

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

In the Matter of	)	
	)	
Amendment of the Commission's Rules to Promote Aviation Safety	)	WT Docket No. 19-140
	)	
WiMAX Forum Petition to Adopt Service Rules for the Aeronautical Mobile Airport Communications System (AeroMACS)	)	RM-11793
	)	
Petition of Sierra Nevada Corporation for Amendment of the Commission's Rules to Allow for Enhanced Flight Vision System Radar under Part 87	)	RM-11799
	)	
Petition of Aviation Spectrum Resources, Inc. for Amendment of Sections 87.173(b) and 87.263(a) of the FCC's Rules to Allow Use of the Lower 136 MHz Band by Aeronautical Enroute Stations	)	RM-11818
	)	
Petition of Airports Council International- North America Regarding Aeronautical Utility Mobile Stations	)	RM-11832
	)	
To: The Commission	)	

**COMMENTS OF THE BOEING COMPANY**

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## EXECUTIVE SUMMARY

The Boeing Company (“Boeing”), a global leader in aircraft and aerospace systems manufacturing and operations, is pleased to offer comments on the Federal Communication Commission’s (“FCC” or “Commission”) *Notice of Proposed Rulemaking* (“*NPRM*”) seeking comment on a number of proposed rule changes designed to facilitate the use of various aeronautical and aviation-related communications services. Boeing strongly supports the Commission’s dedication to aviation safety and appreciates its attention to the opportunities and challenges raised by the current state of aviation communications technology.

By and large, the *NPRM* is a positive step forward for aviation communications and aviation safety more generally. The Commission correctly identifies and seeks to serve a number of principles that are important for rulemaking in the aviation space: enabling new technologies, reducing confusion among operators, harmonizing FCC and Federal Aviation Administration (“FAA”) requirements, incorporating industry standards, facilitating the FAA’s NextGen aviation communications modernization plan, and ensuring that adequate spectrum is available for various aviation safety services. Consistent with these principles, Boeing supports a number of proposals in the *NPRM*, including proposals related to Enhanced Flight Vision Systems, audio visual warning systems, Automatic Dependent Surveillance-Broadcast communications, unicom stations, aeronautical enroute stations, vehicle squitters, and emergency locator transmitter test stations.

The Commission’s treatment of Aeronautical Mobile Airport Communications System (“AeroMACS”) services, however, needs further refinement. While Boeing recognizes the need for AeroMACS services and appreciates the Commission’s efforts to develop service rules to enable AeroMACS deployment, the *NPRM*’s proposal makes certain missteps that could both prevent AeroMACS from operating as intended and threaten critical ongoing flight testing

conducted on the same frequencies. Accordingly, Boeing offers five recommendations for improving the proposed AeroMACS service rules:

- (i) Ensuring that any service rules properly take into account key limitations on the purpose and value of AeroMACS;
- (ii) Adopting the *NPRM*'s proposal to authorize AeroMACS operations through an aircraft operator's existing aircraft license;
- (iii) Imposing proper qualifications for non-aircraft licensees;
- (iv) Designating a qualified frequency coordinator; and
- (v) Precluding AeroMACS deployment at certain airports with significant flight testing operations.

By adopting these recommendations, the Commission can ensure that all of the rules promulgated pursuant to these proceedings best serve the overarching objective of advancing aviation safety.

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**COMMENTS OF THE BOEING COMPANY**

**I. INTRODUCTION**

The Boeing Company ("Boeing") hereby offers comment in response to the Federal Communications Commission's ("FCC" or "Commission") *Notice of Proposed Rulemaking* ("*NPRM*") in the above-referenced proceedings, in which the Commission seeks comment on a number of proposals related to communications services designed to enhance aviation safety.<sup>1</sup>

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<sup>1</sup> *Amendment of the Commission's Rules to Promote Aviation Safety*, Notice of Proposed Rulemaking, WT Docket No. 19-140, RM-11793, RM-11799, RM-11818, RM-11832, FCC 19-53 (rel. June 7, 2019) ("*NPRM*").

Boeing is a global leader in the design and manufacture of aircraft and aerospace systems. As such, Boeing employs a very wide range of wireless communications systems, including for research and development, aircraft flight testing, and incorporation within the operational systems of each aircraft manufactured by Boeing. Boeing is committed to promoting safe global aviation. In that spirit, Boeing appreciates the Commission's focus on aviation safety in this *NPRM* and its attention to how FCC regulations may be updated to enable new technologies, improve and expand the operation of existing services, and harmonize FCC and Federal Aviation Administration ("FAA") requirements. The Commission should adopt many of the proposals advanced in the *NPRM*, including certain proposals related to Enhanced Flight Vision Systems, audio visual warning systems, Automatic Dependent Surveillance-Broadcast communications, unicom stations, aeronautical enroute stations, vehicle squitters, and emergency locator transmitter test stations. Adoption of these proposals will help to facilitate the use of existing and emerging technologies, and ultimately advance aviation safety.

