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FEDERAL COMMUNICATIONS COMMISSION

47 CFR Parts 2 and 87

[WT Docket No. 19-140; RM-11793, RM-11799, RM-11818, RM-11832; FCC 19-53]

Promoting Aviation Safety

AGENCY: Federal Communications Commission.

ACTION: Proposed rule.

SUMMARY: In this document, the Federal Communications Commission (Commission or FCC) proposes changes to the 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.

DATES: Comments due by **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**. Reply comments due by **[INSERT DATE 90 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: You may submit comments, identified by WT Docket No. 19-140, by any of the following methods:

- Federal Communications Commission’s Web Site: <http://apps.fcc.gov/ecfs/>. Follow the instructions for submitting comments.
- People with Disabilities: Contact the FCC to request reasonable accommodations (accessible format documents, sign language interpreters, CART, etc.) by e-mail: FCC504@fcc.gov or phone: 202-418-0530 or TTY: 202-418-0432.

For detailed instructions for submitting comments and additional information on the rulemaking process, see the SUPPLEMENTARY INFORMATION section of this document..

FOR FURTHER INFORMATION CONTACT: Jeffrey Tobias, Jeff.Tobias@FCC.gov, Wireless Telecommunications Bureau, (202) 418-1617, or TTY (202) 418-7233.

SUPPLEMENTARY INFORMATION: This is a summary of the Commission’s Notice of Proposed

Rulemaking (*NPRM*) in WT Docket No. 19-140, FCC 19-53, adopted on June 6, 2019, and released on June 7, 2019. The full text of this document is available for inspection and copying during normal business hours in the FCC Reference Information Center, Portals II, 445 12th Street, SW, Washington, DC 20554. Alternative formats are available to persons with disabilities by sending an e-mail to fcc504@fcc.gov or by calling the Consumer & Governmental Affairs Bureau at 202-418-0530 (voice), 202-418-0432 (tty). To request materials in accessible formats for persons 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). The complete text is also available on the Commission's Web site at: www.fcc.gov.

Synopsis

1. 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.

2. *Enhanced Flight Vision Systems.* 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. 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.

3. The Commission tentatively concludes 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.

The Commission seeks comment on this tentative conclusion.

4. The FAA specifically identifies millimeter wave¹ radar as an acceptable type of Enhanced Flight Vision System imaging. 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. It maintains that millimeter wave radar is superior to existing technology using infrared camera sensors, which provide inadequate penetration in heavily degraded visual conditions. 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 lower penetration, while lower frequency bands require antennas that are too large to fit in an aircraft nose cone.²

5. The frequencies in the 92-95.5 GHz range are allocated for Federal and non-Federal use on a shared basis, and they mainly consist of shared co-primary allocations.³ In addition, Footnote US342 (of the Commission's Table of Frequency Allocations), 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.⁴ 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;⁵ (2) transmissions in the 92-95.5 GHz band are characterized by severe propagation losses; and (3) currently there are very few users of the band. The Commission seeks comment on these assertions, and specifically on whether

¹ *I.e.*, frequencies between 30 GHz and 300 GHz.

² The Commission's rules currently authorize no aircraft station operations above 33.4 GHz.

³ 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.

⁴ The footnote does not apply to the 94-94.1 GHz band.

⁵ FAA rules permit use of Enhanced Flight Vision Systems only below the Decision Altitude/Decision Height, which is the point at which the pilot must decide whether to continue the approach or initiate a missed approach.

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.⁶

6. Consequently, the Commission proposes to amend its rules to permit the use of the 92-95.5 GHz band for Enhanced Flight Vision System radar. It proposes to amend the Table of Allocations to add a Radionavigation Service allocation to the 92-95 GHz band. It also proposes 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,⁷ defining Enhanced Flight Vision System,⁸ and exempting Enhanced Flight Vision Systems from the station identification requirement in section 87.107. The Commission seeks comment on these proposals, and on their costs and benefits. The Commission also asks 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.

7. *Audio Visual Warning Systems.* In 2013, the Commission adopted rules for audio visual warning systems, which are 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. 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 (108-136.975 MHz). 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”). The Commission concluded that authorizing audio visual warning system stations

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.

⁶ 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.

⁷ The Commission also takes 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.

⁸ The Commission proposes 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

would serve the public interest by helping aircraft avoid potential collisions with antenna structures and other obstacles. 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. 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.

