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

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

To: The Commission

COMMENTS ON NOTICE OF PROPOSED RULEMAKING

Aerospace and Flight Test Radio Coordinating Council, Inc. ("AFTRCC"), by its counsel, hereby submits its Comments on the Notice of Proposed Rulemaking in the above-captioned proceedings ("Notice" or "NPRM").[1] The focus of AFTRCC's comments is on that portion of the NPRM considering service rules for the Aeronautical Mobile Airport Communications System ("AeroMACS").[2]

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[1] FCC 19-53, released June 7, 2019.
[2] *Notice, paras. 33-44.*

AFTRCC is an association of the nation's principal aerospace manufacturers (see Attachment). AFTRCC was founded in 1954 to serve as an advocate for the aerospace industry on matters affecting spectrum policy, and it serves as the recognized non-Federal Government coordinator for the shared, Government/Non-Government spectrum allocated for flight testing. AFTRCC is also the FCC-designated AMT coordinator for secondary medical body area network use of the aeronautical mobile telemetry ("AMT") spectrum at 2360-2390 MHz,[3] and is responsible for coordination with Wireless Communications Services ("WCS") licensees in the adjacent, 2345-2360 MHz band.[4] More recently, AFTRCC was designated to coordinate secondary wireless microphone use of the 1435-1525 MHz AMT band.[5] AFTRCC works closely with Government Area Frequency Coordinators in an effort to ensure that interference-free flight test operations are protected, and flight safety maximized.

Background

The U.S. aerospace & defense industry is critical to the national economy. In 2018, for example, the industry supported over 2.5 million U.S. jobs -- approximately 2% of total national employment and 20% of the U.S. manufacturing workforce. It generated $929 billion in economic output; produced $374.2 billion in value-added products and services -- 1.8% of total U.S. GDP; and contributed a trade surplus of approximately $89.5 billion (exports of $151 billion less imports of $61.5 billion) – the largest of any U.S. industry.[6]

Flight test telemetry spectrum is in the critical path for the industry's success. Flight testing requires the marshalling of scores of test and support personnel, a wide variety of range

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[3] *In the Matter of Amendment of the Commission's Rules to Provide Spectrum for the Operation of Medical Body Area Networks, First Report and Order,* FCC 12-54, 27 FCC Rcd 6422 at para. 74 (2012).
[4] Rule 27.73(a).
[5] Rule 74.803(d).
[6] Source: Facts and Figures, U.S. Aerospace and Defense, Aerospace Industry Association (2019).

equipment, search and rescue aircraft, and chase planes, to name just a few elements. Flight test costs for advanced aircraft can exceed $1 million per flight. Flight testing represents as much as 15-20% of cost of developing new aircraft. The more data that can be collected per flight, the fewer the flights required, and the lower the total cost of the aircraft.

There has been an exponential increase in the number of measurements required during flight testing to ensure aircraft and missile performance, efficiency and safety. Modern aircraft and missiles are designed to operate closer to the point of maximum efficiency, and require more data and more extensive testing. Spectrum demand has increased dramatically -- yet AMT has lost a significant amount of spectrum repurposed to accommodate other industry sectors.

For instance, digital video cameras represent an increasingly important source of data for both manned and unmanned (e.g. missiles) test flights. Cameras complement traditional sensors, offering "pictures" that other sensors cannot capture. Video can be synchronized with other instrumentation to record the movements of "tufts," or "strings" glued to the aircraft skin, visibly indicating the direction of air flow over the surface of the aircraft at every instant during flight maneuvers, thereby providing insight for design changes to increase performance and efficiency. Video also provides other benefits, such as the ability to closely observe the interaction of water and tires during wet runway testing, monitoring ice build-up on control surfaces during icing tests, and determining the time lag on cockpit avionics displays.

Video is also used for monitoring weapons separation tests and scoring, and for an over-the-shoulder view of the instrument panel as seen by the pilot. The latter is utilized when trying to capture pilot workload so as to inform efficient and ergonomic instrument panel design: high definition video can show flight test engineers on the ground what the pilot sees, and how he or she is reacting to the various gauges, warning lights, and other visual and auditory inputs. These

video inputs are merged with the rest of the flight test telemetry stream, improving the efficiency and efficacy of the ground operations, but also adding significantly to the spectrum requirement.

