bureau

**Appendix A****LIST OF PLEADINGS ADDRESSING THE BOEING COMPANY'S APPLICATION  
AND ASSOCIATED AMENDMENTS****Filed May 4, 1998**

Comments of Celsat America, Inc. (Celsat Comments)  
Comments of Constellation Communications, Inc. (Constellation Comments)  
Consolidated Comments of ICO Services Limited (ICO Comments)  
Consolidated Comments and Petition to Deny of Iridium LLC (Iridium Petition)  
Comments of Aeronautical Radio, Inc. (ARINC Comments)  
Comments of Bell Atlantic (BA)  
Consolidated Petition to Deny, Petition to Defer, and Comments of GE American Communications, Inc. (GE Americom Petition)  
Petition for Partial Denial or Deferral of Processing, PanAmSat Corp. (PanAmSat 1998 Petition)  
Comments of SkyBridge L.L.C. (Skybridge Comments)  
Comments of the Fixed Point-to-Point Communications Section, Wireless Communications Division, Telecommunications Industry Association (TIA Comments)  
The Satellite Coalition, Joint Petition for Partial Denial or Deferral of Processing (Satellite Coalition Petition)<sup>124</sup>  
Comments of the Wireless Cable Association International, Inc. (WCA Comments)

**Filed June 3, 1998**

Consolidated Opposition of the Boeing Company (Boeing Opposition)  
Consolidated Replies and Oppositions of Celsat America, Inc. (Celsat Reply)  
Consolidated Opposition and Reply Comments of Constellation Communications, Inc. (Constellation Reply)  
Consolidated Reply Comments of ICO Services Limited (ICO Reply)  
Consolidated Response and Opposition to Petition to Hold in Abeyance of Iridium LLC (Iridium Reply)  
Reply to Comments of Globalstar, L.P. (Globalstar Reply)

**Filed June 18, 1998**

Consolidated Reply of The Boeing Company (Boeing Response)  
Motion for Leave to File Additional Pleading of The Boeing Company (Boeing Motion)  
Consolidated Response of Celsat America, Inc. (Celsat Response)  
Reply of Constellation Communications, Inc. (Constellation Response)  
Response to Consolidated Opposition of Globalstar, L.P. (Globalstar Response)  
ICO's Consolidated Response to Reply Comments (ICO Response)  
Consolidated Reply of Iridium LLC (Iridium Response)  
Consolidated Response of Mobile Communications Holdings, Inc. (MCHI Response)

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<sup>124</sup> The Satellite Coalition consisted of PanAmSat, Hughes Electronics Corporation (Hughes), GE Americom, Primestar Partners, L.P. (Primestar), United States Satellite Broadcasting Company, Inc. (USSBC), Echostar Communications Corp. (Echostar), Lockheed Martin Corporation (Lockheed Martin), Skybridge, and TIA.

Reply of GE American Communications, Inc. (GE Americom Response)  
Response of PanAmSat Corporation (PanAmSat Response)  
Response of the Satellite Coalition (Satellite Coalition Response)  
Response of Skybridge (Skybridge Response)  
Response of Wireless Communications Association International, Inc. (WCA Response)

**Filed December 14, 2000**

Petition to Deny or Defer of Hughes Electronics Corporation (Hughes Petition)  
Consolidated Petition to Deny of PanAmSat Corporation (PanAmSat 2000 Petition)  
Comments of TRW Inc. (TRW Comments)  
Comments of Lockheed Martin Corporation (Lockheed Martin Comments)  
Comments of Astrolink International LLC (Astrolink Comments)

**Filed January 16, 2001**

Opposition and Response of The Boeing Company (Boeing Second Opposition)

**Ex Parte Filings**

Written *Ex Parte* Presentation of Hughes Electronics Corporation (Feb. 14, 2001) (Hughes *Ex Parte*)  
Written *Ex Parte* Presentation of Astrolink International LLC (Feb. 21, 2001) (Astrolink *Ex Parte*)  
Response of PanAmSat Corporation (Feb. 21, 2001) (PanAmSat *Ex Parte*)  
Response of PanAmSat Corporation (May 22, 2001) (Second PanAmSat *Ex Parte*)  
The Boeing Company *Ex Parte* (May 24, 2001) (Boeing *Ex Parte*)  
Written *Ex Parte* Presentation of the Fixed Wireless Communications Coalition (July 13, 2001)  
(FWCC *Ex Parte*)