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

NOTICE OF PROPOSED RULEMAKING

Adopted: June 6, 2019 **Released: June 7, 2019**

Comment Date: 60 days after Federal Register publication
Reply Comment Date: 90 days after Federal Register publication

By the Commission: Chairman Pai and Commissioners O'Rielly, Carr, Rosenworcel, and Starks issuing separate statements.

TABLE OF CONTENTS

Title **Para. No.**

I. INTRODUCTION 1
II. BACKGROUND 2
III. DISCUSSION 7
A. Communications to Promote Safety of Aircraft in Flight 8
1. Enhanced Flight Vision Systems 9
2. Audio Visual Warning Systems 14
3. Aeronautical Mobile (Route) Service Systems in the 108-117.975 MHz and 960-1164 MHz Bands 20
4. Aeronautical Advisory (Unicom) Stations 25
5. Air Traffic Control and Aeronautical Operational Control Communications in the 136-137 MHz Band 28
B. Communications with Aircraft and Other Assets on the Ground to Promote Safety 33
1. Aeronautical Mobile Airport Communications Systems 34

2. Vehicle Squitters 45
3. Emergency Locator Transmitter Test Station Frequencies 48
IV. PROCEDURAL MATTERS.....49
V. ORDERING CLAUSES.....56
APPENDIX A – PROPOSED RULES
APPENDIX B – INITIAL REGULATORY FLEXIBILITY ANALYSIS

I. INTRODUCTION

1. The Aviation Radio Service family of radio services uses dedicated spectrum to enhance the safety of aircraft in flight, facilitate the efficient movement of aircraft both in the air and on the ground, and otherwise ensure the reliability and effectiveness of aviation communications. Recent technological advances compel us to open a new proceeding to ensure the timely deployment and use of today's state-of-the-art safety-enhancing technologies. With this Notice of Proposed Rulemaking (NPRM), we propose changes to our part 87 Aviation Radio Service rules to support the deployment of more advanced avionics technology, increase the efficient use of limited spectrum resources, and generally improve aviation safety.

II. BACKGROUND

2. The Commission's part 87 rules provide spectrum and service rules for aviation communications. Each rule is intended to provide communications capabilities that will enhance safety on aircraft and at airports, while ensuring efficient and effective use of the spectrum. The aviation industry uses a wide variety of radio communications and different frequency bands.[1] Our rules address both communications on board aircraft (aircraft stations), and stations on the ground (aeronautical stations) that communicate with aircraft and with stations on the ground that serve a number of terrestrial services.[2] Aircraft and aeronautical stations support the Aviation Radio Service which transmits voice and data communications for a number of safety-related purposes. For example aviation services are used to guide the takeoff, landing, and routing of aircraft; for radionavigation and the avoidance of obstacles; to provide information on weather conditions and other factors that may affect the safety of a flight; to contact search and rescue authorities in the event of an accident or if the aircraft is in distress; to ensure the safe and efficient movement of aircraft on the ground; to test aircraft and aircraft equipment; and for other in-flight communications. These frequencies and services are used by passenger airlines and air freight carriers as well as by private (general aviation) aircraft.

3. Aeronautical stations serve many purposes, including aeronautical advisory (unicom) stations, which provide information relating to the safe and expeditious operation of aircraft and often are the primary source of safety information at airports without control towers; aeronautical enroute stations, which serve aircraft along domestic or international air routes; aeronautical utility mobile stations, which are used by ground vehicles traveling in airport areas where aircraft can operate; and radiodetermination stations for radiolocation and radionavigation, including obstruction warnings.

4. Aviation Radio Service frequency bands range from low frequency spectrum below 300 kilohertz to frequencies over 30 GHz in the lower end of millimeter wave[3] spectrum, with higher bands under consideration. Most notably, the VHF aeronautical band (108-136.975 MHz) is used heavily at airports and by aircraft for a wide range of aeronautical services including air traffic control, airport control towers, unicom stations, enroute stations, and flight test stations. The 960-1164 MHz band is also an important band for aeronautical mobile communications and radionavigation, having been allocated in

[1] *See, e.g.*, 47 CFR §§ 87.173, 87.187 (tables of frequencies for the Aviation Radio Service).

[2] *See* 47 CFR § 87.5.

[3] *I.e.*, frequencies between 30 GHz and 300 GHz. *FCC Releases Bulletin on Millimeter Wave Propagation*, at 1 (Aug. 4, 1997), 1997 WL 431330.

response to increasing congestion in the VHF aeronautical band.[4] More recently, the Commission has allocated spectrum in the 5000-5150 MHz band for aeronautical communications.[5] Some of these bands are shared with, or are adjacent to bands allocated for, non-aviation services.

5. The Commission regulates the Aviation Radio Service in cooperation with the Federal Aviation Administration (FAA), which currently is undertaking several initiatives to promote aviation safety, including, most importantly, developing and implementing the Next Generation Aviation System (NextGen). NextGen is a modernization of the U.S. air transportation system that is designed to increase the safety, efficiency, capacity, predictability, and resiliency of American aviation.[6]

6. As discussed below, we have in recent years received petitions for rulemaking, waiver requests, and requests for clarification or interpretation that seek to ensure that our spectrum allocations and service rules accommodate the most current technologies to promote aviation safety and efficiency. For instance, the WiMAX Forum filed a petition seeking adoption of service rules for a system that will enable broadband communications capability to support airport surface operations.[7] Additionally, providers of avionics electronics and communications requested that the Commission allow for expanded use of certain bands, and a group representing North American commercial airport operators requested that we update our rules to increase flexibility for aeronautical utility mobile stations used to reduce accidents.[8]

III. DISCUSSION

7. This NPRM addresses matters set forth in four pending rulemaking petitions, and we raise on our own motion additional issues. The rule changes that we propose or on which we seek comment are intended to update part 87 to reflect current technology and conditions. Several rule changes considered seek to promote the safety of aircraft in flight, including rules for (1) equipment that enhances pilots' ability to see in degraded visual environments; (2) warnings to alert aircraft of potential obstacles in their path; (3) flight safety-related aeronautical mobile services in the 108-117.975 and 960-1164 MHz frequency bands, including Automatic Dependent Surveillance-Broadcast service; (4) and the use of unicom stations at different kinds of airports. Other proposed rule changes are intended to facilitate NextGen's Data Communications (Data Comm) component, which augments voice channels between air traffic controllers and pilots with digital text-based messages to increase communication speed and reliability and to reduce the risk of miscommunications. These include rule changes necessary to better accommodate the use of the 136-137 MHz band for transmission of air traffic control communications and aeronautical operational control communications in a single data stream, and Aeronautical Mobile Airport Communications Systems that support communications for airport surface operations. In addition, we propose rule changes to improve communications with aircraft and other

[4] *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*, Notice of Proposed Rulemaking and Order, 27 FCC Rcd 14598, 14618, para. 45 (2012); 47 CFR §§ 2.106, 87.173(b).

[5] 47 CFR §§ 2.106, 87.173(b).

[6] *See* https://www.faa.gov/nextgen/what_is_nextgen// (last visited Apr. 9, 2019).

[7] *See* WiMAX Forum Petition for Rulemaking to Adopt AeroMACS Service Rules, RM-11793 (filed Mar. 31, 2017) (WiMAX Forum Petition), https://www.fcc.gov/ecfs/filing/10720063309694.

[8] *See* Petition of Sierra Nevada Corporation for Rulemaking, RM-11799 (filed Feb. 16, 2018) (SNC Petition), https://www.fcc.gov/ecfs/filing/10216097800681; 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 (filed Oct. 16, 2018) (ASRI Petition), https://ecfsapi.fcc.gov/file/1016265213352/ASRI_Petition_for_Rulemaking_in_the_Lower_136_MHz_Band.pdf; Petition of Airports Council International-North America (filed Jan. 30, 2019) (ACI-NA Petition), https://ecfsapi.fcc.gov/file/10130148407288/ACI-NA%20AUMS%20Petition_(30Jan18).pdf.

assets on the ground, including flexible use of vehicle squitters to help reduce runway incursions by airport vehicles; and the effective testing of emergency locator transmitters that alert search and rescue personnel of downed aircraft.

A. Communications to Promote Safety of Aircraft in Flight

8. In this section, we propose rules that are intended to improve safety of aircraft in flight. These rules include a spectrum allocation and service rules for Enhanced Flight Vision Systems, which use an advanced radar technology to enhance pilots' ability to detect potentially dangerous objects in fog and other degraded visual environments. We propose to update rules for systems that alert pilots to land-based obstructions, such as power lines and radio towers. We also propose revised technical rules for aeronautical services that facilitate flight tracking and provide other benefits. In addition, we propose to clarify the rules for unicom stations. Finally, we propose rules to enable more efficient use of spectrum that carries both air traffic control messages and communications relating to other aircraft operations.

1. Enhanced Flight Vision Systems

9. One key objective of NextGen is to increase airport approach and arrival access and flexibility through improved aircraft capabilities such as Enhanced Flight Vision Systems.[9] These are airborne systems that supplement instrument landing systems in limited visibility environments (such as fog, haze, smoke, sand, and precipitation) by providing a synthetic vision or computer-generated image of terrain and obstacles.

10. We tentatively conclude that accommodating the effective and efficient use of Enhanced Flight Vision System radar is in the public interest. Degraded visibility at an airport can cause aborted landing attempts and aircraft being placed in a holding pattern or redirected to other airports. Implementation of Enhanced Flight Vision Systems can increase opportunities for flights to land in conditions that otherwise would close airports. This should enhance safety and reduce flight delays and cancellations, fuel consumption and emissions, aircraft operational costs, and passenger travel time.[10] We seek comment on this tentative conclusion.

a. Millimeter Wave Radar

11. The FAA specifically identifies millimeter wave radar as an acceptable type of Enhanced Flight Vision System imaging.[11] In 2018, Sierra Nevada Corporation (Sierra Nevada) filed a petition for rulemaking asking the Commission to amend its rules to allow for the operation of Enhanced Flight Vision System radar in the 92-95.5 GHz frequency range.[12] It maintains that millimeter wave radar is superior to existing technology using infrared camera sensors, which provide inadequate penetration in heavily degraded visual conditions.[13] Sierra Nevada also asserts that the 90 GHz band is the optimal frequency range to maximize obscurant penetration (removing false detections caused by cloud particles and locating obstacles within the cloud) and radar resolution, because higher frequency bands provide

[9] Federal Aviation Administration, NextGen Implementation Plan 2016, at 38 (June 2016), https://www.faa.gov/nextgen/media/NextGen_Implementation_Plan-2016.pdf.

[10] *See id.* at 38-39.

[11] *See* 14 CFR § 91.176(a)(1)(A); Federal Aviation Administration, Advisory Circular: Enhanced Flight Vision Systems, 90-106A - Including Change 1, para. 2.3.1 (2018) (AC 90-106A), available at https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_90-106A_CHG_1.pdf.

[12] *See* SNC Petition. The SNC Petition was placed on public notice. *See Consumer & Governmental Affairs Bureau Reference Information Center Petition for Rulemaking Filed*, Public Notice, Rep. No. 3090 (CGB Apr. 26, 2018), https://ecfsapi.fcc.gov/file/0426740717130/DOC-350440A1.pdf.

[13] *See* SNC Petition at 2.

lower penetration, while lower frequency bands require antennas that are too large to fit in an aircraft nose cone.[14]

12. The frequencies in the 92-95.5 GHz range are allocated for Federal and non-Federal use on a shared basis,[15] and they mainly consist of shared co-primary allocations.[16] In addition, Footnote US342, which applies to nearly all of this frequency range, requires that all practical steps be taken to protect the Radio Astronomy Service from harmful interference.[17] In its petition, Sierra Nevada argues that its Enhanced Flight Vision System product would be able to co-exist successfully with other users in this band because: (1) the device will be used only under adverse conditions and operate at low power, low altitude, and for short duration;[18] (2) transmissions in the 92-95.5 GHz band are characterized by severe propagation losses;[19] and (3) currently there are very few users of the band.[20] We seek comment on these assertions, and specifically on whether Enhanced Flight Vision System radars are compatible with existing and contemplated services in the 92-95.5 GHz band, such as foreign object debris detection systems.[21]

13. Consequently, we propose to amend our rules to permit the use of the 92-95.5 GHz band for Enhanced Flight Vision System radar. We propose to amend the Table of Allocations to add a Radionavigation Service allocation to the 92-95 GHz band.[22] We also propose to amend part 87 by adding service rules listing the 92-95.5 GHz band as an authorized band for Enhanced Flight Vision System radar,[23] defining Enhanced Flight Vision System,[24] and exempting Enhanced Flight Vision Systems from the station identification requirement in section 87.107.[25] We seek comment on these proposals, and on their costs and benefits. We also ask commenters to identify any other rule changes necessary to allow for the operation of Enhanced Flight Vision Systems and to address any effects that such further rule changes may have on existing services.

2. Audio Visual Warning Systems

14. In 2013, the Commission adopted rules for audio visual warning systems, which are

[14] *See id.* at 4-5. Our rules currently authorize no aircraft station operations above 33.4 GHz. *See* 47 CFR § 87.173.

[15] *See* 47 CFR §§ 2.105(b), 2.106.

[16] The 92-94 GHz and 94.1-95 GHz bands are allocated for the Fixed, Mobile, Radio Astronomy, and Radiolocation services on a co-primary basis. The 94-94.1 GHz band contains Federal co-primary allocations for the Earth Exploration Satellite (Active) and Space Research (Active) Services, and shared allocations for Radiolocation (primary) and Radio Astronomy (secondary). The 95-100 GHz band has shared co-primary allocations for the Fixed, Mobile, Radio Astronomy, Radiolocation, Radionavigation, and Radionavigation-Satellite Services. 47 CFR § 2.106.

[17] *Id*., Footnote US342. The footnote does not apply to the 94-94.1 GHz band.

[18] FAA rules permit use of Enhanced Flight Vision Systems only below the Decision Altitude/Decision Height, *see* 14 CFR § 91.176(a), which is the point at which the pilot must decide whether to continue the approach or initiate a missed approach, 14 CFR § 1.1. Generally, Enhanced Flight Vision Systems will be used for less than a half-minute over the course of less than a linear mile prior to touching down. *See* SNC Petition at 9.

[19] *See Allocations and Service Rules for the 71-76 GHz, 81-86 and 92-95 GHz Bands; Loea Communications Corporation Petition for Rulemaking*, Report and Order, 18 FCC Rcd 23318, 23338-39, para. 45 (2003) (observing that transmissions in the millimeter wave bands "have considerable attenuation at much shorter distances than occurs in the lower microwave bands").

[20] SNC Petition at 12-15.

