

Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554

In the Matter of	)	
	)	
WiMAX Forum Petition to Adopt Service	)	RM-11793
Rules for the Aeronautical Mobile Airport	)	
Communication System (AeroMACS)	)	

**COMMENTS OF AVIATION SPECTRUM RESOURCES, INC.**

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**COMMENTS OF AVIATION SPECTRUM RESOURCES, INC.**

**I. INTRODUCTION AND SUMMARY.**

On behalf of the aviation industry members of the Aeronautical Frequency Committee (“AFC”), Aviation Spectrum Resources, Inc. (“ASRI”) hereby submits comments in response to the Commission’s Public Notice (“PN”)<sup>1</sup> seeking comment on the above-captioned Petition for Rulemaking submitted by the WiMAX Forum.<sup>2</sup> These comments reflect and clarify the initial views of aircraft operators, the intended primary customers for the Aeronautical Mobile Airport Communications System (“AeroMACS”) upon its inception, and many of whom were involved in the development of its technical standards.

The AFC supports the introduction of AeroMACS, and expects the system to bring benefits to aeronautical safety traffic by augmenting existing AM(R)S datalinks. While the existing VHF Datalink (“VDL”) systems used for aviation safety data provide a robust and ubiquitous service across the U.S. and internationally, larger, more sophisticated message types expose the 31.5 kbps limits of these VHF channels. For aircraft on the ground AeroMACS will

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<sup>1</sup> *Wireless Telecommunications Bureau Seeks Comment on WiMAX Forum Petition Proposing Rules for the Aeronautical Mobile Airport Communications System*, Public Notice, RM-11793, DA 17-696 (rel. July 19, 2017) (“PN”).

<sup>2</sup> *WiMAX Forum Petition for Rulemaking to Adopt AeroMACS Service Rules*, RM-11793 (Mar. 31, 2017) (“Petition”).

offer an alternative safety service on the ground for those aircraft equipped to send the necessary data without manual transfer (e.g., a hand-carried USB thumb drive) or a wired connection (e.g. Ethernet).

The AFC also strongly supports the concept of a channel manager role to administer the non-federal frequency assignments, as this function has been tried and tested by the aviation industry with ASRI and its licensing of non-federal VHF and HF aeronautical frequencies. Such industry self-management is an effective mechanism to reduce overhead and increase flexibility, while maintaining the appropriate service levels needed for an AM(R)S system.

Although AeroMACS is favored by the aviation industry for its future benefits, and progress at the Commission is supported by the AFC membership, the industry should first coalesce around appropriate spectrum and licensing coordination measures. By fleshing out these important aspects of the system before issuing a notice of proposed rulemaking (“NPRM”), it will provide assurance to the user community and streamline the Commission’s future work. Fortunately, the aviation industry has the same objectives in this matter, and therefore the AFC believes such discussions can be concluded quickly to prevent unnecessary delay to further progress.

## **II. BACKGROUND**

ASRI is the licensee for Aeronautical Enroute Spectrum (“AES”) within the United States.<sup>3</sup> Established on a cooperative basis with its joint customers/owners, ASRI licenses AES on the FCC’s behalf to all aviation users requiring VHF and HF aeronautical channels for safety

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<sup>3</sup> ASRI assumed this role in 2006 when it succeeded Aeronautical Radio, Inc., as the industry licensee in the aeronautical enroute and fixed services. ASRI is owned by members of the civil aviation community.

and regularity of flight. This includes data services, such as the Federal Aviation Administration's ("FAA") new DataComm system using the aviation industry's existing VDL Mode 2 ("VDLM2") networks,<sup>4</sup> and voice services.

The AFC is an ASRI-sponsored industry committee comprised of major and regional commercial aircraft operators, service providers and aviation associations representing all users of the VHF and HF AES.<sup>5</sup> AFC primarily formulates policies and recommendations relating to the allocation, assignment and efficient use of the VHF and HF AES for the benefit of the aviation industry. AFC also reviews the wider regulatory issues affecting aviation spectrum, both in the U.S. and internationally. ASRI represents these opinions to relevant domestic and international regulatory bodies, such as the Commission, the International Civil Aviation Organization ("ICAO"), and ITU Radiocommunications Sector ("ITU-R"), to ensure the U.S. commercial aviation has input in spectrum matters, especially VHF and HF.

