October 29, 2026

FCC FACT SHEET[*]
Unleashing American Drone Dominance;
Facilitating Opportunities for Advanced Air Mobility
Report and Order
GN Docket No. 26-74; WT Docket No. 24-629

Background: This omnibus Report and Order would advance U.S. drone leadership by eliminating three discrete sets of outdated restrictions in our rules that have hindered the deployment of Unmanned Aircraft Systems (UAS) and counter-UAS technologies in the 450 MHz, 800 MHz, and 24 GHz bands. To enhance aerial connectivity, this Report and Order would allow more flexible use of spectrum to support in-flight broadband, and it would separately authorize a dedicated network for UAS control communications. In addition, the Report and Order would support new counter-UAS detection capabilities to ensure that the rapid growth in UAS use does not compromise public safety and national security and would modify and modernize our rules to expand the range of options available for in-flight connectivity by the American public.

What the Order Would Do:

- Open up the 450 MHz band to UAS command and control operations and other safety of flight-related data uses.
    - Modify the current site-based rules that confine general aviation communications in the band to voice communications.
    - Add a primary non-federal allocation for Aeronautical Mobile (Route) Service in the 450 MHz band and replace the current rigid service rules framework with rules that embrace more flexible and efficient use of the band.
    - Transition the current site-based licenses in the 450 MHz band, which are all held by one incumbent licensee, to a single nationwide license.
- Permit federal and non-federal ground-based radiolocation operations in the 24.45–24.65 GHz band on a secondary basis, which will facilitate deployment of new UAS detection technologies.
- Modernize certain rules governing Commercial Aviation Air-Ground Systems in the 849–851 MHz and 894–896 MHz band to enable the provision of broadband service on commercial aircraft.

[*] This document is being released as part of a "permit-but-disclose" proceeding. Any presentations or views on the subject expressed to the Commission or its staff, including by email, must be filed in GN Docket No. 26-74 and WT Docket No. 24-629, which may be accessed via the Electronic Comment Filing System (https://www.fcc.gov/ecfs/). Before filing, participants should familiarize themselves with the Commission's *ex parte* rules, including the general prohibition on presentations (written and oral) on matters listed on the Sunshine Agenda, which is typically released a week prior to the Commission's meeting. *See* 47 CFR § 1.1200 *et seq*.

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

In the Matter of	)	
	)	
Unleashing American Drone Dominance	)	GN Docket No. 26-74
	)	
Facilitating Opportunities for Advanced Air Mobility	)	WT Docket No. 24-629
	)	

REPORT AND ORDER*

Adopted: [] **Released: []**

By the Commission:

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* This document has been circulated for tentative consideration by the Commission at its November 19, 2026 Open Meeting. The issues referenced in this document and the Commission's ultimate resolution of those issues remain under consideration and subject to change. This document does not constitute any official action by the Commission. However, the Chair has determined that, in the interest of promoting the public's ability to understand the nature and scope of issues under consideration, the public interest would be served by making this document publicly available. The FCC's *ex parte* rules apply and presentations are subject to "permit-but-disclose" *ex parte* rules. *See, e.g.,* 47 C.F.R. §§ 1.1206, 1.1200(a). Participants in this proceeding should familiarize themselves with the Commission's *ex parte* rules, including the general prohibition on presentations (written and oral) on matters listed on the Sunshine Agenda, which is typically released a week prior to the Commission's meeting. *See* 47 CFR §§ 1.1200(a), 1.1203.

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I. INTRODUCTION

1. With today's omnibus decision, the Commission advances America's leadership in the sky by taking a series of actions that unlock new commercial opportunities for next-generation aerial connectivity while addressing their safety and security challenges. Uncrewed aircraft systems (UAS), otherwise known as drones, are a transformative technology that can enhance public safety, drive economic growth, and promote innovation. Drones can deliver critical medical supplies to remote locations, inspect infrastructure with pinpoint precision, aid first responders with real-time aerial intelligence, and give farmers the ability to monitor crops with unprecedented accuracy. At the same time, drones in the hands of criminals, hostile foreign actors, and terrorists can pose serious threats to the homeland.

2. With this Report and Order, we pursue the twin objectives of commercializing America's airspace for innovation while promoting air safety and defense of the homeland. We take steps to promote UAS and counter-UAS[1] technologies by eliminating outdated restrictions in our rules that have hindered their deployment. We also continue our efforts to expand connectivity for Americans by modifying our rules to facilitate more options for in-flight connectivity.[2]

3. Our steps today further the Commission's complementary goals in its *Unleashing American Drone Dominance* proceeding to spur investment in aerial connectivity in a manner that protects the skies from accidents and national security threats. Since we initiated our *Drone Dominance* proceeding, the Commission has opened up large swaths of spectrum for UAS[3] and acted to enable state, local, tribal, and territorial law enforcement and correctional agencies to conduct C-UAS under the SAFER SKIES Act.[4] Across all fronts, our efforts have been guided by President Trump's June 6, 2025

[1] Counter-UAS (C-UAS) refers to technologies, systems, or operations designed to detect, track, identify, and, where authorized, mitigate or disable UAS that pose a threat to safety, security, or regulatory compliance.

[2] We further note, in regards to cyber- and data-security considerations these services may present, that these services will be subject to the prohibition on the use of equipment and services that pose unacceptable risks to national security, and must comply with any other FCC national security requirements the Commission adopts going forward.

[3] [[CITE]]

[4] *See FCC Seeks Comment on Unleashing American Drone Dominance*, GN Docket No. 26-74, WT Docket Nos. 22-323 and 24-629, Public Notice, DA 26-314, 2026 WL 1013779 at 5 (WTB/OET rel. Apr. 1, 2026) (*Drone Dominance Public Notice*); Fact Sheet, FCC, FCC Updates Covered List to Include Foreign UAS and UAS Critical Components on Going Forward Basis (Dec. 22, 2025), https://docs.fcc.gov/public/attachments/DOC-416839A1.pdf. As the *Drone Dominance Public Notice* sets out, the national strategy for achieving U.S. drone superiority involves the production, deployment, and export of both UAS and Counter-UAS, and the public notice sought comment on measures designed to increase UAS spectrum access and deployment as well as steps that the Commission can take to facilitate Counter-UAS operations. Following the *Drone Dominance Public Notice*, the FCC has adopted a number of measures to enable both UAS and Counter-UAS operations, including actions to advance the coordinated federal effort to implement C-UAS authority under the SAFER SKIES Act by clarifying the legal authority and

(continued….)

Executive Order, "Restoring American Airspace Sovereignty," which establishes a national policy to ensure control over our national airspace and to protect the Nation from threats posed by the careless or unlawful use of UAS[5], and his Executive Order, "Unleashing American Drone Dominance," which directed the FAA to fast-track routine Beyond Visual Line of Sight (BVLOS) drone operations.[6]

4. Specifically, we adopt the Commission's proposals to facilitate new technologies using three bands of spectrum: the 454.6625–454.9875 MHz and 459.6625–459.9875 MHz band (450 MHz band); the 24.45–24.65 GHz band; and the 849–851 MHz and 894–896 MHz band.[7] First, we open up the 450 MHz band to UAS command and control operations and other flight safety-related data uses by modifying the current site-based rules that confine air-ground communications in the band to voice communications with aircraft traveling at high altitudes. We replace the current rigid framework with rules that embrace more flexible use of the band at a range of altitudes while minimizing the possibility for harmful interference by creating a single nationwide license. These decisions build on the Commission's efforts to facilitate greater spectrum access for UAS deployments.[8]

5. Second, we modify our rules to permit federal and non-federal ground-based radiolocation operations in the 24.45–24.65 GHz band on a secondary basis, which will facilitate deployment of new UAS detection technologies. These technologies can be used to protect our skies from malicious and rogue drones at sensitive sites, including federal facilities and installations, stadiums, prisons, the U.S. border, and critical infrastructure. Opening the band for radiolocation will thus promote the greater availability of Counter-UAS methods needed to ensure American control over our national airspace while minimizing the risk of harmful interference.

6. Finally, we modernize certain rules governing Commercial Aviation Air-Ground Systems in the 849–851 MHz and 894–896 MHz band to promote the provision of broadband service on commercial aircraft. In particular, we modify the power limits to move from peak power to average power measurements, which better reflect the realities of operations in this band. The changes we adopt will bring these rules into harmony with those that govern similar operations in other bands and enable more efficient use of the spectrum, while also building on the Commission's successful deregulatory

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providing guidance that enable state, local, Tribal, and territorial law enforcement and correctional agencies operating under that Act to take effective counter-drone measures. *See* Fact Sheet, Supporting State, Local, and Tribal Efforts to Counter Drone Threats (rel. July 2, 2026), https://www.fcc.gov/document/fcc-supports-sltt-drone-efforts. The FCC also recently issued an Order conditionally waiving certain Commission rules to support a U.S. Department of Transportation program to test drone use of mobile networks. *See Waiver of Aeronautical Mobile Restrictions to Enable Mobile Network Aviation Assessment Program (MNAAP) et al.*, GN Docket No. 26-74, Order, DA 26-972 (WTB/OET rel. Sept. 11, 2026).

[5] *See Restoring American Airspace Sovereignty*, Exec. Order 14305, 90 Fed. Reg. 24719 (June 6, 2025) (*Airspace Sovereignty Executive Order*), https://www.whitehouse.gov/presidentialactions/2025/06/restoring-american-airspace-sovereignty/.

[6] *See Unleashing American Drone Dominance,* Exec. Order 14307, 90 Fed. Reg. 24727 (June 6, 2025), https://www.whitehouse.gov/presidential-actions/2025/06/unleashing-american-drone-dominance/. Our actions are further consistent with the FAA's proposed performance-based regulations for the design and operation of UAS at low altitudes beyond visual line of sight and for third-party services that support these operations. *See Normalizing Unmanned Aircraft Systems Beyond Visual Line of Sight Operations*, Notice of Proposed Rulemaking, 90 FR 38212, 2025 WL 2240603 (2025).

[7] *See generally Facilitating Opportunities for Advanced Air Mobility et al.*, WT Docket No. 24-629, Notice of Proposed Rulemaking, 40 FCC Rcd 745 (2025) (*AAM NPRM or Notice*).

[8] *See generally Spectrum Rules and Policies for the Operation of Unmanned Aircraft Systems*, WT Docket No. 22-323, Report and Order, 39 FCC Rcd 10005 (2024) (*UAS Report and Order*).

efforts in the Delete, Delete, Delete proceeding[9] by removing and streamlining outdated rules to reduce unnecessary regulatory burdens, encourage investment, and promote technological progress.

7. These licensing options, and the requirements associated with them, are not duplicated by any other existing licensing rules or other federal provisions. In each of the bands we address, we have removed or modified existing regulations that have contributed to inefficient use of spectrum and hampered licensees from deployment of UAS, C-UAS, and other advanced services, including the 450 MHz band restriction to voice calls that prevented its use for UAS control communications, the 24.45–24.65 GHz band restriction to radionavigation equipment that barred the use of similar radar equipment for C-UAS detection, and the power limits rules in the 849–851 MHz and 894–896 MHz band that were designed for an era of voice calls and would hamper use of the band for advanced broadband services. Thus, by adopting the rules described above, we take important steps towards facilitating spectrum abundance for the next generation of aviation services and continue our efforts to ensure that the Commission's rules are updated to avoid restricting new technological developments that can support the safety and economic growth of the country.

II. AIR-GROUND COMMUNICATIONS IN THE 450 MHz BAND

8. We adopt rules to facilitate more intensive use of 650 kilohertz of low-band spectrum for air-ground communications through flexible rights and policies. This action will position the 450 MHz band as one of several alternatives for local, regional, and nationwide UAS networks. Specifically, we modernize the legacy, site-based, general aviation air-ground service rules that have limited service in this band to voice communications for general aviation aircraft at high altitudes, thereby prohibiting data communications and effectively prohibiting wide-area, low-altitude service. We assign new rights and obligations to a single geographic license with nationwide coverage to support UAS at a range of altitudes, including lower altitudes, and to create a new 450 MHz Air-Ground Service that encompasses existing part 22 general aviation air-ground, UAS conduct control and non-payload communications (CNPC), and other flight safety-related data operations. In particular, we adopt additional service rules that would provide UAS operators with the ability to conduct CNPC and other flight safety-related operations in the band that will facilitate Advanced Air Mobility (AAM).

A. Background

9. The Commission allocated 454.6625–454.9875 MHz and 459.6625–459.9875 MHz (450 MHz band) for domestic public land and mobile stations to provide a two-way air-ground public radiotelephone service via footnote NG32 to the U.S. Table of Frequency Allocations (U.S. Table).[10] Currently, the band is primarily used for the Air-Ground Radiotelephone Service to provide communications capabilities to airborne mobile subscribers in general aviation aircraft traveling at high altitudes and the Commission's rules prohibit the transmission of data.[11] The Commission's rules assign 12 pairs of 25 kilohertz-wide communication channels in the 454.700–454.975 MHz and 459.700–459.975 MHz bands for general aviation air-ground use and a frequency pair for signaling (454.675–

[9] *See, e.g.*, *Re: Delete, Delete, Delete*, GN Docket No. 25-133, Public Notice, 40 FCC Rcd 1601 (OMR 2025).