[21] *See Spectrum Horizons; James Edwin Whedbee Petition for Rulemaking to Allow Unlicensed Operation in the 95-1,000 GHz Band*, First Report and Order, FCC 19-19, at 4, para. 7 (Mar. 21, 2019) (establishing rules for spectrum above 95 GHz exclusively for services that operate on a non-interference basis), 2019 WL 1314947. We note in this regard that the International Telecommunication Union Radiocommunication Sector Working Party 5B is considering a proposal to authorize foreign object debris detection systems in the 92-100 GHz band. *See* ITU Radiocommunication Study Groups, Working Party 5B (DG 5B - 1a – Radars 92-100 GHz), *Technical and*

integrated air hazard notification systems that activate obstruction lighting and transmit audible warnings to aircraft on a potential collision course with an obstacle such as a power line, wind turbine, or tower.[26] These systems are installed on a tower or other obstacle and contain a radar unit and a radio capable of transmitting in the VHF aeronautical band. When the radar detects an aircraft within a predefined horizontal and vertical perimeter (warning zone), the system activates the obstruction lighting as a visual warning. If the aircraft continues toward the obstacle into a second warning zone, the VHF radio transmits an audible warning describing the hazard (*e.g.*, "power line . . . power line").[27] The Commission concluded that authorizing audio visual warning system stations would serve the public interest by helping aircraft avoid potential collisions with antenna structures and other obstacles.[28] In order to avoid interference to other communications, the Commission restricted audible warnings to certain frequencies within the VHF aeronautical band, and limited the power and duty cycle.[29] Specifically, the audible warning may not exceed two seconds in duration, no more than six warnings may be transmitted in a single transmit cycle, and there must be an interval of at least 20 seconds between transmit cycles.[30]

15. In 2015, the FAA updated its Advisory Circular regarding obstruction marking and lighting to include requirements for Aircraft Detection Lighting Systems,[31] which it defines as "sensor-based systems designed to detect aircraft as they approach an obstruction or group of obstructions; these systems automatically activate the appropriate obstruction lights until they are no longer needed by the aircraft."[32] The Advisory Circular imposes performance standards for aspects of Aircraft Detection Lighting Systems that are not addressed in our rules, such as the volume of airspace in which aircraft must be detected and the period for which the obstruction lights must remain illuminated.[33] The FAA will not approve Aircraft Detection Lighting System installations that do not comply with the Advisory Circular.[34]

16. The Advisory Circular provides that the audible warning feature is optional rather than mandatory, but it sets forth requirements regarding the content and duration of the warning.[35]

(Continued from previous page)
operational characteristics of the foreign object debris detection system operating in the frequency band 92-100 GHz (7 May 2019).

[22] *See* Appendix A (proposed 47 CFR § 2.106).

[23] *See id.* (proposed 47 CFR §§ 87.147, 87.173, 87.187). We also take this opportunity to propose to update the address to which applicants for equipment certification in an Aviation Radio Service frequency band must send notification to the FAA. *See id.* (proposed 47 CFR § 87.147).

[24] *See id.* (proposed 47 CFR § 87.5). We propose to adopt the FAA definition: "Enhanced flight vision system (EFVS) means an installed aircraft system which uses an electronic means to provide a display of the forward external scene topography (the natural or manmade features of a place or region especially in a way to show their relative positions and elevation) through the use of imaging sensors, including but not limited to forward-looking infrared, millimeter wave radiometry, millimeter wave radar, or low-light level image intensification. An EFVS includes the display element, sensors, computers and power supplies, indications, and controls." *See* 14 CFR § 1.1; AC 90-106A, at App. B para. B.6.

[25] See Appendix A (proposed 47 CFR § 87.107).

[26] *See Amendment of the Commission's Rules Governing Certain Aviation Ground Station Equipment, et al.*, Report and Order, 28 FCC Rcd 2693, 2696, para. 7 (2013) (*Ground Station Report and Order*).

[27] *Id*.

[28] *See id.* at 2697, para. 10.

[29] *See id.* at 2697-98, paras. 11, 13.

[30] *See* 47 CFR § 87.483(b)(3).

[31] *See* Federal Aviation Administration, Advisory Circular: Obstruction Marking and Lighting, AC 70/7460-1L, Chapter 14 (2015). The current version is Federal Aviation Administration, Advisory Circular: Obstruction

Specifically, the audible warning must be activated when an aircraft is within one-half nautical mile horizontally and 500 feet vertically of the obstruction.[36] It is repeated three times or until the system determines that the aircraft is no longer within that area.[37] We note that the FAA's requirements may conflict with our permissible duty cycle in that aircraft may enter this warning zone more frequently, or remain in it longer, than the permitted broadcast of the audible warning allowed under our rules.

17. We propose to amend our rules to address the Advisory Circular and to facilitate the licensing of Aircraft Detection Lighting Systems, which serve the public interest by reducing the impact of nighttime lighting on nearby communities and migratory birds, reducing energy consumption, and extending the life expectancy of obstruction lights. We propose to amend our rules to use the FAA's terminology and to remove the duty cycle limits that conflict with the Advisory Circular.[38] We seek comment on whether the proposed relaxation of the duty cycle limits would pose a significantly greater risk of interference to other communications.

18. We propose to codify in our rules these Advisory Circular standards related to the audible warning and tentatively conclude that additional codification is unnecessary. We do not propose any changes to our rules regarding permissible frequencies or the technical parameters for the audible warning that do not conflict with the Advisory Circular. We tentatively conclude such changes are unnecessary because it would simply duplicate the FAA requirements and would necessitate further revision of our rules if those requirements change. We seek comment on these proposals.

19. We also seek comment on whether any changes to our part 17 rules governing marking and lighting of antenna structures are needed to make them consistent with the Advisory Circular with respect to Aircraft Detection Lighting Systems. Commenters seeking part 17 rule changes are encouraged to provide specific language.

3. Aeronautical Mobile (Route) Service Systems in the 108-117.975 MHz and 960-1164 MHz Bands

(Continued from previous page)
Marking and Lighting, FAA AC 70/7460-1L - Including Change 2 (2016) (AC 70/7460-1L), available at https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_70_7460-1L_-_Obstuction_Marking_and_Lighting_-_Change_2.pdf.

[32] *See* AC 70/7460-1L at para. 14.1.

[33] *See id.* at paras. 14.2.1-14.2.2.

[34] The FAA requested a stay of the Commission's audio visual warning system rules and a concomitant delay in granting any new audio visual warning system licenses until the FAA issued the Advisory Circular addressing Aircraft Detection Lighting Systems. *See* Letter from Ian P. Atkins, Director, Spectrum Engineering and Policy, Federal Aviation Administration, to Scot Stone, Deputy Chief, Mobility Division, Wireless Telecommunications Bureau (Mar. 26, 2015). The FAA was concerned that the Commission's rules did not contain sufficient requirements to ensure aircraft safety unless the installation complied with additional guidelines that would be found in the then-upcoming Advisory Circular. *See id.* at 1-2. In light of the subsequent issuance of AC 70/7460-1L, we conclude that the stay request is moot. It remains the case that the radar component of any audio visual warning system installation will be coordinated with the FAA. *See* 47 CFR § 87.483(a).

[35] *See* AC 70/7460-1L at paras. 14.3.1-14.3.6.

[36] *Id.* at para. 14.3.6.

[37] *Id.* at para. 14.3.5.

[38] *See* Appendix A (proposed 47 CFR §§ 87.5, 87.171, 87.173, 87.483).

20. In 2015, the Commission allocated the 108-117.975 MHz and 960-1164 MHz bands to the Aeronautical Mobile (Route) Service[39] on a primary basis for Federal and non-Federal use, with the limitations that systems must operate in accordance with recognized international aeronautical standards and that such use must be in accordance with certain International Telecommunication Union (ITU) resolutions. The ITU resolutions require that these systems must be able to operate in spectrum adjacent to the FM radio band without interference from broadcast operations.[40] In addition, use of the 108-112 MHz sub-band is limited to systems composed of ground-based transmitters and associated receivers that provide navigational information in support of air navigation functions.[41]

21. The *WRC-07 Report and Order* amended the section 2.106 Table of Frequency Allocations but did not adopt corresponding service rules. We seek comment on whether those amendments are sufficient to codify the relevant ITU decisions in the Commission's rules, or whether we should modify the part 87 service rules to reflect expressly the requirements of the relevant ITU resolutions (in addition to the proposed amendments discussed in the following paragraphs). For example, the Commission could expressly extend the FM broadcasting immunity requirements in section 87.151 of the rules,[42] which currently references only differential Global Positioning System receivers, to all aeronautical mobile (route) service receivers. To implement the provisions that are specific to the 108-112 MHz sub-band, the Commission could limit the use of the band to Ground-Based Augmentation Systems.[43] Commenters favoring amendments to part 87 should identify the appropriate rule sections and provide suggested text to implement such amendments. Commenters should address the costs and benefits of any proffered rules or amendments. Finally, we seek comment on whether we should implement any form of grandfathering protection or transition provisions, should we adopt such rules.

22. Automatic Dependent Surveillance-Broadcast (ADS-B) is a key component of NextGen.[44] ADS-B is a service that automatically broadcasts GPS-derived data on the location, velocity, altitude, heading, etc., of an ADS-B-equipped aircraft to other ADS-B-equipped aircraft and ground stations for distribution to air traffic control systems.[45] After January 1, 2020, virtually all aircraft must be able to transmit ADS-B information (ADS-B Out) to fly in most controlled airspace.[46] For aircraft that

---

[39] The Aeronautical Mobile (Route) Service (also referred to as the Aeronautical Mobile Route (R) Service) is an aeronautical mobile service reserved for communications relating to safety and regularity of flight, primarily along national or international civil air routes. 47 CFR § 87.5. It is a subset of the Aeronautical Mobile Service. *Id.*

[40] Specifically, Aeronautical Mobile (Route) Service systems must meet the requirements in Annex 10 to the Convention on International Civil Aviation, including FM broadcasting immunity. *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, et al.*, Report and Order, Order, and Notice of Proposed Rulemaking, 30 FCC Rcd 4183, 4205, 4231, paras. 50, 127 (2015) (*WRC-07 Report and Order*); 47 CFR § 2.106 Footnotes 5.197A (referencing ITU *Radio Regulations*, Resolution 413 (Rev.WRC-12), titled "Use of the band 108-117.975 MHz by the aeronautical mobile (R) service"), 5.327A (referencing ITU *Radio Regulations*, Resolution 417 (Rev.WRC-15), titled "Use of the frequency band 960-1164 MHz by the aeronautical mobile (R) service").

[41] *See WRC-07 Report and Order,* 30 FCC Rcd at 4205, para. 50; 47 CFR § 2.106 Footnote 5.197A.

[42] *See* 47 CFR § 87.151.

[43] Ground-Based Augmentation Systems stations are ground-based differential Global Positioning System transmitters. *See WRC-07 Report and Order*, 30 FCC Rcd at 4203-04, para. 46.

[44] *See* https://www.faa.gov/nextgen/programs/adsb/ (last visited Apr. 9, 2019).

[45] *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.18 (2006) (*2006 Part 87 Report and Order*); 47 CFR § 87.5.

[46] *See* 14 CFR §§ 91.225, 91.227; Federal Aviation Administration, Advisory Circular: Automatic Dependent Surveillance-Broadcast Operations, FAA AC 90-114A with Change 1, at para. 2-2.c (2014) (AC 90-114A),

operate above 18,000 feet or need to comply with ADS-B requirements outside the United States, the equipment must operate on frequency 1090 MHz using what are often referred to as 1090ES transponders. All other aircraft may carry equipment operating either on frequency 978 MHz or frequency 1090 MHz.[47]

23. In 2006, the Commission adopted technical and operational rules for ADS-B transmissions on 978 MHz using Universal Access Transceiver (UAT) technology.[48] While the Commission authorized the use of the frequency 1090 MHz by aeronautical utility mobile stations used for airport surface detection in 2013,[49] it has not adopted technical and operational rules specifically for airborne ADS-B transmissions on 1090 MHz. We believe that establishing rules specifically for 1090ES is warranted, especially since the use of 1090 MHz for ADS-B will be mandatory for all aircraft operating above 18,000 feet or internationally. We propose such rules below, but we also seek comment on whether the proposed rules are unnecessary because part 87 already accommodates 1090ES as an airborne electronic aid to navigation in the 960-1215 MHz band.[50]

24. We propose to authorize 1090ES equipment for use on aircraft and to require compliance with certain technical standards, including emissions limitations and frequency stability requirements derived from the applicable FAA Technical Standard Order and the Radio Technical Commission for Aeronautics Minimum Operational Performance Standard.[51] We propose similar requirements for UATs operating on 978 MHz to ensure their compatibility and interoperability in the ADS-B service.[52] We seek comment on how best to amend the part 87 rules to reflect these standards to ensure compatibility and interoperability with this critical safety of life service. Should we incorporate the standards by reference in part 87, adopt a rule stating the requirements imposed by the standards, or adopt some other measure? In addition to proposing entries in the appropriate part 87 frequency tables to clarify that the frequency 1090 MHz is authorized for ADS-B use,[53] we propose, *inter alia*, separate power, emission, and

(Continued from previous page)
available at https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_90-114A_CHG_1.pdf. There is a partial exemption from the ADS-B carriage requirements for "any aircraft that was not originally certificated with an electrical system, or that has not subsequently been certified with such a system installed, including balloons and gliders." 14 CFR § 91.225(e). The transmission of ADS-B information from aircraft is known as "ADS-B Out" and the reception of ADS-B information by aircraft is known as "ADS-B In."

[47] *See* 14 CFR §§ 91.225, 91.227; AC 90-114A at para. 2-2.c.

[48] *See 2006 Part 87 Report and Order*, 21 FCC Rcd at 11587-88, para. 8. A Universal Access Transceiver (UAT) is defined in part 87 as a "radio datalink system authorized to operate on the frequency 978 MHz to support Automatic Dependent Surveillance—Broadcast (ADS–B) Service, Traffic Information Services—Broadcast (TIS–B) and Flight Information Service—Broadcast (FIS–B)." *See* 47 CFR § 87.5.

[49] *See Ground Station Report and Order*, 28 FCC Rcd at 2693, para. 1.

[50] *See* 47 CFR §§ 87.173, 87.187(n).

[51] Federal Aviation Administration, Technical Standard Order (TSO)-C166b, Extended Squitter Automatic Dependent Surveillance - Broadcast (ADS-B) and Traffic Information Service - Broadcast (TIS-B) Equipment Operating on the Radio Frequency of 1090 Megahertz (MHz)" (Dec. 2, 2009), available at http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgTSO.nsf/0/E70544D62A001F878625768200579 70F?OpenDocument; RTCA/DO-260B, Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance - Broadcast (ADS-B) and Traffic Information Service - Broadcast (TIS-B) with Corrigendum 1 (Dec. 13, 2011).

[52] Federal Aviation Administration, TSO-C154c, Universal Access Transceiver (UAT) Automatic Dependent Surveillance-Broadcast (ADS-B) Equipment Operating on Frequency of 978 MHz (Dec. 2, 2009), available at

frequency tolerance requirements for ADS-B equipment operating on 978 MHz and 1090 MHz.[54] We ask whether these requirements are appropriate and whether any additional or alternative technical rules are necessary for either 1090ES ADS-B or 978 MHz UAT ADS-B. We invite comment on all aspects of this proposal. For example, we note that the FAA is considering whether to adopt rules to exempt certain government aircraft from the requirement to transmit ADS-B data at all times, in the interest of protecting sensitive information relating to national security and law enforcement activities.[55] We seek comment on whether we may need to take any action to implement exceptions adopted by the FAA for national security and law enforcement activities. We also note that the World Radiocommunication Conference held in 2015 allocated spectrum for satellite reception of ADS-B Out.[56] Space-based ADS-B can extend air traffic visibility over the ocean and other areas of the planet where traditional radio receivers are not feasible. This and other potential changes to the part 87 rules stemming from decisions at WRC-15 will be addressed in a separate proceeding.

