

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554**

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

**COMMENTS OF  
THE BOEING COMPANY**

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The Boeing Company (“Boeing”), by its attorneys and pursuant to Section 1.415 of the Commission’s Rules, 47 C.F.R. § 1.415, hereby submits its comments in response to the above-referenced Notice of Proposed Rulemaking (“*NPRM*”).

**I. INTRODUCTORY SUMMARY**

Boeing applauds the Commission’s efforts to expedite the licensing of Mobile-Satellite Service (“MSS”) systems in the 2 GHz MSS band. It is evident that the Commission has been going to great lengths to assist applicants in bringing their systems into operation at the earliest possible date. Boeing’s comments on the Commission’s *NPRM* are intended to further the prompt licensing of 2 GHz MSS systems. At the same time, Boeing urges the Commission to adopt certain rules and policies that will otherwise benefit 2 GHz MSS licensees and consumers of satellite services.

First, Boeing believes that the Commission should adopt a spectrum sharing approach that initially allocates at least 3.75 MHz of paired spectrum to each applicant.

Assigning a full 3.75 MHz to each licensee will enable them to design MSS networks that maximize the capacity and transmission quality of their initial systems. Additionally, 3.75 MHz assignments can be made without creating any delay in the licensing process.

Second, the Commission should reconsider its tentative decision to refrain from adopting financial qualification rules for 2 GHz MSS licensees. Adoption of such rules is necessary to avoid years of contentious proceedings that could result from the failure of undercapitalized applicants to meet their milestones. Furthermore, an absence of financial qualification rules will encourage the filing of speculative applications in future proceedings, making it much more difficult for legitimate systems to obtain licenses and coordinate spectrum.

Finally, the Commission should promptly authorize Boeing to launch and operate its 2 GHz MSS network and provide communication and navigation services to the global aeronautical community. Boeing's provision of aeronautical communication services is consistent with domestic and international spectrum rules and will comply with Federal Aviation Administration ("FAA") and international requirements for satellite communications systems. Boeing's 2 GHz MSS network will provide critically needed public safety services for the aviation industry, particularly in remote and rural regions of the United States and other countries, where terrestrial-based aeronautical communication systems are less than adequate. In light of the substantial public interest benefits that can be realized from Boeing's aeronautical communication and navigation services, Boeing urges the Commission to promptly grant its 2 GHz MSS authorization.

**II. THE COMMISSION SHOULD AUTHORIZE BOEING TO UTILIZE ITS 2 GHz MSS SYSTEM TO PROVIDE IMPORTANT SERVICES TO THE GLOBAL AVIATION INDUSTRY.**

Boeing is one of nine applicants seeking FCC authority to provide Mobile-Satellite Service (“MSS”) in the 2 GHz MSS band. Unlike other applicants, Boeing seeks to utilize its 2 GHz MSS system to provide communication and navigation services to the global aviation community. The communication services, commonly referred to as Aeronautical Mobile-Satellite Route Services (“AMS(R)S”) are critically needed by the aviation industry to maintain the safety and efficiency of global air transport.

As the Commission observes in its *NPRM*, FCC and International Telecommunication Union (“ITU”) rules permit the provision of AMS(R)S in generic MSS spectrum.<sup>1</sup> This is because AMS(R)S is a type of Aeronautical Mobile-Satellite Service, which is a component of MSS. The Commission also observes that the lack of a footnote in the Table of Frequency Allocations referring to the intra-network requirements of AMS(R)S is not an impediment to the provision of AMS(R)S in the United States.<sup>2</sup> The Commission notes that specific safety measures, such as intra-network priority and preemptive access, can be assured on a contractual basis.<sup>3</sup> For example, Boeing could contract with airlines to provide Aeronautical Operational Control

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<sup>1</sup> See *NPRM*, ¶ 21.

<sup>2</sup> See *id.*

<sup>3</sup> See *id.*

(“AOC”)<sup>4</sup> – the vast majority of AMS(R)S transmissions – and contract with civil aviation authorities to provide Air Traffic Services (“ATS”) communications.<sup>5</sup>

The Commission raises several questions in its *NPRM*, however, about the provision of AMS(R)S by Boeing, particularly outside the United States. First, the Commission questions whether it would be practical for Boeing to coordinate its operations with other satellite systems and aviation authorities in the rest of the world without a regulatory footnote supporting AMS(R)S in the 2 GHz MSS band.<sup>6</sup> The Commission also invites discussion on the international and domestic regulatory framework that the aviation community would require for the provision of AMS(R)S at 2 GHz.<sup>7</sup> Finally, the Commission observes that its rules for aviation terminals may need to be amended to make reference to 2 GHz MSS operations.<sup>8</sup> Boeing will address each of these issues in turn.

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<sup>4</sup> AOC involves communications between aircraft and airlines, airline dispatchers and maintenance staff. It can be used for scheduling of maintenance and engineering, emergency situation management, flight planning to take advantage of weather conditions, or to save fuel, movement control (arrival, delay and diversion), cockpit crew scheduling and aircraft engine monitoring.

<sup>5</sup> ATS includes air traffic control, flight information and altering that is provided by civil aviation authorities.

<sup>6</sup> *See NPRM*, ¶ 21.

<sup>7</sup> *See id.*, ¶ 22.

<sup>8</sup> *See id.*

**A. Boeing Will be Able to Coordinate its Operations With Other Satellite Systems and Aviation Authorities Without Regulatory Footnotes Referring to AMS(R)S.**

While the Commission acknowledges the permissibility of providing AMS(R)S in generic MSS spectrum, the Commission raises a concern in its *NPRM* that it “may not be practical” for Boeing to coordinate its operations with other satellite systems and aviation authorities on a global basis without an AMS(R)S regulatory footnote for the 2 GHz MSS band.<sup>9</sup> Obviously, the complicated and cumbersome process of international satellite network coordination would be simplified greatly for any satellite system if it were provided priority access to spectrum in ITU’s rules. While priority would be convenient, however, it certainly is not necessary. The commercial satellite industry has managed to develop successfully, primarily by utilizing the ITU coordination procedures included in Articles S9 and S11 of the Radio Regulations, along with Resolution 46. Boeing is confident that it can rely on these same rules and the support of the U.S. Government to coordinate sufficient spectrum for Boeing’s operations.

The fact that Boeing intends to provide critically important public safety services does not alter this conclusion. Boeing can coordinate its operations with MSS networks in adjacent bands utilizing interference parameters that are identical to MSS networks that do not carry emergency services. This is because Boeing has designed its MSS system with sufficient intra-network protections from external interference that Boeing does not need to secure a higher level of interference protection from adjacent MSS networks. Thus, Boeing will be able to work with the FCC to coordinate its system in

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<sup>9</sup> *Id.*, ¶ 21.

other regions of the world utilizing coordination agreements that are identical to those provided to non-emergency MSS licensees.

Boeing has also designed its satellite network to be fully capable of providing intra-network preemptive access for priority communications. Because of this design, Boeing has no need to seek inter-network preemptive capabilities with satellite networks in adjacent bands. Boeing observes that ITU rules do not require inter-network preemptive capabilities between adjacent networks when one of them provides AMS(R)S.<sup>10</sup> Additionally, as discussed in the next section, RTCA, Inc. and International Civil Aviation Organization (“ICAO”) standards for AMS(R)S do not include requirements for inter-network preemptive capabilities. Furthermore, ICAO’s Aeronautical Mobile Communications Panel (“AMCP”) recently concluded that the Iridium satellite network is acceptable for the provision of AMS(R)S, even though Iridium is incapable of preempting the signals of adjacent MSS networks such as Globalstar.<sup>11</sup>

Thus, in light of the intra-network preemptive capabilities designed within the Boeing 2 GHz MSS system, Boeing is confident that it can coordinate its AMS(R)S operations with other satellite networks on a global basis without in any way compromising the safety of civil aviation. Due to the undisputed need for the critically-

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<sup>10</sup> *WRC-97 Final Acts* at 29, S5.362A, S5.362B (requiring priority and preemption for AMS(R)S transmissions within a network in the 1545-1555 MHz and 1646.5-1656.5 MHz bands); *see also* ITU Radio Regulations, International Table of Frequency Allocations, n.S5.362 (providing that, in the U.S., AMS(R)S transmissions shall be given priority and preemption within a network in the 1555-1559 MHz, 1656.5-1669 MHz and 1660-1660.5 MHz bands).