However, the Commission must further refine its proposals regarding implementation of service rules for the Aeronautical Mobile Airport Communications System ("AeroMACS") in order to ensure that AeroMACS services can be operated both as intended and without causing harmful interference to co-frequency flight testing operations. To this end, the Commission should take the following steps: (i) ensure that any rules recognize AeroMACS' key limitations, including that it is an application limited to uses impacting the safety of aircraft utilizing a safety service allocation that does not encompass a broader range of general-purpose communications services, and that AeroMACS is highly unlikely to relieve congestion on aviation spectrum frequencies to the extent some proponents suggest; (ii) adopt the *NPRM*'s proposal to authorize AeroMACS operations through an aircraft operator's existing aircraft license; (iii) ensure that non-aircraft

licensees have sufficient experience with comparable aviation safety services; (iv) designate a frequency coordinator that both has experience with aviation safety services and is representative of AeroMACS aircraft station operators; and (v) preclude AeroMACS deployment at the six airports the *NPRM* identified that have significant testing activity, as well as other airports at which Boeing conducts significant flight testing operations, including SeaTac International Airport, Seattle, WA and Philadelphia International Airport, Philadelphia, PA.

## **II. THE COMMISSION SHOULD ADOPT ITS PROPOSAL TO FACILITATE THE DEPLOYMENT OF ENHANCED FLIGHT VISION SYSTEMS.**

The Commission should adopt its proposal regarding Enhanced Flight Vision Systems. The *NPRM* “tentatively conclude[s] that accommodating the effective and efficient use of Enhanced Flight Vision System radar is in the public interest,” and seeks to facilitate such use by adopting rules to permit Enhanced Flight Vision System radar use in the 92-95.5 GHz band, consistent with a Petition for Rulemaking filed by Sierra Nevada Corporation.<sup>2</sup>

Boeing agrees with the Commission that Enhanced Flight Vision Systems will foster measurable benefits for aviation safety and efficiency, including by “enhanc[ing] safety and reduc[ing] flight delays and cancellations, fuel consumption and emissions, aircraft operational costs, and passenger travel time.”<sup>3</sup> Accordingly, Boeing supports the Commission’s proposal to revise its rules consistent with the Sierra Nevada Petition to facilitate implementation of Enhanced Flight Vision Systems in the 92-95.5 GHz band.

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<sup>2</sup> *NPRM* ¶¶ 10-13.

<sup>3</sup> *Id.* ¶ 11.

### **III. THE COMMISSION SHOULD ADOPT ITS PROPOSAL TO HARMONIZE FCC RULES WITH FAA GUIDANCE ON AUDIO VISUAL WARNING SYSTEMS.**

Boeing similarly supports the FCC’s proposals regarding audio visual warning systems. The *NPRM* correctly acknowledges the discrepancies between existing FCC rules governing such systems and the FAA Advisory Circular on obstruction marking and lighting.<sup>4</sup> The FCC accordingly proposes to amend its rules to “use the FAA’s terminology,” “to remove the duty cycle limits that conflict with the Advisory Circular,” and “to codify . . . Advisory Circular standards related to the audible warning,” while leaving FCC requirements regarding frequencies and technical parameters unchanged.<sup>5</sup> This is the correct approach.

It is essential that regulatory regimes both provide clear requirements for regulated entities and ensure consistency among the requirements of agencies that may have overlapping authorities. Boeing commends the Commission for taking the initiative to harmonize requirements related to audio visual warning systems, and agrees that the Commission’s proposal is the best way to eliminate discrepancies between FCC rules and FAA guidance without undertaking any unnecessary codification that would duplicate FAA requirements.

### **IV. BOEING SUPPORTS CERTAIN PROPOSALS REGARDING AUTOMATIC DEPENDENT SURVEILLANCE-BROADCAST TRANSMISSIONS.**

Boeing likewise supports the Commission’s efforts to adopt service rules to enable and harmonize ADS-B at both 1090 MHz and 978 MHz, which is particularly important given the significant increase in ADS-B transmissions that will result from the FAA’s recently-adopted regulatory mandate. As the *NPRM* recognizes, “compatibility and interoperability in the ADS-B service” is essential given that ADS-B is a “key component of NextGen” (the FAA’s aviation

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<sup>4</sup> *Id.* ¶¶ 15-16.

