

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

In the Matter of	)	
	)	
Petition Filed By The WiMAX Forum	)	GN Docket No. ____
Proposing Service Rules For The	)	RM-11793
Aeronautical Mobile Airport Communications	)	
System (AeroMACS)	)	

**COMMENTS OF NETMOBY, INC., SUPPORTING THE  
EFFORTS OF THE FEDERAL COMMUNICATIONS COMMISSION  
TO PROMULGATE AEROMACS SERVICE RULES BUT  
OPPOSING DESIGNATION OF A CHANNEL MANAGER**

NetMoby, Inc. (“NetMoby”), respectfully submits these comments in reply to the *Public Notice*, DA 17-696, released July 19, 2017, by the Federal Communications Commission in the above-referenced proceeding seeking comment on a petition filed by the WiMAX Forum proposing service rules for the Aeronautical Mobile Airport Communications System (AeroMACS).<sup>1</sup> NetMoby supports the effort of the FCC to adopt service rules for the spectrum previously allocated in the 5000-5030 MHz and 5091-5150 MHz bands for Federal and non-Federal AeroMACS use, opposes the designation of a Channel Manager as proposed by the WiMAX Forum. In support of those efforts, the following is submitted.

**I. Introduction**

NetMoby is a Service-Disabled, Veteran-Owned Small business (SDVOSB) incorporated under the laws of the District of Columbia, Washington, D.C. NetMoby is an emerging technology company with decades of collective experience in a myriad of technical areas. Most

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<sup>1</sup> AeroMACS operates in the globally harmonized 5091-5150 MHz band allocated to the aeronautical mobile (Route) service (AM(R)S) by the International Telecommunication Union (ITU) at the World Radiocommunication Conference 2007 (WRC-07).

notably, NetMoby has extensive background and decades of experience in all areas of wireless telecommunications. NetMoby is currently developing wireless broadband systems across the country to provide Wireless Broadband Internet Access Service (“WBIAS”) service to customers; hence its interest in submitting comments in this proceeding.

## **II. NetMoby Background In AeroMACS Systems**

In addition to its extensive background and decades of experience in all areas of wireless telecommunications, NetMoby has developed its expertise in aviation systems and wireless communications systems. For example, on August 24, 2014, Netmoby filed a Response to the Federal Aviation Administration’s (“FAA”) Request For Information / Market Survey, Aeronautical Mobile Airport Communications System. The FAA was requesting information from wireless broadband communication service providers, system developers, and manufacturers as it considered procurement strategies for a possible Aeronautical Mobile Airport Communication System (AeroMACS) to provide wireless broadband communication services on the airport surface. The system would use the Worldwide Interoperability for Microwave Access (WiMAX) profile of the existing IEEE802.16-2009 standard and operate in the internationally allocated dedicated aeronautical AM(R)S radio frequency spectrum from 5091-5150 MHz, with optional future expansion to include 5000 to 5030 MHz. See Federal Aviation Administration Announcement, Request For Information / Market Survey Aeronautical Mobile Airport Communications System, Solicitation / Contract #17357, posted August 4, 2014, <https://faaco.faa.gov/index.cfm/announcement/view/17358>.

Therein, NetMoby provided the FAA with granular knowledge and input on establishing AeroMACS at each tower controlled airport in the United States as a means to replace the aging and inefficient methods of airport communications in place for surface communications such as

navigation aids, baggage/security/fire/fuel/maintenance/food vendor vehicles, control tower and camera apparatus.

In addition, NetMoby has also become heavily involved in the growing small Unmanned Aircraft Systems (otherwise referred to as “small UAS”, “sUAS” or “drones”) commercial industry.<sup>2 3</sup> Through its numerous regulatory filings, NetMoby has become an important stakeholder in the regulatory development of the FAA’s process for promulgating the rules that govern the first stage of the commercial drone industry. In addition, NetMoby was a stakeholder in the National Telecommunications & Information Administration, U.S. Department of Commerce multi-stakeholder process concerning privacy, transparency, and accountability issues regarding commercial and private use of unmanned aircraft systems convened pursuant to the February 15, 2015, Presidential Memorandum "Promoting Economic Competitiveness While Safeguarding Privacy, Civil Rights, and Civil Liberties in Domestic Use of Unmanned Aircraft Systems." This process resulted in the creation of Voluntary Best Practices for UAS Privacy, Transparency, and Accountability document whose purpose is to “describe voluntary Best Practices that UAS operators could take to advance UAS privacy, transparency and accountability for the private and commercial use of UAS.” See Voluntary Best Practices for UAS Privacy, Transparency, and Accountability, Consensus, Stakeholder-Drafted Best Practices