<sup>11</sup> *See Working Paper, Acceptability Assessment of the Iridium System*, AMCP/6-WP/8, n.1 (March 30, 1999).

important public safety services that Boeing is seeking to provide to the global aviation community, Boeing urges the Commission to promptly grant its 2 GHz MSS application.

**B. The International Aviation Community has Important and Detailed Requirements for AMS(R)S, Which Boeing Has Promised to Satisfy.**

Boeing has been working actively with the domestic and international civil aviation community to ensure that the public safety needs of global aeronautics are addressed fully in Boeing's plans to provide AMS(R)S in its 2 GHz MSS network. The safety and reliability of Boeing's AMS(R)S service can be ensured through a combination of FAA, RTCA and ICAO specifications, a contractual commitment by Boeing to provide priority and preemptive access in its satellite network, a technical design for Boeing's satellite system that ensures that interference mitigation measures are in place, and the existing regulatory provisions of the ITU Radio Regulations.

As the Commission is aware, the global aviation community places "safety of flight" as its paramount goal. The primary responsibility of the FAA is ensuring the safety of civil aviation. Assisting the FAA is RTCA, a non-profit organization in which government and industry representatives (both from the United States and other countries) address improvements in aeronautical communication and navigation. RTCA Special Committees develop Minimum Operational Performance Standards ("MOPS"), which are used by civil aviation authorities such as the FAA to develop domestic regulation and policy.

ICAO is also involved in the policy making process. The international organization was established to promote the "safe and orderly" development of civil

aviation.<sup>12</sup> One of ICAO's chief activities is the preparation of Standards and Recommended Practices ("SARPs") covering all aspects of aviation. ICAO SARPs are advisory in nature, but ICAO encourages its Contracting States to incorporate SARPs in domestic regulation.

Both RTCA and ICAO are vigilant in responding to improvements in aviation and communications technology and procedures. In fact, RTCA and ICAO are addressing actively the precise question posed by the FCC in its *NPRM* – what are the international and domestic requirements for the provision of AMS(R)S in radio frequencies globally allocated to MSS? RTCA and ICAO have developed guidance on this question and are continuing to refine their preliminary conclusions. Boeing is participating in these activities and has assured the aviation community that its 2 GHz MSS network will satisfy every public safety requirement.

The preexisting aeronautical regulatory structure for AMS(R)S provides significant instruction, but not clear direction, on the provision of AMS(R)S in the 2 GHz MSS band. RTCA has in place two documents on equipment specifications and network performance standards for satellite systems providing aeronautical mobile-satellite service ("AMSS") and AMS(R)S.<sup>13</sup> While the documents provide valuable information on AMS(R)S architecture, they were primarily intended to assist manufacturers of avionics designed to operate with the Inmarsat network, and their applicability is limited

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<sup>12</sup> *Convention on International Civil Aviation*, Dec. 7, 1944 ("Chicago Convention").

<sup>13</sup> See *Minimum Operational Performance Standards for Aeronautical Mobile Satellite Services (AMSS)*, RTCA/DO-210C (Jan. 16, 1996); *Guidance on Aeronautical Mobile Satellite Service (AMSS) End-to-End System Performance*, RTCA/DO-215A (Feb. 21, 1995).

to the 1.5/1.6 GHz bands.<sup>14</sup> RTCA Special Committee 165 is considering the adoption of a new MOPS for low earth orbit (“LEO”) operations, but the updated document was developed for the Iridium system and limits its applicability to the 1616-1626.5 MHz band.<sup>15</sup>

Despite the lack of direct applicability to the 2 GHz MSS band, RTCA’s existing and draft documents provide information on the technical and operational measures that should be incorporated into an AMS(R)S system.<sup>16</sup> The documents indicate that an AMSS system must have the technical capability to provide priority and controlling precedence for safety communications.<sup>17</sup> This includes mechanisms to provide preemption of the network’s resources as necessary.<sup>18</sup> The documents appear to create a regulatory obligation that is applicable to any satellite system operator providing AMS(R)S in the bands covered by the MOPS, arguably alleviating the need for a footnote addressing priority and preemption in the Table of Frequency Allocations.<sup>19</sup>

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<sup>14</sup> In fact, one of the documents repeatedly refers to Inmarsat by name and indicates that it should be used for AMSS systems operating in the 1.5/1.6 GHz bands. *See* DO-210C, § 1.1.

<sup>15</sup> Draft Document No. RTCA/DO-WWW, Version 6.2 (April 28, 1999).

<sup>16</sup> For example, the documents discuss system architecture, geographic coverage, subsystem characteristics, data protocols, operational service levels, minimum bit rates, along with the types of services that should be classified as AMS(R)S as opposed to AMSS.

<sup>17</sup> *See* DO-210C, at 1.4.3; DO-215A, § 1.6.5.

<sup>18</sup> *See* DO-210C, at 1.4.3; DO-215A, § 1.6.5.

<sup>19</sup> In any event, Boeing has found no indication that RTCA’s existing or draft MOPS require that a priority and preemption provision be included in a footnote of the Table of Frequency Allocations.

Boeing has indicated to RTCA Special Committee 165 that its system will comply with each of the technical and operational specifications included in the MOPS that are applicable to a medium earth orbit (“MEO”) satellite network operating in the 2 GHz MSS band. Additionally, Boeing is preparing a new draft MOPS that would cover MEO operations at 2 GHz. Once this draft is completed, Boeing intends to present the document to the Special Committee for consideration and approval.

Boeing is also active in ICAO working groups addressing the provision of AMS(R)S. ICAO has in place detailed standards (SARPs) addressing transmissions between aircraft and satellite networks. The SARPs indicate that earth stations used for aeronautical communications should be technically capable of preempting low priority messages both in the bands designated for AMS(R)S and in “other frequencies to which the station can tune.”<sup>20</sup> The SARPs also indicate that aeronautical earth stations should be capable of operating in the bands currently designated for AMS(R)S, but place no limitation on other available frequencies.<sup>21</sup>

ICAO’s AMCP is actively preparing amendments to the SARPs,<sup>22</sup> along with Acceptability Criteria for Next-Generation Satellite Systems (“NGSS criteria”).<sup>23</sup> As a part of this process, the AMCP is considering whether satellite systems providing

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<sup>20</sup> See ICAO SARPs, at Annex 10, Volume III, Part 1, Ch. 4, § 4.2.1.1.1 (July 20, 1998).

<sup>21</sup> See *id.*, §§ 4.2.1.2-4.2.1.3.

<sup>22</sup> See Working Paper, *Strawman Generic NGSS Standards and Recommended Practices*, AMCP/WGA-WP/540 presented to the ICAO Aeronautical Mobile Communications Panel/Working Group A, 13th Meeting, Brussels, Belgium (June 30- July 10, 1998).

<sup>23</sup> See Working Paper, *Acceptability Criteria for Next-Generation Satellite Systems*, ICAO, Aeronautical Mobile Communications Panel, AMCP/6-WP/7, § 2.1 (Feb. 15, 1999) (“NGSS criteria”).

AMS(R)S should operate in frequency allocations covered by a footnote that addresses priority and preemptive access. While draft amendments to the SARPs and NGSS criteria currently include such a requirement, the AMCP recently indicated that such a footnote may not be necessary because “the Radio Regulations already contain material providing for” the provision of priority, precedence and preemption, as well as protection from harmful interference.<sup>24</sup>

Specifically, Articles S44 and S45 of the Radio Regulations mandate that a satellite operator carrying aeronautical communications must provide intra-network priorities for AMSS safety and distress communications.<sup>25</sup> In carrying out this requirement, Article S45.4 envisions that a network operator may need to preempt low-priority transmissions to make capacity available for priority communications.