### **III. AEROMACS HAS THE POTENTIAL TO IMPROVE DATA CAPACITY BEYOND EXISTING VHF DATALINKS.**

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<sup>4</sup> The FAA's DataComm program is part of the NextGen Air Traffic Control ("ATC") modernization program being implemented across the U.S. The DataComm system will allow transmission of ATC commands from FAA controllers to aircraft via a text message system using VDLM2 datalinks. This will allow for more flexible communications, adoption of more efficient air traffic routing, and minimization of human error. The FAA's voice network will remain in use for commands by exception should they be needed in emergencies.

<sup>5</sup> Current members of the AFC include: Airlines for America (A4A), Alaska Airlines, American Airlines, Aircraft Owners and Pilots Association (AOPA), ARINC/Rockwell Collins IMS, ASRI, Boeing Corporation, Bristow Helicopters, Chevron, Delta Airlines, Era Helicopters, Federal Express (FedEx), FAA, Frontier Airlines, Harris Corporation, Helicopter Association International (HAI), Helicopter Safety Advisory Conference (HSAC), International Air Transport Association (IATA), JetBlue Airways, National Air Transportation Association (NATA), PHI, Inc., Societe Internationale de Telecommunications Aeronautique (SITA), Southwest Airlines, United Airlines, and United Parcel Service (UPS).

AeroMACS can benefit aircraft operators by providing significant data capacity beyond existing AM(R)S VHF-band datalinks. Though limited to airport surfaces, this is where approximately half of all current datalink traffic is generated during the process for aircraft to land, turn around, and take off. Because this process can be as short as 25 minutes,<sup>6</sup> aircraft require a higher data throughput for approximately the same amount of information that would be transmitted over an 8-hour trans-Atlantic flight. Additionally, the increased bandwidth will allow other messages that cannot be sent with existing systems to have near real-time transmission before aircraft reach airport gates. These benefits are being viewed as having great potential for aircraft operators once avionics are available and operating concepts have become more developed.

ASRI notes that there are no plans for non-federal installations of AeroMACS to carry messages from the FAA's NextGen DataComm system,<sup>7</sup> and therefore VHF offloading will be limited in the United States to just Airline Operational Control ("AOC") and Airline Administrative Communications ("AAC") messages. However, the reduction in VDL congestion will minimize any potential delays to time-critical messages from ATC on these legacy networks, and therefore indirectly bring safety benefits to the aviation community.

ASRI also notes that aviation operators have yet to plan fully for the precise usage of AeroMACS. In addition, given the complexity and cost of integration, purchase of new avionics equipment will likely be slow. However, informal discussions in aviation forums have hinted at several specific and potentially useful applications:

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<sup>6</sup> Several domestic airlines target a 25-minute turnaround of airframes for commercial narrow-body aircraft.

<sup>7</sup> These are planned to remain on the existing VDL system current in operation within the AES spectrum.

- ***Aircraft Health Data.*** Modern airframes are a substantial collection of multiple systems, sensors and components all connected to internal aircraft networks. To ensure proper maintenance and monitoring of system functions, an aircraft's system logs large amounts of data from multiple areas to provide aircraft technicians and manufacturers with the necessary information to repair or improve systems. Also known as the Aircraft Condition Monitoring System ("ACMS"), these data files can be substantial for the existing aviation safety datalinks, exceeding 100 MB per flight for new aircraft with high information demands.
- ***Deicing Functions.*** Allowing for voice and data transmissions related to deicing may alleviate some safety concerns for movement of ground personnel, with a combined data and voice function allowing better coordination in congested airport movement areas.
- ***Ground Equipment Connectivity.*** Providing detailed airport surface movement information to ground equipment and users will increase safety, while also allowing more efficient airline operations, such as tracking of bags or maintenance equipment.

By contrast, AFC objects to certain applications that would be better suited to using more standard mobile wireless frequencies than scarce aviation safety spectrum. For example, the Petition discusses using AeroMACS for security cameras,<sup>8</sup> which are not an aeronautical system, mobile, or used for safety as the term is understood under Part 87 rules. Rather, such cameras ideally are suited to more standard mobile links, such as LTE networks or even Wi-Fi systems. While there may be some direct safety need for a such a system, such as a new, remote, aircraft-operating area that requires temporary monitoring for aircraft movement safety, existing wireless

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<sup>8</sup> See Petition, at 5 n.16.

or even wired pit and duct systems should be the first option for permanent installations before using limited AM(R)S spectrum.