[10] 47 CFR § 2.106(d)(32) (footnote NG32) ("NG32 Frequencies in the bands 454.6625–454.9875 MHz and 459.6625–459.9875 MHz may be assigned to domestic public land and mobile stations to provide a two-way air-ground public radiotelephone service."). The 451–457 MHz band is also allocated on a secondary basis limited to MedRadio operations that are authorized by rule under part 95 of the Commission's rules. *Id.* § 2.106(c)(64) (footnote US64). Neighboring uses include Remote Pickup, Low Power Auxiliary, Public Mobile, Maritime, Private Land Mobile, and MedRadio operations. *See generally* 47 CFR § 2.106.

[11] *See* 47 CFR §§ 2.106(d)(32) (footnote NG32), 22.99 (defining radiotelephone service as "[t]ransmission of sound from one place to another by means of radio"), 22.805 (stating that "the channels are allocated for the provision of radiotelephone service to airborne mobile subscribers in general aviation aircraft"). AGRAS is a technology standard.

459.675 MHz).[12] AURA Network Systems OpCo, LLC (AURA) is the sole incumbent licensee, operating all 54 active licensed locations.[13]

10. In 2010, the Mobility Division (Division) of the Wireless Telecommunications Bureau (Bureau) granted a waiver of various part 22 rules, enabling licensees in the band to upgrade their AGRAS technology-based facilities and to build out their existing networks.[14] In 2021, the Division granted a waiver of relevant part 22 rules to AURA (*2021 Waiver Order*), allowing it to provide additional ancillary services, including UAS, to meet the needs of a broader base of aviation subscribers.[15] In compliance with a condition of the *2021 Waiver Order*, AURA filed a petition for rulemaking (AURA Petition) seeking updates to the Commission's rules to allow for UAS CNPC operations in the 450 MHz band.[16] The AURA Petition received 18 comments and one reply comment, with broad support for the requested rule changes.[17]

11. On January 17, 2025, the Commission released the *AAM NPRM*, proposing to update its rules governing the use of the 450 MHz band to allow for UAS CNPC operations in the band, which could support AAM operations at a range of altitudes.[18] On the same day, the Bureau suspended the acceptance and processing of applications for new licenses to conduct part 22 general aviation air-ground service operations in the 450 MHz band to maintain a stable spectral landscape while the Commission determines how to proceed with respect to this spectrum.[19]

B. Discussion

12. We update our rules governing the use of the 450 MHz band to create new service rules that allow for UAS control operations in the band. Specifically, we take several actions: (1) updating the U.S. Table by adding a primary non-federal Aeronautical Mobile (Route) Service (AM(R)S) allocation in the 450 MHz band to allow for data communications to crewed or uncrewed aircraft relating to the safety or regularity of flight, including CNPC; (2) enabling a transition to a geographic licensing structure with a single, nationwide license made available through a voluntary transition process; and (3) adopting flexible licensing, operating, and technical rules that will facilitate robust use of the band while protecting neighboring operations.

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[12] 47 CFR § 22.805. While licensees are authorized for a 20 kilohertz bandwidth, the total channel spacing for each channel is 25 kilohertz. Therefore, thirteen paired channels comprise the 650 kilohertz of spectrum from 454/459.675–454/459.975 MHz, which includes the "signaling channel pair" that is assigned to every licensee. *See id*. § 22.805(a) (noting that the signaling channel is "to be used only for automatically alerting airborne mobile stations of incoming calls"). As noted in the *AAM NPRM*, there is a slight gap at the edge of the last channel and the edge of the allocation. *AAM NPRM,* 40 FCC Rcd at 764–65, para. 46.

[13] *See, e.g.*, AURA Network Systems call signs, FRN 0029063245.

[14] *See Joint Request by Stratophone, LLC and SkyTel Spectrum, LLC for Waiver of Certain Air-to-Ground Radiotelephone Service Licensing Rules for General Aviation*, WT Docket No. 09-44, Order, 25 FCC Rcd 8581 8587, para. 13 (WTB-MD 2010) (*2010 Order*) (waiving 47 CFR §§ 22.813(a), 22.813(b), 22.815, 22.817).

[15] *AURA Network Systems OpCo, LLC and A2G Communications, LLC Request for Waiver*, WT Docket No. 20-185, Order, 36 FCC Rcd 262, 268–69, paras. 14–17 (WTB-MD 2021) (*2021 Waiver Order*). In the *2021 Waiver Order*, the Division noted that the FAA is the agency responsible for ensuring the safe operation of manned and unmanned aircraft in the national airspace and that AURA will have to receive the requisite FAA authorizations before commencing its planned UAS service. *Id.* at 267, para. 16.

[16] Petition for Rulemaking of AURA Network Systems OpCo, LLC and A2G Communications, LLC, WT Docket No. 20-185, at 2 (filed Feb. 16, 2021) (AURA Petition).

[17] *See* Docket No. RM-11912.

[18] *AAM NPRM*, 40 FCC Rcd at 748, para. 6.

[19] *See Wireless Telecommunications Bureau Announces Temporary Filing Freeze on Applications in the 450 MHz Band*, WT Docket No. 24-629, Public Notice, 40 FCC Rcd 331 (WTB 2025) (*2025 Freeze Public Notice*).

1. Allocating the 450 MHz Band to Permit Air-Ground Data Services

13. Under section 303(y) of the Communications Act of 1934, as amended, the Commission is permitted to allocate spectrum to provide flexibility of use if the allocation is consistent with international agreements and if the Commission finds that: (1) the allocation is in the public interest; (2) the allocation does not deter investment in communications services and systems, or the development of technologies; and (3) such use would not result in harmful interference among users.[20] As discussed below, we find that adding the AM(R)S allocation is in the public interest and also meets the other criteria of section 303(y). Accordingly, we amend the U.S. Table, including footnote NG32, to add a non-federal co-primary Aeronautical Mobile (Route) Service (AM(R)S) allocation for aviation safety operations and adjust our service rules to add data usage rights to the 450 MHz band. Along these lines, we reclassify this service as the 450 MHz Air-Ground Service to reflect these new uses.

14. *Public Interest of the AM(R)S Allocation*. We find that these actions satisfy the public interest requirement under section 303(y)(2)(A).[21] The AM(R)S allocation will support communications relating to the safety and regularity of flight, including UAS CNPC.[22] We agree with AURA that opening the band to UAS CNPC operations will provide expansive public and private benefits to public safety, transportation, supply chains, and other critical areas.[23] The record demonstrates that adding an AM(R)S allocation will remove unnecessary technological restraints, allow for more robust use of the spectrum, and facilitate permanent use of the 450 MHz band for UAS CNPC.[24]

15. We also find it appropriate to more broadly permit communications relating to any flight safety-related data operations, whether to UAS or crewed aircraft, which the AM(R)S allocation will accommodate. While the Commission proposed to specifically permit only UAS CNPC operations in addition to the existing air-ground radiotelephone voice service, the Commission sought comment on whether to expand the scope of permitted operations to allow other data uses beyond UAS CNPC.[25] Based on our review of the record, we find it in the public interest to also permit all other flight safety-related data uses in order to facilitate AAM and UAS operations in this band.

16. As AURA observes, evolving AAM use cases include electronic aircraft, such as eVTOL aircraft, that may have onboard pilots.[26] Because such crewed aircraft may require connectivity to the

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[20] 47 U.S.C § 303(y).

[21] *See* 47 U.S.C § 303(y)(2)(A).

[22] Under the Commission rules, "AM(R)S" is defined as "[a]n aeronautical mobile service reserved for communications relating to safety and regularity of flight, primarily along national or international civil air routes." 47 CFR § 2.1(c). The Commission defines the term "aeronautical mobile service," in relevant part, as "[a] mobile service between aeronautical stations and aircraft stations, or between aircraft stations[.]" *Id*. An aeronautical station is defined as "[a] land station in the aeronautical mobile service." *Id*. An aircraft station is defined as "[a] mobile station in the aeronautical mobile service, other than a survival craft station, located on board an aircraft." *Id.*

[23] *See* AURA Comments at 10. There are numerous uses for UAS, including public safety operations, search-and-rescue missions, medical equipment delivery, infrastructure inspections, environmental disaster response, and transportation, and these uses will help and support a variety of entities, communities, and industries across the country. *See* AIRT Comments at 2; AURA Comments at 3–5; AX Enterprize Comments at 1–2; CDA Comments at 2; CNO Comments at 2; EEI Comments at 2–3, 11; EWA Comments at 2; NPSTC Comments at 2; NWCC Comments at 1–2; Skyports Comments at 1.

[24] *See* AURA Comments at 2, 9; AUVSI Comments at 1–2; AX Enterprize Comments at 1–2; CDA Comments at 2–3; CNO Comments at 2; EEI Comments at 3, 5, 11; EWA Comments at 2; NPSTC Comments at 2, 3; NWCC Comments at 3; Reliable Robotics Comments at 1; Skyports Comments at 1; USI Comments at 1.

[25] *See AAM NPRM*, 40 FCC Rcd at 750, para. 12.

[26] AURA Comments at 12; Letter from Susan Crandall, Vice President of Legal & Regulatory, AURA Network Systems, Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 24-629, at 1 (filed May 1, 2025) (AURA May (continued….)

ground for voice communications and narrowband data for inflight operations, limiting permitted uses to CNPC and voice communications may unnecessarily prevent flight safety-related data communications for such operations. We agree with commenters that argue that we should not limit data uses in this band at this juncture given that UAS and AAM technology and use cases are continuing to evolve, and that we should instead permit those flight safety-related uses that will optimize the band for UAS and AAM operations.[27] While we appreciate that certain commenters have raised concerns that the 450 MHz band spectrum cannot support data uses beyond CNPC,[28] we find that, even given the very limited bandwidth of the 450 MHz band, the scope of operations that are permissible under an AM(R)S allocation are sufficiently limited such that a licensee should be able to balance use cases and conduct UAS operations in a manner that will not jeopardize the signal reliability necessary for safe operations.

17. Accordingly, by amending the allocation in this band, we allow for more intensive use of this spectrum and maximize the use of the band while also ensuring that permitted uses are limited to flight safety operations that support UAS and other next generation aviation services. In turn, optimizing the band for UAS and other next generation aviation services use will help facilitate the deployment of applications and services that enhance public safety and support infrastructure integrity and economic development, including in remote communities.[29]

18. While we adopt an AM(R)S allocation to support safety-related air-ground services in the band, due to the unique circumstances before us, we do not find that as a general matter such services must be provided within spectrum allocated for AM(R)S. Indeed, the Commission has previously observed that "the flexible-use bands where mobile networks are already deployed nationwide . . . are being explored as platforms for UAS operations, including UAS CNPC."[30] In this case, however, given the limited bandwidth of the 450 MHz band, we find that the 450 MHz band would be a challenging case to introduce a broader allocated scope of services that would still ensure the band's availability and reliability for safety-critical services. Further, the AM(R)S allocation is what the sole 450 MHz band licensee has requested and is uniformly supported by other commenters on the issue.[31] The record does not reflect any provider or aviation industry interest in a broader allocation in this band. Moreover, we

(Continued from previous page)
1, 2025 *Ex Parte*). An eVTOL, or electric vertical takeoff and landing, aircraft is an all-electric vehicle capable of vertical takeoff and landing that can be piloted or flown remotely.

[27] AURA Comments at 11–12 (stating that next generation aviation "implicates both crewed and uncrewed flights, especially in the near term," and not limiting the services to CNPC allows the licensee "to offer the full range of services necessary to best meet the needs of the modern aviation market"); EWA Comments at 2 (contending that "[t]echnology and applications are evolving so quickly in this space that prescriptive rules other than those ensuring non-interference should be avoided whenever possible"); *see also* AURA May 1, 2025 *Ex Parte* at 1; CDA Comments at 3 (stating that the rules relevant to this band should be modernized to allow for voice and data services on this band to the most comprehensive possible base of aviation users).

[28] EEI argues that use should be restricted to maintain "reliability and support aviation safety" and notes that "introducing additional data services could jeopardize the integrity of CNPC communications" due to the limited spectrum in this band. EEI Comments at 5. Likewise, FPVFC believes that when this band is used under the AM(R)S allocation, it should be non-voice and, for CNPC, adding voice would restrict the full use of this spectrum. FPVFC Comments.

[29] *See* AURA Comments at 3–4; CNO Comments at 1–2; EEI Comments at 3.

[30] *See Spectrum Rules and Policies for the Operation of Unmanned Aircraft Systems, et al.*, WT Docket No. 22-323, Notice of Proposed Rulemaking, 38 FCC Rcd 474, 480, para. 12 (2023); *see also* CTIA Comments, GN Docket No. 26-74, at 8, 10 (asserting that mobile carrier networks are being used by drones for control communications and discussing 3GPP efforts to explore cellular network support for a number of UAS functions including control).

[31] *See* AURA Comments at 2, 9–10; *see also*, *e.g.*, *id.* at 11 (arguing AM(R)S "sufficiently preserves this spectrum for a critical use case"); AUVSI Comments at 1–2; AX Enterprize Comments at 1; CNO Comments at 2; EWA Comments at 2; Reliable Robotics Comments at 1; Skyports Comments at 1; USI Comments at 1.

find that the addition of safety-related aeronautical mobile data services, such as CNPC, will be sufficient to lead to robust and intensive use of the band. Accordingly, we find that adopting an AM(R)S allocation for the 450 MHz band is in the public interest.