4. Aeronautical Advisory (Unicom) Stations

25. Unicom stations provide safety-related and other information to aircraft, primarily general aviation aircraft.[57] Unicom stations provide information concerning flying conditions, weather, availability of ground services, and other information to promote the safe and expeditious operation of aircraft.[58] We propose two clarifications of the unicom rules to reduce confusion among licensees and applicants. We seek comment on these proposed rule changes and on their costs and benefits.

26. Current rules prohibit the authorization of more than one unicom station at an uncontrolled airport, *i.e.,* an airport which does not have a control tower, remote communications outlet, or FAA flight service station that operates on the published common traffic advisory frequency.[59] Eligibility for the unicom license at such an airport is restricted to State or local government entities and to nongovernmental organizations that are authorized to apply for the license by a State or local government entity whose primary mission is the provision of public safety services.[60] We propose to

(Continued from previous page)
http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgTSO.nsf/0/E5A37977FBDB786B8625768200579728?OpenDocument; RTCA/DO-282B, Minimum Operational Performance Standards for Universal Access Transceiver (UAT) Automatic Dependent Surveillance Broadcast (ADS-B) with Corrigendum 1 (Dec. 13, 2011).

[53] *See, e.g.*, Appendix A (proposed 47 CFR §§ 87.173, 87.187(ii), 87.349(f), 87.475(b)(15)).

[54] *See, e.g.*, Appendix A (proposed 47 CFR §§ 87.131, 87.133(h)).

[55] *See* https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=201904&RIN=2120-AL16 (last visited June 3, 2019).

[56] *See* Resolution 425 (WRC-15), Use of the frequency band 1 087.7-1 092.3 MHz by the aeronautical mobile-satellite (R) service (Earth-to-space) to facilitate global tracking for civil aviation.

[57] 47 CFR § 87.5.

[58] 47 CFR § 87.213(b)(1). Unicom stations also may transmit, on a secondary basis, information pertaining to the efficient portal-to-portal transit of an aircraft, such as information concerning available ground transportation, food, and lodging. 47 CFR § 87.213(b)(2). They must provide impartial information concerning available ground services, and must provide service to any aircraft station upon request and without discrimination. 47 CFR § 87.213(a).

[59] 47 CFR § 87.215(b). Control towers provide air traffic control services to aircraft landing on, taking off from, and taxiing at an airport, as well as aircraft transiting an airport's traffic area. 47 C.F.R. § 87.417(a). A remote communications outlet is an aeronautical radio station at a small uncontrolled airport located near a large controlled airport that is connected via landlines to the control tower (or other FAA control facility) and enables the FAA to provide air traffic services to more airports and aircraft than would normally be served by the control facility alone. *Amendment of the Aviation Services Rules (Part 87) to provide for the licensing of control tower remote communications outlet stations at airports without control towers*, Order, 5 FCC Rcd 4550, 4550, para. 1 (1990). A flight service station is part of a network of stations providing weather briefings and information on flight facilities and monitoring the navigational radio net. *See Review of Part 87 of the Commission's Rules Concerning the*

clarify that this eligibility restriction applies only at public-use airports, and that unicom stations serving private airfields or helipads (such as at a hospital or offshore oil platform) that do not have a published common traffic advisory frequency do not need State or local government approval.[61] The Commission does not appear to have considered such airports[62] when it adopted the requirement,[63] and we see no reason to apply it to the owner or operator of a private airfield or helipad.

27. Only one frequency is assigned to an airport for unicom communications, regardless of how many unicoms serve that airport.[64] Currently, frequency 122.950 MHz must be used at airports that have a full-time control tower or full-time FAA flight service station; unicom stations at other airports use other frequencies.[65] "Full-time," in this context, means 24-hour operation.[66] We propose to revise the rule to specify that unicom stations at airports with "a control tower or FAA flight service station that operates at all times when the airport is used by aircraft for takeoff or landing"[67] must use 122.950 MHz. This would clarify that 122.950 MHz is designated for use at all airports where the control tower or FAA flight service station is in operation at all times when the airport is open, including airports that do not operate continuously. We invite comment on this proposal, and on alternative criteria. For example, should application of the rule be further expanded (by, for example, considering remote communications outlets, as the rules do with respect to whether more than one unicom is permitted at a particular airport) or should it be expanded in a more limited manner (by requiring unicom use of frequency 122.950 MHz only at airports that operate a minimum number of hours each day)? We also seek comment on the costs and benefits of expanding the use of frequency 122.950 MHz by unicom stations.

5. Air Traffic Control and Aeronautical Operational Control Communications in the 136-137 MHz Band

28. Our rules currently differentiate between air traffic control communications spectrum and aeronautical operational control communications spectrum. Air traffic control communications concern "the safe, orderly, and expeditious flow of air traffic."[68] They are intended to ensure the adequate

(Continued from previous page)
Aviation Radio Service, Report and Order and Further Notice of Proposed Rule Making, 18 FCC Rcd 21432, 21459, para. 56, n.209 (2003) (*2003 Part 87 Report and Order*); *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Thirteenth Report, 24 FCC Rcd 6185, 6303, para. 254 (WTB 2009). A common traffic advisory frequency is a frequency designated for the purpose of carrying out airport advisory practices while operating to or from an airport without an operating control tower and is identified in appropriate aeronautical publications. Federal Aviation Administration, Advisory Circular: Non-Towered Airport Flight Operations, AC 90-66B – Including Change 1, para. 6.2 (2018) (AC 90-66B), available at https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_90-66B_CHG_1.pdf.

[60] 47 CFR § 87.215(c). The Commission enacted this eligibility restriction in 2003 to replace the hearing process for choosing among mutually exclusive unicom applicants at an uncontrolled airport. *See 2003 Part 87 Report and Order*, 18 FCC Rcd at 21460-61, para. 58. (The vast majority of airports in the United States are uncontrolled airports, and the unicom often is the only available source of critical safety-related information. *Id.* at 21460, para. 56.).

[61] *See* Appendix A (proposed 47 CFR § 87.215(c)).

[62] An airport is any area of land or water that is used or intended to be used for the landing and takeoff of aircraft, including its buildings and facilities. 47 CFR § 87.5. The Commission's rules regarding unicom stations do not distinguish between public-use and private airports. *See Reorganization and revision of Part 87 of the Rules governing the aviation services*, Report and Order, 3 FCC Rcd 4171 (1988) (replacing section 87.253 with new section 87.217, which combined all unicom frequencies into a single pool for all airports with no distinction between public-use and private airports).

[63] *See 2003 Part 87 Report and Order*, 18 FCC Rcd at 21463, para. 63 ("This public service eligibility nexus will ensure that new licensees have a vested interest in public safety, and will maximize the possibility that adequate ongoing resources will be made available for operating unicom stations in a manner that promotes public safety.

separation of aircraft and include aircraft routing information and departure/landing clearances.[69] Today, air traffic control communications are transmitted through VHF ground stations using voice transmission. Part 87 designates the 136.000-136.475 MHz frequencies (the lower 136 MHz band) for air traffic control communications, but makes no mention of aeronautical operational control communications in connection with those frequencies.[70] Aeronautical operational control communications pertain to "the safe, efficient and economical operation of aircraft, such as fuel, weather, position reports, aircraft performance, and essential services and supplies;"[71] they are transmitted by aeronautical enroute service stations, which are authorized to use the 136.4875-137.000 MHz band (the upper 136 MHz band).[72]

29. NextGen's Data Comm will permit certain repetitive and routine communications transmitted to aircraft to be shifted from voice to data transmission.[73] The system will transmit digital data that includes both air traffic control communications and aeronautical operational control communications over the entire 136-137 MHz band using VHF Datalink Mode 2,[74] an advanced digital protocol for aeronautical safety communications traffic.[75]

30. In response to an FAA request, the Wireless Telecommunications Bureau's Mobility Division (Division) in 2018 clarified that part 87 permits aeronautical enroute service stations to transmit air traffic control communications as well as aeronautical operational control communications in the upper 136 MHz band.[76] The Division did not address the lower portion of the band.

31. In 2018, Aviation Spectrum Resources, Inc.[77] filed a petition for rulemaking asking that the Commission amend part 87 to permit aeronautical enroute service stations to use the lower 136 MHz band to provide aeronautical operational control communications and air traffic control communications.[78] The petition notes that our current rules do not fully accommodate Data Comm because networks using VHF Datalink Mode 2 combine all aviation messages into a single channel.[79] This allows aircraft to exchange communications with aeronautical enroute service stations using a single avionics terminal aboard the aircraft.[80] The petition also asserts that the ability to use VHF Datalink Mode 2 in the entire 136-137 MHz band "is essential to accommodate the growing spectrum bandwidth

(Continued from previous page)
Indeed, we anticipate that many, if not most, new licensees will be state or local government agencies with a public safety mission").

[64] 47 CFR § 87.217(a). As noted in the preceding paragraph, it remains that only one unicom can be authorized to serve an uncontrolled airport. We propose no change to the rule limiting each airport to a single unicom frequency irrespective of the number of unicoms serving that airport.

[65] 47 CFR § 87.217(a)(1)-(2).

[66] *See* Federal Aviation Administration, Aeronautical Information Manual, para. 3-2-5.a.1 (2017), available at https://www.faa.gov/air_traffic/publications/media/AIM_Basic_dtd_10-12-17.pdf. At any airport where there is a part-time control tower, moreover, the unicom frequency becomes the common traffic advisory frequency when the tower is closed. *Id.* at para. 4-1-9.a; AC 90-66B at para. 10.2.

[67] *See* Appendix A (proposed 47 CFR § 87.217(a)).

[68] 14 CFR § 1.1.

[69] *See Review of Part 87 of the Commission's Rules Concerning the Aviation Radio Service*, Notice of Proposed Rule Making, 16 FCC Rcd 19005, 19010, para. 12 & n.25 (2001).

[70] *See* 47 CFR § 87.173(b); *Amendment of Parts 2 and 87 of the Commission's Rules to Accommodate Advanced Digital Communications in the 117.975-137 MHz Band and to Implement Flight Information Services in the 136-137 MHz Band*, Report and Order, 16 FCC Rcd 8226, 8227-28, para. 4 (2001).

[71] 47 CFR § 87.261(a).

[72] 47 CFR §§ 87.173(b), 87.261(a), 87.263(a)(1).

[73] *Federal Aviation Administration,* Order, 33 FCC Rcd 6011, 6012, para. 5 (WTB MD 2018) (*Division Order*).

needs of the aviation industry and ensure the safe operation and navigation of our nation's aircraft,"[81] and that implementation of Data Comm will yield significant gains in operational efficiency and reduce flight delays.[82] We tentatively conclude that permitting both aeronautical operational control and air traffic control communications throughout the 136-137 MHz band in support of Data Comm would enhance aviation safety and efficiency by permitting pilots to obtain critical information through a single integrated data link. We seek comment on this tentative conclusion.

32. We propose to amend part 87 to permit aeronautical enroute stations to transmit both air traffic control communications and aeronautical operational control communications over the entire band. Specifically, we propose to amend the part 87 frequency table in section 87.173(b), and section 87.263(a) in subpart I regarding aeronautical enroute service stations, to provide that: (1) aeronautical enroute service stations may use the entire 136 MHz band, and (2) aeronautical operational control communications may be transmitted over the entire band.[83] We also propose to specify that, when an aeronautical enroute station uses frequencies to transmit both air traffic control communications and aeronautical operational control communications, the specific frequencies and traffic sharing methodology must be agreed upon between the aeronautical enroute service station licensee and the FAA.[84] We seek comment on these proposed rule changes and on their costs and benefits. We request that commenters be as detailed as possible in providing estimates of the costs and benefits to various stakeholders. We also invite commenters to indicate whether they agree that these rule changes would serve the public interest by enhancing aviation safety, whether there are any other alternatives that might reasonably accommodate Data Comm, whether any other rules need to be amended, and whether the specifics of our proposed amendments should be modified. We encourage commenters to address whether more detail is required in the rule regarding the requirement for securing FAA agreement before initiating joint aeronautical operational control/air traffic control operations.

(Continued from previous page)

[74] *See* https://www.faa.gov/nextgen/how_nextgen_works/new_technology/data_comm/in_depth/ (last visited Apr. 9, 2019).

[75] *See 2006 Part 87 Report and Order*, 21 FCC Rcd at 11603, para. 34.

[76] *Division Order*, 33 FCC Rcd at 6012-13, para. 6.

[77] Aviation Spectrum Resources, Inc. is owned by a consortium of U.S. airlines and other airspace users and is the licensee of all U.S. aeronautical enroute service stations (except certain stations in Alaska).

[78] *See* ASRI Petition, at 3. The ASRI Petition was placed on public notice on October 18, 2018. *See Consumer & Governmental Affairs Bureau Reference Information Center Petition for Rulemaking Filed*, Public Notice, Report No. 3106 (CGB Oct. 18, 2018). Commenters unanimously support the petition.

[79] *See* ASRI Petition at 4.

[80] Using a single terminal for both aeronautical operational control and air traffic control traffic simplifies operations aboard the aircraft while also negating a need to retrofit large commercial aircraft with additional radios. *Id*. at 8.

[81] *Id*. at 4.

[82] *Id*. Messages transmitted by VHF Datalink Mode 2 appear on a screen in the cockpit, can be printed, and can be transferred by the pilot or co-pilot into the aircraft's flight computer, thereby reducing the need for "read backs" of instructions and the acknowledgement or repeat of voice messages. *Id*. at 7-8.

[83] *See* Appendix A (proposed 47 CFR §§ 87.173, 87.263).

[84] *See id.* (proposed 47 CFR § 87.263). The Commission has in other contexts required applicants and licensees to coordinate with the FAA as a condition precedent to the use of aviation spectrum. *See, e.g.*, *Ground Station Report and Order*, 28 FCC Rcd at 2695, para. 5 (mandating that vehicle squitter applicants pre-coordinate with the FAA before filing applications with the Commission); 47 CFR § 87.131 note 4 (requiring licensee coordination with the FAA to determine the authorized frequency, emission, and maximum power of radionavigation land stations licensed under part 87).

B. Communications with Aircraft and Other Assets on the Ground to Promote Safety

33. In this section, we address communications between aircraft and ground assets that could improve airport safety. We propose rules for the implementation of a broadband communications system to support airport surface operations in the United States. We also propose to permit expanded use of a type of mobile station that helps reduce collisions between aircraft and airport ground vehicles, such as snow plows and maintenance vehicles. Finally, we propose to provide additional spectrum for testing radio beacons that are activated in distress situations, including airplane crashes.