ICAO’s AMCP also recently concluded that a lack of protective language in a footnote to the Table of Frequency Allocations may not be a public safety concern if a satellite system has a technical design that ensures that intra-network priority and preemptive access is available.<sup>26</sup> Furthermore, the AMCP has recognized that certain aspects of aviation safety, such as unrestricted access for distress and urgency

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<sup>24</sup> Working Paper, *Acceptability Assessment of the Iridium System*, AMCP/6-WP/8, n.1 (March 30, 1999).

<sup>25</sup> Since AMS(R)S is a subset of AMSS, Article S44 applies directly to AMS(R)S.

<sup>26</sup> For example, in assessing the acceptability of the Iridium satellite system, the AMCP noted that while the spectrum licensed to Iridium by the FCC contains a footnote referring to AMS(R)S, it does not ensure priority and preemptive access for AMS(R)S communications. The panel concluded, however, that the actual “provision of priority, precedence and pre-emption within the Iridium system would help alleviate those concerns.” Working Paper, *Acceptability Assessment of the Iridium System*, AMCP/6-WP/8, n.1 (March 30, 1999).

communications, can be ensured through written commitments and contractual arrangements between satellite service providers and the users of services.<sup>27</sup>

In light of these conclusions, Boeing is confident that it can work successfully with the international civil aviation community to finalize a regulatory approach that will advocate Boeing's plan to provide AMS(R)S within the 2 GHz MSS band. A paper was presented recently to the AMCP indicating that Boeing's 2 GHz MSS system will comply with each of ICAO's technical and operational requirements.<sup>28</sup> Boeing believes that the public safety needs of civil aviation can be accommodated in Boeing's AMS(R)S proposal through a combination of (1) RTCA MOPS and ICAO SARPs that mandate priority and preemptive capabilities in AMS(R)S networks, (2) a written contractual commitment by Boeing to provide priority and preemptive access in its satellite network, (3) a technical design for Boeing's satellite system that mitigates interference and ensures that aeronautical communications are provided pursuant to the operational requirements specified by aviation authorities and (4) the existing regulatory provisions contained in Articles S44 and S45 of the ITU Radio Regulations.

Boeing is continuing to work with the FAA, RTCA, ICAO and other aviation authorities to ensure that the public safety needs of the global civil aviation industry are addressed fully in its plans to provide AMS(R)S. In light of the ongoing efforts in the aviation community, the FCC is urged to promptly authorize Boeing to launch and operate its 2 GHz MSS network.

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<sup>27</sup> See *NGSS criteria*, Appendix A, References B & Y.

<sup>28</sup> See Information Paper, *Statement of Future Availability of a Boeing NGSS*, The Boeing Company, AMCP/6-WP/20 (March 23, 1999) presented to the ICAO Aeronautical Mobile Communications Panel, Sixth Meeting, Montreal, 23-30 March 1999.

**C. Boeing Acknowledges the Need to Amend Part 87 of the Commission’s Rules and Will Submit a Petition for Rulemaking in the Near Future.**

Finally, the Commission observes in its *NPRM* that Part 87 of the rules include requirements for aeronautical terminals used for distress and safety communications.<sup>29</sup> The rules include a list of frequency bands that are available for aircraft-to-satellite AMS(R)S transmissions and currently limits such operations to the 1646.5-1660.5 MHz band. As a result, the table may need to be amended to permit Aircraft Earth Stations (“AES”) to operate in other frequency bands, such as the 2 GHz MSS band and the Big LEO MSS bands.

Boeing intends to file a petition for rule making with the Commission seeking to amend Part 87 of the rules. Prior to filing such a petition, however, Boeing has been working with the FAA, RTCA and ICAO to address the technical and public safety issues implicated by its proposed AMS(R)S service. Boeing acknowledges that the FCC will require appropriate time to deliberate on any petition for rule making submitted to the Commission on this issue. Boeing believes, however, that its deliberative process could be greatly simplified by the prior resolution of many of the above discussed public policy questions.

In any event, Boeing does not believe that the Commission should delay the issuance of a 2 GHz MSS license pending changes to Part 87 of the rules. Instead, the Commission should promptly authorize Boeing to launch and operate its 2 GHz MSS system. Only in this way can the global aviation community be assured that Boeing will

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<sup>29</sup> See *NPRM*, ¶ 21.

be able to provide critically needed aeronautical communication and navigation services on an expedited basis.

### **III. THE COMMISSION SHOULD AUTHORIZE BOEING'S PROPOSED RADIONAVIGATION SATELLITE SERVICE.**

In the *NPRM*, the Commission requests comment on Boeing's proposed use of the 1565.42-1585.42 MHz band ("GPS L1 band") to provide Navigation Augmentation Services.<sup>30</sup> The Commission observes that portions of the GPS L1 band are used for the Global Positioning System ("GPS") and, as a result, Boeing's use of the band involves technical and national policy issues.<sup>31</sup>

The Commission should promptly approve Boeing's proposal to provide GPS augmentation services in the GPS L1 band. Boeing can provide these services on a fully coordinated basis with government operations in the band.

The Commission should also promote the public interest by adopting rules requiring that any Radionavigation Satellite Service ("RNSS") operating in the GPS L1 band must provide truly global coverage. Provision of global coverage is necessary in order to ensure that populations in every region of the world benefit from positioning services operating in the limited spectrum globally available for RNSS. Globally available positioning services are especially needed by the aviation industry, which operate major flight paths in northern latitudes that cannot be covered by regional augmentation systems such as those provided by geostationary ("GSO") satellites.

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<sup>30</sup> *See id.*, ¶ 68.

<sup>31</sup> *See id.*

The Commission should also approve Boeing's augmentation service because Boeing has been able to assure government users of the band that Boeing's service is fully compatible with existing systems. As Boeing indicated in its application, the purpose of Boeing's proposed service is to provide satellite correction and integrity information to improve GPS accuracy.<sup>32</sup> To this end, the Boeing Company provided analyses to the GPS Joint Program Office indicating that the Boeing satellite system will comply with the technical specifications included in ICD GPS 200, its subsidiary documents, and any subsequent revisions to those requirements. Boeing has also assured the United States Air Force that Boeing will tailor its satellite operations so that the total number of signals radiated by Boeing in the GPS L1 band will not reduce the carrier-to-noise per bit ratio (C/No) in a GPS tracking receiver below that necessary to acquire and track the satellites.

The Boeing Company looks forward to continuing its work with the United States Government in resolving any remaining technical and policy issues concerning its proposed GPS augmentation service. In light of the substantial benefits that Boeing's proposed service can provide to users, Boeing urges the Commission to promptly grant Boeing's application.

#### **IV. THE COMMISSION SHOULD AUTHORIZE BOEING'S PROPOSED TRAFFIC INFORMATION SERVICE AS A PART OF BOEING'S OVERALL CDMA-BASED SYSTEM.**

As the Commission observes in its *NPRM*, Boeing is proposing to include a traffic information service as one of the components of its 2 GHz MSS system. The traffic

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<sup>32</sup> *Application for Authority to Construct, Launch and Operate a Non-Geosynchronous Satellite System in the 2 GHz Mobile-Satellite Service and the Aeronautical Radionavigation-Satellite Service*, FCC File No. 179-SAT-P/LA-97, Attachment 2, at 2 (Sept. 26, 1997)

information service would broadcast to aircraft the positions of surrounding aircraft on a global basis. This information could be displayed on a cockpit monitor to increase flight crew awareness of potential encroachments.

The Commission observes in its *NPRM* that Boeing's proposed traffic information service is a one-way service.<sup>33</sup> Thus, a specific allocation for this service would create a spectrum assignment imbalance.