<sup>5</sup> *Id.* ¶¶ 17-18.



communications modernization plan).<sup>6</sup> ADS-B will be deployed in virtually all aircraft beginning in 2020.<sup>7</sup> The Commission’s proposal to require compliance with relevant technical standards—specifically, standards from the FAA Technical Standard Order and the Radio Technical Commission for Aeronautics (“RTCA”) Minimum Operational Performance Standard—will achieve the compatibility and interoperability the Commission seeks while providing certainty and consistency for operators through rules that leverage existing standardization efforts by reputable bodies.<sup>8</sup>

The *NPRM* seeks comment on “how best to amend the part 87 rules to reflect [the relevant FAA and RTCA] standards to ensure compatibility and interoperability with this critical safety of life service.”<sup>9</sup> The *NPRM*’s proposal to incorporate the relevant standards by reference is the correct approach.<sup>10</sup> However, to ensure that the appropriate standards will continue to govern ADS-B operations, and that the agency has maximum flexibility to revise its rules to reflect changes in the governing standards, the Commission should also delegate to the relevant bureaus, such as the Wireless Telecommunications Bureau and the Office of Engineering and Technology, the authority to revise the Part 87 rules to reflect changes in the incorporated standards. Delegation to relevant bureaus to for regulations that include standards incorporated by reference is a tested Commission practice that has worked well in other contexts.<sup>11</sup>

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<sup>6</sup> *Id.* ¶ 22.

<sup>7</sup> *Id.*

<sup>8</sup> *NPRM* ¶ 24.

<sup>9</sup> *Id.*

<sup>10</sup> *See id.*

<sup>11</sup> *See, e.g.,* 47 C.F.R. 0.241(a)(2)(ii) (delegating rulemaking authority to the Chief of the Office of Engineering and Technology “to issue an order amending rules in parts 2, 5, 15, or 18 of this chapter that reference industry standards to specify revised versions of the standards,” subject to the limitations that the “delegation is limited to modifying rules to reference revisions to standards that are already in the rules and not to incorporate a new standard into the rules, and is limited to the approval of changes to the technical standards that do not raise major compliance issues”); *Proposed Amendments to the Serv. Rules Governing Pub. Safety Narrowband*

**V. THE COMMISSION SHOULD ADOPT ITS PROPOSED CHANGES TO RULES GOVERNING UNICOM STATIONS.**

The Commission likewise should adopt its proposals regarding unicom stations, which play an important role in aviation safety by providing information to aircraft including flying conditions, weather information, and the availability of ground services. The *NPRM* “proposes two clarifications of the unicom rules to reduce confusion among licensees and applicants”: (i) that the eligibility restriction limiting unicom licensees to State or local government entities and authorized nongovernmental organizations applies only to public-use airports; and (ii) that the requirement that “full time FAA service stations” use 122.950 MHz for unicom communications extends to any “FAA flight service station that operates at all times when the airport is used by aircraft for takeoff or landing.”<sup>12</sup> Boeing agrees with the Commission that these rule clarifications will reduce confusion and facilitate the provision of unicom services, thereby enhancing general aviation safety.

**VI. BOEING SUPPORTS THE COMMISSION’S PROPOSED REVISIONS TO THE 136-137 MHZ BAND CONSISTENT WITH ASRI’S PETITION FOR RULEMAKING.**

Boeing appreciates the Commission’s attention to how its rules can be revised to facilitate NextGen, which has been developed to leverage advancements in aeronautical communications technology. The *NPRM* acknowledges that although NextGen’s Data Comm will use industry infrastructure to transmit both air traffic control communications and aeronautical operational

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*Operations in the 769-775/799-805 MHz Bands*, Seventh Report and Order Notice of Proposed Rulemaking, 28 FCC Rcd. 4783, ¶ 40 (2013) (updating ANSI/TIA Advanced Encryption Standard (AES) incorporated by reference in Part 90 regulation and delegating authority to the Public Safety and Homeland Security Bureau to revise the regulation to “accommodate future updates of the encryption standard”); *Cable Television Tech. & Operational Standards*, Report and Order, 32 FCC Rcd 7754, ¶ 9 (2017) (incorporating by reference a Society of Cable Telecommunications Engineers (SCTE) in regulation governing performance requirements for digital cable systems and delegating to the Media Bureau authority to revise the regulation to reflect non-fundamental changes to the standard).