1. Aeronautical Mobile Airport Communications Systems

34. The Aeronautical Mobile Airport Communications System (AeroMACS) is an internationally standardized and harmonized broadband aeronautical mobile (route) service system that will enable communications for surface operations at airports between aircraft and other vehicles, as well as between critical fixed assets.[85] Implementation of AeroMACS in the United States will support Data Comm by offloading large amounts of aircraft data from, and thus easing overcrowding in, the heavily congested VHF aeronautical band. This will facilitate delivery of critical air traffic control messages, which should enhance safety and reduce flight delays. Other proposed uses for AeroMACS include air traffic management, including air traffic control; aeronautical operations communications; and communications related to airport operations, safety, and security.[86] In addition to the Federal government, AeroMACS users may include airport owners and operators, airline carriers, aeronautical communications network providers, and other entities that engage in airport communications relating to safety and regularity of flight.[87] AeroMACS trials are being conducted in the United States and abroad.[88]

35. The Commission allocated the 5091-5150 MHz band for Federal and non-Federal AeroMACS use on a co-primary basis in 2015[89] and it allocated the 5000-5030 MHz band for such use in 2017,[90] but it has not yet established AeroMACS services in either band. AeroMACS operation in the 5010-5030 MHz segment of the 5000-5030 MHz band is permitted only if the operation cannot be accommodated in the 5000-5010 MHz segment or the 5091-5150 MHz band.[91] In addition, AeroMACS systems in the 5000-5030 MHz band must be designed and implemented to be capable of operational modification if interference is received from or caused to the Radionavigation-Satellite Service.[92] The only permissible Aeronautical Mobile Service use of the 5091-5150 MHz band other than AeroMACS is aeronautical mobile telemetry for flight test purposes, subject to the technical parameters in ITU

---

[85] *See 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, 2717, para. 39 (2017).

[86] *See* WiMAX Forum Petition at 5.

[87] *Id*. at 18-19.

[88] *Id*. at 5-6. Some foreign airlines already use AeroMACS equipment onboard. *Id*. at 6.

[89] The 5091-5150 MHz band is allocated on a co-primary basis to the Aeronautical Mobile, Aeronautical Mobile-Satellite (Route), Aeronautical Radionavigation, and Fixed Satellite (limited to Earth-to-space feeder links of non-geostationary satellite systems in the mobile-satellite service) Services. 47 CFR § 2.106 & Footnote US444B. In designating this band for AeroMACS use, the Commission implemented an international allocation made at the World Radiocommunication Conference held in 2007. *See WRC-07 Report and Order,* 30 FCC Rcd at 4209, para. 58.

[90] The 5000-5030 MHz band is allocated on a co-primary basis to the Aeronautical Mobile (Route) (limited to AeroMACS), Aeronautical Mobile-Satellite (Route), Aeronautical Radionavigation, and Radionavigation-Satellite Services. 47 CFR § 2.106 & Footnote US115.

[91] 47 CFR § 2.106 & Footnote US115.

[92] *Id.*

Resolution 418 (WRC-12) intended to ensure compatibility with other services.[93] AeroMACS has priority over aeronautical mobile telemetry systems, but operators of AeroMACS and aeronautical mobile telemetry systems "are urged to cooperate with each other in the exchange of information about planned deployments."[94] This enhances the prospects for compatible sharing of the band at six airports with significant flight test activity, while other airports may be addressed on a case-by-case basis.[95]

36. In 2017, the WiMAX Forum filed a petition for rulemaking seeking the adoption of AeroMACS service rules. Commenters generally support the promulgation of AeroMACS rules, but not all agree with the WiMAX Forum's suggested licensing and sharing mechanisms.[96] In addition, other users of the 5091-5150 MHz band raise interference concerns.[97]

37. *Licensing and eligibility*. AeroMACS will be used by fixed, base, and mobile units on or near airport property, including aircraft, for airport services related to the safety and regularity of flight. With respect to aircraft, we propose to authorize AeroMACS operation under the existing aircraft station authorization, rather than to require a separate license. For other stations, we propose to authorize AeroMACS operation under a new station class code for AeroMACS stations. Fixed and base station transmitters will be licensed by geographic coordinates and mobile units licensed for an area of operation defined by a geographic point-radius that encompasses the parts of the airport property where the mobile units will operate. While the WiMAX Forum and some commenters suggest that AeroMACS operations be licensed by rule under part 95 of the Commission's rules without individual licensing, with users required to register in a centralized database similar to the Wireless Medical Telemetry Service and Medical Body Area Networks in the MedRadio Service,[98] we 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.[99] 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. We seek comment on these proposals and their costs and benefits, as well as those of any alternative licensing schemes. In particular, how do the administrative costs and administrative benefits of our proposed licensing scheme compare to those of registering in a separate database? How do the safety benefits compare? How should we expect that costs will be allocated to airport owners and operators?

38. We propose to limit eligibility for non-aircraft AeroMACS licenses to airport owners and operators, and entities that have been granted permission by the airport owner or operator to transmit using AeroMACS equipment at or near the airport.[100] This may include airline carriers, aeronautical communications network providers or other third-party network access providers, and entities that

---

[93] 47 CFR § 2.106 Footnote US444B (referencing ITU *Radio Regulations*, Resolution 418 (Rev.WRC-12), titled "Use of the band 5 091-5 250 MHz by the aeronautical mobile service for telemetry applications").

[94] *Id.*

[95] *Id.* The six airports are Boeing Field/King County International Airport in Seattle; Lambert-St. Louis International Airport; Charleston (South Carolina) Air Force Base/International Airport; Wichita Dwight D. Eisenhower National Airport; Roswell (New Mexico) International Air Center Airport; and William P. Gwinn Airport in Jupiter, Florida.

[96] The Wireless Telecommunications Bureau sought comment on the WiMAX Forum Petition on July 19, 2017. *See Wireless Telecommunications Bureau Seeks Comment on WiMAX Forum Petition Proposing Rules for the Aeronautical Mobile Airport Communication System*, Public Notice, 32 FCC Rcd 5698 (WTB MD 2017).

[97] *See, e.g.*, Aerospace and Flight Test Radio Coordinating Council, Inc. Statement of Position on Petition for Rulemaking at 4-6 (filed Aug. 18, 2017), https://ecfsapi.fcc.gov/file/1081800138628/AFTRCCComments.pdf.

[98] *See, e.g.,* WiMAX Forum Petition at 16-17.

[99] *See* Boeing Comments, RM-11793, at 9-10.

[100] *See* 47 CFR §§ 87.347(b)(3), 80.527(b) (so limiting eligibility for certain aviation ground stations).

perform airport services and engage in communications for the purpose of safety and regularity of flight (such as snow removal and deicing). We seek comment on this proposal, and on whether to extend eligibility to other entities. We also seek comment on whether to delineate or limit the entities to which airport owners and operators can grant permission, or in the alternative, whether the eligibility of entities other than airport owners and operators should be determined by the FAA during the application coordination process discussed below.[101]

39. *Coordination and channel management*. 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.[102] We believe that coordination with FAA Regional Offices will expedite the licensing process.[103] We seek comment on these proposed application coordination procedures.

40. AeroMACS spectrum will be shared between Federal and non-Federal users. We believe that the FAA is best-suited to evaluate Federal AeroMACS needs at each location.[104] The FAA already plays a large role in overseeing aviation spectrum use at airports,[105] and we defer to its judgment regarding air safety matters to avoid conflicting requirements, consistent with our statutory obligations.[106] Regarding non-Federal users, the WiMAX Forum suggests that the Commission designate an AeroMACS Channel Manager to manage non-Federal authorized AeroMACS users and to coordinate channel sharing with Federal users.[107] As envisioned by the WiMAX Forum, the Commission would designate a single entity to assign channels to eligible non-Federal entities and manage the use of such channels nationwide. We seek comment on how AeroMACS spectrum should be coordinated among non-Federal users, and between Federal and non-Federal users. Proponents of a third-party coordinator should recommend specific rules to govern the selection, eligibility, and responsibilities of such a coordinator.[108]

---

[101] *See* 47 CFR § 87.349(f)(2) (so defining eligibility for aeronautical utility mobile stations).

[102] *See* 47 CFR §§ 87.349(f)-(f)(1), 87.475(a), 87.527-87.529.

[103] *See Ground Station Report and Order*, 28 FCC Rcd at 2695, para. 5.

[104] *See Amendment of the Commission's Rules Governing Certain Aviation Ground Station Equipment; Petition of the National Telecommunications and Information Administration to Allow Aeronautical Utility Mobile Stations to Use 1090 MHz for Runway Vehicle Identification and Collision Avoidance; Potomac Aviation Technology Corporation Request for Interpretation or Waiver of Sections 87.71 and 87.73 of the Commission's Rules*, Notice of Proposed Rule Making, 25 FCC Rcd 3355, 3359, para. 13 (2010).

[105] *See 2006 Part 87 Report and Order*, 21 FCC Rcd at 11597-98, para. 22 (2006) (amending the part 87 rules to give FAA "additional flexibility to manage air traffic control frequencies").

[106] *2004 and 2006 Biennial Regulatory Reviews – Streamlining and Other Revisions of Parts 1 and 17 of the Commission's Rules Governing Construction, Marking and Lighting of Antenna Structures*, Report and Order, 29 FCC Rcd 9787, 9790, para. 8 (2014).

[107] *See* WiMAX Forum Petition at 19-23.

[108] The WiMAX Forum recommends a rule that provides that the third-party coordinator shall "assign AeroMACS channels to eligible non-Federal entities 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 [and] 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 5091-5 150 MHz bands, including aeronautical mobile telemetry (AMT) users …." *Id*. at 19. The WiMAX Forum's suggested rules also provide that "the Channel Manager is urged to cooperate with aeronautical mobile telemetry (AMT) users in accordance with Table of Allocations footnote US444B(c)." *Id*. Commenters supporting designation of a third-party coordinator should also address the WiMAX Forum's recommended eligibility criteria for the coordinator. *Id*. at 21.

Commenters also should address whether we should designate a channel manager on a nationwide or regional basis, and whether more than one entity should be authorized at any location. We also seek comment on any alternative or additional channel management methods that commenters believe we should consider. Commenters should discuss the costs and benefits of any alternatives they address.

41. *Coordination with flight test systems.* As noted above, AeroMACS has priority over aeronautical mobile telemetry systems in the 5091-5150 MHz band, and operators of AeroMACS and aeronautical mobile telemetry systems are urged to cooperate to avoid causing harmful interference. We expect users to operate cooperatively at the six specified airports with significant flight test activity and at any other locations where circumstances warrant coordination. We seek comment on how to implement this sharing arrangement, and its costs and benefits. In particular, given the power flux density requirements contained in Resolution 418, and the safety of life nature of AeroMACS, we seek comment as to whether technical parameters for aeronautical mobile telemetry should be incorporated in the Commission's part 87 rules to further facilitate compatible operation.

42. The Aerospace and Flight Test Radio Coordinating Council, Inc. claims that there is increased spectrum demand for flight testing due to the increased use of digital video to obtain important flight test data and to the loss of other spectrum for flight test systems.[109] The record indicates that the flight test community has discussed with the WiMAX Forum and the FAA how to maximize use of the 5091-5150 MHz band without causing harmful interference to AeroMACS.[110] We are encouraged that the parties have initiated discussions to develop coordination criteria between flight test and AeroMACS users. We believe that these discussions should proceed in parallel with this rulemaking, and we welcome recommendations developed by the parties. We ask commenters to address whether these discussions should impact the AeroMACS service and technical rules, *e.g.*, if the parties do not timely agree to sharing criteria, to defer AeroMACS implementation at the six specified airports and any other locations that present similar sharing issues.

43. *Coordination with satellite systems.* Globalstar holds licenses for feeder links between its gateway earth stations and space stations in the 5096-5250 MHz band, which overlaps AeroMACS operations in the 5091-5150 MHz band.[111] It alleges that, if the Commission does not adopt appropriate technical rules in this proceeding, widespread AeroMACS operations could result in aggregate interference to Globalstar.[112] This could reduce the capacity of its mobile satellite service network, diminish the quality of its services, and cause unacceptable harm to first responders, public safety personnel, consumers, and other customers.[113] As a basis for its concern, Globalstar cites ITU Recommendation ITU-R M.1827-1, which includes criteria for limiting aggregate interference in order to protect fixed-satellite service feeder links from aeronautical mobile (route) service surface applications at airports in the 5091-5150 MHz band.[114] We note that AeroMACS must operate in accordance with ITU

[109] Aerospace and Flight Test Radio Coordinating Council, Inc. Comments, RM-11793, at 3; *see also ex parte* filing by William K. Keane, counsel for Aerospace and Flight Test Radio Coordinating Council, Inc., WT 19-140, dated May 28, 2019 (citing ITU-R Doc. 8B/143-E, "Spectrum Requirement for Aeronautical Mobile Telemetry" (31 March 2005) (estimating a future need for an additional 650 megahertz of spectrum for aeronautical mobile telemetry)).

[110] *See*, *e.g.*, *ex parte* filing by William K. Keane, counsel for Aerospace and Flight Test Radio Coordinating Council, Inc., RM-11793, dated Nov. 28, 2018.

[111] Globalstar operates a mobile satellite service system in the 1610-1618.725 MHz and 2483.5-2500 MHz bands.

[112] Globalstar Comments, RM-11793, at 4.

[113] *Id.*; *see also* Boeing Comments, RM-11793, at 2.

[114] Recommendation ITU-R M.1827-1, "Guideline on technical and operational requirements for stations of the aeronautical mobile (R) service limited to surface application at airports in the frequency band 5 091-5 150 MHz."

Resolution 748 (Rev. WRC-12), which incorporates ITU-R M.1827-1.[115] Consequently, we believe that AeroMACS operations in this band already are required to comply with Recommendation ITU-R M.1827-1. We observe that proposed section 87.604 includes individual base station power limits, and we seek comment on whether these limits can be expected under typical deployment scenarios to limit aggregate interference sufficiently.[116] We also seek comment on what, if any, additional references or technical rules are needed to protect Globalstar operations.

44. *Technical rules.* The technical standards for AeroMACS have been approved worldwide by numerous technical standards bodies, based on Institute of Electrical and Electronics Engineers Standard 802.16-2009.[117] Similar standards and requirements have been adopted by the Radio Technical Commission for Aeronautics, the International Civil Aviation Organization, and the European Organization for Civil Aviation Equipment. As suggested by the WiMAX Forum,[118] we propose technical rules that are based on the requirements currently incorporated in the International Civil Aviation Organization Standards and Recommended Practices and in the Radio Technical Commission for Aeronautics Minimum Operational Performance Standards.[119] We ask whether any additional or alternative technical rules are needed to ensure the compatibility, interoperability, or efficient operation of AeroMACS users. We also invite comment on how best to ensure that our AeroMACS rules are technology-neutral and flexible. Commenters should address specific aspects of the proposed rules, such as the channel plan, transmitter power levels, and emission mask. Finally, we seek comment on whether, in lieu of setting forth technical criteria in our rules, we should incorporate by reference the relevant international standards. Commenters favoring this option should identify all standards that should be incorporated and address any practical or legal issues associated with such incorporation by reference.[120]

2. Vehicle Squitters

45. In 2013, at the request of the National Telecommunications and Information Administration, the Commission authorized use of the frequency 1090 MHz by aeronautical utility mobile stations used for airport surface detection, known as vehicle squitters.[121] Vehicle squitters help reduce collisions between aircraft and airport ground vehicles such as snow plows and maintenance vehicles by enabling air traffic control to monitor vehicle movement.[122] Consistent with a request from the Airports Council International-North America,[123] we propose two changes to the vehicle squitter rules described below to increase operational flexibility. We invite comment on these proposed rule changes

[115] *See* 47 CFR § 2.106 Footnote US444B(a)(1).