8. In 2015, the FAA updated its Advisory Circular regarding obstruction marking and lighting to include requirements for Aircraft Detection Lighting Systems, 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.” The Advisory Circular imposes performance standards for aspects of Aircraft Detection Lighting Systems that are not addressed in the Commission’s rules, such as the volume of airspace in which aircraft must be detected and the period for which the obstruction lights must remain illuminated. The FAA will not approve Aircraft Detection Lighting System installations that do not comply with the Advisory Circular.

9. 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. Specifically, the audible warning must be activated when an aircraft is within one-half nautical mile horizontally and 500 feet vertically of the obstruction. It is repeated three times or until the system determines that the aircraft is no longer within that area. The Commission notes that the FAA’s requirements may conflict with the permissible duty cycle in the Commission’s Rules 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.

10. The Commission proposes to amend its rules to address the Advisory Circular and to

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.”

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. It proposes to amend its rules to use the FAA's terminology and to remove the duty cycle limits that conflict with the Advisory Circular. The Commission seeks comment on whether the proposed relaxation of the duty cycle limits would pose a significantly greater risk of interference to other communications.

11. The Commission proposes to codify in its rules these Advisory Circular standards related to the audible warning and tentatively concludes that additional codification is unnecessary. The Commission does not propose any changes to its rules regarding permissible frequencies or the technical parameters for the audible warning that do not conflict with the Advisory Circular. It tentatively concludes that such rule changes are unnecessary because they would simply duplicate the FAA requirements and would necessitate further revision of the Commission's rules if those requirements change. The Commission seeks comment on these proposals.

12. The Commission also seeks comment on whether any changes to its 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.

13. *Aeronautical Mobile (Route) Service Systems in the 108-117.975 MHz and 960-1164 MHz Bands.* In 2015, the Commission allocated the 108-117.975 MHz and 960-1164 MHz bands to the Aeronautical Mobile (Route) Service⁹ 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

⁹ 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. It is a subset of the Aeronautical Mobile Service.

to the FM radio band without interference from broadcast operations.¹⁰ 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.

14. The Commission's *WRC-07 Report and Order* amended the section 2.106 Table of Frequency Allocations but did not adopt corresponding service rules. The Commission now seeks comment on whether those amendments are sufficient to codify the relevant ITU decisions in the Commission's rules, or whether it 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, 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.¹¹ 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, the Commission seeks comment on whether it should implement any form of grandfathering protection or transition provisions, should it adopt such rules.

15. Automatic Dependent Surveillance-Broadcast (ADS-B) is a key component of NextGen. 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. After January 1, 2020, virtually all aircraft must be able to transmit ADS-B information (ADS-B Out) to fly in most controlled airspace.¹² For aircraft that operate

¹⁰ Specifically, Aeronautical Mobile (Route) Service systems must meet the requirements in Annex 10 to the Convention on International Civil Aviation, including FM broadcasting immunity.

¹¹ Ground-Based Augmentation Systems stations are ground-based differential Global Positioning System transmitters.

¹² 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,

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.

16. In 2006, the Commission adopted technical and operational rules for ADS-B transmissions on 978 MHz using Universal Access Transceiver (UAT) technology.¹³ While the Commission authorized the use of the frequency 1090 MHz by aeronautical utility mobile stations used for airport surface detection in 2013, it has not adopted technical and operational rules specifically for airborne ADS-B transmissions on 1090 MHz. The Commission believes 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. It proposes such rules below, but also seeks 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.

17. The Commission proposes 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. The Commission proposes similar requirements for UATs operating on 978 MHz to ensure their compatibility and interoperability in the ADS-B service. It seeks 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 the Commission 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, the Commission proposes separate power, emission, and frequency tolerance and other technical

including balloons and gliders.” 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.”

¹³ 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).”

requirements for ADS-B equipment operating on 978 MHz and 1090 MHz. It asks 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. It invites comment on all aspects of this proposal. For example, it notes 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. 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. 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.

18. *Aeronautical Advisory (Unicom) Stations.* Unicom stations provide safety-related and other information to aircraft, primarily general aviation aircraft. Unicom stations provide information concerning flying conditions, weather, availability of ground services, and other information to promote the safe and expeditious operation of aircraft.¹⁴ The Commission proposes two clarifications of the unicom rules to reduce confusion among licensees and applicants. It seeks comment on these proposed rule changes and on their costs and benefits.