Boeing acknowledges the Commission's long-standing policy of licensing spectrum in even pairs for uplink and downlink operations. The practical basis for this policy is becoming less clear as MSS operators begin providing imbalanced data services such as fax and Internet. Nevertheless, the policy may be the only means available to license spectrum use in a coordinated manner. Recognizing this, Boeing would be willing to provide its traffic information service within the overall capacity of Boeing's CDMA-based network. Thus, Boeing urges the Commission to authorize its traffic information service as a part of its 2 GHz MSS network.

**V. BOEING'S 2 GHz MSS SYSTEM WILL PROMOTE THE COMMISSION'S PUBLIC INTEREST GOAL OF PROVIDING SERVICES TO UNSERVED AREAS.**

Boeing supports the Commission's interest in establishing policies and rules that will serve to encourage delivery of satellite services to unserved and rural areas. In the *NPRM*, the Commission seeks comment as to any policies or rules that the Commission could implement (or forbear from) to encourage 2 GHz MSS service to "unserved

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<sup>33</sup> See *NPRM*, ¶ 35.

communities.”<sup>34</sup> Boeing asks the Commission to conclude that the launch and operation of Boeing’s 2 GHz MSS system for aviation activities (which will serve the entire United States, the oceans, and every continent and country) is both consistent with, and in furtherance of, the public policy goals of this proceeding.

Boeing seeks to provide communication and navigation services to the aeronautical community because existing air traffic management facilities are facing increasing difficulty in handling the dramatic growth in global air traffic. The problem is particularly serious in remote areas of the globe where modern aeronautical communication and navigation aids are largely absent. Boeing’s 2 GHz MSS system can help mitigate this problem by providing a satellite-based infrastructure capable of providing state-of-the art communications and navigation services to every region of the world.

The construction of a modern aeronautical communications system will directly benefit consumers residing in, and traveling to, rural and remote areas. Populations in less developed regions are largely dependent on local airports for long distance travel and international commerce. Interconnecting facilities in these regions with a satellite-based communication and navigation system will greatly increase the safety and efficiency of air travel, to the direct benefit of local and traveling populations.

Boeing observes that in discussing the potential benefits of MSS to unserved areas, the Commission highlighted the example of offering communication services to a police force in the Navajo Nation.<sup>35</sup> Providing communication services to public safety

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<sup>34</sup> *NPRM*, ¶ 95.

<sup>35</sup> *See id.*, ¶ 95 n.210.

agencies in remote areas directly benefits rural populations and is directly comparable to the provision of safety communications for airports and airlines in those same communities.

The Commission also observed that “[s]atellites may offer a cost advantage over wireline access alternatives in remote areas where a limited population may not provide the economies of scale to support the deployment of wireline or terrestrial wireless networks.”<sup>36</sup> While aviation activities were not specifically mentioned in the *NPRM*, they truly qualify as areas that are not, and often cannot be, well served by terrestrial communications systems.<sup>37</sup> In Boeing’s view, the public interest justifications for using MSS spectrum to fulfill the underserved needs of the aviation industry are substantial. The Commission is therefore justified in concluding that the launch and operation of Boeing’s 2 GHz MSS system is both consistent with, and in furtherance of, the public policy goals of this proceeding.

**VI. BOEING’S SYSTEM IS CONSISTENT WITH THE COMMISSION’S PUBLIC POLICY OBJECTIVE OF ENCOURAGING THE USE OF MSS SATELLITE SERVICES TO PROMOTE SAFETY OF LIFE.**

Unlike other satellite systems that endeavor to provide traditional telephony, Boeing’s proposed system will utilize spectrum in the 2 GHz MSS band to provide safety of life services by enhancing air traffic management worldwide. The provision of these much needed services is consistent with the Commission objective of using MSS to promote safety of life. In the *NPRM*, the Commission seeks to impose additional service

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<sup>36</sup> *Id.*, ¶ 95.

<sup>37</sup> *Id.*

requirements on MSS systems that, although may be well intended in promoting public safety, are not appropriate for all MSS systems.

Specifically, in the *NPRM*, the Commission seeks comment on its tentative conclusion that the distress and safety rules adopted for Big LEO licensees should also be adopted for 2 GHz MSS systems.<sup>38</sup> In addition, the Commission seeks comment on whether 2 GHz MSS systems, particularly those at an early stage of development, should be required to implement their systems with enhanced 9-1-1 (“E911”) capabilities.<sup>39</sup> While these objectives are laudable, they are not appropriate or practicable to systems, such as Boeing’s, that do not provide traditional mobile telephony services. Therefore, the Commission should refrain from imposing E911 requirements and the provision of distress and safety services on MSS networks unless the inclusion of such services is appropriate.

**VII. THE COMMISSION SHOULD AUTHORIZE EACH QUALIFIED 2 GHz MSS APPLICANT TO INITIALLY OPERATE IN AT LEAST 3.75 MHz OF PAIRED SPECTRUM.**

In order to maximize the likelihood of success for 2 GHz MSS licensees, the Commission should authorize each applicant to initially operate in at least 3.75 MHz of paired spectrum. Authorizing 3.75 MHz to each licensee will enable applicants to utilize technical designs that can provide greater capacity and, equally important, better transmission quality than may be available using only 2.5 MHz of paired spectrum.

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<sup>38</sup> *Id.*, ¶ 93.

<sup>39</sup> *Id.*, ¶ 94.

Boeing's application provides an example of the improved performance that could be realized using 3.75 MHz of paired spectrum. In its application, Boeing proposes to operate its basic service links in about 8 MHz of paired spectrum using 37 spot beams on each satellite and a three-cell frequency reuse approach. Each cell is designed to use two dual-polarized channels of 1.25 MHz (IS-95 CDMA) in each spot beam, providing a high level of performance quality.

In contrast, if Boeing is required to initially operate in 2.5 MHz of paired spectrum (*i.e.*, two 1.25 MHz channels), Boeing would need to use a 100% frequency reuse scheme (each cell using the same 2.5 MHz of spectrum) to provide sufficient bandwidth for each cell. While such an approach is technically feasible, it would reduce overall system capacity by significantly increasing adjacent cell interference.

Interference would increase not only because each cell would use the same frequencies, but also because Boeing would be forced to operate without guard bands. Boeing proposed in its application to incorporate small 0.25 MHz guard bands between each channel. Overall capacity would be reduced because, even though each cell would utilize 2.5 MHz of spectrum, the interference-limited architecture of a CDMA-based system would be adversely affected by the increase in adjacent cell interference.

To avoid these potential problems and improve transmission quality, each applicant should be permitted to initially utilize a third 1.25 MHz channel in its network. Access to a full 3.75 MHz of paired spectrum would give Boeing the option of reducing interference by maintaining its existing three-cell frequency reuse design. For example, Boeing would be able to operate with one band of 1.25 MHz of dual polarized spectrum in each cell. This would reduce adjacent cell interference and allow a higher data

capacity in each cell's frequency band. Such an approach would vastly increase spectrum efficiency, while accommodating the spectrum needs of each of the 2 GHz MSS applicants.

In arguing in favor of 3.75 MHz initial authorizations, Boeing acknowledges the Commission's desire to create expansion spectrum. Boeing believes that it is unnecessary, however, to earmark more than a third of the 2 GHz MSS band for expansion purposes. The Commission does not need to leave this spectrum fallow because ample expansion spectrum will result from the inevitable fact that the market is unlikely to absorb eight to nine new MSS systems in the next decade. The Commission acknowledges in its *NPRM* that all nine of the currently proposed MSS systems may not be constructed.<sup>40</sup> The loss of some of these systems will provide ample expansion spectrum, which the Commission should utilize to accommodate the growth needs of those 2 GHz MSS systems that are successful in serving consumers.

