

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of)
)
WiMAX Forum Petition Proposing Rules for the) RM-11793
Aeronautical Mobile Airport)
Communication System)
)

REPLY COMMENTS OF THE WIMAX FORUM

Paul J. Sinderbrand
Timothy J. Cooney
Sean T. Conway

Wilkinson Barker Knauer, LLP
1800 M Street, NW Suite 800N
Washington, DC 20036
202.783.4141

Counsel to the WiMAX Forum

September 5, 2017

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
I. INTRODUCTION	1
II. AEROMACS IS MOVING FORWARD RAPIDLY, BOTH DOMESTICALLY AND INTERNATIONALLY, AND THE FCC SHOULD FACILITATE THIS PROGRESS BY ISSUING A <i>NOTICE OF PROPOSED RULEMAKING</i>	4
III. A BROAD AND DIVERSE SET OF COMMENTERS RECOGNIZE THE BENEFITS OF AEROMACS	8
IV. THERE IS OVERWHELMING RECORD SUPPORT FOR THE WIMAX FORUM'S PROPOSED SERVICE RULES	11
V. THE COMMISSION SHOULD NOT ALLOW THE AMT COMMUNITY TO RELITIGATE THE COMMISSION'S 2015 DECISION TO AWARD AEROMACS "PRIORITY OVER AMT SYSTEMS".....	15
A. The Commission Awarded AeroMACS Priority Over AMT at the Express Request of the FAA and NTIA	15
B. Suggestions from the AMT Community Would Constrain the Deployment of AeroMACS	17
C. Consistent with NTIA's Request and the FCC 2015 Actions, the Petition Proposes a Mechanism to Ensure Cooperation Between AeroMACS and AMT Operators	19
VI. ADMINISTRATIVE UPDATES TO THE PROPOSED PART 95 RULES	20
VII. CONCLUSION.....	20

EXECUTIVE SUMMARY

The Commission should promptly issue a *Notice of Proposed Rulemaking* proposing service rules for the Aeronautical Mobile Airport Communication Systems, better known as AeroMACS. The record developed in response to the WiMAX Forum's petition recognizes the public interest benefits offered by AeroMACS and overwhelmingly supports the Forum's proposals for service rules. Save for comments from aeronautical mobile telemetry ("AMT") interests that untimely seek a "re-do" of the Commission's carefully considered approach for introducing AeroMACS, there is near uniform support for the prompt issuance of a *Notice of Proposed Rulemaking*.

The adoption of AeroMACS by the global aviation community reflects a need to establish a framework for new 21st Century airport surface communications designed to advance the safety and regularity of flight. The International Telecommunications Union laid the groundwork for the global harmonization of AeroMACS when it added an AeroMACS allocation at the World Radio Conference 2007. In turn, the Commission allocated the 5091-5150 MHz band to AeroMACS in 2015 and the 5000-5030 MHz band to AeroMACS in 2017.

The momentum for AeroMACS continues to grow, both domestically and internationally. Technical standards have been adopted by the relevant global standards organizations. New trials and deployments are being planned and launched at an increasing frequency, and industry groups, including the Forum, are finalizing the certification requirements and implementation details that will facilitate AeroMACS deployment. To sustain this momentum, however, the Commission must adopt a *Notice of Proposed Rulemaking* proposing service rules for AeroMACS.

The instant petition is the direct result of the WiMAX Forum's proactive efforts to engage the AeroMACS ecosystem to promote the deployment of AeroMACS. These efforts to build consensus among stakeholders informed the proposals contained in the petition and are reflected in the substantial record support for the Forum's proposals.

The most significant aspect of the record is the near unanimous appreciation for the public interest need that exists for AeroMACS. Indeed, commenters almost uniformly recognize the potential for AeroMACS to promote the safety and regularity of flight and thus the need to move forward with the adoption of service rules that are essential before AeroMACS can be introduced at American airports. The majority of commenters also support the Forum's proposed service rules, including the license by rule regulatory paradigm and use of a Channel Manager. While a few commenters raise concerns about this approach, it remains the most efficient and effective means for accessing the spectrum.

The only other objections to the petition come from parties representing AMT interests. These filings are out of time to the extent they present a frontal challenge to the Commission's 2015 allocation of the 5091-5150 MHz band for AeroMACS use on a priority basis. Specifically, these commenters purposefully ignore the Commission's determination that AeroMACS be given priority in the 5091-5150 MHz band over AMT systems, and effectively seek reconsideration of that decision. In lieu of presenting suggestions on how to facilitate cooperation between AeroMACS and AMT users at those handful of airports where both

services are likely to be deployed, these commenters propose a series of road blocks designed to constrain the deployment of AeroMACS. In issuing a *Notice of Proposed Rulemaking*, the Commission should make clear that it is not looking to revisit the allocation decision made less than three years ago.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of)	
)	
WiMAX Forum Petition Proposing Rules for)	RM-11793
the Aeronautical Mobile Airport)	
Communication System)	
)	

REPLY COMMENTS OF THE WIMAX FORUM

The WiMAX Forum, by its attorneys, hereby replies to the comments submitted in response to the *Public Notice*¹ issued by the Wireless Telecommunications Bureau (“Bureau”) seeking comment on the Forum’s petition proposing service rules for spectrum at 5000-5030 MHz and 5091-5150 MHz that already has been allocated by the Federal Communications Commission (“Commission”) for the Aeronautical Mobile Airport Communication System, better known as AeroMACS.²

I. INTRODUCTION

The WiMAX Forum is a not-for-profit industry association that certifies and promotes the compatibility and interoperability of broadband wireless products based upon the IEEE Standard 802.16. Its members include companies from the telecommunications, aviation and equipment manufacturing industries, among others.³ In 2012, the WiMAX Forum chartered its Aviation Working Group in response to the aviation industry’s interest in employing the IEEE Standard 802.16 as the technology of choice for aviation communications applications across the

¹ Wireless Telecommunications Bureau Seeks Comment on WiMAX Forum Petition Proposing Rules for the Aeronautical Mobile Airport Communication System, *Public Notice*, DA 17-696 (rel. Jul. 19, 2017) (“*Public Notice*”).

² Petition of WiMAX Forum for Rulemaking to Adopt AeroMACS Service Rules (filed Mar. 31, 2017) (“*Petition*”).

³ See WiMAX Forum, Member Companies, <http://wimaxforum.org/Company/Directory> (last visited Aug. 31, 2017).

world. Since the creation of this working group, the WiMAX Forum has helped advance the development of WiMAX system profiles to meet the international requirements for AeroMACS. Today, the WiMAX Forum is the only equipment certification body for AeroMACS products recognized by the Federal Aviation Administration (“FAA”).⁴ By building consensus among stakeholders in the AeroMACS ecosystem, the WiMAX Forum has played a leading role in advancing the development, testing, and deployment of this vital new communications service.⁵

AeroMACS is a standardized airport surface communications system for high capacity aeronautical mobile and fixed broadband communications. Its adoption by the global aviation community reflects a need to establish a new framework for airport surface communications designed to advance the safety and regularity of flight. The International Telecommunications Union (“ITU”) laid the groundwork for the global harmonization of AeroMACS when it added an aeronautical mobile (route) service allocation for the 5091-5150 MHz band on an international basis at the World Radio Conference 2007.⁶ In recognition of this growing international demand, the Commission allocated the 5091-5150 MHz band to AeroMACS in

⁴ FAA, *Purchase of AeroMACS Technology equipment for field trial*, Request for Qualifications – SIR (DTFACT-16-R-00071) (Aug. 27, 2016), <https://faaco.faa.gov/index.cfm/announcement/view/25330>.

⁵ See Letter from Claude Pichavant, Senior Expert Communications & Surveillance, Airbus Operations S.A.S., to Marlene H. Dortch, Secretary, FCC, RM-11793, at 3 (filed Aug. 17, 2017) (“Airbus Comments”) (“Finally, Airbus wishes to express its deepest appreciation to the WiMAX Forum for its continued leadership in AeroMACS on a worldwide level.”); see also Letter from Eugene Crozier, Powertech Labs Inc., to Marlene H. Dortch, Secretary, FCC, RM-11793, at 2 (filed Aug. 15, 2017) (“Powertech Labs Comments”); Letter from Michel Jabbour, Business Segment Manager CI, Siemens Industry, to Marlene H. Dortch, Secretary, FCC, RM-11793, at 3 (filed Aug. 16, 2017) (“Siemens USA Comments”); Letter from Brian Crowe, Talus Atomics Corporation, to Marlene H. Dortch, Secretary, FCC, RM-11793, at 3 (filed Aug. 16, 2017) (“Talus Atomics Comments”); Letter from Mark Altshuller, CTO, Telrad Networks, to Marlene H. Dortch, Secretary, FCC, RM-11793, at 3 (filed Aug. 17, 2017) (“Telrad Networks Comments”); Letter from Geoffrey Noakes, VP, Business Development, Symantec Corporation, to Marlene H. Dortch, Secretary, FCC, RM-11793, at 3 (filed Aug. 17, 2017) (“Symantec Comments”); Letter from Oscar G. Marcia, Chief Executive Officer, Eonti Inc., to Marlene H. Dortch, Secretary, FCC, RM-11793, at 3 (filed Aug. 17, 2017) (“Eonti Comments”); Letter from Frank O’Connor, Chief Executive Officer, Airtel Inc., to Marlene H. Dortch, Secretary, FCC, RM-11793, at 3 (filed Aug. 18, 2017) (“Airtel Comments”).