19. 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.¹⁵

¹⁴ 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. They must provide impartial information concerning available ground services, and must provide service to any aircraft station upon request and without discrimination.

¹⁵ 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. 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. A flight service station is part of a network of stations

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.¹⁶ The Commission proposes to 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. The Commission did not appear to have considered such airports¹⁷ when it adopted the requirement, and it sees no reason now to apply it to the owner or operator of a private airfield or helipad.

20. Only one frequency is assigned to an airport for unicom communications, regardless of how many unicom stations serve that airport.¹⁸ 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. “Full-time,” in this context, means 24-hour operation.¹⁹ The Commission proposes 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” 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. The Commission invites 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

providing weather briefings and information on flight facilities and monitoring the navigational radio net. 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.

¹⁶ The Commission enacted this eligibility restriction in 2003 to replace the hearing process for choosing among mutually exclusive unicom applicants at an uncontrolled airport. (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.)

¹⁷ 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. The Commission’s rules regarding unicom stations do not distinguish between public-use and private airports.

¹⁸ 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 unicom stations serving that airport.

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)? The Commission also seeks comment on the costs and benefits of expanding the use of frequency 122.950 MHz by unicom stations.

21. *Air Traffic Control and Aeronautical Operational Control Communications in the 136-137 MHz Band.* The Commission’s 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.” They are intended to ensure the adequate separation of aircraft and include aircraft routing information and departure/landing clearances. 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. 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;” 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).

22. NextGen’s Data Communications (Data Comm) component will permit certain repetitive and routine communications transmitted to aircraft to be shifted from voice to data transmission. 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, an advanced digital protocol for aeronautical safety communications traffic.

23. 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

¹⁹ 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.

air traffic control communications as well as aeronautical operational control communications in the upper 136 MHz band. The Division did not address the lower portion of the band.

24. In 2018, Aviation Spectrum Resources, Inc.²⁰ 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.²¹ 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. This allows aircraft to exchange communications with aeronautical enroute service stations using a single avionics terminal aboard the aircraft.²² 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 needs of the aviation industry and ensure the safe operation and navigation of our nation’s aircraft,” and that implementation of Data Comm will yield significant gains in operational efficiency and reduce flight delays.²³ The Commission tentatively concludes 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. It seeks comment on this tentative conclusion.

25. The Commission proposes 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, it proposes 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

²⁰ 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).

²¹ The ASRI Petition was placed on public notice on October 18, 2018. Commenters unanimously support the petition.

²² 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.

²³ 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.

control communications may be transmitted over the entire band. The Commission also proposes 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.²⁴ The Commission seeks comment on these proposed rule changes and on their costs and benefits. It requests that commenters be as detailed as possible in providing estimates of the costs and benefits to various stakeholders. The Commission also invites 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. It encourages 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.

26. *Aeronautical Mobile Airport Communications Systems.* 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. 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. 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. AeroMACS trials are being

²⁴ 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.

conducted in the United States and abroad.²⁵

27. The Commission allocated the 5091-5150 MHz band for Federal and non-Federal AeroMACS use on a co-primary basis in 2015²⁶ and it allocated the 5000-5030 MHz band for such use in 2017,²⁷ 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. 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. 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 Resolution 418 (WRC-12) intended to ensure compatibility with other services. 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.” 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.²⁸

28. 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.²⁹ In addition, other users of the 5091-5150 MHz band raise interference concerns.

²⁵ Some foreign airlines already use AeroMACS equipment onboard.

²⁶ 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. In designating this band for AeroMACS use, the Commission implemented an international allocation made at the World Radiocommunication Conference held in 2007.

²⁷ 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.

²⁸ 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.

²⁹ The Wireless Telecommunications Bureau sought comment on the WiMAX Forum Petition on July 19, 2017.

29. *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, the Commission proposes to authorize AeroMACS operation under the existing aircraft station authorization, rather than to require a separate license. For other stations, the Commission proposes 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, the Commission believes that site-based licensing under part 87 is necessary. AeroMACS is a safety of life service that requires strict license eligibility requirements and individualized coordination of each transmitter to ensure no interference to other AeroMACS links. The Commission and any other interested party must be able to quickly identify licensees in the band, especially in cases of interference to critical safety-related air traffic control AeroMACS applications. The Commission seeks 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?