Accordingly, the channel manager will need to ensure a suitable balance of acceptable usage based on spectrum availability and demand, with a priority for aeronautical mobile safety applications. The governance provided by a user committee discussed below would provide the necessary guidance to the channel manager to avoid any arbitrary decisions, ensuring it meets the needs of the AeroMACS system as it matures.

#### **IV. IN ADDITION TO GRASPING WIMAX TECHNOLOGY, AN EFFECTIVE CHANNEL MANAGER MUST UNDERSTAND THE AVIATION INDUSTRY, AIRPORT ENVIRONMENTS, AND FCC LICENSING AND ENFORCEMENT.**

AFC membership agrees with the Petition that a private channel manager should act on the Commission's behalf in the management of the AeroMACS spectrum.<sup>9</sup> The many decades of ASRI managing a similar function for very comparable systems in aeronautical safety environments provides the AFC with confidence that such a concept can be very successful.

ASRI's role as the channel manager in the VHF and HF aviation bands has allowed an industry-shaped AM(R)S system to minimize overhead and cost, while promoting competition and the efficient use of scarce spectrum resources. Additionally, this industry governance through the AFC allows aviation market forces to self-regulate, requiring minimal action from the Commission other than processes such as filing corporate organizational documents.<sup>10</sup> Therefore, AFC believes that a channel manager role can exist only if the FCC mandates for AeroMACS a similar governance structure to ASRI and the AFC.

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<sup>9</sup> See PN, at 1.

<sup>10</sup> Examples of these documents are bilateral agreements or enforcement activities with non-aviation users.

While the Petition provides some details on how a channel manager should operate, its focus almost entirely on a channel manager's understanding of the underlying WiMAX technology is too narrow. AFC believes a channel manager role entails significantly more requirements to ensure a suitable service is provided to all eligible users. The wider abilities of understanding the aviation industry, airport environments, and Commission licensing and enforcement – in addition to knowledge of WiMAX technology -- will be critical to any channel manager. Such an approach has several key goals to ensure it is effective and viable, and hence, AFC recommends the following channel manager core functions, tasks, and responsibilities:

***a. Maximizing efficient use of AeroMACS spectrum***

In achieving efficiency of spectrum, a channel manager needs to consider three separate aspects: frequency use, operational requirements, and cost. While a channel manager may choose to focus on one specific aspect, it will then be to the detriment of the other two. For example, if certain parts of an airport may not support an antenna due to movement area restrictions or flight areas, then operational constraints may impose less efficient deployment and frequency reuse. Consequently, channel management requires a balanced approach to meet users' needs while maintaining a controlled RF environment for aviation safety services.

To achieve this balance, ongoing and proactive channel planning is vital, anticipating demand from existing and predicted usage to ensure a competitive environment. It is expected that different providers will be more dominant in certain markets, as service providers may target diverse customer bases. While the channel manager will need to provide spectrum for the site traffic generated by a larger and more dominant service provider, it will also need to ensure a spectrum environment that encourages competitors to emerge to prevent monopolies of service.

This can involve setting of channel plans to minimize early entrants from using all the spectrum or warehousing frequencies to prevent competition.

Part of this process will also require a channel manager to ensure all frequency requests are justified in both usage and regulatory requirements, with an ability to claim back frequencies from service providers in cases of surplus, either through encouragement or more direct action, such as during service provider mergers or permanent loss of customer traffic. Such justification will need to be ongoing, with regular reporting of usage by service providers to ensure channels are being used to their full capability and meet the specific requirements of the AM(R)S spectrum.

***b. Promoting competition to reduce costs***

The channel manager should be non-discriminatory in its approach to the various AeroMACS providers requesting service, providing the same level of support, contracts, and engagement. No one provider should be favored, and other providers should not be disadvantaged through special arrangements or relationships. As the channel manager will often be the only communication between competing service providers, maintaining this impartial role is critical. Otherwise, a channel manager may lose credibility with different service providers or users and undermine the concept.

***c. Ensuring compliance with regulatory conditions***

As the licensing expert for the AeroMACS community, the channel manager is responsible for ensuring decisions made by the committee are still within the scope of federal and international regulations. This includes both advice to the committee during its decision-making processes and a more active role in the issuance and management of licenses. Therefore, the channel manager will need to have some enforcement mechanisms in place to manage

properly all licenses, protecting all users from interference. Such a function also allows the channel manager to clear low-level issues before needing to involve the Commission. If the channel manager is unable to resolve such problems, then it or the affected AeroMACS user can raise the issue to the Commission for resolution.