⁶ ITU-R M. 1827, *Guideline on technical and operational requirements for stations of the aeronautical mobile (R) service (AM(R)S) limited to surface application at airports and for stations of the aeronautical mobile service (AMS) limited to aeronautical security (AS) applications in the 5091-5150 MHz*, ITU, 2007, https://www.itu.int/dms_pubrec/itu-r/rec/m/R-REC-M.1827-0-200710-S!!PDF-E.pdf, (superseded 2015, <https://www.itu.int/rec/R-REC-M.1827/en>).

2015⁷ and the 5000-5030 MHz band to AeroMACS in 2017.⁸ In its Petition, the WiMAX Forum urged the Commission to issue a *Notice of Proposed Rulemaking* proposing service rules for AeroMACS in these two allocated bands.

The Petition is the direct result of the WiMAX Forum's proactive efforts to engage with equipment vendors and representatives from the avionics, airframe, and airline operator industries, as well as the various civil aviation authorities, to advance the deployment of AeroMACS. These efforts to build consensus among stakeholders informed the proposals contained in the Petition, and have paid dividends by generating a record that is highly supportive of the WiMAX Forum's proposals. Even those who may question the WiMAX Forum's proposal for use of a license by rule paradigm and a Channel Manager to coordinate usage acknowledge the pressing need for the Commission to promptly adopt service rules that will authorize AeroMACS and advance the public interest in promoting safety and regularity of flight. Indeed, save for comments from AMT interests that untimely seek a "re-do" of the Commission's carefully considered approach for introducing AeroMACS into the 5091-5150 MHz band, there is near uniform support for the prompt issuance of a *Notice of Proposed Rulemaking*.

The filings by AMT interests are out of time to the extent they present a frontal challenge to the Commission's 2015 allocation of the 5091-5150 MHz band for AeroMACS use. Specifically, these commenters purposefully ignore the Commission's determination in the *FCC*

⁷ Amendment of Parts 1, 2, 15, 25, 27, 74, 78, 80, 87, 90, 97, and 101 of the Commission's Rules Regarding Implementation of the Final Acts of the World Radiocommunication Conference (Geneva, 2007) (WRC-07), Other Allocation Issues, and Related Rule Updates, *Report and Order, Order, and Notice of Proposed Rulemaking*, 30 FCC Rcd 4183, 4209 ¶ 58 (2015) ("*FCC 2015 Actions*"). The FCC also allocated the 5091-5150 MHz band to aeronautical mobile telemetry ("AMT") at 52 flight test areas, but with AeroMACS having a priority over AMT systems. *Id.* at ¶ 60.

⁸ Amendment of Parts 2, 15, 80, 90, 97, and 101 of the Commission's Rules Regarding Implementation of the Final Acts of the World Radiocommunication Conference (Geneva, 2012) (WRC-12), Other Allocation Issues, and Related Rule Updates, *Report and Order*, 32 FCC Rcd 2703, 2718 ¶ 40 (2017) ("*FCC 2017 R&O*").

2015 Actions that AeroMACS be given priority in the 5091-5150 MHz band over AMT systems, and effectively seek reconsideration of that decision. In lieu of presenting suggestions on how to facilitate cooperation between AeroMACS and AMT users at those limited number of airports where both services are likely to be deployed, these commenters propose a series of road blocks designed to constrain the deployment of AeroMACS in the United States. The Commission therefore should disregard these arguments and issue a *Notice of Proposed Rulemaking* based on the proposals contained in the Petition.

II. AEROMACS IS MOVING FORWARD RAPIDLY, BOTH DOMESTICALLY AND INTERNATIONALLY, AND THE FCC SHOULD FACILITATE THIS PROGRESS BY ISSUING A *NOTICE OF PROPOSED RULEMAKING*

As addressed in the Petition, the demand for AeroMACS at airports around the world continues to grow.⁹ In response to this demand, AeroMACS continues to move forward rapidly, both domestically and internationally. In light of this progress, the Commission promptly should adopt a *Notice of Proposed Rulemaking* to ensure the timely consideration of final service rules for AeroMACS.

For the past decade, the FAA and the National Aeronautics and Space Administration have conducted an AeroMACS trial at the Glenn Research Center Testbed located on the Cleveland Hopkins International Airport. While this trial represents the longest running AeroMACS deployment in the U.S., it is hardly the only trial and deployment conducted by the FAA. For example, the FAA implemented Airport Surface Surveillance Capability using AeroMACS in May 2013 at San Francisco International Airport, and began conducting field trials of improved weather observation systems using AeroMACS at Otis Air Force Base in July 2015. Since the filing of the Petition, FAA-sponsored AeroMACS trials were completed at

⁹ Petition at 3-10 (discussing the demand for AeroMACS and trials and deployments of AeroMACS both in the U.S. and internationally).

Syracuse Hancock International Airport. Next year, the FAA is expected to deploy an AeroMACS operational network at Boston Logan International Airport for use by the Massachusetts Port Authority and airlines.

Indeed, the number and frequency of trials are expected to increase significantly in the near future. Future trials are currently scheduled at airports throughout the country, including Dallas/Fort Worth International Airport, Detroit Metropolitan Wayne County Airport, Atlantic City International, Daytona Beach International, and Chicago O'Hare International Airport.

Interest in AeroMACS has increased internationally as well. Trials and deployment already have been conducted or are ongoing at Toulouse-Blagnac Airport (France), Sendai International Airport (Japan), Oberpfaffenhofen Airport (Germany), Lisbon Portela Airport (Portugal), and Chengdu Shuangliu International Airport (China), among others, and China Airlines, China Eastern, and Xiamen Airlines are currently using AeroMACS in the cockpit. Future trials and deployments are scheduled for some of the world's largest airports, including Beijing Capital International Airport (China), King Abdulaziz International Airport (Saudi Arabia), Milan-Malpensa Airport (Italy), Rio De Janeiro-Galeao International Airport (Brazil), and Ministro Pistarini International Airport (Argentina). In addition, ENAV, the Italian air navigation service provider, is planning to conduct multi-airport trials next year across Europe,¹⁰ and earlier this year, Aviation Data Communications Corporation of China announced its plans to connect thirty airports in China with AeroMACS systems by 2019.¹¹

¹⁰ ENAV will conduct these trials in cooperation with the Leonardo Company, an Italian high-tech company; NLR, a Dutch research aviation company, and SITA, an air transport communications and information technology company.

¹¹ See WiMAX Forum, *The Need for AeroMACS is Confirmed* (Mar. 28, 2017), http://wimaxforum.org/Page/News-PR/20170328_The_Need_for_AeroMACS_Is_Confirmed.

In addition to these trials and deployments, the development of AeroMACS standards continues to progress. As addressed in the Petition,¹² RTCA¹³ published Minimum Operations Performance Standards for AeroMACS based on IEEE standard 802.16-2009¹⁴ in 2014,¹⁵ and the International Civil Aviation Organization (“ICAO”) adopted Standards and Recommended Practices (“SARPS”) for AeroMACS,¹⁶ which entered into force in November 2016.¹⁷ Since the filing of the Petition, standards setting bodies continue to adopt standards that will facilitate the deployment and implementation of AeroMACS. Specifically, in July 2017 ARINC’s Airlines Electronic Engineering Committee¹⁸ published ARINC 766, the avionics installation standards

¹² See Petition at 13-14.

¹³ RTCA is an FAA-sponsored association of aeronautical organizations with diverse membership. Organized in 1935 as the Radio Technical Commission for Aeronautics, RTCA today includes over 200 government, industry, and academic organizations from the United States as well as other nations, who seek technical solutions to problems involving the application of electronics and telecommunications to aeronautical operations. The findings of RTCA are in the nature of recommendations to all organizations concerned. While RTCA is not a government agency, its Special Committees act under the Federal Advisory Committee Act and its findings and recommendations are often adopted and turned into policy by government agencies. See Review of Part 87 of the Commission’s Rules Concerning the Aviation Radio Service, *Second Report and Order and Second Further Notice of Proposed Rule Making*, 21 FCC Rcd. 11582, 11587 n.19 (2006) (“2006 Aviation Radio Service Order”). See also RTCA, About Us, <http://www.rtca.org/content.asp?pl=49&contentid=49> (last visited Aug. 31, 2017).

¹⁴ IEEE, *IEEE Standard for Local and Metropolitan Area Networks, Part 16: Air Interface for Broadband Wireless Access Systems*, IEEE Std. 802.16-2009 (May 29, 2009).

¹⁵ RTCA, *Minimum Operational Performance Standards (MOPS) for the Aeronautical Mobile Airport Communications System (AeroMACS)*, RTCA DO-346 (Feb. 20, 2014).

¹⁶ ICAO is an international body, operating under the auspices of the United Nations, which develops standards and recommended practices for international application in civil air navigation. Its recommendations, in part, serve as the basis for the Commission’s Aviation Radio Service rules. See *2006 Aviation Radio Service Order*, 21 FCC Rcd. at 11590 n.38 (citing 47 CFR §87.1(a)(3)). ICAO works with Member States and industry groups to reach consensus on international civil aviation SARPs and policies in support of a safe, efficient, secure, economically sustainable and environmentally responsible civil aviation sector. See ICAO, About ICAO, <https://www.icao.int/-/about-icao/Pages/default.aspx> (last visited Sept. 1, 2017).

¹⁷ See Letter from Fang Liu, Secretary General, to ICAO, Adoption of Amendment 90 to the International Standards and Recommended Practices, Aeronautical Telecommunications – Communications Systems (Annex 10, Volume III to the Convention on International Civil Aviation) (Apr. 5, 2016).