30. The Commission proposes 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. This may include airline carriers, aeronautical communications network providers or other third-party network access providers, and entities that perform airport services and engage in communications for the purpose of safety and regularity of flight (such as snow removal and deicing). The Commission seeks comment on this

proposal, and on whether to extend eligibility to other entities. It also seeks 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.

31. *Coordination and channel management.* The Commission proposes 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. The Commission already follow these procedures with respect to other airport operations. It believes that coordination with FAA Regional Offices will expedite the licensing process. It seeks comment on these proposed application coordination procedures.

32. AeroMACS spectrum will be shared between Federal and non-Federal users. The Commission believes that the FAA is best-suited to evaluate Federal AeroMACS needs at each location. The FAA already plays a large role in overseeing aviation spectrum use at airports, and the Commission defers to its judgment regarding air safety matters to avoid conflicting requirements, consistent with its statutory obligations. 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. 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. The Commission seeks 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.³⁰ Commenters also should address whether the Commission should designate a

³⁰ 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-

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

33. *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. The Commission expects users to operate cooperatively at the six specified airports with significant flight test activity and at any other locations where circumstances warrant coordination. It seeks 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, it seeks 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.

34. 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. 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. The Commission is encouraged that the parties have initiated discussions to develop coordination criteria between flight test and AeroMACS users. The Commission believes that these discussions should proceed in parallel with this rulemaking, and it welcomes recommendations developed by the parties. The Commission asks 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

5030 MHz, and 5091-5150 MHz bands, including aeronautical mobile telemetry (AMT) users” 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).” Commenters supporting designation of a third-party coordinator should also address the WiMAX Forum’s recommended eligibility criteria for the coordinator.

six specified airports and any other locations that present similar sharing issues.

35. *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.³¹ 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. 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. 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. The Commission notes that AeroMACS must operate in accordance with ITU Resolution 748 (Rev. WRC-12), which incorporates ITU-R M.1827-1. Consequently, it believes that AeroMACS operations in this band already are required to comply with Recommendation ITU-R M.1827-1. It observes that proposed section 87.604 includes individual base station power limits, and it seeks comment on whether these limits can be expected under typical deployment scenarios to limit aggregate interference sufficiently. The Commission also seeks comment on what, if any, additional references or technical rules are needed to protect Globalstar operations.

36. *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 802.16-2009.³² 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, the Commission proposes 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

³¹ Globalstar operates a mobile satellite service system in the 1610-1618.725 MHz and 2483.5-2500 MHz bands.

³² 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.

Commission for Aeronautics Minimum Operational Performance Standards. The Commission asks whether any additional or alternative technical rules are needed to ensure the compatibility, interoperability, or efficient operation of AeroMACS users. It also invites comment on how best to ensure that its 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, the Commission seeks comment on whether, in lieu of setting forth technical criteria in our rules, it 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.

37. *Vehicle Squitters.* 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.³³ 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. Consistent with a request from the Airports Council International-North America,³⁴ the Commission proposes two changes to the vehicle squitter rules described below to increase operational flexibility. It invites comment on these proposed rule changes and their costs and benefits. In particular, it seeks comment from airport owners and operators, which are the only authorized vehicle squitter licensees.

38. 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.”³⁵ 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

³³ 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.

³⁴ The ACI-NA Petition was placed on public notice on March 28, 2019. No comments were received.

³⁵ 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).

entering the airport movement area, because such operation is ancillary to the authorized operation in the airport movement area. The Commission proposes to amend the rule to codify the Division's clarification that power-up of vehicle squitters outside the airport movement area is permissible. The Commission believes 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.

39. The Commission also proposes to clarify that vehicle squitter use of frequency 978 MHz as well as 1090 MHz is authorized. The frequency 978 MHz is designated for transmissions using UAT datalink technology. UAT transmissions are authorized for all aeronautical utility mobile stations. 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. 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. The Commission also proposes 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). The Commission seeks comment on whether any additional rule changes are required to clarify that vehicle squitters are authorized to transmit on 978 MHz.

40. *Emergency Locator Transmitter Test Station Frequencies.* Emergency locator transmitters are radio beacons that are carried on board aircraft and triggered in the event of a crash or other unplanned downing. 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. 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.³⁶ This list dates from when emergency locator transmitters were first authorized in 1973. More recent FAA guidance, however, authorizes emergency locator transmitter test stations to operate on frequency 121.775 MHz. The Commission proposes 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 its rules with FAA guidance and facilitate emergency locator transmitter testing. The Commission seeks comment on this proposal.