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<sup>2</sup> The FCC has recognized the inherent correlation between UAS and AeroMACS. “In this section, we take actions in support of aeronautical mobile (route) service (AM(R)S) surface applications at airports in the 5000-5030 MHz band and unmanned aircraft systems (UAS) in the 5030-5091 MHz band.” See 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*, FCC 17-33 (2017) (“*FCC 2017 Spectrum Order*”). (“We adopt the AM(R)S allocation to support the anticipated growth of UAS and promote their safe operation.”)

<sup>3</sup> See also *U.S. Proposals for WRC-12*, First Tranche, Agenda Item 1.3 (“given that there is minimum use in this band worldwide and because the lack of an existing or planned microwave landing system deployment in the United States at 5030-5091 MHz ensures availability of appropriate aeronautical spectrum for terrestrial line-of-sight UAS in the band”).

Created in the NTIA-Convened Multistakeholder Process, May 18, 2016,

[https://www.ntia.doc.gov/files/ntia/publications/uas\\_privacy\\_best\\_practices\\_6-21-16.pdf](https://www.ntia.doc.gov/files/ntia/publications/uas_privacy_best_practices_6-21-16.pdf).

NetMoby has continued to develop its expertise in aviation systems and wireless communications systems.<sup>4</sup> For instance, for several years NetMoby has been designing its Unmanned Aerial System Regional Operations Center. The NetMoby UROC system has been developed to work in concert with NASA's UAS Traffic Management (UTM) research initiative. The NASA UTM CONOPs is focused on safely enabling large-scale small Unmanned Aircraft System UAS (sUAS) operations in low altitude airspace. The UTM construct supports large-scale visual line of sight and beyond visual line of sight operations. Preliminary stakeholder feedback and initial UTM tests conducted by NASA show promise of UTM to enable large-scale low altitude UAS operations safely. NetMoby has recently submitted its application to participate with NASA in future field tests for UTM development.

### **III. NetMoby Comments Regarding WiMAX Forum's Petition For Rulemaking To Adopt AeroMACS Service Rules**

NetMoby submits the following proposals focusing on the perceived major issues in the WiMAX Forum's Petition for Rulemaking to Adopt AeroMACS Service Rules. ("WiMAX Petition")

Generally NetMoby agrees that the potential services and applications provided by AeroMACS, which are all related to safety and regularity of flight, are desperately needed. NetMoby welcomes the efforts of the FCC to establish service rules which will allow the United States' aviation industry to catch up to the international standards and systems in international

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<sup>4</sup> NetMoby's chief executive, who was an active commercial rated rotorcraft/helicopter pilot, owned and operated an aviation company, Jet One Systems Corporation, whose aircraft consisted of two McDonnell-Douglas 500-series jet helicopters, at Manassas Virginia Regional Airport that provided electronic news gathering (ENG) and support to the Naval Research Laboratory (NRL) and during that time filed for and received a multi-faceted patent on GPS differential, rapid satellite reacquisition and security applications.

countries already adopting and implementing the AeroMACS standards. However, NetMoby's vision of the method to achieve those goals differs significantly from that of the WiMAX Forum on one critical issue.

**A. The FCC Should Not Adopt a Channel Manager Approach for the Allocation of AeroMACS Spectrum Licenses**

**1. Summary of WiMAX Forum's Channel Manager Proposal**

The WiMAX Forum summarizes the proposed role of the Channel Manager as follows:

A single Channel Manager will ensure coordination among eligible non-Federal users of the AeroMACS band, 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 Aeronautical Mobile Telemetry users in a manner that will avoid interference. The proposed Channel Manager would process requests by non-Federal users for access to AeroMACS channels in a fair and equitable manner to ensure efficient use of AeroMACS spectrum and to prevent either hoarding or warehousing of spectrum by any one entity. The proposed licensing rules are intended to provide the Channel Manager flexibility to manage the AeroMACS spectrum so as to maximize efficient usage.