19. *Encouraging Investment*. We find that the actions we take today satisfy section 303(y)(2)(B) because they do not deter—and in fact encourage—investment in new communications technology and services.[32] Specifically, we conclude that the rules limiting use to air-ground voice communications are outdated.[33] To innovate, AURA has invested more than $100 million on the basis of its current waiver and states that it will invest much more to update and expand its advanced aviation network.[34] We agree with AURA and the National Wireless Communications Council that permitting AM(R)S and enabling CNPC and other flight safety-related data services in this band will promote and foster investment as well as facilitate development and deployment of new, innovative technologies because many fields—including critical infrastructure, emergency response and management, transportation, and public health—will benefit from the expansion of UAS.[35]

20. *Interference Protection*. We find that adding a co-primary AM(R)S allocation to the 450 MHz band in the U.S. Table meets the section 303(y) criteria regarding harmful interference.[36] Currently, AURA is permitted to provide additional services, including CNPC for UAS, pursuant to an existing waiver.[37] We agree with AURA that the updated allocation does not fundamentally change the band's current use, that AURA currently and effectively occupies the entire 450 MHz band without issue, and that there are no co-channel licensees that require protection from harmful interference in connection with AURA's operations.[38] Further, we agree with commenters that harmful interference to public safety channels in the adjacent 450–470 MHz band is unlikely.[39] While some commenters raise general concerns related to interference mitigation,[40] we note that we are not materially changing the band from how it is currently used (without issue), and we conclude that the technical rules adopted below and the amount of spectral separation protect against the potential risk of harmful interference.

21. Accordingly, we amend footnote NG32 in the U.S. Table to add a co-primary AM(R)S allocation for aviation safety operations. In addition, we provide that the AM(R)S allocation shall have priority over other uses, including the existing general aviation air-ground radiotelephone service allocation in footnote NG32, in order to protect the critical services provided through the AM(R)S allocation against harmful interference while still retaining this existing service. We also add service rules to specify this restriction on the general aviation air-ground radiotelephone service allocation.

22. *Control and Non-Payload Communications.* We affirm our tentative conclusion from the *AAM NPRM* to add new definitions to the Commission's part 22 rules for "control and non-payload communications of uncrewed aircraft systems," "uncrewed aircraft," "uncrewed aircraft station," and

[32] *See* 47 U.S.C. § 303(y)(2)(B).

[33] AURA notes that the demand for this current service has declined. AURA Comments at 9–10.

[34] AURA Comments at 10.

[35] AURA Comments at 2, 10; NWCC Comments at 2–3.

[36] *See* 47 U.S.C § 303(y)(2)(C).

[37] *2021 Waiver Order*, 36 FCC Rcd at 268–69, paras. 14–17.

[38] AURA Comments at 10.

[39] AURA Comments at 10, 16; *see also* NPSTC Comments, WT Docket No. 20-185, at 3.

[40] *See* Hatfield Comments at 4 ("As Advanced Mobility services levels develop, I believe it is prudent to remain attentive to the evolving electromagnetic environment and its sources—especially in bands already subject to cumulative interference effects from modern infrastructure and electronic ecosystems."); *see also* Hatfield Reply at 1–5; FPVFC Comments.

"uncrewed aircraft system."[41] We agree with commenters that these terms are necessary for operators engaged in UAS operations in the 450 MHz band, and we find it appropriate to utilize the identical definitions adopted in the *UAS Report and Order* in order to harmonize the definitions of these two UAS services.[42] By aligning these definitions, we provide regulatory consistency and clarity for operators.[43] Additionally, as stated in the *UAS Report and Order*, we continue to find that these definitions can cover a variety of operations, including Urban Air Mobility and AAM, and that we do not need to distinguish among such operations in the rule at this time.[44]

23. *Flight Safety-related Data Services.* Because of our finding above that it is appropriate to permit other flight safety-related data services, we also add a new definition to the Commission's part 22 rules for "flight safety-related data services." Based on the existing definitions of AM(R)S from parts 2 and 87 and safety service from part 2 of the Commission's rules, we define "flight safety-related data services" to be "data communications services relating to safety and regularity of flight used permanently or temporarily for the safeguarding of human life and property."[45] We establish this new definition using existing parts 2 and 87 definitions to promote consistency with the Commission's rules and services.

24. We conclude that it is appropriate to add these definitions to part 22, rather than part 88. While recently established part 88 governs UAS services, this section's scope is limited to UAS in the 5030–5091 MHz band.[46] The UAS services in these bands differ, and housing the 450 MHz band rules in part 88 could cause unnecessary confusion. Additionally, we do not undertake the suggestion by Reliable Robotics to clarify the definition of UAS because, as previously stated, we seek to maintain the same definitions as used in part 88 for UAS operations in the 5030–5091 MHz band.[47] Accordingly, we add these definitions to part 22 of our rules.

2. Voluntary Transition to a Nationwide License

25. *Nationwide License.* We adopt our tentative conclusion that a proposed voluntary transition to a nationwide license ensures that this spectrum is put to its highest use because the single incumbent is in the best position to rapidly deploy operations.[48] The current site-based licensing framework has become administratively inefficient and no longer supports effective utilization of the 450 MHz band.[49] Commenters generally agree that transitioning to a single nationwide license will improve efficiency and align with the Commission's broader spectrum goals.[50] Moreover, this geographic

[41] *See AAM NPRM*, 40 FCC Rcd at 751–52, para. 14; *see id.* at Appx. A (proposed § 22.99). Because AAM is in the early stages of development, we prefer to provide encompassing definitions rather than prescriptive terms that may need to be amended in the future. *See* EEI Comments at 5 ("These definitions should remain focused enough to support flight safety while also accommodating the evolution of UAS capabilities and technologies.").

[42] *See AAM NPRM*, 40 FCC Rcd at 751–52, para. 14; *UAS Report and Order*, 39 FCC Rcd at 10009–10, paras. 10–12; *see also* 47 CFR § 88.5.

[43] *See, e.g.*, AURA Comments at Appx. A; EEI Comments at 5.

[44] *UAS Report and Order*, 39 FCC Rcd at 10010, para. 11.

[45] *See* 47 CFR §§ 2.1(c), 87.5.

[46] 47 CFR § 88.1.

[47] *See UAS Report and Order*, 39 FCC Rcd at 10009–10, paras. 10–12; *see also* Reliable Robotics Comments at 3. We also note that services will not be limited to UAS CNPC, which should help to address Reliable Robotics' concern.

[48] *AAM NPRM*, 40 FCC Rcd at 752, para. 15. The U.S. territories are Puerto Rico, the U.S. Virgin Islands, American Samoa, Guam, and the Commonwealth of Northern Mariana Islands. *Id.* at 752 n.34.

[49] *See* AURA Comments at 14.

[50] *See* AURA Comments at 14; AUVSI Comments at 1–2; AX Enterprize Comments at 1; CNO Comments at 2; EEI Comments at 4, 5–6; EWA Comments at 2–3; Reliable Robotics Comments at 2; USI Comments at 1–2. Only one (continued….)

licensing structure will facilitate public safety uses of UAS CNPC across the country, such as search-and-rescue missions, law enforcement assistance, and emergency response operations.[51] Further, because aviation communications are not neatly confined to geographic or terrestrially defined boundaries and require seamless service across wide geographic areas, a nationwide approach is helpful to ensuring reliability and uniformity for these emerging and safety-critical operations.[52] Moreover, creating technical protections necessary to assign additional rights to a third party would be complex, delay expanded operations in the band, and unnecessarily restrict innovation and use of the limited spectrum. Therefore, we adopt our proposal to offer a voluntary transition for the 450 MHz band from a site-based licensing framework to a single geographic license with nationwide coverage, encompassing the contiguous United States (CONUS), Alaska, Hawaii, and the U.S. territories.[53] In doing so, we decline to adopt our alternative proposal to license this band on a REAG-basis.[54]

26. In addition, we find that AURA, as the only incumbent, is uniquely qualified to place a nationwide license to its highest value use. AURA holds all existing site-based licenses nationwide, providing general aviation air-to-ground services using its 54 sites across the United States and certain territories at high altitude.[55] Because this band is comprised of only 650 kilohertz of spectrum, and because the Commission's co-channel separation requirements and site-dispersion rules limit where facilities can be placed, large white spaces exist that cannot be used by AURA or other parties at lower altitudes without a waiver.[56] Although AURA does not maintain sites in all of the U.S. territories presently, its extensive operational footprint and experience operating in the band throughout the United States demonstrates that it is in the best position to construct facilities and offer service in these additional areas. AURA operates in almost all available frequencies and has expanded its network to all sites feasible for building a functional network.[57]

(Continued from previous page)
commenter, FPVFC, although supporting transition to a single geographic license, opposes having a private licensee for the single license, asserting without analysis that it would lead to underinvestment and monopolistic rates. FPVFC Comments. We note that AURA has long been the sole licensee in the band and neither of these consequences is apparent in the record.

[51] *See* CDA Comments at 2; EWA Comments at 2–3; NPSTC Comments at 2; NWCC Comments at 2.

[52] *See* AURA Comments at 15; USI Comments at 1–2; EEI Comments at 5–6.

[53] The U.S. territories are Puerto Rico, the U.S. Virgin Islands, American Samoa, Guam, and the Commonwealth of Northern Mariana Islands. *AAM NPRM*, 40 FCC Rcd at 752 n.32.

[54] *AAM NPRM*, 40 FCC Rcd at 753, para. 17. We note that AURA and EEI oppose this alternative licensing framework and no commenter supports the proposal. *See* AURA Comments at 16; EEI Comments at 6. Because we find that a nationwide license is in the public interest, we also decline to adopt any additional alternative proposals. *AAM NPRM*, 40 FCC Rcd at 766–67, para. 52.

[55] *See* ULS call signs of AURA Network Systems, FRN 0029063245, KCC793; KEC932; KED350; KGC406; KNKC473; KNKI632; KNKI838; KNKJ550; KNKK614; KNLW652; KOR443; KPE495; KQD306; KRS662; KSC881; KSJ612; KSW213; KUC859; KUC941; KUC982; KUC995; KUO576; KWB376; KWH337; KWT848; KWT849; KWU423; KWU424; KWU425; KWU426; KWU427; KWU428; KWU429; KWU431; KWU510; WPON853; WQKQ290; WQZP762; WQZP763; WQZP764; WQZP765; WQZP766; WQZP767; WQZP769; WQZP770; WQZP771; WQZP772; WQZP773; WRFE609; WRMA477; WRMA478; WRYT612; WSHW461; and WXS445.

[56] *See* 47 CFR §§ 22.813(a) (prohibiting ground transmitters from being located less than 800 kilometers (497 miles) from the antenna location of the nearest co-channel ground transmitter), 22.817 (site-dispersion rule); *see also* EEI Comments at 5–6; EWA Comments at 2.

[57] *See* AURA Comments at 27 & n.74 ("AURA holds all of the licenses for all available channels except for two sites in Alaska and one site in Ohio, in which it holds some, but not all, of the available channels. . . . AURA intends to work closely with the Wireless Telecommunications Bureau to address these missing channels.").

27. *Assignment of New Rights through Application for License Modification.* We further find that the additional rights we propose to assign are, given the circumstances, most efficiently accomplished as a modification to existing license authority,[58] and we adopt our proposal for modifying a site-based license into a nationwide license.[59] Under this approach, a covered incumbent seeking the 450 MHz Air-Ground Service nationwide license will apply to modify one of its site-based licenses into a nationwide license and turn in its remaining site-based licenses. The application for modification will be voluntary. We agree with AURA, the only commenter on this proposal, that this process is more efficient because it will only entail one license modification request, instead of necessitating an application for every site-based license held by the covered incumbent on an individual basis, thereby lessening administrative burdens for both the covered incumbent and the Commission.[60]

28. Consistent with the *AAM NPRM*, we find that our nationwide approach and license modification framework are consistent with our authority under section 309 of the Communications Act, which governs the Commission's process for granting licenses under Title III.[61] Section 309(j)(6)(E) makes clear that the Commission has an "obligation in the public interest to . . . use engineering solutions, negotiation, threshold qualifications, service regulations, and other means in order to avoid mutual exclusivity in application and license proceedings[.]"[62] Section 309 gives the Commission discretion to adopt spectrum management approaches tailored to specific bands.[63] As noted above, we find that our nationwide approach promotes flexible deployments while avoiding interference in a narrow band, and that our license modification process is the least burdensome manner of transitioning to a geographic licensing framework because it will only require one application to transition all site-based licenses to the new nationwide license.[64] Thus, we conclude that this modification process serves the public interest, and we anticipate that this process will result in a seamless transition without disruptions to service for AURA or significant administrative burdens.

29. *Band-Specific Eligibility Criteria and Certifications.* In order to effectuate the nationwide approach, we adopt the proposed eligibility criteria for an entity—defined as a "covered

[58] FCC, *FCC Form 605*, https://www.fcc.gov/wireless/support/knowledge-base/fcc-form-605 (last visited October 8, 2026).