Not only has the number of measurements vastly increased, but they are taken with much greater frequency and precision. With these combined demands, telemetry data rates have increased significantly, which requires more radio frequency spectrum. In general, the amount of instantaneous data collected today requires a much higher data rate than in years past. Indeed, certification of next generation commercial aircraft could require data rates in the 100 to 200 Mbps range.[7] While flight testing of the Boeing 707 required measurement of a few hundred data points, flight testing for the 787 required more than 100,000.

As the Commission's records reflect, the AMT community has long sought access to additional spectrum resources to supplement the safety-of-life spectrum at 1435-1525 and 2360-2390 MHz. The need stems from the loss of legacy spectrum such as 2310-2360 MHz, combined with exponential growth in data requirements. These test data are essential, in the case of commercial aircraft, for FAA airworthiness certification and, in the case of military aircraft, for certification that the aircraft or missile performs in accordance with contract specifications.

It was for these reasons that the United States championed identification of the 5091-5150 MHz band for AMT at the 2007 World Radiocommunication Conference.[8] In particular, the United States determined that the flight test community faced a spectrum shortfall of no less than 650 MHz by the year 2024. This shortfall was demonstrated in a United States contribution to International Telecommunications Union, Radiocommunication Sector Working Party 8B

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[7] It should be noted that flight testing occurs in the air and on the ground, examples of the latter being brake testing, aborted takeoff testing, and equipment calibration, to name a few operations.

[8] *See In the Matter of 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*, FCC 15-50, 30 FCC Rcd 4183 (2015)(hereinafter, "*Report and Order*") at para. 53.

during the study cycle leading up to WRC-07.[9] In the final event, while WRC-07 identified or allocated a total of 1374 megahertz of bandwidth for AMT, the only spectrum the Commission thus far has seen fit to allocate domestically for AMT is the 5091-5150 MHz band. At the same time, the band is also allocated for AeroMACS for airport surface communications, with AeroMACS having priority over AMT per US444B.

The 5091-5150 MHz allocation is thus critical to helping the industry mitigate the spectrum constraint -- but if the AMT community cannot secure access to this band at and near the small number of airports which happen to be close to major aerospace manufacturing plants, the benefits of this AMT allocation will not be realized.

Discussion

The Commission has proposed site-based licensing with coordination conducted by the Federal Aviation Administration ("FAA"). In particular, the Commission has stated:

> [W]e believe that site-based licensing under part 87 is necessary. AeroMACS is a safety of life service that requires strict license eligibility requirements and individualized coordination of each transmitter to ensure no interference to other AeroMACS links. The Commission and any other interested party must be able to quickly identify licensees in the band, especially in cases of interference to critical safety-related air traffic control AeroMACS applications.

Notice at para. 37 (emphasis added). The Commission goes on to say:

> We propose to require applicants to coordinate with the relevant FAA Regional Office prior to filing an application with the Commission. After the application is filed, Commission licensing staff would undertake further coordination with the FAA prior to granting the application to ensure that the FAA does not anticipate any problems stemming from the proposed AeroMACS operations. We already follow these procedures with respect to other airport operations. We believe that coordination with FAA Regional Offices will expedite the licensing process.

Notice at para. 39 (footnotes omitted). AFTRCC supports these proposals.

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[9] ITU-R Doc. 8B/143-E, March 31, 2005, at page 5.

Part 87 fixed/base stations of the AM(R)S-type are licensed on a site-specific basis following frequency coordination.[10] That coordination is often performed by the FAA or a third-party expert in aviation communications.[11] AFTRCC is aware of no aviation service which is licensed by rule, and for good reason: As the Notice observes, site-based licensing minimizes the risk of interference by providing "individualized coordination of each transmitter" (id. at para. 37).

Moreover, since coordination with FAA Regional Offices would be required (NPRM, para. 39), and such coordination must also be considered in the Interdepartment Radio Advisory Committee's Frequency Assignment Subcommittee, were the FAA to serve as the coordinator for AeroMACS and AMT operations, it would save time and money by providing a 'one-stop shop.' In other words, there is no need for a channel manager or the additional procedure and cost of registration in a separate database.[12]

If, despite the above, the Commission should wish to consider a channel manager (or managers) for non-Government AeroMACS use of the spectrum, the selection criteria should stress a demonstrated record of expertise in the management of aviation spectrum for air carriers, general aviation, and the like, particularly aviation safety spectrum such as this. The very same safety considerations that impelled the Commission to propose the FAA as coordinator, are

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[10] Mobile ground stations are licensed on an area of operation basis around a central point.