¹⁸ ARINC was established in 1929 by the airline industry to provide and coordinate aeronautical communications facilities and services. ARINC also organizes aviation industry activities that cooperatively establish voluntary technical Standards and develop shared technical solutions.

for AeroMACS.¹⁹ The publication of this consensus-based, industry-driven international standard defines the form, fit, and function for AeroMACS to be installed in aircraft. In addition, the WiMAX Forum also is close to finalizing an agreement with ICAO to collaborate in the oversight of the AeroMACS Public Key Infrastructure, which will help ensure that AeroMACS communications remain secure.²⁰ With these events, the push to introduce AeroMACS into aircraft for use while on the airport surface will inevitably accelerate.

Moreover, the avionics industry is developing plans for the deployment of AeroMACS in the near future. For example, Airbus states that it already is taking “into account the AeroMACS integration in [its] future aircraft architectures and main avionics suppliers already have commercial AeroMACS kits available.”²¹ Similarly, Siemens USA notes that the product upon which it will base its AeroMACS focused solution “is already certified by the FAA [Telecommunications Infrastructure] program.”²²

It is thus evident that AeroMACS is gaining momentum at a rapid pace. New trials and deployments are being planned and launched in the United States and internationally, standards organizations continue to adopt the technical requirements and implementation details that will facilitate AeroMACS deployment, and the avionics industry is quickly building AeroMACS into its near term plans. To sustain this momentum, however, the Commission must adopt a *Notice of Proposed Rulemaking* proposing service rules for AeroMACS. In the absence of such an action, the Commission risks needlessly slowing the pace of AeroMACS deployments and delaying the resulting benefits to the aviation industry and its passengers.

¹⁹ ARINC Characteristic 766, *766 Aeronautical Mobile Airport Communication System (AeroMACS) Transceiver and Aircraft Installation Standards* (July 2017).

²⁰ WiMAX Forum, Newsletter, Working Groups (Aug. 2017), <http://wimaxforum.org/Page/Resources#news> (last visited Sept. 2, 2017).

²¹ Airbus Comments at 2.

²² Siemens USA Comments at 2.

III. A BROAD AND DIVERSE SET OF COMMENTERS RECOGNIZE THE BENEFITS OF AEROMACS

As the WiMAX Forum explained in its Petition, the adoption of AeroMACS by the global aviation community reflects a need to establish a new framework for airport surface communications.²³ While the full range of potential use cases and applications are still being developed, AeroMACS is expected to improve Air Traffic Management, relieve traffic congestion, reduce delays, improve airport safety, minimize the environmental impact of flying, and contain costs for airport and airlines, allowing the resulting savings and benefits to be passed on to consumers.

In response to the *Public Notice*, entities representing a broad cross section of industries and perspectives filed comments. The overwhelming majority of these commenters support the proposals contained in the Petition and urge the Commission to issue a *Notice of Proposed Rulemaking*.²⁴ While there are some differences of opinion about the appropriate licensing and channel manager rules proposed by the WiMAX Forum for AeroMACS, the most significant aspect of the record is the near unanimous appreciation for the public interest need that exists for

²³ See Petition at 6-9 (describing potential uses and benefits of AeroMACS).

²⁴ See, generally, Airbus Comments; Letter from Leonhard Korowajczuk, CEO/CTO, CelPlan Technologies, Inc., to Marlene H. Dortch, Secretary, FCC, RM-11793 (filed July 26, 2017) (“CelPlan Technologies Comments”); Letter from Nicholas G. Kuhn, ConvergeX Technologies LLC, to Marlene H. Dortch, Secretary, FCC, RM-11793 (filed July 25, 2017) (“ConvergeX Technologies Comments”); Letter from Damon R. Kachur, Head of IoT Solutions, Comodo Group Inc., to Marlene H. Dortch, Secretary, FCC, RM-11793 (filed Aug. 15, 2017) (“Comodo Group Comments”); Powertech Labs Comments; Siemens USA Comments; Talus Atomics Comments; Telrad Networks Comments; Symantec Comments; Eonti Comments; Airtel Comments; Letter from Paul J. Prisaznuk, AEEC Executive Secretary & Program Director, ARINC Industry Activities, to Marlene H. Dortch, Secretary, FCC, RM-11793 (filed Aug. 21, 2017) (“ARINC Comments”); Letter from Melissa Sabatine, Senior Vice President, Regulatory and International Affairs, American Association of Airport Executives, to Marlene H. Dortch, Secretary, FCC, RM-11793 (filed Aug. 18, 2017) (“American Association of Airport Executives Comments”); Letter from Christopher J. Oswald, Vice President, Safety & Regulatory Affairs, Airports Council International-North America, to Marlene H. Dortch, Secretary, FCC, RM-11793 (filed Aug. 18, 2017) (“Airports Council International-North America Comments”).

AeroMACS. Indeed, commenters are uniform in recognizing that AeroMACS will offer the aviation industry numerous benefits.²⁵

Not surprisingly, safety is one of the chief benefits commenters cite.²⁶ Siemens USA states that AeroMACS will enable the transmission to pilots of “up-to-date information on flight plans, maps, and weather forecasts,”²⁷ and Airbus asserts that AeroMACS networks can be used to help provide “[e]mergency services” at airports.²⁸ Similarly, Boeing recognizes that “[a] significant public interest need exists for AeroMACS,” and acknowledges that AeroMACS could help distribute “aeronautical safety communications data using wireless broadband capabilities that can support high speed interactions, live video communications, and wide area data processing.”²⁹ In its recent *FCC 2017 R&O*, the Commission echoed similar sentiments, stating that “AeroMACS frequencies might be used by pilots to receive weather and airfield information; by fire rescue, snow removal, and ground personnel to coordinate operations; and by airport security personnel to monitor live video feeds.”³⁰

²⁵ See *supra* note 24. See also, e.g., Comments of the Boeing Company, RM-11793, at 10 (filed Aug. 18, 2017) (“Boeing Comments”) (“Boeing supports the deployment of AeroMACS at airports in the United States in order to enhance the safety and efficiency of aircraft operations.”).

²⁶ See, e.g., Boeing Comments 1-2; Airbus Comments at 1; CelPlan Technologies Comments at 1; ConvergenX Technologies Comments at 1; Comodo Group Comments at 1; Powertech Labs Comments at 1; Siemens USA Comments at 1; Talus Atomics Comments at 1; Telrad Networks Comments at 1; Symantec Comments at 1; Eonti Comments at 1; Airtel Comments at 1; ARINC Comments at 1; American Association of Airport Executives Comments at 2; Airports Council International-North America Comments at 2.

²⁷ Siemens USA Comments at 1.

²⁸ Airbus Comments at 2.

²⁹ Boeing Comments at 1-2.

³⁰ *FCC 2017 R&O*, 32 FCC Rcd at 2717-18 ¶ 39. The Aviation Spectrum Resources, Inc. (“ASRI”) objects to the use of AeroMACS for security cameras. See Comments of Aviation Spectrum Resources, Inc., RM-11793, at 5 (filed Aug. 18, 2017) (“ASRI Comments”). However, the WiMAX Forum agrees with the Commission that security cameras are an appropriate use of AeroMACS spectrum. For example, an AeroMACS trial in Lisbon’s airport is currently using AeroMACS spectrum for CCTV on the airport fire department’s mobile command center.

Many commenters also identify regularity of flight as a primary benefit.³¹ For example, ARINC states that AeroMACS will allow airport operations teams to “perform a host of tasks ranging from coordinating gate operations to snow removal to support for emergency services.”³² Similarly, ASRI notes that AeroMACS can help facilitate “more efficient airline operations.”³³ AeroMACS trials also are demonstrating the potential of this service to improve the regularity of flight. For example, a recent trial of AeroMACS in China’s Chengdu airport found that air traffic control procedures using AeroMACS reduced the clearance delivery time by twenty minutes per flight.³⁴

AeroMACS also holds the potential to strengthen American equipment manufacturing. For example, Airtel, a Maryland-based company with 30 employees, states that it sees a “solid market opportunity in the provision of new high-bandwidth flight services” as a result of AeroMACS systems.³⁵ Airbus asserts that “the adoption of service rules will spur investment in new and innovative products and services that can be deployed on AeroMACS networks.”³⁶ Moreover, American manufacturers of AeroMACS products and services would gain an advantage on foreign competitors if the Commission promptly adopts AeroMACS service rules. Specifically, increasing demand for AeroMACS by the U.S. airport and airline community could serve as a valuable incubator for U.S. AeroMACS suppliers, which in turn would be able to sell

³¹ See, e.g., Boeing Comments at 1-2; Airbus Comments at 1; CelPlan Technologies Comments at 1; ConvergenX Technologies Comments at 1; Comodo Group Comments at 1; Powertech Labs Comments at 1; Siemens USA Comments at 1; Talus Atomics Comments at 1; Telrad Networks Comments at 1; Symantec Comments at 1; Eonti Comments at 1; Airtel Comments at 1; ARINC Comments at 1; American Association of Airport Executives Comments at 2; Airports Council International-North America Comments at 2.

³² ARINC Comments at 1.

³³ ASRI Comments at 4-5.

³⁴ Aloke Roy, *AeroMACS: It’s like a Real-time GPS, but Better!*, Honeywell (May 23, 2016), <https://aerospace-honeywell.com/en/blogs/2016/may/aeromacs-it-is-like-a-real-time-gps-but-better>.

³⁵ Airtel Comments at 2.

³⁶ Airbus Comments at 2.

AeroMACS-related products and services both domestically and abroad in future years. To realize these benefits, however, the Commission must facilitate American leadership in AeroMACS by moving expeditiously to adopt a *Notice of Proposed Rulemaking* proposing service rules.