**2. The FCC Should Not Abdicate Its Regulatory Role**

NetMoby would suggest that the WiMAX Forum Summary of the Channel Manager is describing exactly the role of the Federal Communications Commission. There is no reason for the FCC to abdicate its responsibility as the licensing authority of the electromagnetic spectrum in this matter, other than to utilize the process of license by rule for AeroMACS frequencies.

**3. The Optimal Channel Manager Already Exists, i.e., Airports**

If the FCC is to adopt the concept of a Channel Manager, the most knowledgeable and optimal candidate for channel manager is already in place, i.e., Airports.<sup>5</sup> The optimal Channel Manager for each of the nation's airports will be the airports themselves. Each airport will have

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<sup>5</sup> See 49 U.S.C. § 47102 for applicable definitions.

different designs to connect all the necessary surface communications elements, based on location, size, and other factors, all of which will already be intimately known by the airports themselves.

All of the major airports have airport authorities in place which are already deeply familiar with the needs of each facility. There is no need to interpose an entity that has national scope for local airports. The imposition of a Channel Manager will simply add another regulatory layer to the process and further slow the rollout of the AeroMACs system in the United States, especially if the license by rule is adopted, which it should be. (See NetMoby's comments in support, *infra*.) There have already been an inordinate amount of delays in implementing the AeroMACs system in the United States. There is no need for a national channel manager as proposed by the WiMAX Forum, which will just delay matters further.

4. There Will Be No Signal Overlap, Hence No Need For A Channel Manger As Proposed By The WiMAX Forum To Prevent Co-Channel Interference In The AeroMACS Ecosystem

In a September 2014 Technical Report by the Mitre Corporation, at the request of the FAA,<sup>6</sup> entitled AeroMACS Implementation Analyses, in Section 4.1.2, entitled "AeroMACS Interference Considerations", states

There is a need to develop a methodology to assign frequency channels for AeroMACS at airports. Current ICAO draft guidance material on AeroMACS identifies the need to minimize interference in AeroMACS

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<sup>6</sup> The Technical Report Abstract states:

The FAA is currently in the process of developing a strategy for the implementation of the Aeronautical Mobile Airport Communications System (AeroMACS) in the National Airspace System (NAS). AeroMACS networks will provide high-data-rate communications in the airport environment in support of Next Generation Air Transportation System (NextGen) operations. At the request of the FAA, the MITRE Corporation's Center for Advanced Aviation System Development (MITRE/CAASD) has provided technical inputs to the AeroMACS strategy development team, and performed technical analyses of AeroMACS scenarios. See Mitre Corporation AeroMACS Implementation Analyses, September 2014, [https://www.mitre.org/sites/default/files/publications/pr\\_14-4004-aeromacs-implementation-analyses.pdf](https://www.mitre.org/sites/default/files/publications/pr_14-4004-aeromacs-implementation-analyses.pdf)

networks and contains three recommendations on this topic, as shown below:

- Recommendation 1: “In order to contain interference between AeroMACS cells and due to AeroMACS TDD (Time Division Duplex) nature, it is necessary that all BSs (Base Stations) installed at the aerodrome shall be synchronized with Global Positioning System (GPS) time or any other time source having equivalent performance as GPS.”

In other words, the use of digital transmission with Time Division Duplex combined with GPS will eliminate entirely any possible interference between AeroMACS signals from even the most proximate airports, such as between Dulles and National airports is the DC area, and BWI to the north.

The Mitre Technical Report also points out in Section 5.1.1.2 that

#### 5.1.1.2 MIMO Multipath Channel

MIMO techniques based on using multiple antennas at the transmitter and/or receiver locations can provide spatial diversity and multiplexing gain. Moreover, the employment of MIMO technology will make for better AeroMACS RF link efficiency and ultimately a more spectrally-efficient and interference free system. So Channel Manager is not needed.