[59] In the *AAM NPRM*, the Commission proposed and sought comment on a method for transitioning to a geographic license framework by converting a single incumbent's site-based licenses into a nationwide license. *See AAM NPRM*, 40 FCC Rcd at 753–54, paras. 16, 19. In proposing this approach, the Commission relied on its authority under section 309 of the Communications Act. *See id*. at 754, para. 19. The Commission discussed the similarly tailored transition approach in the 900 MHz broadband proceeding and tentatively concluded that the proposed transition approach is consistent with Commission precedent. *See id*. at 754–55, para. 20.

[60] *See* AURA Comments at 27.

[61] *See AAM NPRM*, 40 FCC Rcd at 754, para. 19; 47 U.S.C. § 309; *see also* AURA Comments at 27 (stating that the modification is "consistent with Commission precedent and [s]ection 309 of the Communications Act").

[62] 47 U.S.C. § 309(j)(6)(E).

[63] *Id.* § 309.

[64] We affirm our tentative conclusion that this modification approach is consistent with Commission precedent in the *900 MHz Report and Order* where the Commission used a similarly tailored transition approach where the incumbents likewise had extensive knowledge of the band's characteristics and usage and were best positioned to negotiate appropriate terms for transitioning the band for a more robust use. *See AAM NPRM*, 40 FCC Rcd at 754–55, para. 20; *Review of the Commission's Rules Governing the 896–901/935–940 MHz Band*, WT Docket No. 17-200, Report and Order, Order of Proposed Modification, and Orders, 35 FCC Rcd 5183, 5203, 5207, 5221, paras. 43, 53, 89 (2020) (*900 MHz Report and Order*). Consistent with the *AAM NPRM*, we adopt rules for the incumbent to convert its existing radiotelephone licenses into a license authorized for radiotelephone and UAS CNPC operations, as well as for other flight safety-related data operations. *See AAM NPRM*, 40 FCC Rcd at 754–55, para. 20.

incumbent"—to qualify for the geographic license with nationwide coverage: (1) it provides coverage at 25,000 feet over CONUS, Alaska, and Hawaii using all available communication frequencies; and (2) the locations of the sites used to provide this coverage prevent the authorization of any other entity to provide contiguous, regional service using multiple communication frequencies.[65] We find that the eligibility criteria ensures expanded operations are expeditiously deployed in this band, putting the spectrum to its highest and most efficient use.[66]

30. We also adopt the proposed Eligibility Certification to demonstrate that a covered incumbent has met the eligibility criteria. [67] We agree with AURA that these criteria will ensure that the covered incumbent is the sole entity operating in the band and find that these two prongs do not place a heavy burden on the covered incumbent and will efficiently show that the applicant has met the criteria.[68] We also adopt an obligation for the applicant to file the Eligibility Certification and coverage map in the Commission's Universal Licensing System (ULS) that demonstrates how the incumbent's site locations and service prevent the authorization of any other entity to provide contiguous, regional service using multiple communication frequencies.[69] Finally, we direct the Bureau to issue a public notice with instructions for how to submit the Eligibility Certification, as a public notice will make this process straightforward and clear for the applicant.

31. *Windfall.* Consistent with the *AAM NPRM*, we conclude that the voluntary transition in the 450 MHz band will not produce undue enrichment to the licensee and, as such, we do not require a windfall payment or holding period.[70] AURA has already devoted significant financial resources to develop technologies and a network in this band, investing $100 million since the Division granted its waiver request in 2021.[71] This financial investment has been used for developing new technologies, constructing sites, deploying radios, designing a patented frequency assignment and network management system, and testing the provided services.[72] We agree with EWA that AURA's ongoing operations in this

[65] *AAM NPRM*, 40 FCC Rcd at 754, para. 18.

[66] Only AURA comments on the proposed eligibility criteria. AURA is in favor of this criteria and notes that it "currently operates in all available frequencies except at three sites, and the remaining frequencies are insufficient for any other operator to build a functional network at any scale." AURA Comments at 27. Further, in the *AAM NPRM*, the Commission stated that it believed that a licensee meeting the proposed covered incumbent criteria will have significant knowledge of the band's characteristics and usage and is best situated to rapidly put the band to a more robust use. *AAM NPRM*, 40 FCC Rcd at 754, para. 18. AURA, as the sole licensee in the 450 MHz band, demonstrates this desired expertise and knowledge that has led to more efficient and productive use of this spectrum.

[67] In the *AAM NPRM*, the Commission proposed that a request to modify a site-based license into the new nationwide license must include, as an attachment, a certification that the applicant has satisfied the eligibility criteria (Eligibility Certification). *See AAM NPRM*, 40 FCC Rcd at 755, para. 21.

[68] AURA is the sole commenter who addresses this proposal and concurs with our proposal to "require a certification consistent with the eligibility criteria," as "[b]oth criteria are designed to ensure that the entity requesting the modification is in fact the only entity that can operate in the band, and the proposed modification will grant AURA and its current and future customers clarity regarding AURA's current and future license rights, thereby enabling AURA to accelerate its investment to meet the needs of advanced aviation nationwide." AURA Comments at 28. To meet the first prong of the covered incumbent criteria, the Commission proposed that the Eligibility Certification must list the licenses and frequencies that the applicant holds in the 450 MHz band to demonstrate that it meets the proposed threshold. *See AAM NPRM*, 40 FCC Rcd at 755, para. 21.

[69] *AAM NPRM*, 40 FCC Rcd at 755, para. 21 (describing how the covered incumbent can meet the second prong).

[70] *AAM NPRM*, 40 FCC Rcd at 755, para. 22.

[71] *See* AURA Comments at 28, 29.

[72] *See id.* at 28.

band will necessitate a continued, substantial investment from AURA.[73] By undertaking this small band of spectrum and developing new technologies, we find that AURA has taken a risk, and its significant investment demonstrates its commitment to providing these services. Since this waiver grant, AURA has been working to maximize the use of this band in an inventive manner, which is crucial to the Commission, as spectrum is a scarce public resource.

32. In addition, we find that the present circumstances are distinguishable from previous situations where the Commission required a windfall payment. First, in past cases, entities required to make such a payment were gaining access to spectrum that was held in Commission inventory and could have been issued to other entities.[74] Here, the white space spectrum gained by the covered incumbent cannot reasonably be made available to others without causing harmful interference to existing operations in the band. Second, the flexibility granted to licensees in the previous cases allowed the new licensees to deploy mobile broadband services for which the value of the spectrum in this new use was more certain.[75] In the present circumstances, the flexibility we are granting is for an emerging service, which will require significant additional capital to ensure the public benefits are realized. Third, we agree with EWA's assertion that mandating such a payment due to a "theoretical increase in the value" of this band is inappropriate because the increased value is ascribed to AURA's own substantial work and efforts.[76] Though we acknowledge FPVFC's concern that the return on investment in this band is unclear, we disagree with its argument that the Commission should own and manage this spectrum due to this unknown return.[77] Finally, the amount of spectrum for which a licensee is granted additional flexibility in this proceeding is substantially less than prior proceedings where windfall payments were required, and it is likely that a windfall payment, if appropriate, would fall below a *de minimis* threshold.[78] Consequently, we decline to require a windfall payment or a holding period.

33. *National Security*. Finally, we note that AURA, the current and sole incumbent licensee in the 450 MHz band, is an American owned company that satisfies our foreign ownership restrictions,[79] is subject to the prohibition on the use of equipment and services that pose unacceptable risks to national security,[80] and must comply with any other FCC national security requirements the Commission adopts going forward. Accordingly, we will continue to monitor whether additional restrictions or conditions are necessary and take action as needed.

[73] *See* EWA Comments at 3. EWA notes how AURA is able to provide a variety of AAM services, including UAS, in this limited 650 kilohertz of spectrum. *See id*.

[74] *900 MHz Report and Order*, 35 FCC Rcd at 5221–22, paras. 90–92.

[75] *Id.* at 5222–23, para. 93.

[76] *See* EWA Comments at 3; *see also* AURA Reply at 11.

[77] *See* FPVFC Comments (arguing that "the FCC should obtain ownership of this spectrum and then manage it themselves"). We note that the Commission is part of the federal government, and Title III of the Communications Act only authorizes the Commission to license non-federal stations. *See Amendment of Part 2 of the Commission's Rules for Federal Earth Stations Communicating With Non-Federal Fixed Satellite Service Space Stations et al.*, ET Docket No. 13-115, Notice of Proposed Rulemaking and Notice of Inquiry, 28 FCC Rcd 6698, 6701, para 8 (2013); 47 U.S.C. § 305.

[78] *See, e.g.*, *900 MHz Report and Order*, 35 FCC Rcd at 5221, para. 89.

[79] *See* AURA Network Systems OpCo, LLC Form 602, ULS File No. 0010154347.

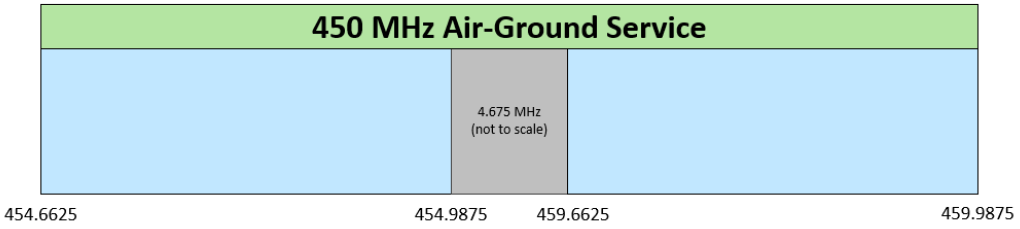
[80] *See* Fact Sheet, FCC, FCC Updates Covered List to Include Foreign UAS and UAS Critical Components on Going Forward Basis (Dec. 22, 2025), https://docs.fcc.gov/public/attachments/DOC-416839A1.pdf.

3. Band Plan

34. Consistent with our proposal in the *AAM NPRM*, we reconfigure the band plan into a single 650 kilohertz nationwide license.[81] Under the Commission's rules, there are 12 communication channel pairs in the 454.700–454.975 MHz and 459.700–459.975 MHz bands for general aviation air-ground use in the 450 MHz band.[82] We find that adopting a single 650 kilohertz nationwide license is in the public interest because a sole licensee and operator in a band have the ability and incentive to manage the internal boundaries between channels in their networks to prevent interference. To maximize use of the band, we also adopt our proposal that the band edge should be the edge of the frequencies in the allocation in footnote NG32 of the U.S. Table, 454.6625–454.9875 MHz and 459.6625–459.9875 MHz, and we adopt standard technical rules to protect adjacent uses as discussed below.[83]

35. As shown in Figure 1 below, we remove the channel pairs in the aviation air-ground service, including the signaling channel pair, and we reconfigure the 450 MHz band plan into a single 650 kilohertz nationwide license, permitting the licensee to channelize within the 650 kilohertz band in a manner it deems appropriate to meet its business and technical objectives.[84]

Figure 1: Band Plan



4. Licensing and Operating Rules

36. *General Eligibility.* Consistent with our proposal in the *AAM NPRM*, we apply the general eligibility standard in part 22 of the Commission's rules to the 450 MHz Air-Ground Service, in addition to the band-specific eligibility criteria discussed above.[85] The standard reads: "Any entity, other than those precluded by section 310 of the Communications Act of 1934, as amended, 47 U.S.C. 310, is eligible to hold a license under this part. Applications are granted only if the applicant is legally, financially, technically and otherwise qualified to render the proposed service."[86] Given our determination above that the newly adopted rules for this service should remain located in part 22,[87] we find that applying the eligibility standard in section 22.7, which applies to all part 22 services, will provide regulatory consistency for the applicant. Further, the applicant meets section 22.7's standard only if the entity has the suitable qualifications to deliver the prospective service, which will ensure that this

[81] *AMM NPRM*, 40 FCC Rcd at 757, para. 27.

[82] *See* 47 CFR § 22.805.

[83] *AAM NPRM*, 40 FCC Rcd at 757, para. 27.

[84] In this Report and Order, we also eliminate the 20 kHz channel requirement in section 22.805. *See infra* para. 77.

[85] *AAM NPRM*, 40 FCC Rcd at 758, para. 28. While the Commission proposed specific eligibility criteria for the covered incumbent to modify one of its site-based licenses into a nationwide license, the Commission proposed and sought comment on maintaining the existing part 22 general eligibility standard for licenses in the 450 MHz band. *See id*. No commenters addressed this proposal.

[86] 47 CFR § 22.7.

[87] *See supra* para. 24.

spectrum is used by a licensee who can render its proposed offering.[88] Accordingly, we apply the eligibility standard in part 22 of the Commission's rules to the 450 MHz Air-Ground Service.

37. *License Term.* We adopt our proposed 15-year license term for the nationwide license.[89] Only AURA comments on this proposal, and it supports a license term of 15 years.[90] Currently, site-based licenses in the band have a license term of 10 years.[91] While this is a beneficial term for site-based licenses, we find that a 15-year term would be beneficial for the 450 MHz Air-Ground Service's nationwide license due to the realities of the aviation industry. As stated by AURA, development of this band will likely entail long timelines, as exemplified by the FAA certification process, potential new site construction, anticipated scaling of this service, and time to recoup the significant investment required.[92] No commenters opposed a 15-year term. Thus, we conclude that a 15-year term is reasonable and adopt this license term.