IV. THERE IS OVERWHELMING RECORD SUPPORT FOR THE WiMAX FORUM'S PROPOSED SERVICE RULES

In the Petition, the WiMAX Forum proposes that non-Federal AeroMACS operations be authorized as a Part 95 license by rule service, with technical rules based on already-adopted international standards and codified in Part 87. A single Channel Manager would coordinate usage among eligible non-Federal users of the AeroMACS bands, facilitate sharing of the AeroMACS bands with Federal users, and assure that AeroMACS' users' obligations to cooperate with the AMT community are met. In its *Public Notice*, the Bureau seeks comment specifically on the proposed Channel Manager and license by rule approach, the proposed eligibility rules, and the proposed technical rules.³⁷

Presumably because the Petition proposed technical rules drawn directly from international aviation standards for AeroMACS, they were overwhelmingly supported by those filing; indeed, none of the commenting parties took issue with them. Similarly, because the Petition's proposed eligibility rules were the result of extensive coordination with the aviation community, they are unopposed in the record.

The majority of commenters support the WiMAX Forum's proposed license by rule regulatory paradigm, with a Channel Manager charged with maximizing efficient and effective sharing of the spectrum.³⁸ However, a few commenters raise concerns about the Channel

³⁷ *Public Notice* at 2.

³⁸ See, e.g., Boeing Comments at 7-9; Airbus Comments at 2; CelPlan Technologies Comments at 2; ConvergeX Technologies Comments at 2; Comodo Group Comments at 2; Powertech Labs Comments at 2; Siemens USA

Manager approach. These few commenters appear to be suggesting that the Channel Manager is unnecessary³⁹ or potentially anti-competitive⁴⁰ and propose the use of multiple channel managers, among other things.⁴¹ The WiMAX Forum respectfully disagrees.

As discussed in the Petition, the Channel Manager is designed to maximize efficient and flexible usage of this spectrum to meet the unique needs of each location, while preventing hoarding or warehousing of spectrum. The flexibility inherent in the Channel Manager approach reflects that AeroMACS users at a major hub like Dallas/Fort Worth International Airport likely will have very different needs from those of users at a smaller regional field like Ithaca Tompkins Regional Airport. Because of the different use cases that are likely to be present at different airports, the Channel Manager will have the flexibility to employ the full range of available sharing techniques based on the needs of each location, but in each case with the goal of achieving fair and equitable sharing that results in the most efficient use of the spectrum.⁴²

At the same time, the Channel Manager approach ensures nationwide consistency for accessing AeroMACS spectrum. End users of the spectrum would not have to dedicate the time

Comments at 2; Talus Atomics Comments at 2; Telrad Networks Comments at 2; Symantec Comments at 2; Eonti Comments at 2; Airtel Comments at 2; ARINC Comments at 2; American Association of Airport Executives Comments at 2; Airports Council International-North America Comments at 2.

³⁹ See, e.g., Comments of Corbitt Financial Group, RM-11793 (filed Aug. 17, 2017) (“Corbitt Financial Comments”); Comments of Bigby Consulting, RM-11793 (filed Aug. 18, 2017) (“Bigby Comments”) (filed as Derry Bigby); Comments of Sanford Electronic Manufacturing & Sales, RM-11793 (filed Aug. 18, 2017) (filed as SEMS); Comments of NetMoby, Inc., RM-11793, at 6-9 (filed Aug. 18, 2017).

⁴⁰ See, e.g., Corbitt Financial Comments.

⁴¹ See, e.g., *id.*; Bigby Consulting.

⁴² For example, at Ithaca, reduced demand may allow the Channel Manager to assign full time use of channels to interested users. At Dallas/Fort Worth, however, it may be necessary for the Channel Manager to provide for a given channel to be shared. That could be accomplished by limiting a given user’s operations to a particular area of the airport (for example, limiting an airline’s use of a particular channel to its hanger area). Or, the Channel Manager could limit use to particular times (for example, an international airline that serves an airport with just a few flights each week might be limited to windows around the arrival and departure of the aircraft). The important point is that the Channel Manager will have the flexibility to make rational decisions on a case-by-case basis, guided by the needs of its constituents. The WiMAX Forum has proposed that the Channel Manager be guided in its activities by an advisor group of interested aviation industry stakeholders, which will assure that the sharing mechanisms employed by the Channel Manager are fair and efficient. See Petition at 22-23.

and resources to deal with different allocation and interference procedures at each airport, but instead would have one single, nationwide non-Federal Channel Manager whose responsibility would be to minimize the burden on AeroMACS users. Moreover, because the Channel Manager would be required to be an impartial entity that makes its services available on a non-discriminatory basis, there would be no motivation for the Channel Manager to engage in anti-competitive behavior.

The use of a single Channel Manager will simplify the utilization of AeroMACS frequencies for non-Federal AeroMACS users. Rather than deal with multiple Channel Managers nationwide, non-Federal AeroMACS users will have one entity with whom they will interact. This will streamline AeroMACS registration by non-Federal users, especially airlines operating at multiple airports, because there will be one single point of contact for all airports. Additionally, a single, nationwide Channel Manager will ensure consistent application of standards and procedures from airport to airport and facilitate aircraft and airline carrier access. Moreover, given the likely small number of entities who will qualify as AeroMACS users, a single Channel Manager is more efficient for fee paying users. Notably, the Commission has designated a single nationwide database manager/coordinator in at least two other contexts, in the case of Wireless Medical Telemetry Service (“WMTS”) and Medical Body Area Network (“MBAN”) services.⁴³

A single nationwide Channel Manager also will facilitate coordination between non-Federal AeroMACS users and Federal users of the band. As discussed in the Petition, the National Telecommunications and Information Administration (“NTIA”), as the representative

⁴³ Amendment of the Commission’s Rules to Provide Spectrum for the Operation of Medical Body Area Networks, *Order on Reconsideration and Second Report and Order*, 29 FCC Rcd 10662, 10681-83 ¶¶ 59-63 (2014); Amendment of Parts 2 and 95 of the Commission’s Rules to Create a Wireless Medical Telemetry Service, *Order*, 16 FCC Rcd 4543 (WTB 2001).

of Federal users, would enter into a Memorandum of Agreement with just the single non-Federal AeroMACS Channel Manager.⁴⁴ Similarly, the Channel Manager would act as the single non-Federal point of contact for spectrum coordination with other authorized users of the 5000-5010 MHz, 5010-5030 MHz, and 5091-5150 MHz bands, including AMT users. With respect to AMT users, Footnote US444B(c) to the Table of Frequency Allocations urges operators of AeroMACS and AMT systems to cooperate in the 5091-5150 MHz band. The Petition's proposed Section 87.606(b) of the rules directly incorporates that language into the Channel Manager's charge. Avoiding the burden of coordination between multiple Channel Managers or individual AeroMACS users, a single non-Federal Channel Manager would be best suited to facilitate effective and organized cooperation efforts.

In sum, a single Channel Manager will ensure coordination among eligible non-Federal users of the AeroMACS bands, ensure nationwide consistency in the allocation and use of the available channels, and provide a single point of contact to facilitate sharing of the AeroMACS bands with Federal AeroMACS users and AMT users in a manner that will avoid interference. The WiMAX Forum believes, for these reasons, that the approach to licensing and Channel Manager coordination proposed in the Petition is the most efficient and will be the most effective means for assuring that the important benefits of AeroMACS are realized by Federal and non-Federal members of the aviation community. That said, the WiMAX Forum has no objection to the Commission seeking comment in the *Notice of Proposed Rulemaking* to any alternative approaches that the Commission believes worthy of consideration.

⁴⁴ See Petition at 14-15.

V. THE COMMISSION SHOULD NOT ALLOW THE AMT COMMUNITY TO RELITIGATE THE COMMISSION’S 2015 DECISION TO AWARD AEROMACS “PRIORITY OVER AMT SYSTEMS”

In comments to the Petition, parties representing the AMT community suggest a series of actions purportedly designed to ensure coexistence between AeroMACS and others operations in the 5091-5150 MHz band.⁴⁵ Because the Commission previously determined that AeroMACS will have priority over AMT systems in this band, the Commission should reject these arguments. The priority afforded by the Commission to AeroMACS was adopted at the request of the FAA and NTIA, and the Petition specifically proposed that the Channel Manager be required to cooperate with AMT users in a manner consistent with the Commission’s codification of that request in its rules.⁴⁶ The Commission therefore should incorporate this cooperation requirement in the proposals it puts forth in a *Notice of Proposed Rulemaking*.

A. THE COMMISSION AWARDED AEROMACS PRIORITY OVER AMT AT THE EXPRESS REQUEST OF THE FAA AND NTIA

Footnote US444B of the Table of Frequency Allocations setting forth the basis for AeroMACS/AMT sharing of the 5091-5150 MHz band was the result of extensive consideration by the Commission and input from Federal users of AeroMACS. Specifically, in the 2012 *WRC-07 NPRM*, the Commission sought comment on a proposal to make the 5091-5150 MHz band available for AeroMACS and AMT.⁴⁷ In response, the Aerospace and Flight Test Radio

⁴⁵ See, e.g., Boeing Comments at 4-5 (proposing priority access to spectrum for AMT operations in a portion of the 5091-5150 MHz band), at 5-6 (proposing testing to determine coexistence between AeroMACS and AMT operations), 6-7 (proposing testing to determine coexistence between AeroMACS and Mobile Satellite Service operations), at 8 (proposing oversight of the Channel Manager by a representative of the AMT community), at 9-10 (objecting to the license by rule approach to AeroMACS users); ASRI Comments at 11-14; Statement of Aerospace and Flight Test Radio Coordinating Council, Inc. Position on Petition for Rulemaking, RM-11793, at 5-6 (filed Aug. 18, 2017) (“AFTRCC Comments”). Because the *FCC 2017 R&O* did not address the allocation of additional spectrum for AMT operations, there is no allocation for AMT in the 5000-5030 MHz band. See *FCC 2017 R&O*, 32 FCC Rcd at 2705 ¶ 5.