[116] *See* Appendix A (proposed 47 CFR § 87.604).

[117] Institute of Electrical and Electronics Engineers, *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). We see no need to require compliance with the IEEE standard, which applies generally to WiMAX operations, in addition to the aviation-specific standards that are based on it.

[118] *See* WiMAX Forum Petition at 13-14.

[119] *See* Appendix A (proposed 47 CFR §§ 87.603-87.606).

[120] *See, e.g.,* Administrative Conference of the United States, Administrative Conference Recommendation 2011-5, Incorporation by Reference, 77 Fed. Reg. 2257 (2012).

[121] *See Ground Station Report and Order*, 28 FCC Rcd at 2693, para. 1. The term "squitter" refers to random output pulses from a transponder caused by ambient noise or by an intentional random triggering system, but not by the interrogation pulses. *Id.* at 2693, para. 1, n.2.

[122] *Id*. at 2693, para. 1.

[123] *See* ACI-NA Petition. The ACI-NA Petition was placed on public notice on March 28, 2019. *See Consumer & Governmental Affairs Bureau Reference Information Center Petition for Rulemaking Filed*, Public Notice, Report No. 3119 (CGB Mar. 28, 2019), https://ecfsapi.fcc.gov/file/032864010427/DOC-356775A1.pdf. No comments were received.

and their costs and benefits. In particular, we seek comment from airport owners and operators, which are the only authorized vehicle squitter licensees.[124]

46. Section 87.345 of the rules states that aeronautical utility mobile stations "provide communications for vehicles operating on an airport movement area," which it defines as "the runways, taxiways and other areas utilized for taxiing, takeoff and landing of aircraft, exclusive of loading ramp and parking areas."[125] In response to an FAA request, the Division in 2015 clarified that vehicle squitters may power up outside the airport movement area to facilitate their acquisition of position data before entering the airport movement area, because such operation is ancillary to the authorized operation in the airport movement area.[126] We propose to amend the rule to codify the Division's clarification that power-up of vehicle squitters outside the airport movement area is permissible.[127] We believe that this codification would remove any residual uncertainty that vehicle squitters may power up in this manner, and would thus facilitate a practice that may enhance airport safety by allowing air traffic control detection of a vehicle squitter immediately upon its entry into the airport movement area.

47. We also propose to clarify that vehicle squitter use of frequency 978 MHz as well as 1090 MHz is authorized.[128] The frequency 978 MHz is designated for transmissions using UAT datalink technology.[129] UAT transmissions are authorized for all aeronautical utility mobile stations.[130] The Commission initially discussed the use of only frequency 1090 MHz for vehicle squitter operation because that frequency was used for existing airport surface detection equipment operations to manage the movement of aircraft on airport surfaces.[131] Operation of vehicle squitters on 978 MHz can enhance operational flexibility for airport managers without increasing the risk that vehicle squitters would cause interference to other airport communications, thereby enhancing the safety of passengers and airport workers. We also propose to permit operation of vehicle squitters on 978 MHz over a broader portion of the airport than just the airport movement area (plus ancillary operation for powering up and down).[132] We seek comment on whether any additional rule changes are required to clarify that vehicle squitters are authorized to transmit on 978 MHz.

3. Emergency Locator Transmitter Test Station Frequencies

48. Emergency locator transmitters are radio beacons that are carried on board aircraft and triggered in the event of a crash or other unplanned downing.[133] Emergency locator transmitter test stations are used for testing related to the manufacture or design of emergency locator transmitters, and for training operations with respect to the operation and location of emergency locator transmitters.[134]

---

[124] *See* 47 CFR § 87.349(f)(2).

[125] *See* 47 CFR § 87.345. Vehicle squitter communications are limited to the airport movement area to prevent use of the system for purposes other than vehicle and aircraft safety (such as tracking baggage carts). *See Ground Station Report and Order*, 28 FCC Rcd at 2694, para. 4; *Bill Kaplan,* Letter Ruling, 30 FCC Rcd 1966, 1966 (WTB MD 2015) (*Kaplan Letter*).

[126] *See Kaplan Letter*, 30 FCC Rcd at 1967.

[127] *See* Appendix A (proposed 47 CFR § 87.345).

[128] *See id.* (proposed 47 CFR §§ 87.345, 87.349)

[129] *See* 47 CFR §§ 87.5, 87.475(b)(7).

[130] *See* 47 CFR §§ 87.173(b), 87.345(f), 87.349(e).

[131] *See Ground Station Report and Order*, 28 FCC Rcd at 2694, para. 3.

[132] *See* Appendix A (proposed 47 CFR § 87.345); *see also* ACI-NA Petition at 3-5.

[133] *See Review of Part 87 of the Commission's Rules Concerning the Aviation Radio Service*, Fourth Report and Order, FCC 18-155, at 1, para. 1 (Nov. 9, 2018), 2018 WL 5961750; 47 CFR § 87.5.

[134] *See* 47 CFR §§ 87.471(c), 87.473(b).

Section 87.475(d) of the Commission's rules makes frequencies 121.600, 121.650, 121.700, 121.750, 121.800, 121.850, and 121.900 MHz available for emergency locator transmitter test stations.[135] This list dates from when emergency locator transmitters were first authorized in 1973.[136] More recent FAA guidance, however, authorizes emergency locator transmitter test stations to operate on frequency 121.775 MHz.[137] We propose to amend section 87.475(d) by adding frequency 121.775 MHz to the list of frequencies available for emergency locator transmitter test stations to align our rules with FAA guidance and facilitate emergency locator transmitter testing.[138] We seek comment on this proposal.

IV. PROCEDURAL MATTERS

49. *Regulatory Flexibility Analysis.* The Regulatory Flexibility Act of 1980, as amended (RFA),[139] requires that a regulatory flexibility analysis be prepared for notice-and-comment rulemaking proceedings, unless the agency certifies that "the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities."[140] As required by the RFA,[141] the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on small entities of the policies and rules proposed in this *Notice of Proposed Rulemaking* (*Notice*). The analysis is found in Appendix B. We request written public comment on the IRFA. Comments must be filed in accordance with the same filing deadlines for comments on the *Notice*, and must have a separate and distinct heading designating them as responses to the IRFA. The Commission will send a copy of this *Notice of Proposed Rulemaking*, including the IRFA, to the Chief Counsel for Advocacy of the Small Business Administration.

50. *Paperwork Reduction Analysis*. This *Notice* contains proposed new and modified information collection requirements. The Commission, as part of its continuing effort to reduce paperwork burdens, invites the general public and the Office of Management and Budget (OMB) to comment on the information collection requirements contained in this document, as required by the Paperwork Reduction Act of 1995, Public Law 104-13. In addition, pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, *see* 44 U.S.C. 3506(c)(4), we seek specific comment on how we might further reduce the information collection burden for small business concerns with fewer than 25 employees.

51. *Ex Parte Presentations*. The proceeding this *Notice* initiates shall be treated as a "permit-but-disclose" proceeding in accordance with the Commission's *ex parte* rules.[142] Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within two business days after the presentation (unless a different deadline applicable to the

---

[135] 47 CFR § 87.475(d) introductory paragraph. Licensees must "[n]ot cause harmful interference to voice communications on these frequencies or any harmonically related frequency," and must "[c]oordinate with the appropriate FAA Regional Spectrum Management Office prior to the activation of each transmitter." 47 CFR § 87.475(d)(1), (2).

[136] *See Amendment of Parts 1, 2, and 87 of the Rules to Provide for the Licensing and Use of Emergency Locator Transmitters (ELT's)*, Report and Order, 39 F.C.C.2d 1004, 1006, para. 6 (1973).

[137] *See United States Spectrum Management Regulations and Procedures Manual*, Federal Aviation Administration Order 6050.32B, page 42, Appendix 2, Federal Aviation Administration, November 17, 2005, available at https://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentID/73412.

[138] *See* Appendix A (proposed 47 CFR § 87.475).

[139] The RFA, *see* 5 U.S.C. §§ 601-612, was amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[140] 5 U.S.C. § 605(b).

[141] 5 U.S.C. § 603.

[142] 47 CFR §§ 1.1200 *et seq.*

Sunshine period applies). Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentation must (1) list all persons attending or otherwise participating in the meeting at which the *ex parte* presentation was made, and (2) summarize all data presented and arguments made during the presentation. If the presentation consisted in whole or in part of the presentation of data or arguments already reflected in the presenter's written comments, memoranda or other filings in the proceeding, the presenter may provide citations to such data or arguments in his or her prior comments, memoranda, or other filings (specifying the relevant page and/or paragraph numbers where such data or arguments can be found) in lieu of summarizing them in the memorandum. Documents shown or given to Commission staff during *ex parte* meetings are deemed to be written *ex parte* presentations and must be filed consistent with rule 1.1206(b). In proceedings governed by rule 1.49(f) or for which the Commission has made available a method of electronic filing, written *ex parte* presentations and memoranda summarizing oral *ex parte* presentations, and all attachments thereto, must be filed through the electronic comment filing system available for that proceeding, and must be filed in their native format (*e.g.*, .doc, .xml, .ppt, searchable .pdf). Participants in this proceeding should familiarize themselves with the Commission's *ex parte* rules.

52. *Comment Dates and Filing Procedures.* Pursuant to sections 1.415 and 1.419 of the Commission's rules, 47 CFR §§ 1.415, 1.419, interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS). *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

- Electronic Filers: Comments may be filed electronically using the Internet by accessing the ECFS: http://apps.fcc.gov/ecfs/.
- Paper Filers: Parties who choose to file by paper must file an original and one copy of each filing. If more than one active docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number.

Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

- All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th St., SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes and boxes must be disposed of before entering the building.
- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9050 Junction Drive, Annapolis Junction, MD 20701.
- U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554.

53. People with Disabilities: To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an e-mail to fcc504@fcc.gov or call the Consumer & Governmental Affairs Bureau at 202-418-0530 (voice), 202-418-0432 (tty).

54. Comments, reply comments, and *ex parte* submissions will be available for public inspection during regular business hours in the FCC Reference Center, Federal Communications Commission, 445 12th Street, S.W., Room CY-A257, Washington, D.C. These documents will also be available via ECFS. Documents will be available electronically in ASCII, Microsoft Word, and/or Adobe Acrobat.

55. For further information, contact Mr. Jeff Tobias, Mobility Division, Wireless Telecommunications Bureau, (202) 418-1617 or TTY (202) 418-7233; or via e-mail at

jeff.tobias@fcc.gov.

V. ORDERING CLAUSES

56. Accordingly, IT IS ORDERED, pursuant to sections 4(i), 301, 303(r), 307, 308, 309, and 332(a)(2) of the Communications Act of 1934, 47 U.S.C. §§ 154(i), 301, 303(r), 308, 307, 309, 332(a)(2), that this *Notice of Proposed Rulemaking* is HEREBY ADOPTED.

57. IT IS FURTHER ORDERED that the petition for rulemaking filed by the WiMAX Forum on March 31, 2017, RM-11793, the petition for rulemaking filed by Sierra Nevada Corporation on February 16, 2018, RM-11799, the petition for rulemaking filed by Aviation Spectrum Resources, Inc. on October 16, 2018, RM-11818, and the petition for rulemaking filed by the Airports Council International-North America on January 30, 2019, RM-11832, ARE GRANTED to the extent set forth herein and otherwise DENIED. RM-11793, RM-11799, RM-11818, and RM-11832 shall be closed and the records thereof consolidated into the above-captioned docket.

58. IT IS FURTHER ORDERED that the stay request filed by the Federal Aviation Administration on April 6, 2015, IS DISMISSED AS MOOT.

59. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this *Notice of Proposed Rulemaking*, including the Initial Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A

Proposed Rules

Chapter I of Title 47 of the Code of Federal Regulations, Parts 2 and 87, are proposed to be amended as follows:

PART 2 – FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

1. The authority citation for part 2 continues to read as follows:

AUTHORITY: 47 U.S.C. 154, 302a, 303, and 336, unless otherwise noted.

2. Section 2.106, the Table of Frequency Allocations, is amended by revising page 63 to read as follows:

§ 2.106 Table of Frequency Allocations.

* * * * *

International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
86-92 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) 5.340			86-92 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) US246		
92-94 FIXED 5.338A MOBILE RADIO ASTRONOMY RADIOLOCATION 5.149			92-94 FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION RADIONAVIGATION US161 US342		RF Devices (15) Aviation (87) Fixed Microwave (101)
94-94.1 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) Radio astronomy 5.562 5.562A			94-94.1 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION SPACE RESEARCH (active) Radio astronomy 5.562 5.562A	94-94.1 RADIOLOCATION RADIONAVIGATION Radio astronomy 5.562A	RF Devices (15) Aviation (87)
94.1-95 FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION 5.149			94.1-95 FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION RADIONAVIGATION US161 US342		RF Devices (15) Aviation (87) Fixed Microwave (101)
95-100 FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE 5.149 5.554			95-100 FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE 5.554 US342		Aviation (87)
100-102 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) 5.340 5.341			100-102 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) 5.341 US246		
102-105 FIXED MOBILE RADIO ASTRONOMY 5.149 5.341			102-105 FIXED MOBILE RADIO ASTRONOMY 5.341 US342		

* * * * *

PART 87 – AVIATION SERVICES

3. The authority citation for Part 87 continues to read as follows:

AUTHORITY: 47 U.S.C. 154, 303 and 307(e), unless otherwise noted

4. Section 87.5 is amended by adding in alphabetical sequence definitions of "AeroMACS," "Aircraft Detection Lighting System," "Enhanced Flight Vision System," and "1090 Extended Squitter (1090ES)" 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.

* * * * *

Aircraft Detection Lighting System. An Aircraft Detection Lighting System (ADLS) is a sensor-based system designed to detect aircraft as they approach an obstruction or group of obstructions; these systems automatically activate the appropriate obstruction lights until they are no longer needed by the aircraft. ADLS may include an optional voice/audio feature that transmits a low-power, audible warning message to provide pilots additional information on the obstruction they are approaching. The ADLS operations are limited to locations where natural and man-made obstructions exist.

* * * * *

Enhanced Flight Vision System. Enhanced flight vision system (EFVS) means an installed aircraft system which uses an electronic means to provide a display of the forward external scene topography (the natural or manmade features of a place or region especially in a way to show their relative positions and elevation) through the use of imaging sensors, including but not limited to forward-looking infrared, millimeter wave radiometry, millimeter wave radar, or low-light level image intensification. An EFVS includes the display element, sensors, computers and power supplies, indications, and controls.

* * * * *

1090 Extended Squitter (1090ES). A radio datalink system authorized to operate on the frequency 1090 MHz to support Automatic Dependent Surveillance-Broadcast (ADS-B) Service and Traffic Information Services-Broadcast (TIS-B).

* * * * *

5. Section 87.107(d) is amended by revising paragraph (d) to read as follows:

§ 87.107 Station identification.

* * * * *

(d) Exempted station. The following types of stations are exempted from the use of a call sign: Airborne weather radar, radio altimeter, air traffic control transponder, distance measuring equipment, collision avoidance equipment, racon, radio relay radio-navigation land test station (MTF), automatically controlled aeronautical enroute stations, and enhanced flight vision systems.