In advocating an initial authorization of 3.75 MHz of paired spectrum, Boeing maintains its support for the Commission's Traditional Band Arrangement for 2 GHz MSS licensees. Such an approach will accommodate each of the applicants, including both GSO and non-geostationary ("NGSO") constellations, along with TDMA and CDMA-based networks. Use of a traditional approach would also greatly facilitate international spectrum coordination by giving U.S. licensees a model that can be pursued in other countries. Furthermore, implementation of a traditional approach could take place in concert with any terrestrial relocation that is required by the Commission. Each

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<sup>40</sup> See *id.*, ¶ 29.

applicant would relocate terrestrial operations in its share of the spectrum band, while a compensation scheme could be utilized to balance relocation costs between licensees.

In continuing to advocate a traditional spectrum sharing approach, Boeing acknowledges that both the Commission and 2 GHz MSS applicants are studying other spectrum sharing regimes that may offer certain benefits in this proceeding. Boeing is continuing to talk with other applicants about potential opportunities and hopes to be able to comment further on their suitability in its reply comments on July 26th. In any event, regardless of the spectrum sharing approach adopted by the Commission, Boeing believes that the Commission should maximize spectrum efficiency and the likelihood of success for 2 GHz MSS licensees by initially authorizing at least 3.75 MHz of spectrum to each applicant.

#### **VIII. THE COMMISSION SHOULD AUTHORIZE BOEING'S FULL REQUEST FOR FEEDER LINK SPECTRUM.**

As the Commission noted in its *NPRM*, Boeing is seeking authority to operate feeder links for its 2 GHz MSS system in the Ku-band.<sup>41</sup> Specifically, Boeing requested only 109 MHz of paired spectrum at 14.391-14.5 GHz and 11.591-11.7 GHz. As Boeing demonstrated in a technical supplement to its application filed January 8, 1999, Boeing can operate its feeder links in the Ku-band without causing unacceptable interference to GSO satellites and terrestrial networks in the band. Boeing's proposal constitutes a highly efficient use of spectrum because it increases the number and variety of spectrum uses that can be accommodated within the Ku-band. Furthermore, Boeing can operate its feeder links on a shared basis with other NGSO satellite systems that have been

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<sup>41</sup> See *id.*, ¶ 61.

proposed. Thus, the Commission should promptly authorize Boeing's feeder link request.

**A. The Commission Should Consider Cautiously Any Proposal to Reduce Feeder Link Assignments for 2 GHz MSS Licensees.**

In its *NPRM*, the Commission requests comment on whether it should reduce the amount of feeder link spectrum authorized to applicants to reflect anticipated reductions in the amount of 2 GHz MSS service links spectrum that may be authorized.<sup>42</sup> Boeing acknowledges that most of the 2 GHz MSS applicants requested the use of the entire 2 GHz MSS band for service links. To the extent that these same applicants made comparable feeder link requests, some reduction in feeder link authorizations may be appropriate. In contrast, Boeing requested access to only about 8 MHz of service link spectrum and its feeder link request was equally modest.<sup>43</sup>

In any event, the Commission should exercise caution in considering reductions in feeder link authorizations. It cannot be automatically concluded that a reduction in an operator's service link spectrum warrants a comparable reduction in its feeder link requirements. This is because of the extensive re-engineering that may be required in order to provide adequate services in a reduced service link assignment.

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<sup>42</sup> See *id.*, ¶ 55.

<sup>43</sup> In addition to Boeing's feeder link bandwidth requirements to accommodate its service links, Boeing requested a certain amount of feeder link bandwidth for TT&C operations. In its application, Boeing included two TT&C bands -- one on each end of its proposed feeder link band. Each TT&C band would utilize 2 MHz of bandwidth for an overall TT&C bandwidth requirement of 4 MHz. Any calculation of Boeing's feeder link requirements would need to add this TT&C capacity to the overall bandwidth required.

Boeing's application provides an example of this difficulty. As discussed in the previous section, Boeing proposed to operate its basic service links in about 8 MHz of paired spectrum using 37 spot beams on each satellite and a three-cell frequency reuse approach. Each cell was designed to use 2.5 MHz of spectrum with guard bands of 0.25 MHz. This resulted in a total feeder link requirement of about 101.75 MHz for the basic service (2.75 x 37 spot beams).<sup>44</sup>

In contrast, if Boeing is forced to redesign its system to initially operate in just 2.5 MHz of service link spectrum, Boeing would need to adopt a 100% frequency reuse scheme (each cell using the same 2.5 MHz of spectrum) in order to provide sufficient bandwidth for each cell. Along with the interference problems discussed in the previous section, such an approach would necessitate the use of a guard band of 0.25 MHz between each cell in the feeder link signal in order to allow for filtering and demultiplexing at the satellite. As a result, Boeing's total feeder link bandwidth requirement using the FCC's 2.5 MHz approach would still be 101.75 MHz of paired spectrum (37 beams at 2.75 MHz for each beam) – the same bandwidth required under Boeing's original approach.

Importantly, the above calculations provide no room for growth. The Commission should anticipate that those 2 GHz MSS applicants that are successful in launching their systems will probably need to expand their operations to utilize additional service link and feeder link bandwidth. The ability to expand will be particularly important for 2 GHz MSS licensees that do not hold prior MSS authorizations in the Big

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<sup>44</sup> The remaining feeder link spectrum would be used for TT&C (4 MHz) and to provide feeder links for Boeing's GPS augmentation service (3.75 MHz).

LEO MSS band. Additionally, it can be anticipated that the 2 GHz MSS band will be able to accommodate future growth because of the significant likelihood that undercapitalized 2 GHz MSS applicants will be unsuccessful in proceeding to launch.

Injecting future growth into the redesign of Boeing's system would increase its feeder link requirements above the spectrum indicated in its system application. In other words, as a result of the spectrum sharing rules that may be adopted in this proceeding, Boeing may need more feeder link spectrum than it originally requested. In light of this fact, the Commission should move cautiously when considering reductions in feeder link authorizations. The Commission should also refrain from considering any reductions in feeder link bandwidth until it has reviewed any amended applications submitted by 2 GHz MSS applicants that may be necessary to incorporate the spectrum sharing approach eventually adopted in this proceeding.

**B. Milestones for 2 GHz MSS Licensees Should not Begin Until the FCC Completes Feeder Link Assignments.**

In the *NPRM*, the Commission raises the possibility of starting the running of milestones for 2 GHz MSS licensees as soon service link authorizations are issued, regardless of whether feeder link and inter-satellite link assignments have been finalized.<sup>45</sup> Such an approach would be unprecedented for the Commission, which has routinely delayed implementation of milestones for satellite licensees until all critical spectrum assignments have been completed.

During *ex parte* discussions with the FCC, Boeing refrained from objecting to the Commission's proposed approach to milestone implementation. This is because Boeing

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<sup>45</sup> See *NPRM*, ¶ 49.

has anticipated throughout this proceeding that final authorizations for NGSO systems in the Ku-band would be issued on a timeframe comparable to the 2 GHz MSS proceeding. As a result, Boeing would be able to operate feeder links for its 2 GHz MSS system in the Ku-band without an appreciable delay in construction.

Boeing continues to have confidence in the Commission's ability to expeditiously grant final authorizations for NGSO systems in the Ku-band. Boeing is concerned, however, about proposals by other applicants to operate feeder links in the C-band and Ka-band. According to records maintained by the International Telecommunication Union, Radiocommunication Bureau ("ITU-R"), a substantial number of administrations have filed notices seeking to operate feeder links in the C-band and Ka-band MSS feeder link allocations. It appears unlikely that all of these systems can be accommodated in the available spectrum.

Admittedly, many of the systems slated to operate feeder links in the C- and Ka-bands may turn out to be "paper satellites." With respect to U.S. licensed systems, this possibility is heightened by the Commission's preliminary decision to refrain from adopting financial qualification rules for the 2 GHz MSS service.