41. **Procedural Matters. *Initial Regulatory Flexibility Analysis.*** As required by the Regulatory Flexibility Act (RFA), 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. 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 *NPRM*. The Commission will send a copy of the *NPRM*, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA). In addition, the *NPRM* and IRFA (or summaries thereof) will be published in the Federal Register.

42. In the *NPRM*, 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. It proposes 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. The Commission invites comment on whether it should amend its 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 proposes to authorize use of the frequency 1090 MHz for Automated Dependent Surveillance – Broadcast (ADS-B) service. It further proposes to

³⁶ 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.”

clarify certain rules regarding license eligibility and assignable frequencies for aeronautical advisory (unicom) stations. In addition, it proposes 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. The Commission proposes 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. It further proposes to establish service rules for new obstacle avoidance technologies. It proposes 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, the Commission proposes to add 121.775 MHz to the list of frequencies available for testing of Emergency Locator Transmitters (ELTs).

43. 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. The RFA defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.” In addition, the term “small business” has the same meaning as the term “small business concern” under the Small Business Act.³⁷ 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).

44. *Small Businesses, Small Organizations, Small Governmental Jurisdictions.* The Commission’s actions, over time, may affect small entities that are not easily categorized at present. It therefore describes here, at the outset, three broad groups of small entities that could be directly affected herein. 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. These types of small businesses

³⁷ 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

represent 99.9% of all businesses in the United States which translates to 28.8 million businesses.

45. 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.”

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).³⁸

46. 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.” U.S. Census Bureau data from the 2012 Census of Governments³⁹ indicate that there were 90,056 local governmental jurisdictions consisting of general purpose governments and special purpose governments in the United States.⁴⁰ Of this number there were 37,132 General purpose governments (county, municipal and town or township⁴¹) with populations of less than 50,000 and 12,184 Special purpose governments (independent school districts⁴² and special districts⁴³) 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 populations of less than 50,000.⁴⁴ Based on this data we estimate that at least 49,316 local government jurisdictions fall in the category of “small governmental jurisdictions.”

47. *Air Traffic Control*. This industry comprises establishments primarily engaged in

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*.”

³⁸ 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

³⁹ The Census of Government is conducted every five (5) years compiling data for years ending with “2” and “7”.

⁴⁰ 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).

⁴¹ There were 18,811 municipal and 16,207 town and township governments with populations less than 50,000.

⁴² There were 12,184 independent school districts with enrollment populations less than 50,000.

⁴³ The U.S. Census Bureau data did not provide a population breakout for special district governments.

providing air traffic control services to regulate the flow of air traffic. 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. For this category, U.S. Census Bureau data for 2012 shows that there were 8 firms that operated for the entire year. 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. Based on this data, the Commission estimates the majority of firms in this industry can be considered small.

48. *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. U.S. Census Bureau data for 2012 shows that there were 967 firms in that category that operated for the entire year. 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 the Commission’s evaluations in this analysis, it estimates that there are up to approximately 712,000 licensees that are small businesses (or individuals) under the SBA standard.

49. *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 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.

⁴⁴ 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.

U.S. Census Bureau data for 2012 show that there were a total of 841 establishments in this category that operated that year. Of this total, 828 had fewer than 1,000 employees and 13 had 1,000 or more employees. Thus, under this size standard, the majority of firms in this industry can be considered small.

50. *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. 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. For this category, U.S. Census Bureau data for 2012 show that there were 1,096 firms that operated for the entire year. 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. Thus, the Commission estimates that the majority of firms in this industry can be considered small.

51. *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. The SBA has established a size standard for this industry of 1,250 or fewer employees. U.S. Census Bureau data for 2012 show that 588 establishments operated in this industry in that year. 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. Based on this data, the Commission concludes that a majority of manufacturers in this industry are small.

52. *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.” 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. 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. Of this total, 299 firms had annual receipts of less than \$25 million. Consequently, the Commission estimates that the majority of satellite telecommunications providers are small entities.

53. The Commission expects the proposals in the *NPRM* will impose new or additional reporting or recordkeeping and/or other compliance obligations on small entities. For the most part, however, the 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.

54. 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. The Commission believes, 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 *NPRM*, the Commission seeks comment on this tentative determination and on the proposed new service rules for AeroMACS. It also seeks comment on whether its 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.