* * * * *

6. Section 87.131 is amended by adding entries for "ADS-B UAT" and "ADS-B" at the beginning of the table to read as follows:

§ 87.131 Power and emissions.

Class of station	Frequency band/ frequency	Authorized emission(s)[9]	Maximum power[1]
ADS-B UAT	978 MHz	F1D	Various[11]
ADS-B	1090 MHz	M1D	Various[11]
* * *			

[1] The power is measured at the transmitter output terminals and the type of power is determined according to the emission designator as follows:

(i) Mean power (pY) for amplitude modulated emissions and transmitting both sidebands using unmodulated full carrier.

(ii) Peak envelope power (pX) for all emission designators other than those referred to in paragraph (i) of this note.

* * *

[9] Excludes automatic link establishment.

* * *

[11] Maximum power will be determined by appropriate standards during the certification process.

* * * * *

7. Section 87.133 is amended by adding paragraph (h) to read as follows:

§ 87.133 Frequency stability.

* * *

* *(h) For ADS-B Universal Access Transmitters operating on the frequency 978 MHz, the frequency stability is 20 parts per million. For ADS-B transmitters operating on 1090 MHz, the frequency stability is ± 1 MHz.

* * * * *

8. Section 87.147 is amended by revising paragraph (d) introductory paragraph to read as follows and revising paragraph (d)(3) by adding an entry for "92 GHz to 95.5 GHz" at the end of the list of frequency bands.

§ 87.147 Authorization of equipment.

* * * * *

(d) An application for certification of equipment intended for transmission in any of the frequency bands listed in paragraph (d)(3) of this section must notify the FAA of the filing of a certification application. The letter of notification must be mailed to: Federal Aviation Administration, Orville Wright Building, Spectrum Engineering Services Group, AJW-1C, 800 Independence Ave., SW., Washington, DC 20591 prior to the filing of the application with the Commission.

* * * * *

9. Section 87.171 is amended by removing from the list of *Symbol and class of station* the entry for "AVW—Audio visual warning systems" and inserting at the beginning of the list entries for "ADL—Aircraft Detection Lighting Systems" and "AMC—AeroMACS."

10. Section 87.173 is amended by revising the table in paragraph (b) by replacing "AVW" with "ADL" under Class of station in the entries for 122.700 MHz, 122.725 MHz, 122.750 MHz, 122.800 MHz, 122.850 MHz, 122.900 MHz, 122.950 MHz, 122.975 MHz, 123.000 MHz, 123.025 MHz, 123.050 MHz, 123.075 MHz, 123.300 MHz, and 123.500 MHz; by adding in sequence an entry for 92000-95500 MHz; and by revising the entries for 121.600-121.925 MHz, 136.000-136.400 MHz, 136.425 MHz, 136.450 MHz, 136.475 MHz, 978.000 MHz, and 1090.000 MHz to read as follows:

§ 87.173 Frequencies.

* * * * *

Frequency or frequency band	Subpart	Class of station	Remarks
* * *	* * *	* * *	* * *
121.600-121.925 MHz …….	O, L, Q…	MA, FAC, MOU, MRT, RLT, GCO, RCO, RPC	25 kHz channel spacing.
* * *	* * *	* * *	* * *
136.000-136.475 MHz……	I, O, S…	MA, FAC, FAE, FAW, GCO, RCO, RPC	Air traffic control operations; aeronautical operational communications; 25 kHz channel spacing.
* * *			
978.000 MHz…….	F, L, Q….	MA, MOU, UAT…….	Universal Access Transceivers.
* * *			
1090.000 MHz…….	T……	AMC…….	Vehicle Squitter, 1090ES
5000-5030 MHz……	T……	AMC……..	AeroMACS
5091-5150 MHz…….			AeroMACS
* * *			
92000-95500 MHz……..	F……..	MA……	Aeronautical radionavigation
* * *			

* * * * *

11. Section 87.187 is amended by adding paragraphs (ii) and (jj) to read as follows:

§ 87.187 Frequencies.

* * * * *

(ii) The frequency 1090 MHz is authorized for 1090ES data transmission.

(jj) The frequency band 92-95.5 GHz is available for use by air carrier and private aircraft stations for aeronautical radionavigation (EFVS airborne radars).

* * * * *

12. Section 87.215 is amended by revising paragraph (c) to read as follows:

§ 87.215 Supplemental eligibility.

* * * * *

(c) At an airport with a published common traffic advisory frequency where only one unicom may be licensed, eligibility for new unicom licenses is restricted to State or local government entities, and to nongovernmental organizations (NGOs) that are authorized to apply for the license by a State or local government entity whose primary mission is the provision of public safety services. All applications submitted by NGOs must be accompanied by a new, written certification of support (for the NGO applicant to operate the applied for station) by the state or local government entity. Applications for a unicom license at the same airport, where only one unicom may be licensed, that are filed by two or more applicants meeting these eligibility criteria must be resolved through settlement or technical amendment.

* * * * *

13. Section 87.217 is amended by revising paragraph (a)(1) to read as follows:

§ 87.217 Frequencies.

a) * * *

1) 122.950 MHz at airports which have a control tower or FAA flight service station that operates at all times when the airport is used by aircraft for takeoff or landing.

* * * * *

14. Section 87.263 is amended by revising paragraph (a)(1) to read as follows:

§ 87.263 Frequencies.

(a) *Domestic VHF service.* (1) Frequencies in the 128.8125-132.125 MHz and 136.000-137.000 MHz bands are available to serve domestic routes, except that the frequency 136.750 MHz is available only to aeronautical enroute stations located at least 288 kilometers (180 miles) from the Gulf of Mexico shoreline (outside the Gulf of Mexico region). The frequencies 136.900 MHz, 136.925 MHz, 136.950 MHz, and 136.975 MHz are available to serve domestic and international routes. Frequency assignments may be based on either 8.33 kHz or 25 kHz spacing. Frequencies in the 136.000-137.000 MHz band are available to provide air traffic control (ATC) and aeronautical operational control (AOC) service for data link communication. When frequencies are shared for ATC and AOC for data link communications in the 136.000-137.000 MHz band, the specific frequencies and traffic sharing methodology must be agreed upon with the FAA. Use of these frequencies must be compatible with existing operations and must be in accordance with pertinent international treaties and agreements.

* * * * *

15. Section 87.345 is amended by revising the introductory paragraph and paragraph (a) to read as follows:

§ 87.345 Scope of service.

Aeronautical utility mobile stations provide communications for vehicles that are authorized to operate on an airport movement area. An airport movement area is defined as the runways, taxiways and other areas utilized for taxiing, takeoff and landing of aircraft, exclusive of loading ramp and parking areas. Aeronautical utility mobile stations operating on frequency 978 MHz or 1090 MHz also may transmit at a designated vehicle service area for system check out, or just prior to entering or just after exiting the airport movement area. Transmissions on 978 MHz by aeronautical utility mobile stations for Universal Access Transceiver service are authorized within all portions of the air operations area of the airport.

(a) An aeronautical utility mobile station must monitor its assigned frequency during periods of operation except for operations on frequencies 978 MHz and 1090 MHz.

* * * * *

16. Section 87.349 is amended by removing paragraph (e), renumbering paragraph (f) as paragraph (e), and revising the renumbered paragraphs (e) introductory paragraph, (e)(3), and (e)(5), and adding a new paragraph (f) to read as follows:

§ 87.349 Frequencies.

* * *

(e) The Commission will assign either frequency 978 MHz or frequency 1090 MHz for use by aeronautical utility mobile stations for ground vehicle identification and collision avoidance after coordination with the FAA, subject to the following conditions:

* * *

(3) No more than either two hundred 978 MHz or two hundred 1090 MHz aeronautical utility mobile stations will be authorized at one airport.

* * *

(5) Message transmission rates are limited as indicated in the table below:

ADS-B Message	Rate when moving	Rate when stationary
978 MHz:		
Surface Position Message…….	Once per second……	Once per second
Mode Status Message……	Every 4 to 5 seconds…	Every 4 to 5 seconds
1090 MHz:		
Surface Position Message (Types 5, 6, 7, 8)..	Every 0.4 to 0.6 seconds..	Every 4.8 to 5.2 seconds
Aircraft Operational Status (Type 31)……..	Every 4.8 to 5.2 seconds..	Every 4.8 to 5.2 seconds
Aircraft Identification and Type (Type 2)…..	Every 4.8 to 5.2 seconds..	Every 9.8 to 10.2 seconds

* * *

(f) The frequency 1090 MHz is authorized for 1090ES data transmission.

* * * * *

17. Section 87.475 is amended by adding paragraph (b)(15), and revising paragraph (c)(2) and the introductory text to paragraph (d) to read as follows:

§ 87.475 Frequencies.

* * * * *

(b) * * *

(15) The frequency 1090 MHz is authorized for 1090ES data transmission.

(c) * * *

(2) The frequencies available for assignment to radionavigation land test stations for the testing of airborne receiving equipment are 108.000 and 108.050 MHz for VHF omni-range; 108.100 and 108.150 MHz for localizer; 334.550 and 334.700 MHz for glide slope; 978 and 979 MHz (X channel)/1104 MHz (Y channel) for DME; 978 MHz for Universal Access Transceiver; 1030 MHz for air traffic control radar beacon transponders; 1090 MHz for Traffic Alert and Collision Avoidance Systems (TCAS) and for 1090 Extended Squitter (1090ES) data transmissions; and 5031.0 MHz for microwave landing systems. Additionally, the frequencies in paragraph (b) of this section may be assigned to radionavigation land test stations after coordination with the FAA. The following conditions apply after coordination with the FAA:

* * *

(d) *Frequencies available for ELT test stations.* The frequencies available for assignment to ELT test stations are 121.600, 121.650, 121.700, 121.750, 121.775, 121.800, 121.850, and 121.900 MHz. Licensees must:

* * *

* * * * *

18. Section 87.483 is amended by revising the section title, introductory paragraph, and paragraphs (a) and (b) introductory paragraph, and removing the introductory paragraph and paragraph (b)(3) to read as follows:

§ 87.483 Aircraft Detection Lighting Systems.

(a) Radiodetermination (radar) frequencies. Frequencies authorized under § 87.475(b)(8) of this chapter are available for use by an ADLS. The frequency coordination requirements in § 87.475(a) of this chapter apply.

(b) VHF audible warning frequencies. Frequencies authorized under § 87.187(j), § 87.217(a), § 87.241(b), and § 87.323(b) (excluding 121.950 MHz) of this chapter are available for use by an ADLS. Multiple frequencies may be authorized for an individual station, depending on need and the use of frequencies assigned in the vicinity of a proposed ADLS facility. Use of these frequencies is subject to the following limitations:

* * * * *

19. Part 87 is amended by adding new Subpart T to read as follows:

SUBPART T-AeroMACS

§ 87.601 Scope of service.

AeroMACS supports wireless broadband communications connectivity for safety and regularity of flight to fixed, base and mobile stations in the airport surface. Applications fall into three general categories: Air Traffic Services (ATS), including Air Traffic Control (ATC) and Air Traffic Management

(ATM); Aeronautical Operations Communications (AOC); and communications related to airport operations, safety, and security.

§ 87.602 Licensing.

(a) Eligibility for an AeroMACS base, fixed, or mobile station is limited to the owner or operator of an airport or to a person who has entered into a written agreement with the owner or operator for the right to operate and maintain the station.

(b) AeroMACS base and fixed stations may be installed where needed to provide adequate service to the airport being served. Mobile stations will be licensed for an area of operation defined by a radius around a geographic point that encompasses the airport property.

(c) Aircraft stations are authorized pursuant to § 87.18 of this chapter.

§ 87.603 Channel plan.

The frequencies listed below are available for AeroMACS operation. Channel spacing is 5 megahertz without a guardband between adjacent channels. AeroMACS shall operate in time division duplex (TDD) mode.

Lower AeroMACS Band (5000-5030 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 Band (5091-5150 MHz)	
Channel Number	Channel Center Frequency
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

§ 87.604 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.

§ 87.605 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 (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 (percent of (BW)/55) dB.

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

(d) on any frequency removed from the assigned frequency beyond 150 percent of the authorized bandwidth: 50 dB or 55+10log(P) dB, whichever is the lesser attenuation.

§ 87.606 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
30 MHz < f < 1 GHz	100 kHz	-36 dBm
1 GHz < f < 12.75 GHz	30 kHz if 2.5xBW < = absolute value of (f_c-f) < 10xBW	-30 dBm

1 GHz < f < 12.75 GHz	300 kHz if 10xBW < = absolute value of (f_c-f) < 12xBW	-30 dBm
1 GHz < f < 12.75 GHz	1 MHz if 12xBW < = absolute value of (f_c-f)	-30 dBm
Note: f_c denotes the center frequency and f denotes the frequency of the spurious emission. BW is 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
30 MHz < f < 1 GHz	100 kHz	-57 dBm
1 GHz < f < 12.75 GHz	1 MHz	-47 dBm

APPENDIX B

Initial Regulatory Flexibility Analysis

1. As required by the Regulatory Flexibility Act (RFA),[1] the Commission has prepared this present Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on a substantial number of small entities by the policies and rules proposed in the *Notice of Proposed Rulemaking* (*Notice*). Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments provided in this *Notice*. The Commission will send a copy of the *Notice*, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA).[2] In addition, the *Notice* and IRFA (or summaries thereof) will be published in the Federal Register.[3]

A. Need for, and Objectives of, the Proposed Rules

2. In the *Notice*, the Commission seeks comment on rule amendments that are intended to enhance aviation safety, accommodate new aviation radio services and technologies, and promote the efficient use of aviation radio spectrum. We propose to allocate spectrum and establish service rules for an Enhanced Flight Vision System (EFVS) to improve pilots' ability to detect and avoid objects in degraded visual environments. We invite comment on whether we should amend our part 87 rules to mandate that aeronautical mobile (route) service systems operating in the 108-117.975 and 960-1164 MHz bands meet FM broadcasting immunity requirements and other requirements adopted by the International Telecommunication Union (ITU), and propose to authorize use of the frequency 1090 MHz for Automated Dependent Surveillance – Broadcast (ADS-B) service. We propose to clarify certain rules regarding license eligibility and assignable frequencies for aeronautical advisory (unicom) stations. We propose to establish service rules for non-Federal use of the Aeronautical Mobile Airport Communications System (AeroMACS), a globally standardized broadband network for use at airports by the aviation industry in the 5000-5030 MHz and 5091-5150 MHz bands. We propose to permit use of the 136.000-136.4875 MHz band for aeronautical operational control communications as well as the already-permitted air traffic control communications as an accommodation for NextGen data transmissions. We propose to establish service rules for new obstacle avoidance technologies. We propose to adopt rules allowing more flexible use of vehicle squitters, which are aeronautical utility mobile stations designed to reduce accidents on airport runways and other airport movement areas. Finally, we propose to add 121.775 MHz to the list of frequencies available for testing of Emergency Locator Transmitters (ELTs).

B. Legal Basis

3. in the proposed action is authorized pursuant to sections 4(i), 301, 302a, 303(r), 307(e), 308, 309, 332(a)(2), 336, 356, and 384 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 301, 302a, 303(r), 307(e), 308, 309, 332(a)(2), 336, 356, and 384.