***d. Representing AeroMACS users when coordinating with other spectrum users***

The channel manager will be the focal point for the AeroMACS licensing community's interaction with other spectrum users. This will primarily be the co- and adjacent-frequency users such as AMT, FAA, Globalstar, Regional Navigation Satellite System ("RNSS"), Unmanned Aircraft Systems ("UAS") and WiFi. However, other spectrum users also may need to be engaged if issues arise, such as interference from a different allocation or new spectrum allocations introduced after AeroMACS.

***e. Ensuring a cooperative arrangement with users for financing and governance***

The implementation of a representative committee of service providers at the working level to advise and direct the channel manager is a key component of the proposed cooperative model. Similar to the AFC's role in ASRI's function, it can provide numerous benefits to the channel manager and users.

*First*, industry should have large input into the channel manager's policies for frequency assignments. This ensures policies are relevant to industry and not taken in isolation by the channel manager. Such a process also provides credibility to such policies, with any users opposing policies needing to convince the community why certain changes should be made. Once established, the combined committee provides a form of self-regulation for the channel manager, meeting its customers' needs at their direction without bias to any one service provider. Additionally, the support provided by a user community protects the channel manager from a

single entity imposing its will. By using a consensus-based approach, all users and providers can provide input and prevent larger companies from dominating the process.

*Second*, user oversight can self-regulate costs. Operating in a cooperative manner with its customers, the channel manager's costs are maintained in line with its expenditure. Additional costs in the channel manager's role are then spread equally among all customers at their agreement. This aligns with the Petition's proposal that the channel manager act like a non-profit,<sup>11</sup> but it provides more control at the user level for any changes that may be needed in the future.

*Third*, the committee can develop common positions on issues related to AeroMACS. The range of expertise and background from the different providers enables discussion and recommendations on any future spectrum changes or process needed to support AeroMACS. While AeroMACS will be a global system, consensus views from the U.S. can often serve as guideposts in international regulatory forums.

*Fourth*, the committee can ensure the channel manager is adaptive to the needs of different user classes. While the AFC does not object to the WiMAX Forum's proposed classes of users, additional user classes may emerge once the system is established and more mature.

*Finally*, the committee allows for a regular path of communication among providers. This has many low-level benefits that cumulatively add up, such as sharing of best practice (key in the system's early adoption in the U.S.), promoting understanding among different providers (to stop potential competitive issues disrupting service), and allowing the channel manager to gather information on system performance, trends, and potential improvements.

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<sup>11</sup> See Petition, at 16.

In summary, the AeroMACS channel manager's foundational requirement will be to serve the user community that will both deploy and use the system, providing effective management, license processing, cost minimization, and representation.

**V. INDUSTRY MUST BE GIVEN TIME TO UNDERSTAND COORDINATION WITH OTHER SPECTRUM USERS.**

AFC has some concerns regarding the Petition's lack of detail on coordination measures between Aeronautical Mobile Telemetry ("AMT") and AeroMACS in the WiMAX proposal. AMT "systems are used for flight testing of manned and unmanned aircraft, missiles, and space vehicles, and associated communications such as range safety, chase aircraft, and weather data."<sup>12</sup> The AFC community indirectly benefits from the use of AMT on new and existing airframe development by the aerospace industry. While AeroMACS has priority over AMT in the 5091-5150 MHz band, the Commission expressly recognized a need to coordinate usage at certain sites.<sup>13</sup> However, it is still not entirely clear based on current testing what the potential implications for licensing AeroMACS and AMT will be in the RF environment for both co- and adjacent-frequency at the same airport.<sup>14</sup>

Rather than having these issues surface at the time of licensing, the AFC believes a coordination plan is needed, and such work may impact the service rules of AeroMACS.

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<sup>12</sup> *Promoting Spectrum Access for Wireless Microphone Operations*, 30 FCC Rcd 8739, para. 105 (2015).

<sup>13</sup> *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)*, 30 FCC Rcd 4183, para. 60 (2015) ("AeroMACS Allocation Order")

<sup>14</sup> The AeroMACS Allocation Order acknowledged that "in preparations for WRC-07, the sharing studies between AM(R)S and AMT in the 5091-5150 MHz band were done on the basis of significant geographic separation, with the understanding that AMT systems would only be operating at remote test ranges." Para. 56 n.159

Therefore, AFC recommends that stakeholders conduct additional work before the issue of any NPRM to understand the requirements of such co- and adjacent-frequency assignment at the same airport.