<sup>12</sup> *NPRM* ¶¶ 25-27.

control communications over the entire 136-137 MHz band, the FCC’s rules do not expressly permit use of the 136.000-136.475 MHz band (the “lower 136 MHz band”) for aeronautical operational control communications.<sup>13</sup> Accordingly, consistent with a Petition for Rulemaking filed by Aviation Spectrum Resources, Inc. (“ASRI”), the *NPRM* proposes to permit aeronautical enroute stations to transmit over the entire band, and to specify that when such a station also transmits air traffic control communications, “sharing methodology must be agreed upon between the aeronautical enroute service station licensee and the FAA.”<sup>14</sup>

Boeing supports these proposed rule changes. As ASRI explains in its petition, Data Comm will leverage key developments in aeronautical communications technology that allow for air traffic control and aircraft operational control communications to be transmitted using a single terminal. This will enable the FAA to “leverag[e] industry networks” to meet growing “demand for bandwidth for data communications” aboard aircraft.<sup>15</sup> Boeing welcomes the Commission’s attention to the design and spectrum needs of NextGen, and agrees with ASRI that updating the allocation and service rules for the lower 136 MHz band will complement the implementation of Data Comm. Accordingly, the Commission should adopt its proposal.

**VII. ANY NEW RULES TO ENABLE AEROMACS SERVICES MUST ENSURE THAT ONLY THE APPROPRIATE ENTITIES ARE LICENSED AND DESIGNATED AS FREQUENCY COORDINATORS, AND THAT AEROMACS DEPLOYMENT DOES NOT UNNECESSARILY DISRUPT CRITICAL FLIGHT TESTING OPERATIONS.**

The *NPRM* offers a number of proposals related to adopting service rules for AeroMACS, a broadband aeronautical mobile (route) service designed for transmitting safety communications

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<sup>13</sup> *Id.* ¶¶ 28-29.

<sup>14</sup> *NPRM* ¶ 32.

<sup>15</sup> Petition of Aviation Spectrum Resources, Inc. for Amendment of Sections 87.173(b) and 87.263(a) of the FCC’s Rules to Allow Use of the Lower 136 MHz Band by Aeronautical Enroute Stations, RM-11818, at 8 (filed Oct. 16, 2018) (“ASRI Petition”).

between aircraft and other vehicles and infrastructure at airports.<sup>16</sup> Many of the *NPRM*'s proposals are based on the WiMAX Forum's 2017 Petition for Rulemaking asking the Commission to adopt AeroMACS service rules.<sup>17</sup> Boeing appreciates the Commission's efforts to develop service rules for AeroMACS to facilitate its implementation. However, some of these proposals could benefit from further refinement to ensure that the services are operated, and the spectrum managed, by the appropriate entities, and that AeroMACS will not jeopardize existing flight testing operations that are critical to aviation safety.

Boeing offers five overarching recommendations to aid the Commission's development of AeroMACS services rules. These recommendations, if implemented, will help to facilitate the deployment and operation of AeroMACS services, ensure that AeroMACS capabilities are put to their best use, and protect all operations in the 5091-5150 MHz band. Specifically, the Commission should: (i) take into account the aviation-safety-focused purpose of AeroMACS—and in so doing refine the service rules to reflect that narrow purpose—and the limited role AeroMACS is likely to play in relieving congestion of aviation spectrum; (ii) authorize AeroMACS operations through aircraft operators' existing station authorizations as proposed in the *NPRM*; (iii) require appropriate qualifications for non-aircraft AeroMACS licensees; (iv) designate a frequency coordinator that is both experienced in aviation safety services and representative of AeroMACS aircraft operators; and (v) preclude AeroMACS deployment at this time at certain airports with significant ongoing flight testing ("AMT") activity.

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<sup>16</sup> *NPRM* ¶¶ 34-44.

<sup>17</sup> WiMAX Forum Petition for Rulemaking to Adopt AeroMACS Service Rules, RM-11793 (filed Mar. 31, 2017).

A. The Commission’s Development of AeroMACS Service Rules Should Consider Both the Purpose and Limitations of the AeroMACS System.