**This means because MIMO is so efficient less power can be used to provide channel transmission without co-channel interference between closely-located airports. (Emphasis added.)**

So the Mitre Technical Report concludes that utilization of the applicable technology will eliminate co-channel interference between closely-located airports. If there is no possibility of interference, then there is no need for a Channel Manager to coordinate spectrum to resolve interference issues. Since there is no signal overlap, like in the Wireless Medical Telemetry Service (“WMTS”), a service upon which the WiMAX Forum heavily relies in its Channel Manager proposal, operators in the AeroMACS system will not be in competition with each other for spectrum and therefore

do not need to be assigned protected service areas.<sup>7</sup> NetMoby believes this is another reason to eschew the Channel Manager concept.

5. The FCC Should Issue A Further NPRM To Develop A Standard AeroMACS Channel Template for Adoption by Airports

The FCC, with input from commenters, should develop a basic template for the allocation of frequencies in airports. This template could serve as an overlay for each facility, allocating High Band and Low Band frequencies in a consistent fashion in airports across the country. This would have several functions:

1. It would eliminate the need for the unnecessary Channel Manager as envisioned by WiMAX Forum.<sup>8</sup>
2. It would create a regulatory and operational consistency and uniformity across the country. This allocation certainty would have many benefits, allowing for consistency in equipment operation, installation and operation nationwide the ensuring safety and regularity of flight.
3. Airports, as their own channel managers, would be enabled to develop AeroMACS system plans with greater ease and consistency, while also being able to fine-tune the basic FCC AeroMACS template as needed (for Large Hub airports, for example.)
- 4 Adoption of the FCC AeroMACS template would enable AeroMACS system rollouts much more quickly, a critical element given the headstart the international aviation community has developed on the United States in AeroMACS deployment.
5. Adoption of the FCC AeroMACS template would eliminate the need for an unnecessary and time-consuming process of establishing a channel sharing arrangement between Federal and non-Federal users, a role espoused by the WiMAX Forum for channel-sharing.
6. Adoption of the FCC AeroMACS template would eliminate the possibility of any intra-system interference , a concept supported by the WiMAX Forum.

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<sup>7</sup> In the unlikely event of AeroMACS interference with licensed services, like the Fixed Satellite Services (FSS), for example, such can be resolved by the FCC, if needed. Certainly, the adoption of a Channel Manager is not necessary to resolve rare instances of interference from FCC-licensed facilities in the 5091-5150 MHz frequency band.

<sup>8</sup> If the WiMAX Forum wishes to be a channel manager, then it can function as the data manager similar to the WMTS data manager. See NetMoby Comments, *infra*.



The WiMAX Forum proposes that “sharing take place between Federal and non-Federal users in accordance with a Memorandum of Agreement (MOA) to be negotiated: 1) on behalf of Federal users by the National Telecommunications and Information Administration (NTIA); and 2) on behalf of non-Federal users by the Channel Manager to be designated by the Commission...” If the FCC adopts an AeroMACS system template for adoption by each airport as proposed by NetMoby, then, this MOA process will no longer be necessary. All of the concepts described above could be incorporated in the FCC spectrum template for the expeditious implementation of the AeroMACs system in the United States.

The FCC should initiate a further rulemaking to a fashion a basic AeroMACS communications template for use by airports across the country to hasten the implementation of the AeroMACs system in the United States.

#### 6. The WiMAX Forum Still Has A Role To Play

If the WiMAX Forum wants to be a channel manager, then it can function as the data manager similar to the WMTS data manager. As proposed on page 16 of the WiMAX Forum NPRM,

The database should be based upon required registration in a centralized database administered by a single, non-profit, impartial, non-governmental entity (the Channel Manager) appointed by the Commission. The centralized database registration will ensure coordination among eligible non-Federal users of the AeroMACS band, ensure nationwide consistency in the allocation and use of the available channels in the AeroMACS bands, and facilitate sharing of the AeroMACS bands with Federal users in a manner that will avoid interference.

However, as demonstrated above, since there will be no interference between AeroMACS users, this aspect of the role of the Channel Manager will not be necessary. There simply will need to be a data record after the AeroMACS system has been implemented.