C. Description and Estimate of the Number of Small Entities to Which the Proposed Rules Will Apply

4. The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.[4] The RFA defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and

[1] *See* 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. §§ 601-612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[2] *See* 5 U.S.C. § 603(a).

[3] *See id*.

[4] 5 U.S.C. § 603(b)(3).

"small governmental jurisdiction."[5] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[6] A small business concern is one which (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA).[7]

5. *Small Businesses, Small Organizations, Small Governmental Jurisdictions*. Our actions, over time, may affect small entities that are not easily categorized at present. We therefore describe here, at the outset, three broad groups of small entities that could be directly affected herein.[8] First, while there are industry specific size standards for small businesses that are used in the regulatory flexibility analysis, according to data from the SBA's Office of Advocacy, in general a small business is an independent business having fewer than 500 employees.[9] These types of small businesses represent 99.9% of all businesses in the United States which translates to 28.8 million businesses.[10]

6. Next, the type of small entity described as a "small organization" is generally "any not-for-profit enterprise which is independently owned and operated and is not dominant in its field."[11] Nationwide, as of August 2016, there were approximately 356,494 small organizations based on registration and tax data filed by nonprofits with the Internal Revenue Service (IRS).[12]

7. Finally, the small entity described as a "small governmental jurisdiction" is defined generally as "governments of cities, counties, towns, townships, villages, school districts, or special districts, with a population of less than fifty thousand."[13] U.S. Census Bureau data from the 2012 Census of Governments[14] indicate that there were 90,056 local governmental jurisdictions consisting of general purpose governments and special purpose governments in the United States.[15] Of this number there were 37, 132 General purpose governments (county[16], municipal and town or township[17]) with populations of less than 50,000 and 12,184 Special purpose governments (independent school districts[18] and special districts[19]) with populations of less than 50,000. The 2012 U.S. Census Bureau data for most types of governments in the local government category show that the majority of these governments have

[5] 5 U.S.C. § 601(6).

[6] 5 U.S.C. § 601(3) (incorporating by reference the definition of "small business concern" in 15 U.S.C. § 632). Pursuant to the RFA, the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register." 5 U.S.C. § 601(3).

[7] Small Business Act, 15 U.S.C. § 632 (1996).

[8] *See* 5 U.S.C. § 601(3)-(6).

[9] *See* SBA, Office of Advocacy, "Frequently Asked Questions, Question 1 – What is a small business?" https://www.sba.gov/sites/default/files/advocacy/SB-FAQ-2016_WEB.pdf (June 2016)

[10] *See* SBA, Office of Advocacy, "Frequently Asked Questions, Question 2- How many small businesses are there in the U.S.?" https://www.sba.gov/sites/default/files/advocacy/SB-FAQ-2016_WEB.pdf (June 2016).

[11] 5 U.S.C. § 601(4).

[12] Data from the Urban Institute, National Center for Charitable Statistics (NCCS) reporting on nonprofit organizations registered with the IRS was used to estimate the number of small organizations. Reports generated using the NCCS online database indicated that as of August 2016 there were 356,494 registered nonprofits with total revenues of less than $100,000. Of this number, 326,897 entities filed tax returns with 65,113 registered nonprofits reporting total revenues of $50,000 or less on the IRS Form 990-N for Small Exempt Organizations and 261,784 nonprofits reporting total revenues of $100,000 or less on some other version of the IRS Form 990 within 24 months of the August 2016 data release date. *See* http://nccs.urban.org/sites/all/nccs-archive/html//tablewiz/tw.php where the report showing this data can be generated by selecting the following data fields: Report: "The Number and

populations of less than 50,000.[20] Based on this data we estimate that at least 49,316 local government jurisdictions fall in the category of "small governmental jurisdictions."[21]

8. *Air Traffic Control.* This industry comprises establishments primarily engaged in providing air traffic control services to regulate the flow of air traffic.[22] The SBA has developed a small business size standard for the Air Traffic Control industry which consists of all such firms with annual receipts of $32.5 million or less.[23] For this category, U.S. Census Bureau data for 2012 shows that there were 8 firms that operated for the entire year.[24] Of those firms, a total of 5 firms had annual receipts less than $25 million and 3 firms had annual receipts of $50 million or more.[25] Based on this data, the Commission estimates the majority of firms in this industry can be considered small.

9. *Aviation and Marine Radio Services.* Small businesses in the aviation and marine radio services use a very high frequency (VHF) marine or aircraft radio, and, as appropriate, a type of emergency position indicating radio beacon (EPIRB) and/or radar, and/or any type of emergency locator transmitter (ELT). The Commission has not developed a definition of small entities specifically applicable to these small businesses. The closest applicable SBA size standard is for Wireless Telecommunications Carriers (except Satellite)," which is an entity employing 1,500 or fewer employees.[26] U.S. Census Bureau data for 2012 shows that there were 967 firms in that category that operated for the entire year.[27] Of those 967, 955 had fewer than 1,000 employees, and 12 firms had 1,000 or more employees. Thus under this category and the associated small business size standard, the majority of firms can be considered small. Most applicants for recreational licenses are individuals. Approximately 581,000 ship station licensees and 131,000 aircraft station licensees operate domestically and are not subject to the radio carriage requirements of any statute or treaty. For purposes of our evaluations in this analysis, we estimate that there are up to approximately 712,000 licensees that are small businesses (or individuals) under the SBA standard.

10. *Aviation Radio Equipment Manufacturers*. Neither the Commission nor the SBA has adopted a size standard for small businesses specific to aviation radio equipment manufacturers. The

(Continued from previous page)
Finances of All Registered 501(c) Nonprofits"; Show: "Registered Nonprofits"; By: "Total Revenue Level (years 1995, Aug to 2016, Aug)"; and For: "2016, Aug" then selecting "Show Results".

[13] 5 U.S.C. § 601(5).

[14] *See* 13 U.S.C. § 161. The Census of Government is conducted every five (5) years compiling data for years ending with "2" and "7". *See also* Program Description Census of Government *https://factfinder.census.gov/faces/affhelp/jsf/pages/metadata.xhtml?lang=en&type=program&id=program.en.COG#*.

[15] *See* U.S. Census Bureau, 2012 Census of Governments, Local Governments by Type and State: 2012 - United States-States. https://factfinder.census.gov/bkmk/table/1.0/en/COG/2012/ORG02.US01. Local governmental jurisdictions are classified in two categories - General purpose governments (county, municipal and town or township) and Special purpose governments (special districts and independent school districts).

[16] *See* U.S. Census Bureau, 2012 Census of Governments, County Governments by Population-Size Group and State: 2012 - United States-States. https://factfinder.census.gov/bkmk/table/1.0/en/COG/2012/ORG06.US01. There were 2,114 county governments with populations less than 50,000.

[17] *See* U.S. Census Bureau, 2012 Census of Governments, Subcounty General-Purpose Governments by Population-Size Group and State: 2012 - United States – States. https://factfinder.census.gov/bkmk/table/1.0/en/COG/2012/ORG07.US01. There were 18,811 municipal and 16,207 town and township governments with populations less than 50,000.

[18] *See* U.S. Census Bureau, 2012 Census of Governments, Elementary and Secondary School Systems by Enrollment-Size Group and State: 2012 - United States-States. https://factfinder.census.gov/bkmk/table/1.0/en/COG/2012/ORG11.US01. There were 12,184 independent school districts with enrollment populations less than 50,000.

closest applicable SBA size standard is for Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing, which is an entity employing 1,250 or fewer employees.[28] U.S. Census Bureau data for 2012 show that there were a total of 841 establishments in this category that operated that year.[29] Of this total, 828 had fewer than 1,000 employees and 13 had 1,000 or more employees.[30] Thus, under this size standard, the majority of firms in this industry can be considered small.

11. *Other Airport Operations.* This industry comprises establishments primarily engaged in (1) operating international, national, or civil airports, or public flying fields or (2) supporting airport operations, such as rental of hangar space, and providing baggage handling and/or cargo handling services.[31] The SBA has developed a small business size standard for the "Other Airport Operations" which consists of all such firms with annual receipts of $32.5 million or less.[32] For this category, U.S. Census Bureau data for 2012 show that there were 1,096 firms that operated for the entire year.[33] Of those firms, a total of 1,052 had annual receipts less than $25 million and 18 firms had annual receipts of $25 million to $49, 999,999.[34] Thus, the Commission estimates that the majority of firms in this industry can be considered small.

12. *Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing.* This U.S. industry comprises establishments primarily engaged in manufacturing search, detection, navigation, guidance, aeronautical, and nautical systems and instruments. Examples of products made by these establishments are aircraft instruments (except engine), flight recorders, navigational instruments and systems, radar systems and equipment, and sonar systems and equipment.[35] The SBA has established a size standard for this industry 1,250 or fewer employees.[36] U.S. Census Bureau data for 2012 show that 588 establishments operated in this industry in that year.[37] Of that number, 557 establishments operated with fewer than 1,000 employees, 21 establishments operated with between 1,000 and 2,499 employees and 10 establishments operated with 2,500 or more employees.[38] Based on this data, we conclude that a majority of manufacturers in this industry are small.

(Continued from previous page)

[19] *See* U.S. Census Bureau, 2012 Census of Governments, Special District Governments by Function and State: 2012 - United States-States. https://factfinder.census.gov/bkmk/table/1.0/en/COG/2012/ORG09.US01. The U.S. Census Bureau data did not provide a population breakout for special district governments.

[20] *See* U.S. Census Bureau, 2012 Census of Governments, County Governments by Population-Size Group and State: 2012 - United States-States - https://factfinder.census.gov/bkmk/table/1.0/en/COG/2012/ORG06.US01; Subcounty General-Purpose Governments by Population-Size Group and State: 2012 - United States–States - https://factfinder.census.gov/bkmk/table/1.0/en/COG/2012/ORG07.US01; and Elementary and Secondary School Systems by Enrollment-Size Group and State: 2012 - United States-States. https://factfinder.census.gov/bkmk/table/1.0/en/COG/2012/ORG11.US01. While U.S. Census Bureau data did not provide a population breakout for special district governments, if the population of less than 50,000 for this category of local government is consistent with the other types of local governments the majority of the 38, 266 special district governments have populations of less than 50,000.

[21] *Id.*

[22] *See*, U.S. Census Bureau, 2012 NAICS Definitions, "488111 Air Traffic Control", https://factfinder.census.gov/faces/affhelp/jsf/pages/metadata.xhtml?lang=en&type=ib&id=ib.en./ECN.NAICS2012.488111#.

[23] *See* 13 CFR § 121.201, NAICS code 488111.

[24] U.S. Census Bureau, *2012 Economic Census of the United States*, Table EC1248SSSZ4, Transportation and Warehousing: Subject Series - Estab & Firm Size: Summary Statistics by Revenue Size of Firms for the U.S.: 2012, NAICS code 488111, https://factfinder.census.gov/bkmk/table/1.0/en/ECN/2012_US/48SSSZ4//naics~488111.

[25] *Id.*

[26] 13 CFR § 121.201, NAICS code 517210.

13. *Satellite Telecommunications.* This category comprises firms "primarily engaged in providing telecommunications services to other establishments in the telecommunications and broadcasting industries by forwarding and receiving communications signals via a system of satellites or reselling satellite telecommunications."[39] Satellite telecommunications service providers include satellite and earth station operators. The category has a small business size standard of $32.5 million or less in average annual receipts, under SBA rules.[40] For this category, U.S. Census Bureau data for 2012 show that there were a total of 333 firms that operated for the entire year.[41] Of this total, 299 firms had annual receipts of less than $25 million.[42] Consequently, we estimate that the majority of satellite telecommunications providers are small entities.

D. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements

14. We expect the proposals in the Notice will impose new or additional reporting or recordkeeping and/or other compliance obligations on small entities For the most part, however, the

(Continued from previous page)

[27] U.S. Census Bureau, 2012 Economic Census, Sector 51, 2012 NAICS code 517210 (rel. Oct. 20, 2009), https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ5&prodType=table.

[28] 13 CFR § 121.201 NAICS code 334220.

[29] U.S. Census Bureau, *2012 Economic Census of the United States*, Table EC1231SG2, Manufacturing: Summary Series: General Summary: Industry Statistics for Subsectors and Industries by Employment Size: 2012, NAICS Code 334220, https://factfinder.census.gov/bkmk/table/1.0/en/ECN/2012_US/31SG2//naics~334220

[30] See http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk.

[31] *See*, U.S. Census Bureau, 2012 NAICS Definitions, "488119 Other Airport Operations", https://factfinder.census.gov/faces/affhelp/jsf/pages/metadata.xhtml?lang=en&type=ib&id=ib.en./ECN.NAICS2012.488119.

[32] *See* 13 CFR § 121.201, NAICS code 488119.

[33] U.S. Census Bureau, *2012 Economic Census of the United States*, Table EC1248SSSZ4, Transportation and Warehousing: Subject Series - Estab & Firm Size: Summary Statistics by Revenue Size of Firms for the U.S.: 2012, NAICS code 488119, https://factfinder.census.gov/bkmk/table/1.0/en/ECN/2012_US/48SSSZ4//naics~488119.

[34] *Id.*

[35] *See*, U.S. Census Bureau, 2012 NAICS Definitions, "334511 *Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing",* https://factfinder.census.gov/faces/affhelp/jsf/pages/metadata.xhtml?lang=en&type=ib&id=ib.en./ECN.NAICS2012.334511.

[36] 13 CFR § 121.201, NAICS Code 334511.

[37] U.S. Census Bureau, *2012 Economic Census of the United States*, Table EC1231SG2, Manufacturing: Summary Series: General Summary: Industry Statistics for Subsectors and Industries by Employment Size: 2012, NAICS Code 334511, https://factfinder.census.gov/bkmk/table/1.0/en/ECN/2012_US/31SG2//naics~334511.

[38] *Id*.

[39] U.S. Census Bureau, 2017 NAICS Definitions, "517410 Satellite Telecommunications"; https://www.census.gov/cgi-bin/sssd/naics/naicsrch?input=517410&search=2017+NAICS+Search&search=2017.

[40] 13 CFR § 121.201, NAICS code 517410.

[41] U.S. Census Bureau, *2012 Economic Census of the United States*, Table EC1251SSSZ4, Information: Subject Series - Estab and Firm Size: Receipts Size of Firms for the United States: 2012, NAICS code 517410 https://factfinder.census.gov/bkmk/table/1.0/en/ECN/2012_US/51SSSZ4//naics~517410.

[42] *Id*.

proposed rules will give the aviation community the opportunity to use new technologies that benefit aviation safety, such as AeroMACS, EFVS radar sensors, and the AVWS and ADLS obstruction avoidance technologies; modernize the rules to accommodate advancements in avionics, such as NextGen Data Comm equipment; and enhance user flexibility by easing restrictions on the use of spectrum in the 136.0-136.475 MHz band, allowing the power-up of vehicle squitters before they enter the airport movement area, and making an additional frequency available for ELT testing, .