Unfortunately, due to the cumbersome nature of the ITU-R process, it may take two or more years for the FCC to ascertain just how many additional MSS systems can operate feeder links successfully in the C- and Ka-bands. During this period, it would not be equitable to run the milestones of 2 GHz MSS licensees that have not been issued final feeder link assignments. As the Commission is aware, significant limitations exist with respect to a satellite operator's ability to appreciably influence the ITU-R's satellite system coordination procedure. Substantial delays exist in every step of the process,

which cannot be avoided by proponents of new satellite systems. Accordingly, in order to provide equitable treatment for each new satellite system operator, the Commission should maintain its long standing approach of refraining from starting the milestone “clock” for new satellite systems until each of the critical spectrum allocation decisions has been finalized by the Commission.

**IX. THE COMMISSION SHOULD ESTABLISH FINANCIAL QUALIFICATION REQUIREMENTS TO DETER GREENMAIL-LIKE PRACTICES AND TO PREVENT DELAY IN THE PROVISION OF ADDITIONAL MSS SERVICE TO THE PUBLIC.**

The Commission should adopt financial qualification rules for the 2 GHz MSS service. Boeing respectfully disagrees with the Commission’s tentative conclusion that a demonstration of financial qualifications may not be necessary in the 2 GHz MSS processing round.<sup>46</sup> The Commission bases this tentative proposal on its belief that the 2 GHz MSS allocation can accommodate all nine of the proposed systems without mutual interference. Boeing is convinced that even if all nine of the proposed systems can be accommodated, the failure to adopt financial qualification requirements could still jeopardize the public interest in the immediate availability of new types of MSS service and the efficient use of the spectrum allocated to this service. The lack of financial requirements is also likely to introduce additional parties for international coordination, which could tie up spectrum for years. Another serious result of not imposing financial requirements is that it could facilitate abuses by applicants, such as the “warehousing” of spectrum and engaging in “greenmail-like” practices of selling a bare license and privately profiting from the regulatory process.

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<sup>46</sup> See *id.*, ¶¶ 23-25.

**A. The Commission Has Clear Authority to Impose Financial Qualifications.**

Section 308(b) of the Communications Act, 47 U.S.C. § 308(b), obligates the Commission to ensure that an applicant is qualified to hold a license.<sup>47</sup> To satisfy this obligation, the Commission may prescribe necessary qualifications, including those relating to citizenship, character, and financial and technical ability to operate a station. Indeed, in many of the services authorized by the Commission, applicants must demonstrate their financial ability to implement the proposed facilities.<sup>48</sup> As the Commission has previously stated, “[a] financial requirement is in the public interest when . . . the Commission is authorizing a new service and does not want the implementation of service to the public unduly delayed.”<sup>49</sup> In this proceeding, the Commission has made clear its objective of establishing rules and policies that will “facilit[ate] prompt delivery of 2 GHz mobile satellite services to consumers.”<sup>50</sup> Financial qualification requirements will serve to satisfy that objective.

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<sup>47</sup> See *Land Mobile Satellite Service for the Provision of Various Common Carrier Services*, 2 FCC Rcd 485, 488 (1986) (“*Land Mobile Second Report & Order*”).

<sup>48</sup> See *Land Mobile Satellite Service for the Provision of Various Common Carrier Services*, 4 FCC Rcd 6029, 6032 (1998) (“*Land Mobile Memorandum Opinion & Order*”).

<sup>49</sup> *Id.*

<sup>50</sup> *NPRM*, ¶ 10.

**B. The Lack of Financial Qualification Requirements Could Facilitate Abuses by Applicants, Such as the “Warehousing” of Spectrum and Engaging in “Greenmail-Like” Practices of Selling a Bare License and Privately Profiting From the Regulatory Process.**

Significantly, the imposition of financial requirements can serve to deter speculative applications filed by underfinanced entities that have no real interest in operating a satellite system but are seeking to profit from obtaining a license.<sup>51</sup> Concern about speculative satellite system proposals is shared by the international community, which is currently engaged in an effort to chase out “paper satellites.” The United States should establish itself as a leader in preventing these types of abuses. Without financial qualification requirements, applicants could be placed at the mercy of speculators that could acquire spectrum and “greenmail” those applicants that need additional spectrum in order to serve their customers. As the Commission recognizes, “based on the system proponents’ spectrum requests, there is insufficient spectrum to accommodate all systems as proposed without causing mutual interference”;<sup>52</sup> this lack of sufficient spectrum presents an opportunity for abuses, such as “greenmail.” Creating an environment conducive to abusive practices could substantially delay service to the public and thereby contravene the Commission’s stated objective of facilitating prompt delivery of 2 GHz MSS to the public.<sup>53</sup>

Abuses to the regulatory process caused by speculative applications are well documented in the licensing of wireless and broadcasting services, which have since

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<sup>51</sup> See *Land Mobile Memorandum Opinion & Order* at 6032 (stating same).

<sup>52</sup> *NPRM*, ¶ 8.

<sup>53</sup> See *id.*, ¶ 10.

compelled the Commission to establish “greenmail” restrictions for public mobile services under Part 22,<sup>54</sup> for private land mobile radio services under Part 90,<sup>55</sup> and for broadcast radio services under Part 73.<sup>56</sup> In a proceeding concerning rules for rural cellular services, for example, the Commission was convinced to adopt (after abuses which resulted from a previous policy of not imposing financial requirements) firm financial commitment showing at the time RSA cellular applicants file their applications for each cellular market, given the evidence of abuse stemming from the lottery process. The Commission provides the account of one commenting party urging for the establishment of a firm financial commitment when filing applications:

Some commenters claim that the proposed requirement is needed to solve problems created by the filing of speculative applications . . . . [T]he absence of a requirement for a financial showing prior to lottery enabled application preparers to market large numbers of applications at little cost. Consequently, . . . the average number of applications per market increased . . . . Under such circumstances, according to CTIA, the chances of legitimate applicants are overwhelmed by frivolous and speculative applications. CTIA notes other consequences of our earlier decision not to require a financial demonstration upon filing. It submits that half of the non-wireline winners in markets 121-305 were subject to petitions to deny. CTIA also estimates that at least 80% of non-wireline permits awarded have been transferred or are in the process of being transferred. This activity, it contends, is a further indication that many applicants were not serious about providing service to the public.<sup>57</sup>

Although these abuses occurred under a different licensing regime, it nonetheless illustrates the serious potential for abuse when applicants for FCC licenses are not

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<sup>54</sup> 47 C.F.R. § 22.129.

<sup>55</sup> 47 C.F.R. § 90.162.

<sup>56</sup> 47 C.F.R. § 73.3588.

<sup>57</sup> *In the Matter of Amendment of the Commission’s Rules for Rural Cellular Service*, 4 FCC Rcd 2542, 2542-43 (1988).

screened for financial qualifications. The Commission should ensure that regulatory measures, such as financial qualification requirements, are in place to prevent a similar occurrence in the 2 GHz MSS context.

**C. The Lack of Financial Qualification Requirements Could Jeopardize the Public Interest in the Immediate Availability of 2 GHz MSS Service and the Efficient Use of the Spectrum.**

Additionally, a determination of an applicant's financial ability helps to ensure that much needed MSS service is made available promptly to the public. As Boeing stated in its 2 GHz MSS application,<sup>58</sup> Boeing's proposed system will operate in the 2 GHz MSS band to provide a number of communication services that are needed by the global aviation industry to increase navigational accuracy and, with it, air space safety, capacity and efficiency. The international aeronautical community is facing a rapidly increasing need for a satellite-based CNS/ATM infrastructure. Boeing's satellite system provides a potential solution to this growing problem.

Furthermore, launching and operating a satellite system requires an enormous capital investment with large risks involved. Boeing believes that close scrutiny of an applicant's financial qualifications assures the Commission that an applicant can promptly begin to construct and operate its system. Without sufficient financial resources at the time an authorization is granted, an applicant will spend a significant amount of time attempting to raise capital before even beginning to fulfill its representations to the Commission that it can begin constructing its system. Furthermore,

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<sup>58</sup> See *Boeing Satellite System Application in the 2 GHz Mobile-Satellite Service and Aeronautical Radionavigation-Satellite Service*, FCC File No. 179-SAT-P/LA-97 (filed Sept. 26, 1997).

experience has shown that there is no guarantee that financing attempts will prove successful even with the issuance of a construction permit by the Commission.<sup>59</sup> In fact, the failure of licensees to obtain financing has resulted in protracted proceedings and placed substantial burdens on other applicants.<sup>60</sup> The grant of a license to an applicant that is not financially qualified is likely to preclude qualified applicants from constructing and operating proposed systems. This, in turn, delays critical service to the public.