38. *License Renewal.* Next, the Commission sought comment on the appropriate license renewal requirement for the 450 MHz Air-Ground Service.[93] Currently, 450 MHz band licensees must comply with part 1 of the Commission's rules that generally apply to Public Mobile Services, including renewal.[94] The Commission proposed and sought comment on continuing to require the nationwide licensee to comply with section 1.949 of our rules, which governs applications for renewal of authorization for covered geographic licensees.[95] As noted by AURA, the only commenter to address this proposal, this rule generally applies to a wide variety of services, which provides regulatory harmony because it would align this service's requirements with the other part 22 services.[96] Likewise, this rule will continue to ensure that licensed spectrum is utilized in an efficient manner that serves the public, as the license will be subject to this standard renewal authorization.[97] Therefore, we adopt the proposal for the nationwide licensee to comply with section 1.949.

39. *Partitioning and Disaggregation.* We determine that it is in the public interest to allow partitioning and disaggregation for the 450 MHz band, as proposed in the *AAM NPRM*, and we adopt a modified version of proposed section 22.811.[98] Though we adopt a nationwide approach to licensing this spectrum in order to avoid interference among multiple users and to facilitate the transition, we acknowledge that a licensee may find it efficient to partner with other providers to fully use the spectrum. The Commission's rules generally permit partitioning and disaggregation of licensed spectrum,[99] and we concur with AURA that, in the future, the market may advocate for "more discrete use cases" for utilizing the 450 MHz band.[100] We find that allowing partitioning and disaggregation will foster more intensive

[88] *See* 47 CFR § 22.7.

[89] *See AAM NPRM*, 40 FCC Rcd at 758, para. 30.

[90] AURA Comments at 17.

[91] *See, e.g.*, AURA Network Systems OpCo, LLC, Call Sign WQZP766 (granted June 29, 2017, expiring on June 29, 2027).

[92] *See* AURA Comments at 17.

[93] *AAM NPRM*, 40 FCC Rcd at 758, para. 31.

[94] 47 CFR § 22.801.

[95] *Id.* § 1.949; *AAM NPRM*, 40 FCC Rcd at 758, para. 31.

[96] AURA Comments at 17.

[97] *See id.*

[98] *AAM NPRM*, 40 FCC Rcd at 762, para. 40.

[99] *See* 47 CFR § 1.950.

[100] *See* AURA Comments at 22–23.

use of this spectrum, increase the flexibility of this band, and meet the dynamic needs of the market. Likewise, adopting this proposal promotes uniformity and harmonization because partitioning and disaggregation is a standard practice permitted for spectrum in the Wireless Radio Services under our rules.[101] Therefore, we adopt proposed section 22.811 to permit geographic partitioning and spectrum disaggregation for the 450 MHz band.

40. However, to preserve the benefits of our nationwide licensing approach, and in recognition that this band only contains 650 kilohertz of spectrum, we modify the text of section 22.811 as proposed in the *AAM NPRM* to require a demonstration of how interference will be avoided. Specifically, we agree with EEI that it is reasonable to require the licensee to demonstrate how co-channel and adjacent channel licensees will be protected, if the license is partitioned or disaggregated, and we adopt such a requirement.[102] As part of any partitioning and disaggregation application, the licensees must also describe the service they will provide and how it will satisfy the performance requirements required by this Order for each portion of the resulting license.[103]

41. *Leasing.* We adopt the Commission's proposal to allow spectrum leasing in the 450 MHz band pursuant to part 1 of the Commission's rules and to add UAS CNPC and other flight safety-related data services as an included service in its spectrum leasing rules.[104] We agree with AURA that secondary markets are important for putting spectrum to its highest and best use and that there will be future technological evolution in the 450 MHz band.[105] Leasing is a standard Commission practice, and the licensees of all part 22 services, including general aviation air-ground, are permitted to lease their spectrum under the Commission's rules.[106] By enabling this band of spectrum to be leased, we promote regulatory consistency and uniformity while also harmonizing the new 450 MHz Air-Ground Service with the part 22 services.[107] Additionally, leasing will provide flexibility for the licensee to meet the needs of the market.[108] We also find it serves the public interest to permit a licensee to determine how much spectrum to lease, consistent with the current leasing procedures in the Commission's rules, which will enable flexibility and innovation for the licensee.[109]

42. While we do not implement restrictions on how much spectrum can be leased, we adopt our proposal requiring the lessor to demonstrate how the parties will provide interference protections along the lease boundary and to neighboring operations. Through this demonstration, it will be essential for the parties to make a showing of non-interference, especially when seeking a partial lease, and we will permit the licensee to demonstrate through power flux density limits and strategic site placements how the

[101] *See* 47 CFR § 1.950; AURA Comments at 22–23.

[102] *See* EEI Comments at 7. We note that any criteria in the licensee's demonstration filing will be binding on the parties to the transaction.

[103] Any portion of a partitioned or disaggregated license must proportionally satisfy buildout obligations required by the entire license. To the extent partitioning or potential differences in technology among entities may create buildout challenges, such challenges must be identified at the time the partitioning or disaggregation application is submit and not at a later point when construction requirements are due. This permits the Commission to consider whether or not the partitioning or disaggregation application is in the public interest.

[104] *AAM NPRM*, 40 FCC Rcd at 762, para. 41; *see also* 47 CFR § 1.9005; 47 CFR pt. 1, subpt. X.

[105] AURA Comments at 22–23.

[106] *See* 47 CFR § 1.9005.

[107] *See id.*

[108] *See* AURA Comments at 22–23.

[109] *See* 47 CFR pt. 1, subpt. X. We agree with EEI that the nationwide licensee should not be required to lease all of the spectrum in the 450 MHz band. *See* EEI Comments at 7.

parties will provide interference protections. We agree with EEI that the results of this demonstration should be binding on the parties.[110]

43. When reviewing lease applications, the Wireless Telecommunications Bureau will evaluate the provided demonstration and will determine whether the lease is in the public interest.[111] Because this band is now allocated for AM(R)S, a safety-of-life service, ensuring that there will be no interference to operations within or adjacent to the band will be a significant factor.

44. *General Applicability of Other Part 22 and Part 1 Rules.* The Commission proposed that the nationwide licensee in the 450 MHz band should be governed by licensing and operating rules that are applicable to all part 22 services, including foreign ownership[112] and permanent discontinuance of operations,[113] and sought comment on this proposal.[114] Likewise, it proposed to retain existing station identification rules for general aviation air-ground stations (ground and mobile) and not to require station identification for ground and mobile stations providing UAS CNPC.[115] The Commission also asked commenters to identify any aspects of our general part 22 and part 1 service rules that should be modified to accommodate the particular characteristics of the 450 MHz band.[116]

45. AURA is the sole commenter to discuss this proposal. Generally, AURA "supports the application of other [p]art 22 rules and identifies [] additional rule changes that would be consistent with the Commission's proposals in" the *AAM NPRM*.[117] However, AURA suggests revising our rules to clarify which ones would apply to the 450 MHz Air-Ground Service by consolidating these rules at AURA's proposed section 22.883 *et al.*[118] AURA reasons that this consolidation is appropriate due to the nature of the new rules and that the Commission must preserve the current rules for the general aviation air-ground service in case the licenses are not modified.[119]

46. We find it reasonable to expect that the nationwide licensee in the 450 MHz band is aware of, and compliant with, all part 22 licensing and operating rules applicable to its service offering. Accordingly, we make clear that the 450 MHz Air-Ground Service is governed by licensing and operating rules that are applicable to all part 22 services.[120] We also agree with AURA's suggestion to organize part 22 rules in a way that distinguishes legacy rules from new rules in case the licenses are not modified,[121] and, accordingly, we include the rules for the 450 MHz Air-Ground Service in a separate section.[122]

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[110] *See* EEI Comments at 7.

[111] While we did not receive direct comments about factors to consider reviewing a lease application, EEI generally advocates for "reasonable terms and conditions," EEI Comments at 7, and AURA recommends using the current leasing procedures "without further Commission action to update or modify any rules." AURA Comments at 22–23.

[112] 47 U.S.C. § 310; 47 CFR § 22.5.

[113] 47 CFR § 1.953.

[114] *AAM NPRM*, 40 FCC Rcd at 762, para. 42.

[115] *Id.*; 47 CFR § 22.313(a).

[116] *AAM NPRM*, 40 FCC Rcd at 762, para. 42.

[117] AURA Comments at 23; *see id.* at Appx. A (AURA Amended Proposed Rules).

[118] AURA Comments at 23; *see id.* at Appx. A (AURA Amended Proposed Rules).

[119] AURA Comments at 23.

[120] *See* 47 CFR § 22.801; *see also infra* Appx. A.

[121] AURA Comments at 23; *see id.* at Appx. A (AURA Amended Proposed Rules).

[122] The provisions of sections 22.805 through 22.817 and 1.1929(e)(1) shall apply only to individual ground station communication channel authorizations issued under this subpart. In the event that a covered incumbent seeking the (continued….)

47. We also retain the existing station identification rules for general aviation air-ground stations, and we do not require station identification for ground and mobile stations providing UAS CNPC or other flight safety-related data services. While no commenters address this proposal, the FAA rules presently regulate remote identification of UAS, so the Commission proposed not to adopt duplicative rules.[123] Therefore, we find that it is sensible for operators to rely on the FAA's regulations for this station identification for ground and mobile stations providing UAS CNPC. Accordingly, we adopt these proposals.

48. *Prioritization*. In the *AAM NPRM*, the Commission noted that NPSTC does not believe UAS CNPC operations will cause interference to nearby public safety operations.[124] The Commission asked commenters that disagree with NPSTC's conclusion to discuss what measures would protect public safety from interference would lead to fast resolution of interference complaints if they occur.[125] In response, AIRT proposes that we designate public safety as a priority user category in the 450 MHz band.[126] AIRT asserts that it is critical for public safety entities to be recognized as "primary stakeholders" in this band and asserts that access for public safety "will directly contribute to safer, more efficient emergency response capabilities across the nation."[127] AURA does not comment directly on this proposal but indirectly addresses it by saying that "[o]ther proposals would destroy value and create unnecessary delay to any future expanded use of this spectrum, with no countervailing public interest benefits."[128] Additionally, NPSTC recommends that UAS CNPC operated by public safety entities is made "an allowable use of the spectrum under AURA's license."[129]

49. We agree with AIRT that the 450 MHz band will be important for public safety entities and, given scarcity of UAS-specific spectrum, find AIRT and NPSTC arguments that public safety entities should have access to this band understandable. In the *UAS Report and Order*, the Commission adopted two priorities for public safety in the event of congestion.[130] We believe it is valuable to align the 450 MHz band with the 5 GHz band by adopting a similar prioritization requirement and, accordingly, we establish that to the extent there is an emergency, we will prioritize public safety in a manner that serves the public interest.

50. Given the limited record, we impose this requirement at a high-level, and we expect that, as with other high-level requirements, stakeholders will develop common standards regarding who

(Continued from previous page)
450 MHz Air-Ground Service nationwide license applies to modify one of its site-based licenses into the nationwide license, turns-in its remaining site-based licenses, and the Commission grants the modification, we delegate authority to the Wireless Telecommunication Bureau to announce that all ground station communication channel authorizations have been canceled in connection with the issuance of a nationwide 450 MHz Air-Ground Service authorization under this part and to delete the legacy rules (sections 22.805 through 22.817 as well as 1.929(e)) because they are no longer applicable to the band. Sunsetting the site-based rules after the transition will reduce regulatory burdens and eliminate confusion regarding the continue applicability of rules governing a legacy service that will no longer operate in the band.

[123] *See* 14 CFR §§ 89.105, 89.110, 89.115, 89.305, 89.315.

[124] *AAM NPRM*, 40 FCC Rcd at 764, para. 46.

[125] *Id*.

[126] *See* AIRT Comments at 2–3.

[127] *Id.* at 2, 3. Likewise, AIRT highlights the difficulties for public safety UAS operations because of "spectrum congestion, lack of priority access, and absence of dedicated frequencies optimized for Beyond Visual Line of Sight (BVLOS) and high-reliability communications." *Id.* at 1.

[128] AURA Reply at 10–11.

[129] NPSTC Comments at 3.

[130] *UAS Report and Order*, 39 FCC Rcd at 10054–55, paras. 109–112.

qualifies as public safety entities, what constitutes a triggering emergency, how priority is implemented, and over what period or area such priority rights apply. We limit the requirement to prioritization that is feasible and consistent with the interests of aviation safety, to address the concern that prioritization might itself increase safety risks, for example, if a particular implementation of prioritization would increase the risk of conflicting uses. We provide that, in the event of emergencies, AURA should, to the extent feasible and consistent with the interests of aviation safety, prioritize requests from public safety entities, including federal agencies conducting wildland-fire response, search and rescue, law enforcement, disaster response, and other emergency operations, as well as authorized cooperators and contractors operating under an incident command structure.