As a threshold matter, the Commission should bear in mind two points of clarification about AeroMACS as it develops operational rules for this nascent service. *First*, as the *NPRM* recognizes, the primary purpose of AeroMACS is to enhance aviation safety by enabling high capacity safety and regularity of flight communications at airports.<sup>18</sup> Indeed, as the 2007 World Radiocommunication Conference (“WRC-07”) recognized, the purpose of allocating the 5091-5050 MHz band to AeroMACS was to “support the introduction of application and concepts in air traffic management which are data intensive, and which will support data links that carry *safety-critical aeronautical data*.”<sup>19</sup> AeroMACS was not developed, and should not be construed, as an all-purpose generic communications service to satisfy the general communications needs of airport operators. As such, the Commission must ensure that any service rules for AeroMACS reflect the appropriate range of applications for which AeroMACS spectrum is properly used. To further this objective, the Commission should modify its proposed rules on the definition of AeroMACS and the scope of the service as follows (additions in bold text):

**§ 87.5 Definitions.**

*AeroMACS*. The Aeronautical Mobile Airport Communications System utilizing the 5000-5010 MHz, 5010-5030 MHz, and 5091-5150 MHz bands ~~for high capacity wireless~~ **limited to communications on the ground and/or surface at airports which support the** safety and regularity of flight ~~communications (mobile and fixed) supporting airport surface applications~~.

**§ 87.601 Scope of service.**

AeroMACS supports wireless broadband communications connectivity for safety and regularity

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<sup>18</sup> See *NPRM* ¶ 34 (“[AeroMACS] is an internationally standardized and harmonized broadband [AM(R)S] service system that will . . . facilitate delivery of critical air traffic control messages . . . enhance safety and reduce flight delays . . . [be used in] air traffic management . . . and [be used by] entities that engage in airport communications relating to safety and regularity of flight.”); *id.* ¶ 37 (“AeroMACS is a safety of life service[.]”).

<sup>19</sup> WRC-07 Res. 748 (Geneva, 2007) (emphasis added); see also *Amendment of Parts 1, 2, 15, 25, 27, 74, 78, 80, 87, 90, 97, & 101 of the Commission's Rules Regarding Implementation of the Final Acts of the World Radiocommunication Conference (Geneva, 2007)*, Report and Order, Order, and Notice of Proposed Rulemaking, 30 FCC Red 4183, ¶ 53 n. 142 (2015) (recognizing same).

of flight to fixed, base and mobile stations in the airport surface. Applications fall into three general categories: Air Traffic Services (ATS), including Air Traffic Control (ATC) and Air Traffic Management (ATM); Aeronautical Operations Communications (AOC); and communications related to airport operations **impacting the safety of aircraft, safety, and security**.

These revisions will help to prevent AeroMACS from transforming into an unfettered general purpose communication service that would congest the 5091-5150 MHz band while failing to serve the aviation safety objectives for which the service was designed.

*Second*, the Commission's service rules for AeroMACS should be developed with a realistic notion of the system's capabilities. The *NPRM* asserts that "[i]mplementation of AeroMACS in the United States will support Data Comm by offloading large amounts of aircraft data from, and thus easing overcrowding in, the heavily congested VHF aeronautical band."<sup>20</sup> In reality, however, AeroMACS will not ease overcrowding in the band to the extent AeroMACS proponents suggest. Large data files from aircraft at airports are already largely offloaded via manual processes and not over VHF links. Thus, because this offloading already occurs, AeroMACS will not relieve congestion in the VHF aeronautical band, even though it may improve the efficiency of data transmission by reducing the need for manual offloading.

B. The Commission Should Authorize AeroMACS Operations under Existing Aircraft Station Licenses.

The Commission was correct in the *NPRM* to reject the proposal of the WiMAX Forum and other AeroMACS proponents to adopt licensing by rule for AeroMACS operations, with user registration in a central database.<sup>21</sup> As the Commission recognizes, "site-based licensing under part 87 is necessary" given that "AeroMACS is a safety of life service that requires strict license

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<sup>20</sup> *NPRM* ¶ 34.

<sup>21</sup> *Id.* ¶ 37.

eligibility requirements and individualized coordination of each transmitter to ensure no interference to other AeroMACS links.”<sup>22</sup>

To this end, the Commission should adopt its proposal to “authorize AeroMACS operation under [an aircraft operator’s] existing aircraft station authorization, rather than to require a separate license.”<sup>23</sup> Such an approach will promote efficiency in aircraft licensing while also ensuring the requisite flexibility for operators of aircraft AeroMACS stations. Indeed, aircraft station licensees, by virtue of obtaining this authorization, have demonstrated the qualifications necessary to conduct aviation safety services aboard aircraft. The Commission should leverage this existing licensing process in implementing a procedure to authorize aircraft-based AeroMACS operations. Further, placing all necessary authorizations on one aircraft license will streamline operations for aircraft operators and also provide the necessary flexibility to use AeroMACS services internationally should the need arise, as foreign jurisdictions generally require aircraft operators to have paper copies of radio licenses authorizing any services operated within that jurisdiction.<sup>24</sup>