55. The Commission's 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. The Commission seeks comment, however, on its 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.

56. The Commission has also invited comment on whether it 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. It 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, the Commission 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

57. At this time, the Commission is not currently in a position to determine whether its 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. The Commission does not believe however, that the costs and/or administrative burdens associated with any of the proposed rule changes will unduly burden small entities. In the discussions of its proposals in the *NPRM*, the Commission has 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.

58. 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.

59. In this proceeding the Commission seeks to update its 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 the Commission's 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 the Commission's rules and potentially conflicts with the Commission's rules. To address this matter, the Commission proposes to amend its rules to reflect FAA terminology and remove the provisions that conflict with the FAA's Advisory Circular, and seeks comment on this proposal.

60. 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 *NPRM*, 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 *NPRM* before it adopts final rules.

61. Federal rules that may duplicate, overlap, or conflict with the proposed rules: None.

62. *Paperwork Reduction Analysis.* This *NPRM* 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), the Commission seeks specific comment on how it might further reduce the information collection burden for small business concerns with fewer than 25 employees.

63. *Ex Parte Presentations.* The proceeding this *NPRM* initiates shall be treated as a “permit-but-disclose” proceeding in accordance with the Commission’s *ex parte* rules. 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 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.

64. *Filing Procedures.* Pursuant to §§ 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).

- 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.

65. 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).

66. 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.

67. 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.

68. **Ordering Clauses.** 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.

69. 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.

70. 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.

List of Subjects

47 CFR Part 2

Communications equipment, Reporting and recordkeeping requirements.

47 CFR Part 87

Air transportation, Communications equipment, Radio.

FEDERAL COMMUNICATIONS COMMISSION.

Cecilia Sigmund,

Federal Register Liaison Officer,

Office of the Secretary.

Proposed Rules

For the reasons discussed in the preamble, the Federal Communications Commission proposes to amend 47 CFR parts 2 and 87 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)			86-92 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive)		
5.340 92-94 FIXED 5.338A MOBILE RADIO ASTRONOMY RADIOLOCATION			US246 92-94 FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION RADIONAVIGATION		RF Devices (15) Aviation (87) Fixed Microwave (101)
5.149 94-94.1 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) Radio astronomy			US161 US342 94-94.1 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION SPACE RESEARCH (active) Radio astronomy	94-94.1 RADIOLOCATION RADIONAVIGATION Radio astronomy	RF Devices (15) Aviation (87)
5.562 5.562A 94.1-95 FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION			5.562 5.562A 94.1-95 FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION RADIONAVIGATION	5.562A	RF Devices (15) Aviation (87) Fixed Microwave (101)
5.149 95-100 FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE			US161 US342 95-100 FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE		Aviation (87)
5.149 5.554 100-102 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive)			5.554 US342 100-102 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive)		
5.340 5.341 102-105 FIXED MOBILE RADIO ASTRONOMY			5.341 US246 102-105 FIXED MOBILE RADIO ASTRONOMY		
5.149 5.341			5.341 US342		

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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 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
* * *	*	* *	* *

¹The 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.

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⁹ Excludes automatic link establishment.

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

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

§ 87.133 Frequency stability.

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(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:

a. By revising the introductory text of paragraph (d); and

b. In paragraph (d)(3) by adding an entry for “92 GHz to 95.5 GHz” at the end of the list of frequency bands.

The revision and addition read as follows:

§ 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.

* * * * *

(3) * * *

92 GHz to 95.5 GHz

* * * * *

§ 87.171 [Amended]

9. Section 87.171 is amended:

a. By removing from the list of *Symbol and class of station* the entry for “AVW—Audio visual warning systems”; and

b. By adding at the beginning of the list entries for “ADL—Aircraft Detection Lighting Systems” and “AMC—AeroMACS.”

The revision and addition read as follows:

§ 87.171 Class of station symbols.

Symbol and class of station

AX—Aeronautical fixed

ADL—Aircraft Detection Lighting Systems

AMC—AeroMACS

AXO—Aeronautical operational fixed

* * * * *

10. In § 87.173, amend the table in paragraph (b) by:

a. Revising the entries for 121.600-121.925 MHz, 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, 136.000-136.400

MHz, 136.425 MHz, 136.450 MHz, 136.475 MHz, 978.000 MHz, 1090.000 MHz; and

b. Adding an entry for 92000-95500 MHz in numerical order.

The revisions and additions 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.