[11] Aeronautical enroute frequencies have been coordinated by Aviation Spectrum Resources, Inc. ("ASRI") and, before that entity, by its predecessor-in-interest, ARINC. See https://www.asri.aero/about-us/.

[12] Designating a one-stop shop for all users of the 5091-5150 MHz band would also signal that the Commission continues to lead the way in forward-thinking spectrum management.

no less applicable to non-Government use of the band.[13]

Regardless of the entity responsible for coordination, however, AeroMACS deployment at the few airports co-located with aerospace manufacturing plants should be deferred as the NPRM suggests until AMT access at these locations is achieved (id. at para. 42).[14] There will be no commercial deployment of AeroMACS in the United States until the airlines are willing to pay for it, an event which, as AFTRCC understands it, has not yet occurred. For this reason, AeroMACS is not even close to being widely deployed in the United States (or even seemingly under serious consideration by the airlines). Indeed, given the need for aircraft manufacturers to test installed technology when, and if, the airlines decide to make the capital investment in aircraft modification, it is ironic that there should be a dispute over AMT access to the band to in part help conduct such tests.

In AFTRCC's view, the concerned government agencies should consult with industry stakeholders to establish reasonable sharing criteria, and this should be accomplished prior to any AeroMACS deployment at these airports and any others added on a case-by-case basis. The fact that AMT users and the WiMax Forum thus far have been unable to reach agreement on terms for access, underscores the need for government agency intervention. Once sharing criteria are

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[13] Vendors of WiMax products and services support the WiMax Forum's proposal for designation of a channel manager and licensing by rule. See Comments of Convergex Technologies, filed August 13, 2019, and Comments of Ondas Networks, Inc., filed August 16, 2019. These parties fail to grasp the safety implications to use of this spectrum. While their approach might "help promote investments in AeroMACS products and services" (Convergex at page 2), the Commission's mandate goes beyond the profits of any one technology's vendors, especially when it comes to safety.

[14] Those airports are Boeing Field/King County Int'l Airport, Seattle, WA; Lambert-St. Louis Airport, St. Louis, MO; Charleston AFB/Int'l Airport, Charleston, SC; Wichita Dwight D, Eisenhower National Airport, Wichita, KS; Roswell Int'l Air Center Airport, Roswell, NM; William P. Gwinn Airport, Jupiter, FL; Boeing Field, Paine, WA; Florence, SC; Moses Lake, WA; Tucson International Airport, Tucson, AZ; Oklahoma City, OK; SeaTac International Airport, Seattle, WA; and Philadelphia International Airport, Philadelphia, PA., with additional locations authorized on a case-by-case basis per US111.

established, consideration should be given to memorializing the terms in an MOU between and among the concerned agencies.

Conclusion

The United States has long maintained a policy of protecting and promoting spectrum resources dedicated for flight testing. This policy has paid dividends many times over for the economy, for the travelling public, and for national security. The policy has also helped protect thousands of aerospace jobs while enhancing the global competitiveness of U.S. industry. The 5091-5150 MHz allocation is a critical piece of the resources necessary to help meet the need for additional flight test spectrum, and access to the band under Part 87 for the aerospace manufacturer locations at or near the small number of airports where flight testing can be expected, needs to be achieved.[15]

Respectfully submitted,

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[15] The on-going need for access to the band on a non-interference basis for coordinated Part 5 operations per the Commission's existing experimental license framework, is also to be anticipated.

Attachment

AFTRCC Membership

AEROTEC

BOEING

BOMBARDIER

L3 MISSION INTEGRATION

Beechcraft | Cessna | Hawker

TEXTRON AVIATION

Gulfstream
A GENERAL DYNAMICS COMPANY

THE VALUE OF PERFORMANCE.
NORTHROP GRUMMAN
Aerospace Systems

Bell Helicopter TEXTRON

LOCKHEED MARTIN
Aeronautics Company

LOCKHEED MARTIN
Enterprise Operations/Government Affairs

NORTHROP GRUMMAN
Electronic Systems

Rockwell Collins

Raytheon

SIKORSKY
A LOCKHEED MARTIN COMPANY

L3 communications
Communication Systems-West

KEYSIGHT TECHNOLOGIES

Quasonix

ZODIAC DATA SYSTEMS
ZODIAC AEROSPACE