5. Performance Requirements

51. We establish performance requirements for the nationwide licensee to ensure that this spectrum is used efficiently and productively.[131] Because of the unique attributes of this service, we adopt performance metrics for deployment at high altitude and medium altitude as well as at low altitude. We also find it appropriate to measure service based on a percentage of the geographic areas over the Continental United States, Alaska, and Hawaii, rather than applying performance metrics on a REAG basis. Further, we adopt 4- and 8-year benchmarks to evaluate and ensure that the licensed spectrum does not lie fallow and provide enforceable penalties for failure to meet the benchmarks. Finally, we adopt compliance procedures for how a licensee can demonstrate it has satisfied the performance requirements.

52. *Performance at Altitude Levels.* In the *AAM NPRM*, the Commission proposed to establish performance metrics for high altitude and low altitude deployments, and the Commission proposed to define high altitude at 25,000 feet, and low altitude at 400 feet.[132] AURA argues that, while its network can provide low-altitude coverage, it anticipates its customer demand will be for flights in controlled airspace primarily at medium and high altitudes between 3,000 feet and 10,000 feet, and that the low altitude benchmark is unnecessary.[133] AURA accordingly urges the adoption of performance metrics to reflect medium- and high-altitude operations.[134] FPVFC requests that we modify the phrase from "at 400 feet" to "below 400 feet."[135]

53. In order to provide the greatest optionality to reflect technological evolution in the band, we adopt performance requirements that can be met by deploying service at high altitude and medium altitude or by deploying service at low altitude, with specific options/metrics described in the next section. For high-altitude deployments, we affirm the Commission's tentative conclusion that providing reliable signal coverage and offering service at 25,000 feet is a reasonable performance metric for such high-altitude service,[136] because the incumbent in the band currently provides service to private aircraft traveling at high altitudes.[137] We also add a performance benchmark for medium-altitude operations (at an altitude of 5,000 feet above sea level), as requested by AURA, to reflect the anticipated service offerings in the band.[138] We acknowledge that AURA's current customer base generally flies between

[131] *See* 47 U.S.C. § 309(j); *AAM NPRM*, 40 FCC Rcd at 759, para. 32.

[132] *AAM NPRM*, 40 FCC Rcd at 759, para. 32.

[133] AURA Comments at 18–19.

[134] *Id*.

[135] FPVFC Comments.

[136] For the medium- and high-altitude definition, we use "above sea level", which is more commonly used in aviation.

[137] Only AURA comments on this proposal, noting that commercial aviation generally flies around 35,000 feet and that some parties have expressed interest in flights above 60,000 feet, including high-altitude platforms. AURA Comments at 18.

[138] AURA Comments at 18.

3,000 and 10,000 feet and find that a medium-altitude benchmark, will better capture where the spectrum will be used.

54. For low-altitude service, we adopt the Commission's proposal to define low-altitude service as providing reliable signal coverage and offering service at 400 feet above ground level.[139] Our performance requirement seeks to ensure there is robust use of the band and, thus, we affirm our tentative conclusion that we should use the altitude at which UAS operators are already flying under FAA regulations. We recognize that AURA does not anticipate significant demand in a low-altitude service and, accordingly, we do not require the licensee to meet low-altitude metrics. However, we include these metrics as an option for meeting performance requirements to capture potential technological advancements and future needs of the industry. In addition, we decline to adopt FPFVC's suggestion to modify "at 400 feet" to "below 400 feet" because our proposed terminology is consistent with FAA regulations.[140]

55. *Geographic Area for Applying Performance Requirements*. The *AAM NPRM* proposed to measure service on a REAG basis to ensure the licensee distributes coverage widely across the United States and its territories.[141] The Commission sought comment pertaining to whether REAGs are sufficient to ensure deployment in rural areas.[142] Two commenters responded with differing views on how to geographically measure performance. AURA recommends that we measure coverage on an aggregate geographic basis across CONUS, Hawaii, and Alaska, instead of measuring service on a REAG basis, and "requiring aggregate coverage over a large percentage of the U.S., Alaska, and Hawaii" to ensure the band is utilized in the most efficient manner possible.[143] In contrast, FPVFC objects to our goal that

[139] We clarify that low altitude is defined as "above ground level" because a measurement based on sea level would be impracticable in areas where terrain elevations exceed 400 feet.

[140] We also do not adopt FPFVC's suggestion to add "44809 recreational operators" to our references to part 107 pilots because these rules are under the jurisdiction of the FAA, and part 107 does not apply to recreational users. *See* FPVFC Comments. A low altitude metric of 400 feet is consistent with FAA regulations. *See* FAA, *Small Unmanned Aircraft Systems (UAS) Regulations (Part 107)* (July 6, 2026), https://www.faa.gov/newsroom/small-unmanned-aircraft-systems-uas-regulations-part-107; *see also* FAA, *UAS Data Exchange (LAANC)*, https://www.faa.gov/uas/getting_started/laanc (last visited Oct. 8, 2026). For example, under part 107, UAS operators are authorized to fly in uncontrolled airspace below 400 feet above the ground (AGL) and in accordance with part 107 of the FAA's rules without specific airspace authorization, whereas part 107 flights in controlled airspace generally require a specific airspace authorization from air traffic control. *See* FAA, *Small Unmanned Aircraft Systems (UAS) Regulations (Part 107)* (July 6, 2026), https://www.faa.gov/newsroom/small-unmanned-aircraft-systems-uas-regulations-part-107. Moreover, under the Low Altitude Authorization and Notification Capability (LAANC) system initiative, UAS operators can apply to LAANC service providers to receive a near real-time airspace authorization for operations at or below 400 feet in controlled airspace around airports. *See* FAA, *UAS Data Exchange (LAANC)*, https://www.faa.gov/uas/getting_started/laanc (last visited Oct. 8, 2026).

[141] *AAM NPRM*, 40 FCC Rcd at 759–60, para. 33. A REAG is a geographic area based on groupings of 172 Economic Areas (EAs) and 4 EA-like areas developed by the Bureau of Economic Analysis of the U.S. Department of Commerce, used to define the coverage of spectrum licenses for certain services. FCC, *Auctions Glossary*, https://www.fcc.gov/auctions/auctions-glossary (last visited Oct. 8, 2026). REAG 1 is the Northeast, REAG 2 is the Southeast, REAG 3 is the Great Lakes, REAG 4 is the Mississippi Valley, REAG 5 is Central, REAG 6 is the West, REAG 7 is Alaska, REAG 8 is Hawaii, REAG 9 is Guam and the Northern Marian Islands, REAG 10 is Puerto Rico and the Virgin Islands, REAG 11 is American Samoa, and REAG 12 is the Gulf of Mexico. A map of the defined REAGs can be found on the Commission's website. FCC, *Regional Economic Area Groupings (REAGs) and Their Constituent MEAs*, https://transition.fcc.gov/oet/info/maps/bea/reagwcsc.pdf (last visited Oct. 8, 2026).

[142] *AAM NPRM*, 40 FCC Rcd at 760, para. 33.

[143] AURA Comments at 21, 22. AURA contends that much of the land mass of Alaska "may never require coverage given the lack of population or other possible business cases necessitating coverage[,]" and that REAGs would be disadvantageous, as "[m]arkets will evolve differently, and building out REAGs where there is no demand would result in significant wasted investment." *Id*.

operations be evenly deployed across the United States and instead argues that operations should be deployed proportionately to the population.[144]

56. After careful review of the record, we decline at this time to measure service based on REAGs. We agree with AURA that imposing substantial coverage requirements on a per REAG basis would potentially require the licensee to invest in infrastructure in areas where there is no demand.[145] Considering not only challenging regions like Alaska, but also vast unpopulated areas in, for example, REAG 4 (the Gulf), REAG 5 (Central United States), and REAG 6 (the West and Northwest United States), such an investment would potentially overburden the licensee at this early stage of technology deployment in the band, and could defeat our goal of expanding UAS operations at a range of altitudes. Therefore, we will forego REAG based metrics and measure service based on a percentage of the geographic areas over the Continental United States, Alaska, and Hawaii.[146] We find that measuring 450 MHz Air Ground service in this way is in the public interest as it will provide the licensee with additional flexibility to explore multiple use cases, while also representing the best approach to ensure that the service is available in the places where people live, work, and travel across the United States and its territories. As previously discussed, the aviation industry is not constrained by borders, and empowering the licensee to deploy operations in areas throughout the country where it is needed most, including rural communities, will ensure that the public interest benefits are best targeted.

57. *Timeframes for Interim and Final Benchmarks*. In the *AAM NPRM*, the Commission reasoned that 4 year and 8 year benchmarks are consistent with performance benchmarks in other services with 15-year license terms, and appropriate when technology for deployment is already available and in the marketplace.[147] Moreover, the Commission tentatively concluded that, given the operational flexibilities afforded to the covered incumbent under the waiver, it will be well-positioned to meet benchmarks of 4 years and 8 years.[148]

58. AURA and EWA address these proposed performance schedules. While AURA initially disagreed with our proposal, suggesting at first that the interim benchmark should be 8 years and the final benchmark should be 15 years,[149] it subsequently modified its proposal to align with the Commission's 4 year interim and 8 year final benchmark proposal.[150] AURA, the sole licensee in the 450 MHz band, maintains that it can meet the 4/8 year deployment schedule provided the Commission gives the licensee a choice between low- and high-altitude performance metrics,[151] which we have done here. Similarly, EWA expresses support for performance requirements inasmuch as they ensure that all spectrum is used

[144] FPVFC Comments.

[145] *See* AURA Comments at 21, 22.

[146] While we do not adopt specific coverage requirements for Puerto Rico, Guam, and the Northern Mariana Islands, we anticipate that the nationwide licensee will be incentivized to either provide service to those areas, or else sell/lease those areas to another interested operator, including local operators.

[147] *See AAM NPRM*, 40 FCC Rcd at 761, para. 37; *Facilitating Shared Use in the 3100–3550 MHz Band*, WT Docket No. 19-348, Second Report and Order, Order on Reconsideration, and Order of Proposed Modification, 36 FCC Rcd 5987, 6030–31, paras. 122, 123 (2021) (*3.45 GHz Band Second R&O*).

[148] *AAM NPRM*, 40 FCC Rcd at 761, para. 37.

[149] AURA Comments at 21.

[150] Letter from Denise Olmsted, SVP of Legal, Compliance & Regulatory, AURA Networks Systems, Inc., to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket No. 24-629, at 3 (filed July 21, 2025) (AURA July 21, 2025 *Ex Parte*).

[151] *See* AURA Reply at 10.

productively.[152] We further find no opposition in the record to our proposed 4 and 8 year deployment schedule. Accordingly, we adopt an interim benchmark at 4 years and a final benchmark at 8 years for both the low and high-altitude options for the 450 MHz Air-Ground Service.

59. *Performance Benchmark Options*. The Commission proposed and sought comment on allowing the licensee to meet the performance requirement through one of two options, each with an interim and final performance requirement:[153]

Figure 2

	Interim Requirement at 4 Years	Final Requirement at 8 Years
Option 1	Service at 25,000 feet above CONUS, Alaska, and Hawaii And Service at 400 feet above 17.5% of each individual REAG	Service at 25,000 feet above CONUS, Alaska, and Hawaii And Service at 400 feet above 35% of each individual REAG
Option 2	Service at 400 feet above 35% of each individual REAG	Service at 400 feet above 70% of each individual REAG

The Commission tentatively concluded that creating the option to meet performance requirements either through a combination of high-altitude and low-altitude service or significant low-altitude service would give the licensee flexibility to meet market demands.[154] The Commission proposed to permit the licensee to make its election at the time it files its Notice of Construction.[155]

60. AURA and EWA encourage us to consider the business and technical realities of the band. For example, EWA advocates for us to "ensure that the requirements are tailored to the practical [and] technical realities of a 650 kHz bandwidth license, which may not be able to achieve ubiquitous nationwide low- and high-altitude coverage."[156] Similarly, AURA provides alternatives to Option 1 by recommending a medium- and high-altitude approach, as opposed to the proposed low- and high-altitude approach, and asserts that these metrics are more tailored to the realities of operations in the band.[157] However, AURA supports the Commission's efforts to "craft[] rules for the 450 MHz band that are flexible enough to meet present and future market demands."[158] It states that, should the Commission

[152] EWA Comments at 3. For the 450 MHz band, in particular, EWA cautions that any performance requirements should be tailored to the technical limitations of a 650 kilohertz bandwidth license, "which may not be able to achieve ubiquitous nationwide low- and high-altitude coverage." *Id*.

[153] *AAM NPRM*, 40 FCC Rcd at 760–61, paras. 34–36.

[154] *Id.* at 760, para. 35.

[155] *Id.*

[156] EWA Comments at 3.

[157] AURA Comments at 18; AURA May 1, 2025 *Ex Parte* at 2. AURA reasons that the proposed benchmarks do not represent the rational use cases for this band given that the band only contains 650 kilohertz of spectrum and contends that high- and medium- altitude flights are best suited for this band because it will provide more flexibility and more efficient use of the band while "avoiding overly burdensome requirements that could hinder investment and deployment." *See* AURA Comments at 18–21; AURA May 1, 2025 *Ex Parte* at 2. As previously stated, AURA has been developing a network for this band for several years and has established a new business plan that it seeks to pursue using this spectrum. It currently provides air-ground service to subscribers at high altitudes, but "its customer base generally flies between 3,000 feet and 10,000 feet," which it anticipates will continue to be true. AURA Reply at 8.