C. The Commission Should Adopt Appropriate Qualifications for Non-Aircraft Licensees.

Like aircraft licensees, it is essential that non-aircraft licensees satisfy “strict eligibility requirements” that demonstrate their qualifications to conduct AeroMACS services. However, unlike aircraft licensees, operators of airports or vehicles or infrastructure located at airports do not necessarily possess these qualifications simply by virtue of conducting those operations. Accordingly, non-aircraft applicants for AeroMACS licenses should be required to demonstrate

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<sup>22</sup> *Id.*

<sup>23</sup> *Id.*

<sup>24</sup> *See, e.g.,* Convention on International Civil Aviation, Doc 7300/9, Art. 33 (2006).

that they possess both sufficient experience with aviation safety services and the technical and operational knowledge that this safety-of-life service demands.

The *NPRM* does not go far enough to ensure that the appropriate entities are operating ground-based AeroMACS services: while it “propose[s] to limit eligibility for non-aircraft AeroMACS licenses to airport owners and operators, and entities that have been granted permission by the airport owner or operator to transmit using AeroMACS equipment at or near the airport,”<sup>25</sup> the *NPRM* does not propose any specific qualifications for those entities. Owning or operating an airport in and of itself does not necessarily equate to experience operating aviation safety communications services such as AeroMACS. The Commission should revise its proposal to ensure, consistent with its recognition of the need for “strict license eligibility requirements,”<sup>26</sup> that any AeroMACS licensee possesses the requisite qualifications and experience to provide this service and that service is offered on a nondiscriminatory basis to eligible aircraft and to ground support vehicles. To this end, the Commission should require that applicants for an AeroMACS license make a showing that includes knowledge of aeronautical safety communications pertaining to the safe and efficient operation of aircraft and ground services in support of aircraft.

D. The Commission Should Designate a Qualified Frequency Coordinator.

The *NPRM* seeks comment on how AeroMACS spectrum can be shared between Federal and non-Federal users, including the WiMAX Forum’s proposal “that the Commission designate an AeroMACS Channel Manager to manage non-Federal authorized AeroMACS users and to coordinate channel sharing with Federal users.”<sup>27</sup> Boeing agrees with the designation of a third-party coordinator for non-federal AeroMACS services. The FCC frequently employs frequency

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<sup>25</sup> *NPRM* ¶ 38.

<sup>26</sup> *Id.* ¶ 37.

<sup>27</sup> *Id.* ¶ 40.



coordinators to manage non-Federal use of frequencies for specific services.<sup>28</sup> By placing frequency management into the hands of a qualified entity, the Commission can alleviate administrative burdens and optimize operational flexibility for licensees.

Experienced entities that are representative of service users have been very successful in managing spectrum for aviation services and in serving as frequency coordinators for other safety services. Indeed, aviation in its enroute services has a long tradition of using a spectrum manager representative of all users.<sup>29</sup> The spectrum manager contracts with communications service providers to operate facilities licensed to the spectrum manager to offer service to all eligible users, regularly inspects the stations, and resolves interference issues. This cooperative approach achieves competition among the service providers who, like the licensee, have deep experience with aeronautical safety communications.

Boeing cautions, however, that any frequency coordinator designated for AeroMACS must have the requisite qualifications to perform this important role. To this end, a qualified AeroMACS frequency coordinator should have demonstrated experience with users of aviation

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<sup>28</sup> See, e.g., *Amendment of Parts 2 & 95 of the Commission's Rules to Create A Wireless Med. Telemetry Serv.*, Order, 16 FCC Rcd 4543 (2001) (designating a third-party frequency coordinator for the Wireless Medical Telemetry Service); *Wireless Telecommunications Bureau Certifies an Additional Frequency Coordinator for the 800 MHz SMR Pool*, 20 F.C.C. Rcd. 8681, 8681 (2005) (designating a third-party frequency coordinator for the 800 MHz Specialized Mobile Radio (SMR) Pool).