To facilitate such investigation and testing, AFC suggests that both the AMT community and AeroMACS manufacturers immediately engage in a joint venture to conduct real-world tests at the same airport.<sup>15</sup> This could be completed in a relatively short timeframe and potentially yield important coordination information to assist the Commission in proposing AeroMACS service rules. The joint venture could publish any information discovered and submit it as part of the record in this proceeding to fully inform interested parties. Such a public process would also self-regulate the timeline of discussions in the record, allowing consensus to build on when a suitable amount of information has been developed to make informed decisions and proceed to an NPRM.

Without an understanding of AeroMACS/AMT interaction, spectrum planning for AeroMACS will not be assured at important airports. The lack of coordination could also breed animus with a key co-frequency user, which would be to the detriment of both systems going forward. The AFC wishes for both systems to experience minimal disruption for the benefit of the aviation industry, and therefore spending a few months further understanding the co-siting of systems will reduce uncertainty in proposed service rules while maximizing potential sharing options.

## **VI. THE PETITION'S PROPOSALS FOR LICENSING REQUIRE FURTHER INPUT.**

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<sup>15</sup> AFC suggests that the AeroMACS test bed at Cleveland Hopkins International Airport would be a logical location.

AFC agrees that the AeroMACS channel manager should operate to minimize overhead and cost to service providers using AeroMACS frequencies. In reviewing how such a process would be implemented, several questions have arisen among AFC members about whether the Petition's license-by-rule proposal can fully enable this intent. While AFC agrees that the license-by-rule approach suggested by the Petition has benefits, there are several aspects to the approach -- and the environment in which it will operate -- that require investigation:

- How will federal or non-federal requests for usage be coordinated with each other?
- How will other spectrum users know where and how AeroMACS is being operated if no public information of licenses is available?
  - Will the AeroMACS channel manager need to publish its license database online for public access?
  - What interaction is needed with AMT licensees to ensure full coordination?
  - How much authority and by what process will the AeroMACS channel manager claim protection from interference without formal FCC registration of the frequencies in use at each site?
- Will a license by rule concept be suitable compatible with international frequency licensing of airframes to satisfy the ICAO Chicago Convention requirements?<sup>16</sup>
  - Will there be full reciprocity for domestic and overseas aircraft operators under such an arrangement?<sup>17</sup>
- Is a single licensee concept more appropriate for the channel manager?

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<sup>16</sup> Convention on International Civil Aviation, signed Dec. 7, 1944 ("Chicago Convention").

<sup>17</sup> *See id.*, Article 33.

- Would this be per transmitter, or on a site license basis?

With these outstanding issues in mind, a discussion within the aviation industry is needed to fully understand the implications of any licensing concept before the Commission issues an NPRM. AFC welcomes more engagement on this topic to achieve consensus quickly. Fortunately, the aviation industry wants AeroMACS to succeed, and therefore such discussion is expected to be positive and swift.

## **VII. TECHNICAL CHARACTERISTICS AND EQUIPMENT CERTIFICATION REQUIREMENTS.**

AFC agrees with the technical requirements specified by the Petition, as these are a direct copy from the ICAO SARPS that internationally standardizes the system.<sup>18</sup> Any movement away from these internationally-harmonized standards would create certification uncertainty for manufacturers and prevent overseas users from accessing U.S.-based AeroMACS networks. AFC notes that the WiMAX implementation of the rules seems very extensive for the radio regulations. Therefore, incorporation of technical standards by reference may be more appropriate for Part 87 adoption.

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<sup>18</sup> See Petition, at 14 and Appendix A.

## VIII. CONCLUSION

ASRI, on AFC's behalf, endorses the benefits of AeroMACS. In addition, ASRI's longstanding role with systems comparable to AeroMACS in aeronautical safety environments gives AFC confidence that a channel manager concept can be successful here. To ensure a successful NPRM process, the AFC believes aviation stakeholders must first address and develop a clear plan for coordination, including the proper licensing structure. Once the Commission does proceed with an NPRM, it should ensure that any AeroMACS channel manager selected must use the AM(R)S spectrum efficiently, by understanding the aviation industry, airport environments, FCC licensing and enforcement, and the underlying technology.

Respectfully submitted,

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