⁴⁶ See Petition at 19.

⁴⁷ See Amendment of Parts 1, 2, 15, 74, 78, 87, 90, and 97 of the Commission’s Rules Regarding Implementation of the Final Acts of the World Radiocommunication Conference (Geneva, 2007) (WRC-07), Other Allocation Issues,

Coordination Council (“AFTRCC”) and Boeing asked the Commission to require coordination of AeroMACS with AMT operations at six airports.⁴⁸

The FAA and NTIA opposed this coordination requirement. Specifically, in its comments to the FCC, NTIA informed the FCC of its position in response to the Boeing and AFTRCC coordination proposal:

This is a new constraint that was not considered in the International Telecommunication Union Radiocommunication (ITU-R) sector studies in preparation for WRC-07 or WRC-12. Since there is no established framework for the proposed coordination, ***AMT operations could constrain the deployment of AeroMACS at the six airports specified by AFTRCC and Boeing, which is not acceptable to the FAA.***⁴⁹

The NTIA Priority Letter subsequently recommended the language that has since been codified in footnote US444B awarding a priority for AeroMACS over AMT systems in the band.⁵⁰ In the *FCC 2015 Actions*, the Commission adopted the FAA’s and NTIA’s recommendation and concluded that, “at NTIA’s request, airport surface wireless systems operating in the AM(R)S, *i.e.*, AeroMACS, will have priority over AMT systems in the 5091-5150 MHz band.”⁵¹

When considering the arguments of the AMT commenters, the Commission must keep in mind its decision to award AeroMACS priority over AMT systems and the FAA’s stated desire

and Related Rule Updates, *Notice of Proposed Rulemaking and Order*, 27 FCC Rcd 14598, 14626 ¶ 65 (2012) (“*WRC-07 NPRM*”).

⁴⁸ See Comments of Aerospace and Flight Test Radio Coordinating Council, ET Docket No. 12-338, at 5 (Feb. 25, 2013); Comments of the Boeing Comments, ET Docket No. 12-338, at 4 (Feb. 25 2013).

⁴⁹ See Letter from Paige R. Atkins, Associate Administrator, Office of Spectrum Management, NTIA, to Julius P. Knapp, Chief, Office of Engineering and Technology, FCC, ET Docket No. 12-338, at 2 (filed Feb. 11, 2015) (“NTIA Priority Letter”) (emphasis added) attached as Appendix A. Notably, the ITU-R also did not recommend imposing any of the additional coordination or coexistence requirements on AeroMACS that have been suggested by the AMT commenters. Therefore, these various suggestions effectively would result in rules governing AeroMACS operations in the U.S. that would not conform to the international recommendations.

⁵⁰ *Id.*

⁵¹ *FCC 2015 Actions*, 30 FCC Rcd at 4209 ¶ 60.

to avoid requirements that would allow AMT operations to constrain the deployment of AeroMACS.

B. SUGGESTIONS FROM THE AMT COMMUNITY WOULD CONSTRAIN THE DEPLOYMENT OF AEROMACS

While acknowledging in one breath the Commission's previous determination that AeroMACS has priority over AMT systems,⁵² AMT commenters suggest in the next breath a series of steps that fly in the face of the AeroMACS priority determination. These suggestions would result in either indeterminate delays in the deployment of AeroMACS or a de facto reversal of the Commission's AeroMACS priority determination, and in some cases both. A closer look at the constraints that a few of these proposals would place upon the deployment of AeroMACS makes clear that the Commission should reject these proposals outright.

First, a number of commenters representing AMT interests suggest coexistence testing between AeroMACS and AMT operations.⁵³ These arguments blink reality.⁵⁴ In the *FCC 2015 Actions*, the Commission, based on objections received from the FAA and NTIA, rejected proposals by the AMT community that would require advance coordination of AeroMACS at the six airports where AMT for flight testing is conducted. Undeterred, these commenters now double down on this request, presenting unsubstantiated arguments for the need for coexistence testing before the adoption of AeroMACS service rules.⁵⁵ Not only is testing inappropriate given the AeroMACS priority in the band, but it also would have the practical effect of

⁵² See, e.g., Boeing Comments at 3-4.

⁵³ See, e.g., Boeing Comments at 6 ("the Commission should encourage the completion of testing between AeroMACS and AMT and refrain from initiating a rulemaking on service rules for AeroMACS until the results of those studies have been analyzed.").

⁵⁴ Similarly blinking reality is Boeing's concern for Globalstar. Boeing dedicates an entire section of its Comments expressing concern about potential interference between AeroMACS and Globalstar's MSS operations. See *id.* at 6-7. Notably, Globalstar did not submit comments in response to this Petition nor did it submit comments in response to the Commission's proposal in the *WRC-07 NPRM* to allocate the 5091-5150 MHz band to AeroMACS.

⁵⁵ Tellingly, the AMT commenters present no evidence that AeroMACS cannot coexist with AMT operations.

constraining AeroMACS deployment on a nationwide basis, well beyond those six airports where AMT operations occur.

Next, Boeing also recommends a role for AMT operators in overseeing the Channel Manager.⁵⁶ Putting aside Boeing's failure to provide any detail about how such oversight would work, an oversight role flies in the face of the Commission's determination that AeroMACS has priority over AMT. Indeed, an oversight role for AMT operators would render the priority AeroMACS holds over AMT meaningless, amounting to a priority in name only and a de facto reversal of this priority. Under the WiMAX Forum's proposed rules, the Channel Manager would be obligated to assure that AeroMACS users comply with the rules regarding cooperation between AeroMACS and AMT operators.⁵⁷ That is sufficient to protect AMT's rights, as any AMT interest who believes the Channel Manager is not complying with its obligations would be able to resort to the Commission's complaint process.

Boeing's objection to the license by rule approach is similarly without merit.⁵⁸ According to Boeing, an individual Universal Licensing Service ("ULS") license should be required for each AeroMACS user and the location of each transmitter should be recorded in ULS.⁵⁹ While it implies that such an approach will help resolve interference events if they occur, Boeing is incorrect. Given the flexibility that will be afforded the Channel Manager to reassign channels on an as-needed basis to reflect the geographic or time-based needs of users, Boeing ascribes too much weight to the value of its proposal.⁶⁰ Indeed, even if each AeroMACS

⁵⁶ See Boeing Comments at 8.

⁵⁷ See Petition at 22-23.

⁵⁸ See Boeing Comments at 9-10.

⁵⁹ *Id.* at 10.

⁶⁰ Alternatively, if Boeing is proposing that each license would be authorized to operate on a specific channel, this would eliminate the flexibility that a Channel Manager would have to reassign channels on an as-needed basis to

user was required to obtain an individual license and record the location of each of its transmitters in ULS, the Channel Manager still would remain best situated to help resolve interference in the unlikely event that it would occur.⁶¹ Moreover, Boeing's proposal would impose a tremendous burden not only on AeroMACS users, but on the Commission staff. In sum, while the WiMAX Forum appreciates Boeing's recognition of the significant public interest that exists for AeroMACS, Boeing's proposal would raise the barrier to entry for eligible AeroMACS users with no corresponding benefit, and thus needlessly risks constraining the deployment of AeroMACS.⁶²

***C. CONSISTENT WITH NTIA'S REQUEST AND THE FCC 2015 ACTIONS,
THE PETITION PROPOSES A MECHANISM TO ENSURE
COOPERATION BETWEEN AEROMACS AND AMT OPERATORS***

In contrast to the AMT community's efforts to relitigate the AeroMACS priority over AMT systems, the Petition's Channel Manager proposal conforms to the Commission's current rules. Specifically, NTIA requested and the FCC adopted footnote US444B(c) to the U.S. Table of Frequency Allocations, which states in relevant part that AeroMACS operators and AMT systems "are urged to cooperate" about planned deployments at those airports where AMT operations occur.⁶³ The rules proposed in the Petition cite to this footnote, instructing that the "Channel Manager is urged to cooperate with [AMT] users in accordance with Table of [Frequency] Allocations footnote US444B(c)."⁶⁴ The flexibility inherent in the proposed

reflect the geographic or time-based needs of users. Such a proposal certainly would constrain the deployment of AeroMACS.

⁶¹ See Petition, App. A at 4-A (proposed Section 87.606(c)) (describing the responsibility of the Channel Manager to create a database of non-Federal AeroMACS licensees, equipment technical parameters, base station locations, and channel assignments and the role of the Channel Manager in resolving interference from non-Federal use of AeroMACS channels).

⁶² Additionally, as addressed in the Petition, a license by rule/database approach using a Channel Manager is consistent with the Commission's WMTS and MBAN services. See *id.* at 17.

⁶³ See NTIA Priority Letter at 2-3.

⁶⁴ See Petition, App. A at 4-A (proposed Section 87.606(b)).

Channel Manager approach will afford for this cooperation to occur. Moreover, as even Boeing concedes, AeroMACS and AMT operations likely will be able to use the same spectrum.⁶⁵

Indeed, no commenters provide evidence that suggests otherwise.

Consequently, the Commission should reject attempts to relitigate the AeroMACS priority over AMT systems and issue a *Notice of Proposed Rulemaking* proposing service rules that recognize and reaffirm this priority.

VI. ADMINISTRATIVE UPDATES TO THE PROPOSED PART 95 RULES

The Petition proposes revisions to certain sections of Part 87 and Part 95 of the Commission's rules. Since the filing of the Petition, the Commission adopted an order in a separate proceeding that reorganized the Part 95 rules.⁶⁶ Consequently, Appendix B to this reply conforms the rule changes initially proposed in the Petition to the Part 95 rules as reorganized.