15. The proposed rule requiring AeroMACS base stations to be individually licensed, rather than licensed by rule, coupled with the proposal to require license applicants to coordinate with the FAA and perhaps others before filing a license application with the Commission, could impose a burden on small entities and impact their costs of compliance due to the need to complete FCC Form 605 and pay any attendant filing fees. We believe, however, that the benefits of an individual licensing requirement, chiefly assurance that the Commission can effectively maintain regulatory oversight over AeroMACS operations in the interest of airport safety, outweigh any such burdens. In the *Notice*, we seek comment on this tentative determination and on the proposed new service rules for AeroMACS.. We also seek comment on whether our proposed eligibility rules for AeroMACS licensing would have an adverse impact. The proposed rule would confine AeroMACs eligibility to airport owners and operators, airline carriers, aircraft plots, ramp operators, aeronautical communications network providers, emergency service, snow removal, and deicing entities and other entities that engage in airport communications relating to safety and regularity of flight.

16. Our proposed rule to authorize EFVS operations in the 92-95.5 GHz frequency range, which will increase airport approach and arrival access, should not impose any burdens on EFVS users. We seek comment, however, on our proposals associated with allowing EFVS operations in the 92-95.5 GHz band, such as whether there are any existing operations in the 90 GHz band that might be adversely affected by EFVS operations, either through harmful interference or for other reasons; the costs and benefits associated with such proposals; and whether any other rule changes are necessary.

17. We have also invited comment on whether we should adopt rules in part 87 to require that aeronautical mobile (route) service systems in the 108-117.975 MHz and 960-1164 MHz bands meet FM broadcasting immunity requirements and other standards adopted by the Convention on International Civil Aviation. We further sought comment on whether codification in part 87 is necessary or warranted given that affected entities should already be subject to such requirements because the requirements are imposed by existing international agreements and/or are codified as notes in the Commission's part 2 Table of Frequency Allocations. Relatedly, we sought comment on a proposal to establish rules for the use of the frequency 1090 MHz for Automatic Dependent Surveillance—Broadcast (ADS-B) service, but also sought comment on whether such rules are necessary given that the part 87 rules already permit airborne electronic aids to air navigation such as ADS-B for aircraft in the 960-1215 MHz band

18. At this time, the Commission is not currently in a position to determine whether our proposals if adopted, will require small entities to hire attorneys, engineers, consultants, or other professionals and cannot quantify the cost of compliance with the potential rule changes discussed herein. We do not believe however, that the costs and/or administrative burdens associated with any of the proposal rule changes will unduly burden small entities. In the discussions of our proposals in the *Notice*, we have sought comments from the parties in the proceeding, including cost and benefit analyses, which may help the Commission identify and evaluate other relevant matters, including any compliance costs and burdens on small entities that may result from the proposed rules.

E. Steps Taken to Minimize the Significant Economic Impact on Small Entities, and Significant Alternatives Considered

19. The RFA requires an agency to describe any significant, specifically small business, alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives, among others: (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; (3) the use of performance, rather than design standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.[43]

20. In this proceeding the Commission seeks to update our Part 87 Aviation Radio Service rules to improve aviation safety, increase efficiency, and reflect advances in avionics technology. The proposed rules will give small entities and others in the aviation community the use of new and safer technologies, and will remove certain restrictions and requirements providing more operational flexibility. The removal of these restrictions and requirements will benefit small entities by reducing their administrative costs to comply with our Part 87 rules. The Commission also seeks to create consistency and harmony with relevant Federal Aviation Administration (FAA) requirements and international standards and requirements, and has sought comments on steps taken to meet this objective. For example, with regard to Aircraft Detection Lighting Systems, the FAA's 2015 Advisory Circular contains performance standards that are not addressed in our rules and potentially conflicts with our rules. To address this matter, we propose to amend our rules to reflect FAA terminology and remove the provisions that conflict with the FAA's Advisory Circular and seek comment on this proposal.

21. The Commission believes that applying the proposed Part 87 rules equally to all entities is necessary to carry out its objectives to improve spectrum efficiency and protect the safety of life and property in air navigation. However, to assist the Commission's evaluation of the economic impact on small entities as a result of actions that have been proposed in the *Notice*, and to better explore options and alternatives, the Commission has sought comment on its proposals from the parties. The Commission expects to more fully consider and evaluate the economic impact and alternatives for small entities following the review of comments filed in response to the *Notice* before it adopts final rules.

F. Federal Rules that May Duplicate, Overlap, or Conflict with the Proposed Rules

22. None.

[43] *See* 5 U.S.C. § 603(c).

STATEMENT OF
CHAIRMAN AJIT PAI

Re: *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

This summer, I'll join millions of Americans in boarding an airplane to reach my destination. Some might take for granted that flights will be safe. But not me—in part because I know a lot of work goes into ensuring that thousands of flights take-off and land smoothly in our country every single day.

A critical aspect of aviation safety is provided by wireless communications, and that's where the FCC comes in. The Commission's Aviation Radio Service uses dedicated spectrum for aviation communications. These services enable aircraft and ground services to coordinate important safety functions, like guiding aircraft take-off and landing, routing aircraft on the ground and in the air, helping pilots avoid obstacles, and contacting search and rescue authorities in the event of an accident.

I've often said that it's important for the Commission to update its rules to reflect current technological and marketplace realities. And that's certainly true when it comes to rules impacting aviation safety. We want our aviation system to benefit from cutting-edge technologies in order to ensure that Americans are safe, whether in the air or on the ground at an airport. So today, we kickstart the process to modernize our Aviation Radio Service rules to enable the use of today's state-of-the-art safety-enhancing technologies. For example, we propose to allocate spectrum and establish service rules for Enhanced Flight Vision System radar to enhance pilots' detection of objects in degraded visual environments, such as fog. Admittedly, many of the changes we propose are very technical and involve things like vehicle squitters, Automatic Dependent Surveillance-Broadcast, and unicom stations. They may not be familiar to the flying public, but they'll be appreciated nonetheless by everyone who'll spend time in the air in the years to come.

I look forward to reviewing the responses from our commenters and working with my colleagues and the Commission's talented staff on bringing this proceeding in for a landing. From the Wireless Telecommunications Bureau, I'd like to thank Stephen Buenzow, Jonathan Campbell, Linda Chang, Jennifer Flynn, Garnet Hanly, Stanislava Kimball, Tim Maguire, Charles Mathias, Roger Noel, John Schauble, Becky Schwartz, Blaise Scinto, Dana Shaffer, Jiaming Shang, Scot Stone, Cecilia Sulhoff, Suzanne Tetreault, Jeff Tobias, and Rebecca Williams; from the Enforcement Bureau, Charles Cooper, Shannon Lipp, Jeremy Marcus, and Elizabeth Mumaw; from the International Bureau, Karl Kensinger; from the Office of Communications Business Opportunities, Chana Wilkerson and Sanford Williams; from the Office of Economics and Analytics, Judith Dempsey, Catherine Matraves, Giulia McHenry, and Emily Talaga; from the Office of Engineering and Technology, Rashmi Doshi, Michael Ha, John Kennedy, Tom Mooring, Nicholas Oros, Aspasia Paroutsas, and Jamison Prime; from the Office of General Counsel, David Horowitz, Thomas Johnson, Douglas Klein, and Bill Richardson; and from the Public Safety and Homeland Security Bureau, David Furth.

STATEMENT OF
COMMISSIONER MICHAEL O'RIELLY

Re: *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

I will vote in favor of initiating a new proceeding to update our rules pertaining to aviation radio services, which facilitate the movement of aircraft in flight and on the ground. The interest in deploying state-of-the-art spectrum-based technologies, such as 5G, Wi-Fi 6, ATSC 3.0, and enormous NGSO constellations, does not end with our communications providers, but also permeates other U.S. industries seeking to increase productivity, efficiency, functionality, and safety. Most of us have been caught up in flight delays caused by various glitches, such as lagging flight route information or even brushes between planes and ground vehicles, so I am supportive of harnessing wireless solutions to reduce such incidents, not to mention more serious accidents.

While the frequencies that will support most of these new or expanded aviation systems were previously allocated and are already in use, the Notice proposes to allow Enhanced Flight Vision System radar in the 92 to 95.5 GHz range. It is expected, however, that this system will be able to co-exist with other users in the band. If, for some reason, this turns out not to be the case and they ultimately need protection, the Commission will need to take steps to ensure that the spectrum is efficiently used and does not lay fallow for years on end. We must make clear that we will not protect potential uses, even if well-intended, that do not come to fruition.

STATEMENT OF
COMMISSIONER BRENDAN CARR

Re: *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

The FAA's NextGen initiative aims to modernize air travel by incorporating new technology into aircraft, especially around in-flight communication. NextGen includes Performance Based Navigation, which takes advantage of GPS signals to route planes more efficiently, saving time and fuel. NextGen's Data Comm system allows pilots and air traffic controllers to communicate via text instead of by voice command, reducing the chance of misunderstandings and delays. And Automatic Dependent Surveillance-Broadcast, or ADS-B, transmits each aircraft's position, altitude, speed, and other information automatically so that traffic controllers and other aircraft can safely coordinate flight paths.

I learned more about this last technology from a pilot in Louisville's Police Department. Bryan Arnold is the chief of Louisville's police helicopter division, with more than 20 years of service. When I joined him for one of his patrols above the city, he showed me some of the advanced communication technologies that allow him to coordinate with other law enforcement on the ground.

With ADS-B, Bryan told me, air safety will be greatly improved by broadcasting, in real time, the exact position of every aircraft. But he also identified one way that this new technology could actually undermine public safety. Bryan noted that criminals can easily obtain this new location information and use it to determine when police helicopters, border patrol, or even military aircraft take off and then monitor their exact flight paths and operations. It is not difficult to imagine how criminals or foreign adversaries could take advantage of this new and easy access to location information to evade or undermine law enforcement activities, as well as national security. Indeed, the GAO issued a report last year that highlighted the security risks of openly transmitting flight and location data from DOD aircraft. It's information that anyone can obtain from a number of publicly-accessible websites.

Thankfully, the FAA is working on this issue. And time is of the essence, since all aircraft must comply with ADS-B by January 2020. I asked my colleagues to expand today's Notice to seek comment on the steps we can take, if any, to support the FAA's work to protect the security of law enforcement, public safety, and military operations as ADS-B comes online. And I want to thank my colleagues for agreeing to do so.

I look forward to reviewing the record as it develops on this issue. And I want to thank the Wireless Bureau for its work on this Notice. It has my support.

STATEMENT OF
COMMISSIONER JESSICA ROSENWORCEL

Re: *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

The legend of Amelia Earhart still captivates. She was responsible for so many aviation firsts. She was the first woman to fly solo across the Atlantic Ocean and the first person to fly solo from the Hawaiian Islands to the continental United States. But despite all this, she is best known for how she disappeared—while on a record-setting flight circumnavigating the globe, she vanished over the Pacific Ocean. The wreckage from her plane was never found.

There's something haunting about flights that disappear and there is something very human about our desire to do something about it. But that urge is not limited to the legend of Amelia Earhart, it burns with every new report of a downed plane. Like ten years ago, when an Air France flight was lost in the Atlantic Ocean or five years ago when Malaysia Airlines Flight 370 disappeared or more recently, when an Indian Air Force plane was lost for good somewhere over the Bay of Bengal.

In our always-on and connected world it seems impossible that we still lose track of flights. But the reality is that over international waters, air traffic controllers have no real-time knowledge of where planes are located. Instead, they rely on flight plans, radio contact with pilots, and a system called ACARS that provides something like text-message communications between planes and ground stations. But a jet cruising at 500 knots an hour that disappears between 15-minute communications intervals creates a potential search zone of roughly 65,637 miles. That's as big as the state of Florida. That's a lot of territory to cover.

To address this problem, the Federal Aviation Administration mandated that all United States aircraft must use a tracking system called Automatic Dependent Surveillance-Broadcast, or ADS-B. As a result, by 2021, aircraft will broadcast their Global Positioning System location each second. A network of ground stations across the country will collect this information and provide it to air traffic controllers.

This is good—but there is one big problem. Those ground receivers need to be within 172 miles of aircraft to catch any signal. That means flights far out over the ocean are still vulnerable because there is a knowledge gap between the planes and the air traffic controllers they cannot reach.

I think this agency can help—if we get creative. And creativity here comes from above, not below.

Let me explain. In 2015, following the disappearance of Malaysia Airlines Flight 370, countries around the world came together. At the World Radiocommunication Conference, they harmonized the 1087.7-1092.3 MHz band for something called space-based ADS-B. The idea is simple: when our ground stations drop off, satellites can pick up. New payloads on satellites can be designed to detect ADS-B signals wherever they are broadcast, whether over the ocean or on a mountain range, finally providing continuous tracking of aircraft anywhere on earth. In fact, some companies are already starting to test this idea.

Today's rulemaking features a range of ideas to modernize aviation radio, from allocating spectrum for Enhanced Flight Vision System radar to updating the audible alerts that pilots hear in the cockpit to enabling broadband communications to support airport operations and accommodate next-generation aviation systems. At my request, it now also includes a discussion about the possibilities for space-based ADS-B. I think they're big. So I want to thank my colleagues for agreeing to this discussion. Likewise, I want to thank the Chairman for agreeing to my request to start a proceeding within six months to implement the WRC outcome from 2015. I hope that by doing so we can make mysterious flight disappearances a thing of the past.

STATEMENT OF
COMMISSIONER GEOFFREY STARKS

Re: *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

Legend has it that the first American aviation radio communication took place before World War I, when two members of the Army's newly formed Air Service sent a signal from a plane-mounted transmitter to a ground-based receiver. Within a few years, pilots were talking to each other and the ground from the air, although Morse Code remained the primary means of aviation communication till World War II. And into the 1950s, air crews relied not on radios but on astronavigation to determine their position, using a sextant, a map, the sun, the moon and the stars.

The pilots of those days would be amazed at the communications and navigation tools available to modern aviators. Today, our technology not only provides reliable communications between and among aircraft and the ground, but also highly accurate navigation tools, weather updates, collision avoidance, automatic flight control, flight recording, and flight management services. We can even check our work e-mails from the air now – I'm sure we all appreciate that.

Today's NPRM represents another step forward in ensuring that America remains a leader in aviation communications. We propose several rule changes to enable the use of 21st Century systems that make flying safer, including computer systems that will produce images of terrain and obstacles when the weather conditions are too poor for the pilots to see. We also propose rules to harmonize FCC policies with those of the FAA regarding the ADS-B system, which automatically broadcasts GPS-derived data on an aircraft's location, velocity, altitude and heading to other ADS-B-equipped aircraft and ground stations. ADS-B will allow pilots to have the same ability to see other aircraft in the sky as air traffic controllers. It will also pinpoint hazardous weather and terrain, identify ground obstacles, and give pilots important flight information, such as temporary flight restrictions. Ultimately, ADS-B will increase the number of flights possible and permit aircraft to fly more directly from Point A to Point B, saving time and money and reducing fuel burn and emissions.

While these proposed changes are laudable, I recognize that several of these proposals involve expanded operations in spectrum bands that already have existing licensees or other users, including some that involve public safety. For example, as we propose rules for a new broadband system for airport surface operations, we also must ensure appropriate spectrum coordination to avoid interference to Federal users and flight test operations in the same band. Interference to these operations could lead to a catastrophic accident. I fully support the efficient use of spectrum, but I will be paying close attention to any interference-related concerns.

Things have changed a lot since the early 20th Century, but America remains a center of innovation in aviation communications and navigation. I'm proud that the FCC is doing its part to encourage such progress and I support this item.

Thank you to the Wireless Telecommunications Bureau for your work on this item.