122.700 MHz.....	G, L, Q...	MA, FAU, MOU, ADL	Unicom at airports with no control tower; Aeronautical utility stations.
122.725 MHz.....	G, L, Q...	MA, FAU, MOU, ADL	Unicom at airports with no control tower; Aeronautical utility stations.
122.750 MHz.....	F, Q...	MA2, ADL	Private fixed wing aircraft air-to-air communications.
* *	*	* *	* *
122.800 MHz.....	G, L, Q...	MA, FAU, MOU, ADL	Unicom at airports with no control tower; Aeronautical utility stations.
* *	*	* *	* *
122.850 MHz.....	H, K, Q...	MA, FAM, FAS, ADL	
* *	*	* *	* *
122.900 MHz.....	F, H, L, M, Q...	MA, FAR, FAM, MOU, ADL	
* *	*	* *	* *
122.950 MHz.....	G, L, Q...	MA, FAU, MOU, ADL	Unicom at airports with control tower; Aeronautical utility stations.
122.975 MHz.....	G, L, Q...	MA, FAU, MOU, ADL	Unicom at airports with no control tower; Aeronautical utility stations.
123.000 MHz.....	G, L, Q...	MA, FAU, MOU, ADL	Unicom at airports with no control tower; Aeronautical utility stations.
123.025 MHz.....	F, Q...	MA2, ADL	Helicopter air-to-air communications; Air traffic control operations.
123.050 MHz.....	G, L, Q...	MA, FAU, MOU, ADL	Unicom at airports with no control tower; Aeronautical utility stations.
123.075 MHz.....	G, L, Q...	MA, FAU, MOU, ADL	Unicom at airports with no control

			tower; Aeronautical utility stations.
**	*	**	**
123.300 MHz.....	K, Q...	MA, FAS, ADL	
**	*	**	**
123.500 MHz.....	K, Q...	MA, FAS, ADL	
**	*	**	**
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... UAT Q...	MA, MOU, UAT..... RLT	Universal Access Transceivers.
**	*	**	**
1090 MHz.....	L...	MOU, RLT	Vehicular Squitter; 1090ES
**	*	**	**
5000-5030 MHz.....	T.....	AMC.....	AeroMACS
**	*	**	**
5091-5150 MHz.....	T.....	AMC.....	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.

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

§ 87.263 Frequencies.

(a) * * *

(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 text 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), redesignating paragraph (f) as paragraph (e), and revising newly redesignated paragraphs (e) introductory text and(e)(3) and (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
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(f) The frequency 1090 MHz is authorized for 1090ES data transmission.

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17. Section 87.475 is amended by adding paragraph (b)(15) and revising paragraph (c)(2) and paragraph (d) introductory text 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:

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18. Section 87.483 is amended:

- a. By revising the section heading;
- b. By removing the introductory text;
- c. By revising paragraph (a);
- d. By revising paragraph (b) introductory text; and
- e. By removing paragraph (b)(3).

The revisions 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. Add subpart T, consisting of §§ 87.601 through 87.606, to read as follows:

PART 87—AVIATION SERVICES

Subpart T—AeroMACS

Sec.

87.601 Scope of service.

87.602 Licensing.

87.603 Channel plan.

87.604 Base station EIRP limits.

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

§ 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.

Table 1 to § 87.603

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

Table 2 to § 87.603

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: $26 + 145 \log (\text{percent of BW}/50)$ dB.

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

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

(d) On any frequency removed from the assigned frequency beyond 150 percent of the

authorized bandwidth: 50 dB 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.

Table 1 to § 87.606

Frequency Band	Measurement Bandwidth	Maximum Level
30 MHz < f < 1 GHz	100 kHz	-36 dBm
1 GHz < f < 12.75 GHz	30 kHz if $2.5 \times BW \leq$ absolute value of $(f_c - f) <$ $10 \times BW$	-30 dBm
1 GHz < f < 12.75 GHz	300 kHz if $10 \times BW \leq$ absolute value of $(f_c - f) <$ $12 \times BW$	-30 dBm
1 GHz < f < 12.75 GHz	1 MHz if $12 \times BW \leq$ 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.

Table 2 to § 87.606

Frequency Band	Measurement Bandwidth	Maximum Level
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30 MHz < f < 1 GHz	100 kHz	-57 dBm
1 GHz < f < 12.75 GHz	1 MHz	-47 dBm

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