[158] AURA Reply at 9.

adopt AURA's proposed performance requirements, the Commission could also allow a licensee to meet an alternative performance requirement at 400 feet "to address all future use cases, while ensuring a viable service at either low- or medium/high-altitudes."[159]

61. Based on the record, we adjust the proposals in the *AAM NPRM*. We agree with AURA and EWA that it is important to consider the economic and technical realities of providing coverage through the 450 MHz Air-Ground Service and take these realities into account when determining the optimal set of performance metrics for all possible use cases.[160] In particular, we acknowledge the assertion by AURA and EWA that it is not feasible to provide broad coverage of both high-altitude service and low-altitude service because of this band's characteristics, and we agree.[161] The propagation characteristics and limited bandwidth of this spectrum create significant difficulties in developing a network optimized to serve both high-altitude and low-altitude flights, so it is most likely not feasible for a licensee to design such a network, especially with the anticipated rise in small UAS operations around 400 feet.[162] We find that offering two distinct options gives the nationwide licensee greater flexibility. While AURA is the presumptive nationwide licensee, if in the future it decides that it no longer wishes to operate in this band, the successive licensee will choose which of these two attainable options it would like to pursue, which will safeguard this spectrum from lying fallow. Further, these options will ensure that this band is used intensively and productively with an approach best suited for the licensee while avoiding burdensome requirements that could hinder its deployment and operations. Ultimately, we conclude that establishing these options will give the licensee flexibility by enabling the licensee to select an approach that best aligns with its business practice and market demands.

62. AURA is the only commenter in the record to propose specific performance metrics.[163] We find that there is no disagreement in the record regarding AURA's ability to meet the service requirement we have proposed at 25,000 feet and as AURA has proposed at 5,000 feet.[164] Accordingly, we adopt a modified, hybrid high-altitude and medium-altitude performance requirement: at the interim benchmark, we will require service at 25,000 feet above sea level over CONUS and Hawaii and service at 5,000 feet above sea level over 50% of CONUS and Hawaii; and at the final benchmark, we will require service at 25,000 feet above sea level over CONUS and Hawaii, and service at 5,000 feet above sea level over 90% of CONUS and Hawaii. We further agree with AURA that a separate requirement for Alaska designed to ensure coverage "where people live, work, and are most likely to travel"[165] is appropriate given Alaska's "substantial land mass, challenging terrain, and lack of telecom assets across much of the

[159] AURA Reply at 9–10.

[160] AURA Comments at 18; AURA May 1, 2025 *Ex Parte* at 2; EWA Comments at 3.

[161] *See* AURA Reply at 8–9; EWA Comments at 3.

[162] *See* AURA Reply at 8–9; EWA Comments at 3.

[163] In its initial comments, AURA proposed an interim benchmark at 8 years—"coverage of the aggregate geographic area of [the] contiguous United States ("CONUS"), Alaska, and Hawaii of 75% at 25,000 feet and 35% at 5,000 feet[,]" and a final benchmark at 15 years—"coverage of the aggregate geographic area of CONUS, Alaska, and Hawaii of 85% at 25,000 feet and 70% at 5,000 feet." AURA later modified its approach "to better align[] with the Commission's proposal." Specifically, it recommended an "[i]nterim benchmark at 4 years: i) Service at 25,000 feet above CONUS and Hawaii, and service at 5,000 feet above 50% of CONUS and Hawaii; ii) Service at 25,000 feet above 13% of Alaska[,] and a [f]inal benchmark at 8 years: i) Service at 25,000 feet above CONUS and Hawaii, and service at 5,000 feet above 90% of CONUS and Hawaii; ii) Service at 25,000 feet above 25% of Alaska." AURA July 21, 2025 *Ex Parte* at 3. Because AURA anticipates that its customer base will generally fly aircraft between 3,000 and 10,000 feet, it did not propose performance metrics at 400 feet, and no other commenter addressed performance metrics at 400 feet.

[164] *Id*. at 3.

[165] *Id*.

state[.]"[166] We therefore adopt AURA's proposal specifying a separate performance requirement for Alaska as part of our high-altitude performance requirement, i.e., service at 25,000 feet above sea level over 13% of Alaska for the interim requirement, and service at 25,000 feet above sea level over 25% of Alaska for the final requirement.

63. There is also no meaningful opposition in the record regarding our proposed low-altitude option. While AURA expresses concern that attempting to meet the demands of both high- and low-altitude aircraft simultaneously with only 650 kilohertz of spectrum would render service "non-viable" at all altitudes,[167] it nevertheless concedes that crafting the rule with a low-altitude alternative metric "could ensure that the rules are sufficiently flexible to address all future use cases[.]"[168] Accordingly, we adopt a separate low-altitude option: service at 400 feet above ground level over 35% of CONUS and Hawaii for the interim requirement and service at 400 feet above ground level over 70% of CONUS and Hawaii for the final requirement. We also adopt a separate service requirement for Alaska as part of our 400 feet low-altitude performance requirement that, again acknowledging Alaska's challenging topography and land mass and its relative lack of wireless infrastructure, is proportional to the reduced coverage requirement at high altitude. Specifically, we adopt AURA's proposal to require service at 400 feet above ground level over 9% of Alaska for the interim requirement and service at 400 feet above ground level over 19% of Alaska for the final requirement.

64. We also affirm our tentative conclusion that our adopted performance metrics will ensure reliable signal coverage at a range of altitudes at which UAS and AAM currently operate and are expected to operate in the future. These industries are rapidly evolving, and implementing options with a range of altitudes will enable the licensee to select the approach that is best suited for its business and for market demands while delivering distinct avenues for the provision of UAS and AAM services. Accordingly, in an effort to provide the nationwide licensee with operational flexibility while ensuring robust service, we adopt two distinct options for the licensee to meet the performance requirements, as shown below in Figure 2.

65. We also find that it is appropriate to permit the licensee to make its election of a performance option at the time the licensee files its Notice of Construction. No party commented on this proposal, but we believe that it will provide the licensee flexibility that accounts for the economic, technical, and logistical realities of developing the 450 MHz Air-Ground Service. We depict our adopted deployment schedule and both low and high-altitude performance options below in Figure 3.

[166] *Id*.

[167] *See id.* at 2.

[168] AURA Reply at 10.

Figure 3

	Interim Requirement at 4 Years	Final Requirement at 8 Years
Option 1	Service at 25,000 feet above sea level over 100% of CONUS and Hawaii, and Service at 25,000 feet above sea level over 13% of Alaska, and Service at 5,000 feet above sea level over 50% of CONUS and Hawaii	Service at 25,000 feet above sea level over 100% of CONUS and Hawaii, and Service at 25,000 feet above sea level over 25% Alaska, and Service at 5,000 feet above sea level over 90% of CONUS and Hawaii
Option 2	Service at 400 feet above ground level over 35% of CONUS and Hawaii, and Service at 400 feet above ground level over 9% of Alaska	Service at 400 feet above ground level over 70% of CONUS and Hawaii, and Service at 400 feet above ground level over 19% of Alaska

66. *Failure to Meet Performance Requirements.* Along with performance benchmarks, the Commission proposed and sought comment on adopting meaningful and enforceable penalties for failure to meet the benchmarks.[169] Specifically, the Commission proposed that, in the event the nationwide licensee fails to meet the first performance benchmark in any REAG, the licensee's second benchmark and license term would be reduced by 2 years, thereby requiring it to meet the second performance benchmark 2 years sooner (at 6 years into the license term) and reducing its license term to 13 years.[170] Then, the Commission proposed that if the nationwide licensee fails to meet the second performance benchmark in any REAG, its authorization for the license shall terminate automatically without Commission action.[171] AURA is the sole commenter who addresses this proposal and contends that it would be very harmful to this market and its users if the Commission were to terminate the nationwide license due to the licensee's "failure to meet a discrete geographic benchmark, especially given the long aeronautical industry timelines and the potential for variable industry demand across different geographies."[172]

67. Although we decline to measure low-altitude service based on REAGs, as discussed above, we retain the substance of the proposed penalty: (i) in the event the nationwide licensee fails to meet the first performance benchmark in any of the defined metrics,[173] the licensee's second benchmark and license term will be reduced by 2 years, thereby requiring it to meet the second performance benchmark 2 years sooner (at 6 years into the license term) and reducing its license term to 13 years; and

[169] *AAM NPRM*, 40 FCC Rcd at 761, para. 38.

[170] *AAM NPRM*, 40 FCC Rcd at 761, para. 38.

[171] *Id.* The Commission recognized that this proposal could result in a licensee losing the nationwide license due to its failure to meet the performance requirement in one REAG and sought comment on whether this result is appropriate or whether there are other ways to structure performance incentives and penalties to ensure intensive use of this spectrum nationwide at a range of altitudes. *Id.*

[172] AURA Comments at 22.

[173] At the Interim Requirement, for Option 1, the defined metrics are: (1) Service at 25,000 feet above sea level above CONUS and Hawaii, (2) Service at 25,000 feet above sea level above 13% of Alaska, and (3) Service at 5,000 feet above sea level above 50% of CONUS and Hawaii. For Option 2, the defined metrics are: (1) Service at 400 feet above ground level above 35% CONUS and Hawaii, and (2) Service at 400 feet above ground level above 9% Alaska.

(ii) if the nationwide licensee fails to meet the second performance benchmark in any of the defined metrics,[174] its authorization for the license shall terminate automatically without Commission action. While the measurement differs, the principle remains the same: a partial failure impacts the entire license. We are not persuaded by AURA's argument that the variable demands across different geographies and regions should require that we partition our regulation of a nationwide license. We have also acknowledged the different assortment of challenges presented by different geographies by adopting a variety of benchmarks designed to address unique circumstances where they exist (for example, our reduced performance thresholds for the state of Alaska). Therefore, we see no reason to further protect the licensee from hypothetical localized failures.

68. *Compliance Procedures.* The Commission proposed a rule requiring a licensee to submit electronic coverage maps in ULS that accurately depict both the boundaries of the licensed area and the coverage boundaries of the actual area to which the licensee provides service and posed several questions about how the map should be submitted.[175] In demonstrating that it has met its construction requirement, the licensee must describe the service it provides and the technical reasons that service is sufficient such that we should consider the area covered.[176]

69. The Commission also proposed that the covered incumbent must notify the Commission by filing FCC Form 601 when it meets its construction obligations within the construction period.[177] Further, the Commission proposed that the notification must be filed within 15 days of the expiration of the applicable construction period.[178] Finally, the Commission sought comment on whether a covered incumbent has any special or unique issues such that it would require additional time to comply.[179] Only AURA comments on this proposal, and it supports a requirement to file a coverage map.[180] AURA recommends that the coverage map depict "coverage at elevation using real world propagation characteristics relative to [its] technology and the frequency band."[181] AURA did not address the other proposals for this section.

70. We find that our proposal for licensees to submit an electronic coverage map will provide insight and clarity, as these maps will show the coverage provided by the licensee in this band and demonstrate whether the licensee has met the benchmark requirements. Further, this requirement is similar to our compliance rules in the Wireless Radio Service.[182] By implementing a similar requirement for this service, we follow Commission precedent, which harmonizes our rules, provides uniformity, and lessens the regulatory burden for the licensee. Therefore, we adopt a requirement for licensees to submit

[174] At the Final Requirement, for Option 1, the defined metrics are: (1) Service at 25,000 feet above sea level above CONUS and Hawaii, (2) Service at 25,000 feet above sea level above 25% Alaska, and (3) Service at 5,000 feet above sea level above 90% of CONUS and Hawaii. For Option 2, the defined metrics are: (1) Service at 400 feet above ground level above 70% of CONUS and Hawaii, and (2) Service at 400 feet above ground level above 21% of Alaska.

[175] *AAM NPRM*, 40 FCC Rcd at 761–62, para. 39.

[176] For example, with respect to air-ground radiotelephone service to general aviation aircraft, the licensee may enable voice communications using any type of technology that best suits its business and technical needs. However, a licensee that intends to use control and non-payload data communications for uncrewed aircraft systems must comply with the standards referenced in RTCA-DO-406, or subsequent standard adopted by the Commission or on delegated authority, in order to satisfy its construction requirements.

[177] *Id.*

[178] *Id.*

[179] *Id.*

[180] AURA Comments at 22.

[181] *Id.*

[182] 47 CFR § 1.946.

electronic coverage maps into ULS consistent with our proposal above. We also adopt the additional proposals for notifying the Commission through FCC Form 601 and filing within 15 days of the expiration of the applicable construction period. While no commenters address these two proposals, we find that both measures will ensure that the Commission promptly and efficiently obtains the requisite information.