<sup>29</sup> See, e.g., *Aviation Radio Serv., Report and Order and Further Notice of Proposed Rule Making*, 18 FCC Rcd 21432, ¶ 22 (2003) (finding that allowing ARINC to serve as the sole licensee for domestic aeronautical enroute stations and coordinate use of frequencies “has worked exceedingly well over the years, fostering safety, efficiency, competition, innovation and growth”); *Amendment of Parts 2 & 87 of Commission's Rules to Accommodate Advanced Digital Commc'ns in 117.975-137 MHz Band & to Implement Flight Info. Servs. in 136-137 MHz Band*, Report and Order, 16 FCC Rcd. 8226, ¶ 3 (2001) (describing ARINC’s role as frequency coordinator for the upper 136 MHz band for aircraft operational control communications). Although ARINC continues to operate enroute communications facilities as a communications service provider, its role as a spectrum manager and enroute licensee has been assumed by Aviation Spectrum Resources, Inc. (“ASRI”), which is owned and controlled by user-entities, primarily passenger and cargo air transport providers with input from general aviation and helicopter operators, who also rely on certain enroute facilities licensed to ASRI. See ASRI Petition at 1 n.1. In addition to ARINC, SITA (the Societe Internationale de Telecommunications Aeronautique) operates enroute facilities licensed to ASRI as do certain other entities responsible for providing operational control communications to aircraft. ASRI maintains the license database, inspects ground stations, and represents aviation in international organizations.

safety services as well as managing aviation safety spectrum operations with AM(R)S requirements.

E. The Commission Should Preclude AeroMACS Deployment at Airports with Significant Ongoing Flight Testing Activities.

Finally, to ensure that the deployment of AeroMACS does not unnecessarily disrupt flight testing operations or inadvertently cause harmful interference to AeroMACS operations, the Commission should preclude AeroMACS deployment at this time at airports where significant levels of such activities are conducted. This approach strikes the appropriate balance between facilitating AeroMACS deployment at the vast majority of airports across the country and protecting ongoing flight testing and aircraft certification activities, thus best serving the overall purpose of aviation communications—maximizing safety.

The *NPRM* acknowledges that AeroMACS will use the same spectrum as aeronautical mobile telemetry systems used for flight testing,<sup>30</sup> but does not propose specific measures to protect AeroMACS where significant flight testing occurs. Instead, the *NPRM* asserts that FCC regulations “urg[ing] [operators of AeroMACS and aeronautical mobile telemetry systems] to cooperate with each other in the exchange of information about planned deployments” will “enhance[] the prospects for compatible sharing of the band at six airports with significant flight test activity, while other airports may be addressed on a case-by-case basis.”<sup>31</sup>

While Boeing appreciates the Commission’s efforts to ensure compatibility of these two services, it is technically impossible for aeronautical mobile telemetry systems to operate on the same channel as AeroMACS in a given location given the restrictive ITU Resolution 418 criteria.<sup>32</sup>

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<sup>30</sup> See *NPRM* ¶ 41; ITU *Radio Regulations*, Resolution 418 (Rev.WRC-12).

<sup>31</sup> *NPRM* ¶ 35.

<sup>32</sup> See *id.* ¶ 36.

And considerable work remains to determine how these services can coexist on nearby channels, if at all. As Boeing has previously explained, although some field testing has been conducted with respect to the compatibility between AeroMACS and flight testing operations, the tests did not conclusively determine the requisite amount of physical spacing between AeroMACS transmitters and flight testing receivers, nor did it determine the appropriate mechanism for ensuring protection (i.e., a guard band, filters, directional antennas, or other mechanisms).<sup>33</sup> Therefore, until testing has been completed that answers these critical technical questions, AeroMACS and flight testing operations simply cannot coexist at the same location.

Given this technical uncertainty and the importance of flight testing to aviation safety, mere “exchange of information about planned deployments” between AeroMACS operators and flight test services operators is simply insufficient at this point in time to ensure that flight testing can continue to operate in an area where AeroMACS has been deployed. Flight testing is central to ensuring that the various aircraft safety systems work properly in order to obtain certification, so aircraft can be delivered. Flight testing activities are too critical to our nation’s economy and aviation safety to be placed in jeopardy in favor of hasty deployment of a new service providing minimal benefits.

Accordingly, the Commission should preclude AeroMACS deployment at airports with significant flight testing at this time. These ongoing flight testing operations are well-established at these airports and should not be placed at risk. Further, since AeroMACS has yet to be widely deployed, carving out a small number of airports with flight testing operations will not hamper the overall deployment of the service. Thus, the Commission should at this time preclude AeroMACS deployment at the airports identified in the *NPRM* (Boeing Field/King County International

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<sup>33</sup> See Comments of Boeing, RM-11793, at 4-6 (Aug. 18, 2017).

Airport in Seattle; Lambert-St. Louis International Airport; Charleston (South Carolina) Air Force Base/International Airport; Wichita Dwight D. Eisenhower National Airport; Roswell (New Mexico) International Air Center Airport; and William P. Gwinn Airport in Jupiter, Florida) as well as additional airports at which Boeing has significant flight testing activities. These airports include SeaTac International Airport, Seattle, WA and Philadelphia International Airport, Philadelphia, PA.<sup>34</sup> Similarly, the Commission should also take into account airports at which other entities are conducting flight testing.