VII. CONCLUSION

In response to increasing demand for high-bandwidth services, the momentum for AeroMACS continues to grow, both domestically with the FAA and U.S. airports and airlines, and internationally. New trials and deployments are being planned and launched at an increasing frequency, and standards organizations have finalized the technical requirements and implementation details that will facilitate AeroMACS deployment. Moreover, the benefits offered by AeroMACS are undisputed by commenters. Moving forward with the adoption of a *Notice of Proposed Rulemaking*, therefore, will facilitate AeroMACS deployment and the resulting benefits identified herein. The *Notice of Proposed Rulemaking* should recognize that the single Channel Manager approach offers the most efficient and flexible approach to ensuring

⁶⁵ Boeing Comments at 4 (“Certain factors potentially enhance the ability for spectrum sharing between AeroMACS and AMT flight testing in the 5091-5150 MHz band.”).

⁶⁶ See Review of the Commission's Part 95 Personal Radio Service Rules, *Report and Order*, 32 FCC Rcd 4292 (2017).

that eligible non-Federal users maximize the benefits of AeroMACS. Similarly, the Commission's proposals should reflect NTIA's recommendation and the Commission's decision that AeroMACS has priority over AMT operations in the 5091-5150 MHz band.

Respectfully submitted,

THE WIMAX FORUM

By: /s/
Paul J. Sinderbrand
Timothy J. Cooney
Sean T. Conway

Wilkinson Barker Knauer, LLP
1800 M Street, NW Suite 800N
Washington, DC 20036
202.783.4141

Its Attorneys

September 5, 2017

APPENDIX A



UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and
Information Administration
Washington, D.C. 20230

Mr. Julius P. Knapp
Chief, Office of Engineering and Technology
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

ACCEPTED/FILED

FEB 11 2015

Federal Communications Commission
Office of the Secretary

RE: Amendment of Parts 1, 2, 15, 74, 78, 87, 90, and 97 of the Commission's Rules
Regarding Implementation of the Final Acts of the World Radiocommunication
Conference (Geneva, 2007) (WRC-07), Other Allocation Issues, and Related Rule
Updates (ET Docket No. 12-338)

Dear Mr. Knapp:

The National Telecommunications and Information Administration (NTIA) sent several letters to the Federal Communications Commission (FCC) recommending actions to implement the Final Acts for the 2007 and 2012 World Radiocommunication Conferences (WRC-07 and WRC-12).¹ In this letter, NTIA responds to the above-referenced proceeding for the purposes of: (1) addressing issues associated with the allocations intended to support operation of a new airport surface local area network, the Aeronautical Mobile Aircraft Communications System (AeroMACS), in the 5 GHz frequency range; (2) protection of passive operations in the 1400-1427 MHz band; and (3) implementing federal and non-federal aeronautical mobile telemetry (AMT) in the 4400-4940 MHz and 5925-6700 MHz bands.

Allocations for AeroMACS in the 5091-5150 MHz Band

In the preparations for WRC-07, the sharing studies between aeronautical mobile (route) service (AM(R)S) and AMT in the 5091-5150 MHz band were done on the basis of geographic separation, with the understanding that AMT operations would only be operating at remote test ranges. As a result, though a power flux density was adopted to protect AM(R)S from airborne AMT transmissions, no constraints were placed on AM(R)S to protect AMT ground stations.²

¹ See letter from Karl B. Nebbia, Associate Administrator, Office of Spectrum Management, NTIA to Julius P. Knapp, Chief, Office of Engineering and Technology (OET), FCC (Aug. 20, 2009); letter from Karl B. Nebbia, Associate Administrator, Office of Spectrum Management, NTIA to Julius P. Knapp, Chief, Office of Engineering and Technology (OET), FCC (Sept. 20, 2009); letter from Karl B. Nebbia, Associate Administrator, Office of Spectrum Management, NTIA to Julius P. Knapp, Chief, Office of Engineering and Technology (OET), FCC (Jul. 26, 2012); letter from Karl B. Nebbia, Associate Administrator, Office of Spectrum Management, NTIA to Julius P. Knapp, Chief, Office of Engineering and Technology (OET), FCC (Feb. 25, 2013); and letter from Karl B. Nebbia, Associate Administrator, Office of Spectrum Management, NTIA to Julius P. Knapp, Chief, Office of Engineering and Technology (OET), FCC (Mar. 28, 2013).

² See WRC-12 Final Acts Resolution 418 (REV. WRC-12) Use of the band 5 091-5 250 MHz by the aeronautical mobile service for telemetry applications.

Based on the outcome of WRC-07, the FCC proposed to make the 5091-5150 MHz band available for AMT.³

The Aerospace and Flight Test Radio Coordinating Council (AFTRCC) and the Boeing Company (Boeing) were supportive of the FCC's proposal to make the 5091-5150 MHz band available for AMT use.⁴ Given the critical nature of flight test communications, Boeing urged the FAA to coordinate any AeroMACS deployment with operators of flight test receivers that could suffer harmful interference from co-channel operations in the 5091-5150 MHz band, and asked that the FCC require such coordination at the St. Louis and Seattle-Tacoma international airports.⁵ In its reply comments, AFTRCC supported the Boeing request and urged that coordination also be required at four additional airports where AMT for flight testing of aircraft is conducted.⁶ At the request of the FCC AFTRCC clarified the list of airports where AMT for flight testing will be conducted.⁷

The proposals by AFTRCC and Boeing would require coordination of AM(R)S with AMT operations at six airports. This is a new constraint that was not considered in the International Telecommunication Union Radiocommunication (ITU-R) sector studies in preparation for WRC-07 or WRC-12. Since there is no established framework for the proposed coordination, AMT operations could constrain the deployment of AeroMACS at the six airports specified by AFTRCC and Boeing, which is not acceptable to the FAA. Consequently, NTIA revises its WRC-07 recommendations by proposing that the following footnote be added to the U.S. Table of Frequency Allocations instead of international footnote 5.444B:

US444B In the band 5091-5150 MHz, the following provisions shall apply to the aeronautical mobile service:

- (a) Use is restricted to: (1) Systems operating in the aeronautical mobile (R) service (AM(R)S) in accordance with international aeronautical standards, limited to surface applications at airports, and in accordance with Resolution 748 (Rev.WRC-12) (*i.e.*, AeroMACS); and (2) Aeronautical telemetry transmissions from aircraft stations (AMT) in accordance with Resolution 418 (Rev.WRC 12).
- (b) Consistent with Radio Regulation No. 4.10, airport surface wireless systems operating in the AM(R)S have priority over AMT systems in the band.
- (c) Operators of AM(R)S and AMT systems at the following airports are urged to cooperate with each other in the exchange of information about planned deployments of

³ See Amendment of Parts 1, 2, 15, 74, 78, 87, 90, and 97 of the Commission's Rules Regarding Implementation of the Final Acts of the World Radiocommunication Conference (Geneva, 2007) (WRC-07), Other Allocation Issues, and Related Rule Updates, ET Docket No. 12-338, *Notice of Proposed Rulemaking and Order*, 27 FCC Rcd 14598 (2012) (*WRC-07 Final Acts NPRM*) at ¶ 68.

⁴ AFTRCC Comments in Response to *WRC-07 Final Acts NPRM* (Feb. 25, 2013) at 5 and Boeing Comments in Response to *WRC-07 Final Acts NPRM* (Feb. 25, 2013) at 4.

⁵ Boeing Comments in Response to *WRC-07 Final Acts NPRM* at 4.

⁶ AFTRCC Reply Comments in Response to *WRC-07 Final Acts NPRM* (Mar. 27, 2013) at 1 (the locations are Wichita, Kansas; Roswell, New Mexico; Charleston, South Carolina; and Palm Beach-Dade, Florida).

⁷ AFTRCC *Ex Parte Statement* in Response to *WRC-07 Final Acts NPRM* (Jan. 21, 2015).

their respective systems so that the prospects for compatible sharing of the band are enhanced: 1) Boeing Field/King County Intl Airport, Seattle, WA; 2) Lambert-St. Louis Intl Airport, St. Louis, MO; 3) Charleston AFB/Intl Airport, Charleston, SC; 4) Wichita Dwight D. Eisenhower National Airport, Wichita, KS; 5) Roswell Intl Air center Airport, Roswell, NM; and 6) William P. Gwinn Airport, Jupiter, FL. Other airports may be addressed on a case-by-case basis.

(d) Aeronautical fixed communications that are an integral part of the AeroMACS system authorized in paragraph (a)(1) are also authorized on a primary basis.

Allocations for AeroMACS in the 5000-5010 MHz and 5010-5030 MHz Bands

As part of the WRC-12 implementation, there is a proposal to allocate the 5000-5010 MHz and 5010-5030 MHz bands on a primary basis to the AM(R)S in support of the AeroMACS system. In addition to the allocation for AM(R)S there is also a requirement for an allocation for fixed service operations in the 5000-5010 MHz and 5010-5030 MHz bands. Although the international allocation table does not include the fixed service in these bands, the work within the ITU-R recognizes that this service was integral to the systems being studied.⁸ Thus, NTIA recommends that the FCC add a footnote to the U.S. Table of Frequency Allocations that would authorize on a primary basis fixed service operations that are an integral part of the AeroMACS system in the 5000-5010 MHz and 5010-5030 MHz bands.