**D. The Commission Should Impose Strict Financial Requirements.**

The Commission should impose stringent financial qualification rules to ensure that the public interest is served. Imposing such a requirement does not prevent smaller firms from participating in the satellite services market because ownership of a space

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<sup>59</sup> *Land Mobile Memorandum Opinion & Order* at 6032 n.43 (The Commission noted that, in 1983, for example, it “made conditional grants to several new entrants in the domestic Fixed-Satellite Service. None of the licensees were able to obtain the requisite financing, and their authorizations were nullified. See *Advanced Business Communications, Inc.*, 58 RR 2d (P&F) 153 (1985); *Rainbow Satellite, Inc.*, Mimeo No. 2583 (February 14, 1985); *United States Satellite Systems, Inc.*, Mimeo No. 2584 (February 14, 1985).

Further, Boeing observes that the Commission has previously stated:

We are not convinced by those applicants that assert that the absence of a competing MSS system ensures that the licensee will easily attract investment capital. To the contrary, MSS is a new, innovative and as yet unproven service, and one which must recover costs within the nominal life of the satellite. Moreover, it is likely to compete with alternative terrestrial technologies. Therefore, it may be perceived as a relatively risky investment by financiers.

*Land Mobile Second Report & Order*, 2 FCC Rcd at 488.

<sup>60</sup> *In the Matter of Licensing Space Stations in the Domestic Fixed-Satellite Service*, 101 FCC 2d 223, 231 (1995).

station is not mandatory for such participation.<sup>61</sup> Furthermore, as the Commission previously has observed, space station capacity can be leased or bought, and earth stations can be acquired at relatively low costs.<sup>62</sup> The Commission should impose the same financial requirements imposed on licensees for the Big LEO service – that is, applicants should be required to provide evidence of current assets, operating revenues, or irrevocably committed debt or equity financing sufficient to meet the estimated costs of constructing and launching all planned satellites, and operating the system for one year.<sup>63</sup> In Boeing’s view, adopting a less stringent financial requirement could have the effect of tying up spectrum for years, while the Commission considers various requests for waivers of milestone deadlines.

Given the considerations presented, Boeing urges the Commission to impose financial requirements on applicants for the 2 GHz MSS processing round. Such a requirement will serve to identify those speculative applications that could permit those unqualified applicants to tie up spectrum to the detriment of other entities able to proceed promptly with implementation of their systems. The penalty imposed by delaying qualified entities is a delay in the provision of much needed satellite services to the public. This is a particularly significant issue for Boeing’s system, which is intended to provide critical safety of life service to the public.

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<sup>61</sup> *Big Leo Report & Order* at 5948.

<sup>62</sup> *Id.*

<sup>63</sup> *Id.*

**X. THE COMMISSION SHOULD PROMOTE INTERNATIONALLY COMPATIBLE BAND PLANS FOR 2 GHz MSS AND SHOULD ADOPT RULES THAT FURTHER THIS EFFORT.**

The Commission should continue its policy of promoting internationally compatible band plans in the 2 GHz MSS proceeding.<sup>64</sup> The Commission should also take the additional step of conditioning 2 GHz MSS authorizations by requiring that each operator participate in the development of an international spectrum sharing approach that can accommodate each of the 2 GHz MSS systems authorized by the FCC. Furthermore, each of the applicants should be required to cooperate in coordinating sufficient feeder link spectrum to accommodate each of the 2 GHz MSS proposals.

Pursuing an internationally compatible band plan for the 2 GHz MSS service is particularly important because, as the Commission acknowledges in the *NPRM*, this is the FCC's first satellite application process round in which non-U.S. licensed systems have been permitted to participate using letters of intent. In prior satellite proceedings, the United States oversaw international spectrum coordination for each U.S.-licensed system. This permitted the United States to encourage the use of a compatible band plan in every region of the world.

In this proceeding, however, several applicants may have already begun spectrum coordination with the support of foreign administrations. These applicants will be under no obligation to cooperate with the development of an internationally compatible band plan unless the FCC makes such cooperation a condition of their U.S. operating authority. It is for this reason that Boeing filed petitions with the FCC seeking to condition any

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<sup>64</sup> See *NPRM*, ¶ 108 (seeking comment on the Commission's practice of promoting internationally compatible band plans).

authorizations issued to applicants such as ICO on, *inter alia*, refraining from using preexisting spectrum coordination agreements to inhibit the ability of other 2 GHz MSS systems from participating on an equal footing in international markets.<sup>65</sup>

Of course, it may not be possible for 2 GHz MSS licensees to be able to utilize precisely the same spectrum segment for their operations in each region of the world. The Commission should promote an internationally coordinated band sharing approach, however, that aligns spectrum use on a global basis as much as possible. Additionally, the Commission should work to ensure that 2 GHz MSS licensees have spectrum assignments that are comparable in size in every region where they provide services.

Without such a concerted effort, 2 GHz MSS licensees may risk being excluded from operating in some foreign markets. Additionally, individual systems may be “whipsawed” in negotiations with other administrations. Such an outcome would seriously disadvantage MSS licensees, which need to be able to market the ubiquitous availability of their services.

#### **XI. THE COMMISSION SHOULD EXTEND ITS LONG-STANDING PROHIBITION ON EXCLUSIVE ARRANGEMENTS.**

Since the advent of competitive markets for international telecommunications, the Commission has enforced a policy of prohibiting exclusive arrangements for traffic between the United States and foreign countries. It is important for the Commission to apply this policy to 2 GHz MSS. Specifically, the Commission should prohibit 2 GHz MSS operators from entering into arrangements that give them exclusivity in providing

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<sup>65</sup> See, e.g., *Petition to Condition Authorization and Hold in Abeyance of The Boeing Company*, File No. 188-SAT-LOI-97, at 5-8 (May 4, 1998).

2 GHz MSS services to any country. This prohibition should extend to arrangements that may give some applicants exclusive, or near exclusive use of 2 GHz MSS spectrum in certain markets.

Such a prohibition is warranted because the applicants seeking FCC authority to provide MSS at 2 GHz include a mixture of foreign licensees, U.S. incumbents and new entrants in the MSS industry. Most of the incumbents have already developed strategic contacts and business arrangements with government officials and telecommunications companies in numerous foreign countries. These preexisting arrangements were developed through the promotion of previously licensed systems, such as Big LEO MSS, or as a result of ongoing affiliations with existing international satellite service providers such as Inmarsat.

Furthermore, in many cases the preexisting business arrangements of 2 GHz MSS applicants include strategic equity investments entered into with dominant foreign carriers. These relationships need to be scrutinized closely to ensure that foreign business arrangements do not provide exclusivity or undue advantages, both on paper or in practice.

Concerns about preexisting equity arrangements led Boeing to petition the Commission to condition any authorization issued to applicants such as ICO, barring them from entering into exclusive arrangements or special concessions with foreign telecommunications operators or governments for the provision of MSS.<sup>66</sup> Boeing also urged the Commission to condition any MSS authorization issued to ICO on an obligation to refrain, on a continuing basis, from using its status as an Inmarsat affiliate to

inhibit the ability of other 2 GHz MSS systems from participating on an equal footing in international markets.<sup>67</sup>

As noted above, the Commission's prohibition on exclusive arrangements should apply to both *de jure* and *de facto* arrangements. Thus, a business arrangement that does not include exclusive arrangements in its expressed terms, may later be found to create exclusivity in practice. Additionally, a spectrum sharing arrangement may give a MSS operator exclusive or near exclusive use of 2 GHz MSS spectrum in a certain region. The Commission should scrutinize such arrangements carefully in order to ensure that consumers both in the United States and abroad are able to enjoy the benefits of a truly competitive international market for 2 GHz MSS services.