#### **VIII. BOEING SUPPORTS THE COMMISSION’S PROPOSAL TO AUTHORIZE VEHICLE SQUITTER USE AT 978 MHZ, WHICH MAY PROVIDE MUCH-NEEDED RELIEF TO THE 1090 MHZ BAND.**

Boeing supports the Commission’s proposal regarding authorized frequencies for vehicle squitter operations, which enhance aviation safety by reducing the likelihood of ground collisions at airports. The *NPRM* proposes to update its rules to clarify that 978 MHz is an authorized frequency for vehicle squitters, in addition to 1090 MHz, which is presently used for such operations.<sup>35</sup> Boeing agrees with the Commission that use of 978 MHz can “enhance operational flexibility for airport managers without increasing the risk that vehicle squitters would cause interference to other airport communications.”<sup>36</sup> Moreover, allowing vehicle squitter use on 978 MHz would have the added benefit of relieving significant congestion at 1090 MHz.

As Boeing has previously emphasized to the Commission, 1090 MHz is overly used in some places, which creates difficulties for the allocated services attempting to use this frequency. This problem has persisted for a significant time. Indeed, as Boeing explained in comments to the

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<sup>34</sup> Boeing also conducts flight testing activities at the following airports and AeroMACS deployment should be precluded here as well: Boeing Field/Paine Field Airport, Paine, WA; Grant County International Airport, Moses Lake, WA; Phoenix Sky Harbor International Airport, Phoenix, AZ; and Mesa Gateway Airport, Mesa, AZ.

<sup>35</sup> *NPRM* ¶¶ 46-47.

<sup>36</sup> *Id.* ¶ 47.

Commission in 2008, congestion in the 1090 MHz band has created “substantial difficulties and delays associated with securing radio-navigation land test and experimental licenses necessary to conduct installation and checkout testing of new [Traffic Collision Avoidance] and [military identification friend or foe] systems[.]”<sup>37</sup> Accordingly, FCC policies that work to relieve this congestion will benefit all aviation applications that depend on 1090 MHz.

The Commission’s proposal to clarify the availability of 978 MHz for vehicle squitter operations will support this objective. However, Boeing remains concerned about FAA limitations on testing of military and commercial equipment at airports created by overuse of 1090 MHz.

In addition, while Boeing supports the Commission’s proposal to declutter the 1090 MHz band by allowing vehicle squitter operations at 978 MHz, Boeing cautions that 978 MHz is also an important band for testing aviation communications equipment. The Commission should ensure that any increased traffic on 978 MHz does not jeopardize the need for aircraft manufacturers like Boeing to use this frequency.

#### **IX. BOEING SUPPORTS THE COMMISSION’S PROPOSAL TO EXPAND THE AUTHORIZED FREQUENCIES FOR EMERGENCY LOCATOR TRANSMITTER TEST STATIONS.**

Finally, Boeing supports the Commission’s proposal with respect to emergency locator transmitter test stations. Consistent with FAA guidance, the *NPRM* proposes to expand the authorized frequencies for such stations to include 121.775 MHz.<sup>38</sup> Just as with the Commission’s proposed changes to its rules governing audio visual warning systems, Boeing appreciates the Commission’s focus on harmonizing FAA and FCC requirements and procedures. Boeing thus supports the expansion of the Commission’s rules on emergency locator transmitter test stations

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<sup>37</sup> Comments of the Boeing Company, RM-11503, at 2 (filed Dec. 15, 2008).

<sup>38</sup> *NPRM* ¶ 48.

to include this FAA-authorized frequency, which will facilitate use of test facilities that are instrumental to the design and operation of emergency locator transmitters.

## **X. CONCLUSION**

Boeing respectfully urges the Commission to consider the issues and proposals raised in the *NPRM* in the above-referenced proceedings consistent with the comments provided herein. Accordingly, the Commission should adopt several of its proposals related to Enhanced Flight Vision Systems, audio visual warning systems, Automatic Dependent Surveillance-Broadcast communications, unicom stations, aeronautical enroute stations, vehicle squitters, and emergency locator transmitter test stations; and should refine its proposals regarding the AeroMACS service rules consistent with Boeing's five overarching recommendations. Taking these actions will help to ensure that the Commission's rules accommodate emerging aviation communications technologies, provide regulatory certainty to licensees, foster the development of new technology, and put aviation spectrum to its best use—all of which will enhance aviation safety and help to maintain the United States' exceptional aviation safety record.

Respectfully submitted,

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