Protection of Passive Operations in the 1400-1427 MHz Band

The 1435-1525 MHz band is allocated to the mobile service on a primary basis for federal and non-federal use, restricted to AMT. The 1400-1427 MHz band is a passive band (*i.e.*, no transmissions are authorized in this band). For AMT stations that operate in the 1435-1452 MHz sub-band, WRC-07 adopted a recommended maximum unwanted emissions level of -28 dBW/27 MHz in the 1400-1427 MHz passive band.⁹ NTIA recommends that the FCC require those AMT stations that do not meet the -28dBW/27MHz unwanted emissions limit attempt to use the 1452-1525 MHz sub-band first. Consequently, NTIA recommends that proposed footnote US338A be revised to read as follows:

US338A In the band 1435-1452 MHz, operators of aeronautical telemetry stations are encouraged to take all reasonable steps to ensure that the unwanted emissions power does not exceed -28 dBW/27 MHz in the band 1400-1427 MHz. Operators of aeronautical telemetry stations that do not meet this limit shall first attempt to operate in the band 1452-1525 MHz prior to operating in the band 1435-1452 MHz.

⁸ Recommendation ITU-R M.1450-5, *Characteristics of broadband radio local area networks* (Feb. 2014).

⁹ See WRC-07 Final Acts, Resolution 750 (WRC-07) Compatibility between the Earth exploration-satellite service (passive) and relevant active services.

Federal and Non-Federal AMT Allocations in the 4400-4940 MHz and 5925-6700 MHz Bands

At WRC-07, the United States was a leading proponent of AMT allocations in several bands, including the 5925-6700 MHz band. In its WRC-07 proposals, the United States stated that with the increasing complexity of aircraft design and pressure to shorten timescales for the development of new aircraft, and the rapidly increasing data rates associated with the testing of new and emerging technologies, as much as an additional 650 megahertz may be required for aeronautical flight test telemetry.¹⁰ The new AMT spectrum will not be used for the protection of life and property, hence new applications will not require the level of protection associated with safety operations in other AMT bands. Consistent with the U.S. proposals to WRC-07 and the outcome of WRC-07, we now propose to move forward with the proposals for the 4400-4940 MHz and 5925-6700 MHz bands.¹¹ Action on these bands had been deferred by our July 26, 2012 letter to the FCC.¹² Based on the continued pressing need for additional spectrum to support AMT, NTIA believes it is the time to address implementing allocations in these bands to support federal and non-federal AMT.

As noted in the U.S. contributions to WRC-07, and the studies performed by the U.S. and submitted to ITU-R Working Party 8B in 2006, sharing between the fixed service (FS) and fixed satellite service (FSS), and AMT operations, while challenging, would be feasible. Further, AMT users will implement technical and operational measures to ensure compatible operations between AMT and the FSS and FS users in the 5925-6700 MHz band.

The operational restrictions contained in WRC-07 Resolution 416 were a result of cooperation and collaboration between DoD, the National Aeronautics and Space Administration (NASA), and industry representatives of the FSS community and were agreed to by the U.S. as able to protect the FSS uplink satellite receivers and result in minimal interference to the FSS (e.g., less than a 3 percent increase in the satellite receiver noise level).¹³ Similarly, the operational restrictions in Resolution 416, in conjunction with measures that can be employed by AMT operators, were developed in cooperation with industry participants in the ITU-R from the

¹⁰ Conference Preparatory Meeting, *CPM Report on technical, operational and regulatory/procedural matters to be considered by the 2007 World Radiocommunication Conference* (Geneva, 2007) at 43, available at <http://www.itu.int/md/R07-CPM-R-0001/en>.

¹¹ See letter from Karl B. Nebbia, Associate Administrator, Office of Spectrum Management, NTIA to Julius P. Knapp, Chief, Office of Engineering and Technology (OET), FCC (Aug. 20, 2009). We note that the 4400-4940 MHz and 6425-6525 MHz bands are allocated to the mobile service on a primary basis for federal use and non-federal use, respectively. Thus, NTIA recommends that the 4400-4940 MHz, 5925-6425 MHz, and 6525-6700 MHz bands be allocated to the aeronautical mobile service (AMS) on a primary basis for non-federal use, the 5925-6700 MHz band be allocated to the AMS on a primary basis for federal use, and the use of these new AMS allocations be limited to AMT applications for aircraft testing.

¹² See letter from Karl B. Nebbia, Associate Administrator, Office of Spectrum Management, NTIA to Julius P. Knapp, Chief, Office of Engineering and Technology (OET), FCC (Jul. 26, 2012).

¹³ See WRC-07 Final Acts Resolution 416 (WRC-07): Use of the bands 4 400-4 940 MHz and 5925-6 700 MHz by an aeronautical mobile telemetry application in the mobile service; Report ITU-R M.2119, *Sharing between aeronautical mobile telemetry systems for flight testing and other systems operating in the 4400-4940 and 5925-6700 MHz band* (Feb. 2007) (ITU-R Report ITU-R M.2119) at 13.

fixed service community, and the U.S. agreed that these measures should enable sharing between AMT and the FS users in the band. NTIA recognizes the burden of finding solutions that avoid interference to the existing FS stations would primarily be on the AMT users, notwithstanding that we would anticipate that both the AMT and FS operators would work together to resolve compatibility challenges. We also recommend the FCC encourage the kind of cooperative dialogue between the FS and FSS community and AMT users that resulted in the U.S. successfully gaining international support for its AMT proposals at WRC-07.

Analysis conducted by DoD and the NASA prior to WRC-07 demonstrated that through a combination of co-frequency avoidance and spatial isolation it is possible to find significant amounts of useable spectrum for AMT operations even in heavily congested areas of FS deployment.¹⁴ Spatial isolation and avoidance of co-frequency operations are commonplace interference avoidance techniques. In addition it may be possible to access unused spectrum between the FS channels (interstitial use of frequency space between FS channels). Interstitial use of spectrum between FS channels, may require development of AMT systems that employ more advanced technologies and capabilities so that in congested areas, spectrum between FS channels can be consolidated to allow AMT access to spectrum with sufficient bandwidth to support AMT operations. Initially, NTIA believes co-channel avoidance and spatial isolation techniques would be the primary means to achieve compatible operations between AMT and FS operations. As more advanced AMT technologies are developed and demonstrated to be effective, it may be possible to coordinate interstitial AMT operation between the FS channels.

NTIA looks forward to our collaborative efforts in completing this important proceeding. If you have any questions, please contact me or Edward Drocella, Chief, Spectrum Engineering and Analysis Division, Office of Spectrum Management at edrocella@ntia.doc.gov or (202) 482-2608.

Sincerely,



Paige R. Atkins
Associate Administrator
Office of Spectrum Management

¹⁴ ITU-R Report ITU-R M.2119 at 37.

APPENDIX B

**AMENDED APPENDIX A
TO THE WIMAX FORUM PETITION FOR RULEMAKING TO ADOPT AEROMACS
SERVICE RULES FILED MARCH 31, 2017**

PROPOSED FCC RULE REVISIONS

AMENDED SEPTEMBER 5, 2017

PART 87 – AVIATION SERVICES

SUBPART A—General Information

Section 87.5 is amended by adding a new definition at the beginning to read as follows:

§ 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 safety and regularity of flight communications (mobile and fixed) supporting airport surface applications.

SUBPART B — Applications and Licenses

Section 87.18(a) is amended to read as indicated in red:

§ 87.18 Station License Required.

(a) Except as noted in paragraph (b) of this section, stations in the aviation service must be licensed by the FCC either individually or by fleet, **or, in the case of AeroMACS stations authorized under Section 95.305, licensed by rule.**

* * * *

SUBPART E—Frequencies

Section 87.171 is amended as indicated in red:

§ 87.171 Class of station symbols.

The two or three letter symbols for the classes of station in the aviation services are:

Symbol and class of station

AMC – AeroMACS

§ 87.173 Frequencies.

Section 87.173(b) is amended as indicated in red:

PROPOSED FCC RULE REVISIONS WITH ADDITIONS IN RED AND EXPLANATIONS IN ITALICS
(Amended September 5, 2017)

Frequency table:

Frequency or frequency band	Subpart	Class of station	Remarks
5000-5010 MHz	T	AMC	AeroMACS
5010-5030 MHz	T	AMC	AeroMACS
5091-5150 MHz	T	AMC	AeroMACS
* * * *			

Subpart L—Aeronautical Utility Mobile Stations

§87.345 Scope of service.

Section 87.345 is amended by adding subsection (g):

(g) Transmissions by aeronautical utility mobile stations for AeroMACS service are authorized in accordance with Subpart T of this chapter.

§87.349 Frequencies.

Section 87.349 is amended by adding subsection (g):

(g) Aeronautical utility mobile stations used for AeroMACS may operate in the 5000-5010 MHz, 5010-5030 MHz, and 5091-5150 MHz bands in accordance with Subpart T of this chapter.

Part 87 is amended by adding a new Subpart T as follows:

SUBPART T—AeroMACS

§ 87.601 Scope of service.

AeroMACS supports wireless broadband communications connectivity for safety and regularity of flight to fixed 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, safety, and security.

§ 87.602 Eligibility.

Eligible non-federal licensees for access to specific channels in the AeroMACS bands include:

- (a) Airport Owners or Operators, including a private entity, a governmental port authority, an airport management company, or a proxy authorized by an airport to operate on its behalf;
- (b) Airline Carriers (both passenger and cargo) and owners of private or corporate aircraft;
- (c) Aeronautical Communications Network Providers (ACNPs) or other third party network access provider (NAP) that has entered into an agreement with the Airport Owner or Operator;
- (d) Other entities, such as hangar maintenance service providers, that engage in communications used exclusively for the purpose of safety and regularity of flight.
- (e) Manufacturers or Network Providers of AeroMACS equipment and their representatives may operate such equipment for the purpose of demonstration upon registration by an eligible user for a temporary period.