**XII. THE COMMISSION SHOULD EXTEND THE LICENSE TERM FOR 2 GHz MSS LICENSEES FROM 10 YEARS TO AT LEAST 15 YEARS.**

In the *NPRM*, the Commission proposes ten-year license term rules for 2 GHz MSS operators, but asks for comment as to whether 2 GHz MSS licenses should be granted for periods longer than ten years.<sup>68</sup> Boeing supports extending the license terms for 2 GHz MSS licenses to more than 10 years. The Commission has statutory authority to extend the license term beyond ten years. The Telecommunications Act of 1996 amended the Communications Act to modify the statutory term limit for particular classes of stations, including satellite space and earth stations, by granting the Commission

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(. . . continued)

<sup>66</sup> *See id.*

<sup>67</sup> *See id.*

<sup>68</sup> *See NPRM*, ¶ 80.

authority to “prescribe the period or periods for which licenses shall be granted and renewed . . . .”<sup>69</sup> Furthermore, because of the investment required to construct and launch these systems combined with the development of satellite technology, specifically technology that has given satellites longer life spans (up to 15 or more years in some cases, as noted in the *NPRM*), the Commission is justified in extending 2 GHz MSS license terms to at least 15 years.

**XIII. IT IS APPROPRIATE TO APPLY EXISTING OUT-OF-BAND EMISSION LIMITS TO 2 GHz MSS LICENSEES.**

In the *NPRM*, the Commission proposes to apply the existing out-of-band emission limits in Section 25.202(f) of its Rules to 2 GHz MSS licensees.<sup>70</sup> Boeing believes that continued use of these limits is appropriate. Boeing also concurs with the Commission’s proposal to employ the same out-of-band, user terminal limits that it employed in the Big LEO MSS proceeding to protect aeronautical radionavigation operations.<sup>71</sup>

The Commission also raises the issue of mutual interference between out-of-band emissions of U.S. Government space systems in the 2025-2110 MHz and 2200-2290 MHz bands and 2 GHz MSS systems.<sup>72</sup> In Boeing’s view, large guard bands could help

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<sup>69</sup> Telecommunications Act of 1996, Pub. L. No. 104-104, Title II, 110 Stat. 56, 112 (1996) (amending Section 307 of the Communications Act to eliminate ten-year term and creating new Section 307(c)(1) granting the Commission authority to determine license terms for particular classes of stations, including satellite space and earth stations.).

<sup>70</sup> See *NPRM*, ¶ 114.

<sup>71</sup> See *id.*, ¶ 116.

<sup>72</sup> See *id.*, ¶ 115.

resolve the potential problem, but the spectrum scarcity below 3 GHz precludes this solution. In order to avoid causing harmful interference to each other, exchange of information, close cooperation and coordination will be necessary between 2 GHz MSS licensees and U.S. Government users of the 2 GHz Space Research/Space Operation bands.

**XIV. APPLICANTS SHOULD BE ABLE TO AMEND THEIR APPLICATIONS TO COMPLY WITH RULES ADOPTED IN THIS PROCEEDING.**

Boeing supports the Commission's tentative decision to permit applicants to amend their applications in order to comply with rules that are adopted in this proceeding. In the *NPRM*, the Commission states: "As stated in the cut-off Public Notice, applicants and LOI filers will be afforded an opportunity to amend their applications and letters of intent, if necessary, to conform with any requirements and policies that may be adopted for the 2 GHz MSS."<sup>73</sup> Indeed, permitting such amendments is standard practice in the International Bureau, where applicants are often required to file satellite applications prior to the adoption of rules governing such systems.

Boeing believes that such an approach is equitable for the 2 GHz MSS applicants. Any other approach would stifle innovation by forcing new applicants to file applications that use old designs and technology that have previously been approved by the Commission, rather than the latest innovations which the Commission has yet to

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<sup>73</sup> *NPRM*, ¶ 5. See Public Notice, Report No. SPB-88, 12 FCC Rcd 10446, 10448 (1997) ("Cut-Off Public Notice") ("Applicants filing by the cut-off date will be afforded an opportunity to amend their applications, if necessary, to conform with any requirements and policies that may be adopted subsequently for space stations in these bands.").

consider. Providing applicants the ability to amend their applications, as the Commission proposes, allows satellite operators the maximum flexibility that they need to design their satellite systems in a way that will promote innovative system design. Further, it will create additional public interest benefits by allowing operators to tailor their systems to best meet the needs of customers and the newly adopted rules.

**XV. BOEING WILL COMPLY WITH THE DRAFT U.S. GOVERNMENT/INDUSTRY ORBITAL DEBRIS MITIGATION PRACTICES ESTABLISHED BY NASA AND THE DEPARTMENT OF DEFENSE.**

Boeing supports U.S. Government and industry efforts that will serve to mitigate orbital debris. Boeing agrees with the Commission's observation that NASA and the Department of Defense's (NASA/DoD) jointly developed practices for debris mitigation can be used to develop government and industry guidelines that both sectors could use in the design and development of future systems.<sup>74</sup> The Commission notes that NASA and other Federal government agencies require that, for space missions under their control, new missions and projects be designed with these practices in mind.

As a major contributor to the global aerospace and satellite telecommunications industries, Boeing is very familiar with the NASA<sup>75</sup> and DoD<sup>76</sup> proposed practices for dealing with the issue of orbital debris mitigation. Boeing believes that many of the practices already have been adopted by satellite system operators, and Boeing intends to follow the NASA/DoD orbital debris mitigation practices. For example, in its satellite

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<sup>74</sup> *Id.*, ¶¶ 97-98.

<sup>75</sup> Available on Internet at <http://sn-callisto.jsc.nasa.gov/mitigate/nss1740/nss1740.html>.

<sup>76</sup> See US Space Command Satellite Disposal Procedures, UPD10-39 (Nov. 3, 1997).

system applications pending before the Commission, Boeing proposed to allocate additional propellant in order to raise the orbit of Boeing system satellites at the end of their operational life for safe disposal purposes.

In the *NPRM*, the Commission asks whether some or all elements of the NASA/DoD practices should be incorporated in the Commission's rules or authorization process for 2 GHz MSS systems.<sup>77</sup> While Boeing would not oppose rule codification of the NASA/DoD practices, it recommends, instead, the adoption of the Commission's alternative proposal of requiring applicants to submit narrative information concerning debris mitigation in connection with satellite system licensing.<sup>78</sup> Because of the significant likelihood that participants in the satellite industry intend to comply with the NASA/DoD practices, the Commission need not establish any new policies and rules on this issue in this proceeding.

In the *NPRM*, The Commission also invites comment on any transitional issues that may arise if new orbital debris mitigation requirements are adopted.<sup>79</sup> The Commission asks at what point in the development of a satellite system should such a rule be applied.<sup>80</sup> Boeing recommends that the Commission consider requiring the licensee of any future systems to have an orbital debris mitigation plan in place prior to the launch of the first satellite of the proposed system. Furthermore, Boeing urges the Commission to

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<sup>77</sup> *Id.*, ¶ 100.

<sup>78</sup> *Id.*

<sup>79</sup> *NPRM*, ¶ 101-102.

<sup>80</sup> *Id.*, ¶ 101.

apply a grandfathered period after the adoption of such rules, so that those systems that have already begun construction will not be forced to face a major redesign.

## **XVI. CONCLUSION**

For the reasons stated herein, Boeing urges the Commission to promptly grant its authorization to launch and operate its 2 GHz MSS network. The Commission is also urged to adopt rules and policies in this proceeding that will facilitate the expeditious licensing of 2 GHz MSS networks and will otherwise benefit consumers of satellite services.

Respectfully submitted,

**THE BOEING COMPANY**

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