#### **B. NetMoby Supports The Concept of License by Rule**

WiMAX Forum proposes:

The licensing approach proposed in Appendix A for non-Federal users is “License by Rule,” whereby an eligible non-Federal entity is authorized under Part 95 to operate AeroMACS stations without an individual license issued by the FCC: a) upon required registration in a centralized database administered by a single, non-profit, impartial, non-governmental entity (the Channel Manager) appointed by the Commission; and b) the assignment of channels at the desired location by the Channel Manager

NetMoby agrees that similar to the WMTS regulatory regime relied upon by the WiMAX Forum, licensing by rule will minimize regulatory procedures and costs, thus facilitating expeditious deployment of the AeroMACS system in the United States. This is particularly true if there is a channel allocation template for each airport as designed by the FCC as proposed herein.

As in the Wireless Medical Telemetry Service situation, the Commission determined that WMTS equipment should be “licensed by rule” in lieu of individual licensing, because operators in the WMTS will not be in competition with each other and therefore do not need to be assigned protected service areas.<sup>9</sup> As demonstrated above, there will be no completion for licenses in the AeroMACS ecosystem either.

### **C. Netmoby Supports The Concept Of Eligible Users**

The WiMAX Forum proposes:

Non-Federal entities eligible to register for access to channels in the AeroMACS bands should be limited to:

A. Airport 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. Airport licensees should be permitted to authorize others to utilize their networks to advance the safety and regularity of flight.

B. Airline Carriers: The nation’s busiest airports serve multiple passenger and cargo airlines, all of which will be eligible users to access the AeroMACS network.

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<sup>9</sup> In the *Report and Order*, the Commission expressly stated that a WMTS frequency coordinator would not have authority to recommend specific frequencies to users or to resolve disputes. So the analogy to this service is misplaced. See Amendment of Parts 2 and 95 of the Commission’s Rules to Create a Wireless Medical Telemetry Service, *Report and Order*, ET Docket 99-255, 15 FCC Rcd 11206 (2000) (*Report and Order*).

The assignment by the Channel Manager of specific dedicated channels across an airport property may be justified at airports serving as a major hub for a large airline carrier. Airline carriers with a smaller presence likely would be authorized by the Channel Manager to operate only on shared channels. Airline licensees should be permitted to authorize others to utilize their networks to advance the safety and regularity of flight.

C. Aeronautical Communications Network Providers (ACNPs): Smaller airport hubs may find it more financially viable to enlist the services of an ANCP or other third party network access provider to provide a dedicated common user AeroMACS network to eligible aviation users on a contractual basis. ACNP licensees should be permitted to authorize others to utilize their networks to advance the safety and regularity of flight.

D. Others: Other proposed authorized mobile and fixed users of AeroMACS channels could also include owners of private or corporate aircraft, hangar maintenance service providers and others, so long the communications are used exclusively for the purpose of promoting safety and regularity of flight.

E. Developmental Users: Manufacturers or prospective users of AeroMACS and their representatives should be eligible to obtain authorization to operate such equipment for the purpose of network development or product demonstration on a temporary basis.

NetMoby generally supports the above categories, but would add the requirement that all such contracts be filed with the FCC for regulatory oversight and to avoid any transfer of control issues, if any.

#### **IV. Conclusion**

In its August 24, 2014, Response to the Federal Aviation Administration's ("FAA") Request For Information / Market Survey, Aeronautical Mobile Communications System. NetMoby presciently stated that

We recommend that joining of airport base stations be at the Application Services Network ("ASN") and Connectivity Services Network ("CSN") whereby, the proposed AeroMACS architecture consist of one Centralized ASN-GW (specific location at each respective airport to be determined) and typically one de-centralized ASN-Gateway location within or near the serving airport RF network areas plus a CSN which brings in customized applications that are accessed from local or Cloud-based servers."

This foresaw the eventuality that each airport to design its own AeroMACS system utilizing a uniform allocation of spectrum allocations. This architecture envisioned by NetMoby

in 2014 remains the most efficient and relevant system today.

Again, NetMoby applauds the FCC as it continues to explore ways in which it can accelerate the deployment of the AeroMACs system in the United States. NetMoby supports this effort, and urges the FCC adopt its comments as set out above.

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Respectfully submitted,

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