§ 87.603 Authorized locations.

AeroMACS base stations may be installed where needed to provide adequate service to the airport being served.

§ 87.604 Equipment authorization requirement.

AeroMACS transmitters must be certified in accordance with §§ 87.145 and 87.147 of this chapter.

§ 87.605 Frequency coordination and channel registration.

- (a) Prior to operation, potential non-Federal AeroMACS users must demonstrate their eligibility to and register all devices with the Channel Manager designated by the Commission pursuant to Section 87.606 of this chapter.
- (b) A registered non-Federal AeroMACS user must notify the Channel Manager whenever registered base station equipment or type of mobile station is taken out of service for more than 30 days, unless the device is replaced with another transmitter utilizing the same technical characteristics as those reported on the effective registration. The registered AeroMACS user shall maintain the information contained in each registration current in all material respects and shall not make any change in the location or operating parameters previously registered prior to modifying its registration with the Channel Manager.

§ 87.606 Non-Federal AeroMACS Channel Manager.

(a) The Commission will designate as the single nationwide AeroMACS Channel Manager for non-Federal users a non-profit, impartial entity with a requisite understanding of the AeroMACS technology.

(b) The AeroMACS Channel Manager will assign AeroMACS channels to eligible non-Federal entities from time to time either on an exclusive or shared basis, and manage the use of such channels, in a manner that reasonably maximizes the efficient utilization of the spectrum at each location where AeroMACS spectrum is utilized and protects the spectrum from either hoarding or warehousing. The AeroMACS Channel Manager shall act as a single non-Federal point of contact for spectrum coordination with Federal Government users and other authorized users of the 5000-5010 MHz, 5010-5030 MHz, and 5091-5150 MHz bands, including aeronautical mobile telemetry (AMT) users (in particular, the Channel Manager is urged to cooperate with aeronautical mobile telemetry (AMT) users in accordance with Table of Allocations footnote US444B(c)). The Channel Manager will be obligated to enter into a Memorandum of Agreement (MOA) with representatives of Federal Government AeroMACS users to govern their respective efforts to promote the joint Federal and non-Federal use of the AeroMACS channels; such MOA will be subject to Commission approval.

(c) The AeroMACS Channel Manager shall create and maintain a database of non-Federal AeroMACS licensees, equipment technical parameters, base station locations, and channel assignments on a per airport basis, and shall share such data with Federal Government AeroMACS users to facilitate efficient frequency coordination. Additionally, the Channel Manager will be the first point of contact for Federal AeroMACS users, AMT users, and non-Federal AeroMACS licensees that experience harmful interference from non-Federal use of AeroMACS channels. The Channel Manager is responsible for identifying the source of any harmful interference and for taking steps in the first instance to resolve interference caused by non-Federal users, although the ultimate responsibility for resolving interference remains with the Commission.

(d) The AeroMACS Channel Manager is authorized to charge non-Federal users a reasonable, cost-based registration fee and other fees not prohibited by the Commission.

§ 87.607 Frequencies and Channels.

The frequencies listed below are available for AeroMACS operation by non-Federal users after registration with, and assignment (consistent with the MOA required under Section 87.606(b)) by, the Channel Manager. Channel spacing is 5 MHz without a guardband between adjacent channels. AeroMACS shall operate in time division duplex (TDD) mode.

PROPOSED FCC RULE REVISIONS WITH ADDITIONS IN RED AND EXPLANATIONS IN ITALICS
(Amended September 5, 2017)

Lower AeroMACS Sub-Band (5000 MHz to 5030 MHz)	
Channel Number	Channel Center Frequency (f_c)
1	5005 MHz
2	5010 MHz
3	5015 MHz
4	5020 MHz
5	5025 MHz
Upper AeroMACS Core-Band (5091 MHz to 5150 MHz)	
Channel Number	Channel Center Frequency (f_c)
6	5095 MHz
7	5100 MHz
8	5105 MHz
9	5110 MHz
10	5115 MHz
11	5120 MHz
12	5125 MHz
13	5130 MHz
14	5135 MHz
15	5140 MHz
16	5145 MHz

NOTE: Derived from Sections 7.4.1.1, 7.4.1.2 and 7.4.1.5 of the SARPs. Channel 16 is specified as reference frequency per Section 7.4.2.1, Note 2 of the SARPs.

§ 87.608 Base Station EIRP Limits.

(a) The total base station equivalent isotropic radiated power (EIRP) in a single channel sector shall not exceed:

- (1) 39.4 dBm for elevation angles from the horizon up to 1.5 degrees;
- (2) 39.4 dBm linearly decreasing (in dB) to 36.4 dBm for elevation angles from 1.5 to 7.5 degrees;
- (3) 36.4 dBm linearly decreasing (in dB) to 24.4 dBm for elevation angles from 7.5 to 27.5 degrees;
- (4) 24.4 dBm linearly decreasing (in dB) to 1.4 dBm for elevation angles from 27.5 to 90 degrees;
- (5) For multiple transmit antenna configurations the EIRP limit is the sum of the individual antennas.
- (6) For aircraft (A/C) and ground equipment, the maximum allowable EIRP is +30 dBm.

(b) For purposes of this section, EIRP is defined for these purposes as antenna gain in a specified elevation direction plus the average AeroMACS transmitter power. While the instantaneous peak power from a given transmitter may exceed that level when all of the subcarriers randomly align in phase, when the large number of transmitters assumed in the analysis is taken into account, average power is the appropriate metric.

(c) If a sector contains multiple transmit antennas, e.g., multiple input multiple output (MIMO) antenna, the specified power limit is the sum of the power from each antenna.

NOTE: The EIRP limits are taken from Section 3.3. (Radiated Power) of ICAO SARPs WP4 R5: Attachment to WP-3.

§ 87.609 Transmitted Spectral Mask for frequencies greater than 250 percent of the channel bandwidth away from the Base Station/Mobile Station operating center.

The power spectral density of the emissions when all active sub-carriers are transmitted in the channel shall be attenuated below the maximum power spectral density as follows:

- (a) on any frequency removed from the assigned frequency between 50 and 55 percent of the authorized bandwidth: $26 + 145 \log (\text{percent of BW}/50)$ dB.
- (b) on any frequency removed from the assigned frequency between 55 and 100 percent of the authorized bandwidth: $32 + 31 \log (\text{percent of BW}/55)$ dB.

PROPOSED FCC RULE REVISIONS WITH ADDITIONS IN RED AND EXPLANATIONS IN ITALICS
(Amended September 5, 2017)

(c) on any frequency removed from the assigned frequency between 100 and 150 percent of the authorized bandwidth: $40 + 57 \log (\text{percent of (BW)}/100)$ dB; and

(d) on any frequency removed from the assigned frequency beyond 150 percent of the authorized bandwidth: 50 dB.

NOTE: This rule is derived from Section 7.4.5.1 of the SARPS (spectral mask and emissions).

§ 87.610 Unwanted Emissions.

(a) Transmitter spurious emissions For AeroMACS frequencies that are greater than 250 percent of the channel bandwidth away from the Base Station/Mobile Station operating center, Base Station and Mobile Station transmitter spurious emissions must not exceed the values in the following table.

FREQUENCY BAND	MEASUREMENT BANDWIDTH	MAXIMUM LEVEL
30MHz < f < 1 GHz	100 kHz	-36 dBm
1GHz < f < 12.75 GHz	30kHz if $2.5 \times \text{BW} \leq f_c - f < 10 \times \text{BW}$	-30 dBm
	300kHz if $10 \times \text{BW} \leq f_c - f < 12 \times \text{BW}$	-30 dBm
	1MHz if $12 \times \text{BW} \leq f_c - f $	-30 dBm
Note: f_c denotes the center frequency and f denotes the frequency of the spurious emission. BW stands for the AeroMACS channel bandwidth of 5 MHz. The above values apply to both MS and BS equipment. All transmitter spurious emission shall be measured at the output of the equipment.		

(b) Receiver spurious emissions. Receiver spurious emissions must not exceed the values in the following table.

FREQUENCY BAND	MEASUREMENT BANDWIDTH	MAXIMUM LEVEL
30MHz < f < 1 GHz	100 kHz	-57 dBm
1GHz < f < 12.75 GHz	1 MHz	-47 dBm

NOTE: The proposed limit on transmitter spurious emissions is from Section 2.2.10.1 of the MOPS. The proposed limit on receiver spurious emissions is from Section 2.2.11 of the MOPS.

Part 95 – Personal Radio Services

The authority citation for Part 95 continues to read as follows:

AUTHORITY: Secs. 4, 303, 48 Stat. 1066, 1082, as amended; 47 USC 154, 303.

Section 95.303 is amended to read as indicated in red:

§95.303 Definitions.

The following terms and definitions apply only to the rules in this part.

The Aeronautical Mobile Airport Communications System (AeroMACS). The rules for this service, including technical rules, are contained in Part 87, Subpart T of the Commission's rules.

Section 95.305 is amended to read as indicated in red:

§95.305 Authorization to operate Personal Radio Services stations.

Pursuant to 47 U.S.C. 307(e)(1), this rule section authorizes eligible persons to operate **Part 87 Aeronautical Mobile Airport Communications System (AeroMACS) stations**, Part 95 Personal Radio Service stations and Part 96 Citizens Broadband Radio Service stations without individual licenses, except as provided in paragraph (a). Such operation must comply with all applicable rules in this part.

NOTE: The proposed Part 95 rules are redlined against the rules adopted by the Commission in the Part 95 Report and Order.¹

.

¹ *Review of the Commission's Part 95 Personal Radio Service Rules*, Report and Order, WT Docket No. 10-119, FCC 17-57 (rel. May 19, 2017).