6. Technical Rules

71. In modernizing the technical rules in the 450 MHz band, we seek to encourage efficient use of spectrum resources and promote investment in the band while protecting incumbent operations in adjacent bands. Generally, commenters support these updates to our rules to facilitate UAS operations,[183] and only a few commenters address our specific technical rule proposals.[184]

72. *Power Levels.* In the *AAM NPRM*, the Commission sought comment on the appropriate power levels in the 450 MHz band under the nationwide licensing regime.[185] Section 22.809 establishes a 50-Watt minimum effective radiated power requirement for ground station transmitters and a 4-Watt minimum transmitter power output requirement for airborne mobile transmitters.[186] In its Petition for Rulemaking, AURA stated that the radiated power level requirements are "unnecessarily high and inconsistent with current technology,"[187] and no commenters in the record opposed AURA's statement.[188] The Commission noted that the Division previously waived the section 22.809 minimum power requirements so that AURA could operate at power levels consistent with the demands of its ancillary services, including services to UAS, to meet the needs of a broader base of aviation subscribers.[189] In the *AAM NPRM*, the Commission proposed to retain the power level as prescribed by the current rule.[190] The Commission also sought comment on the appropriate power level, whether there should be a peak-to-average ratio (PAR) and, if so, what the PAR should be, and whether the minimum power level in section 22.809 should be eliminated entirely.[191]

73. AURA and EEI responded to these questions. AURA supports the maximum power levels in the Commission's proposed new section 22.813.[192] However, both parties disagree with prescribing minimum power levels for this band. AURA does not support minimum power levels because they are "vestige[s] of older technologies" that are "unnecessary for modern wireless systems."[193] Similarly, EEI believes that removing or lessening the minimum power requirement for airborne mobile transmitters in particular "would provide greater flexibility for UAS designs tailored to specific operational scenarios, especially in the utility sector."[194] AURA also notes the importance of removing the minimum power level for its operations because there will be areas where AURA will densify its sites,

[183] *See, e.g.*, AURA Comments at 24; CDA Comments at 3; NPSTC Comments at 5; NWCC Comments at 3.

[184] *See* AURA Comments at 24–25; EEI Comments at 8; EWA Comments at 2, 4; FPVFC Comments; NWCC Comments at 3; Reliable Robotics Comments at 2.

[185] *AAM NPRM*, 40 FCC Rcd at 763, para. 44.

[186] 47 CFR § 22.809.

[187] AURA Petition at 11.

[188] *See* Docket No. RM-11912 (docket for AURA's 2021 Petition for Rulemaking).

[189] *2021 Waiver Order*, 36 FCC Rcd at 269, para. 17.

[190] *AAM NPRM*, 40 FCC Rcd at 763, para. 44; *see id.* at Appx. A (proposed section 22.813).

[191] *AAM NPRM*, 40 FCC Rcd at 763, para. 44.

[192] AURA Comments at 24.

[193] *Id.*

[194] EEI Comments at 8.

which will necessitate operation at lower power levels to minimize co-channel interference.[195] Further, AURA states that eliminating the minimum power level would "enable AURA to operate at power levels that will depend on the applications and use cases and, thus, would improve frequency utilization."[196]

74. We adopt our proposed maximum power requirements: the ERP of ground station transmitters must not exceed 100 Watts and the transmitter power output of airborne mobile transmitters must not exceed 25 Watts.[197] However, we find that in this instance, the proposed minimum power levels are unnecessary and constrain the licensee's ability to deploy particular technologies, and we agree with AURA and EEI that there is no reason to implement a minimum power requirement in this case.[198] We agree with AURA that enabling low power levels will be critical to minimizing co-channel interference as it densifies its sites.[199] No commenters addressed whether there should be a PAR, and, therefore, we decline to adopt one for this band.

75. *Channel Plan.* Next, the Commission proposed and sought comment on eliminating the 20 kilohertz channel requirement.[200] Section 22.805 establishes channelization in the 450 MHz band and states that channels in the band have a bandwidth of 20 kilohertz and are designated by their center frequencies in megahertz.[201] In AURA's Petition, it argued that the prescribed channelization is unnecessary because AURA is the only licensee and operator in the band and thus has "the ability and incentive to manage the internal boundaries between these channels in AURA's network to prevent interference."[202] The Commission sought comment on AURA's argument and further reasoned that the AURA Petition record also supported removing internal guard bands because they are unnecessary to safeguard "against intra-network interference when AURA will hold licenses for multiple contiguous channels and this would allow for more efficient use of scarce spectrum."[203] Finally, the Commission did not propose to designate uplink and downlink frequencies in our rules.[204]

76. Only AURA and EEI address this proposal, and both comment in support. AURA agrees with the Commission's decision to not propose a channelization plan or designate uplink and downlink frequencies.[205] Further, AURA considers this to be consistent with the Commission's proposal to have a single band plan.[206] Likewise, EEI is in favor ending channel-by-channel licensing and observes that

[195] AURA Comments at 24.

[196] *Id*.

[197] *AAM NPRM*, 40 FCC Rcd at 763, para. 44; *see id.* at Appx. A (proposed section 22.813).

[198] *See* AURA Comments at 24; EEI Comments at 8.

[199] *See* AURA Comments at 24.

[200] *AAM NPRM*, 40 FCC Rcd at 763–64, para. 45.

[201] 47 CFR § 22.805.

[202] *AAM NPRM*, 40 FCC Rcd at 763–64, para. 45; AURA Petition at 10.

[203] *AAM NPRM*, 40 FCC Rcd at 763–64, para. 45 (internal quotations omitted); EEI Comments, RM-11912, at 7. EEI argues that "[t]he Commission should eliminate guard bands between channels which would allow AURA to operate at power levels consistent with the demand of its service." EEI Comments, RM-11912, at 7.

[204] *AAM NPRM*, 40 FCC Rcd at 763–64, para. 45. We note, however, that the 450 MHz Air-Ground Service licensee would be required to comply with the 2013 Statement of Intent between the United States and the Department of Industry of Canada, which imposes certain technical restrictions, including narrowband channels, uplink and downlink designations, station locations, and frequency availability, within the designated Sharing Zone. *See* Letter from Roger S. Noel, Chief, Mobility Division, Wireless Telecommunications Bureau, to Albert Gencarella, President, Stratophone, LLC, and Michael R. Carper, Senior Vice President Corporate Development, SkyTel Spectrum, LLC, ULS File No. 0004552869 (WTB-MD July 27, 2016).

[205] AURA Comments at 24.

[206] *Id.*

AURA is able to utilize the entire band once operational, which makes individual channel licensing obsolete and burdensome.[207] EEI also advocates for eliminating the guard bands between channels, as this would permit the incumbent to use the band more efficiently and operate at power levels appropriate for UAS CNPC.[208]

77. We agree with AURA and EWA's comments and find it in the public interest to not include the 20 kilohertz channel requirement prescribed by section 22.805 in the new 450 MHz Air-Ground Service because it will provide the nationwide licensee with more flexibility and efficiency in operating the band.[209] Not implementing this channelization will maximize the benefits of this spectrum because it allows the licensee to use the band in a manner that is best suited for its operational needs without constraining the licensee to set channels. As previously stated, the licensee will have significant expertise of this band and serve as the sole nationwide licensee; thus, the licensee will possess the best understanding of how to channelize the band without causing interference to itself. We do not desire to be overly prescriptive and seek to authorize the licensee to use this band in the most efficient manner possible, especially due to the limited bandwidth of this spectrum.

78. *Out-of-Band Emissions.* In the *AAM NPRM*, the Commission proposed and sought comment on the appropriate out-of-band emissions (OOBE) requirements that would protect services in adjacent bands while still allowing full commercial use in the 450 MHz band.[210] The Commission also proposed to extend the band to the edge of the allocation, (454.6625–454.9875 MHz and 459.6625–459.9875), and to apply the OOBE limit at the edge of the allocation.[211] The Commission sought comment, however, on whether it should continue to apply the OOBE limit at the legacy band edge or at the edge of the allocated band.[212] AURA is the only commenter to address the Commission's proposed OOBE limit. It agrees generally that the existing emission limit of 43 + 10 log (P) dB will sufficiently protect neighboring operations.[213] Likewise, AURA concurs with NPSTC's comments in response to AURA's Petition for Rulemaking that interference to public safety channels in this band would be unlikely.[214] AURA supports our proposal that the OOBE limit be set at 454.6625–454.9875 MHz and 459.6625–459.9875 MHz rather than at the legacy band edge.[215] No commenters in the record oppose our proposed OOBE limit or contradict AURA's justifications in support.

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[207] EEI Comments at 8.

[208] *See id*.

[209] *See* AURA Comments at 24; *see also supra* n.122 (describing conditions for sunsetting 47 CFR § 22.805).

[210] *AAM NPRM*, 40 FCC Rcd at 764, para. 46. Under the current rules, the band is made up of 13 channels. *Id.*; 47 CFR § 805. The channels have a bandwidth of 20 kilohertz and are designated by their center frequencies in megahertz. 47 CFR §§ 22.99, 22.805. The authorized operating frequency range is measured from the last channel at either edge of the band. *See id.* § 22.805. Therefore, the existing band edges, which we also refer to as "legacy band edges" are 454.665, 454.985 MHz, 459.665, and 459.985 MHz. *See AAM NPRM*, 40 FCC Rcd at 764, para. 46. The existing OOBE limit in our rules protects neighboring operations by applying 43 + 10 log (P) dB at the edge of the last channel at the legacy band edges. *See id.*

[211] *AAM NPRM*, 40 FCC Rcd at 764, para. 46.

[212] *Id.* at 764, para. 46; *id.* at Appx. A.

[213] *See* AURA Comments at 25.

[214] AURA Comments at 10. In the *AAM NPRM*, the Commission noted NPSTC's statement that it "analyzed [AURA's] waiver request and based on the proximity of the AGRAS channels to public safety channels in the 450-470 MHz band, determined that interference would be unlikely, a key element for NPSTC's support." *AAM NPRM*, 40 FCC Rcd at 750, para. 12 (internal quotations omitted).

[215] AURA Comments at 25. AURA reasons that this measure "will allow the use of the 2.5 kilohertz guard bands on either side of the band for filter roll-off." *Id*.

79. The Commission also sought comment on whether 100 kilohertz would be an appropriate measurement bandwidth for the 450 MHz band.[216] Again, AURA is the only commenter in the record to address measurement bandwidth. It offers that "the measurement bandwidth of 100 kilohertz will be suitable beyond the adjacent 1 megahertz bands[,]"[217] but it recommends a narrower measurement bandwidth for the immediately adjacent bands, specifically arguing that "the measurement bandwidth [should] be explicitly defined as 200 hertz in the 1 megahertz bands immediately adjacent above and below the 450 MHz band (*i.e.*, 1% of the 20 kilohertz channel bandwidths that were historically used in this band)[.]"[218]

80. Given the absence of objection in the record regarding OOBE requirements, we conclude that our proposal to apply 43 + 10 log (P) dB at the edge of the allocation (454.6625–454.9875 MHz and 459.6625–459.9875 MHz) is sufficient to protect neighboring operations, and we adopt this OOBE requirement pursuant to our proposal in the *AAM NPRM*. We further adopt a 100 kilohertz measurement bandwidth for the 450 MHz Air-Ground Service. We agree that AURA's recommended approach to a measurement bandwidth in the 450 MHz band would not increase the risk of interference to adjacent channels. We find that its proposed application is an extrapolation of what is already permitted by the measurement procedures in part 22 of our rules.[219] Indeed, we note that ITU-R Regulations for out-of-band measurements in the 30 MHz–1 GHz band require a 100 kilohertz measurement bandwidth.[220] We decline to explicitly define the measurement bandwidth as 200 hertz in the 1 megahertz bands immediately adjacent to 450 MHz band because our rules already permit narrower resolution bandwidths intended to improve measurement accuracy.[221]

81. *Channel Siting.* The Commission also proposed to eliminate the channel siting requirement in our rules,[222] reasoning that the channel siting criteria will no longer be necessary under a nationwide licensing framework because there will be no co-channel licensees that require harmful interference protection within the 450 MHz band.[223] Further, the Commission proposed to remove the rules assigning channel pairs because it determined that the underlying purpose of these rules is no longer served with a nationwide license.[224] Given the proposal to eliminate the technical channel assignment criteria set forth in section 22.813, the Commission also proposed to eliminate section 1.929(e), which

[216] *AAM NPRM*, 40 FCC Rcd at 764, para. 46.

[217] AURA Comments at 25.

[218] *Id*. AURA contends that "adopting a narrower measurement bandwidth provides a better and more accurate test of the unwanted emissions into the adjacent bands[,]" "allow[s] better distinction between the very close channels[,]" and "would not in any way increase the risk of interference to adjacent channels versus a 100 kilohertz measurement bandwidth." AURA July 21, 2025 *Ex Parte* at 4.

[219] *See* 47 CFR § 22.861(b) ("***Measurement procedure.*** Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. *A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy* provided the measured power is integrated over the full required measurement bandwidth (*i.e.*, 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.") (second emphasis added).

[220] *See* ITU Radio Regulations, Recommendation ITU-R SM.329-13 (Sept. 2024).

[221] *See* 47 CFR § 861(b).

[222] *See AAM NPRM*, 40 FCC Rcd at 764–65, para. 47; *see also* 47 CFR § 22.813(a), (b).

[223] *AAM NPRM*, 40 FCC Rcd at 764–65, para. 47.

[224] *Id.* Section 22.817(f) of our rules limits carriers to six channel assignments in a given 350-kilometer area. *See* 47 CFR § 22.817(f).

designates a request to relocate an existing ground station as a major modification.[225] The Commission sought comment on each of these proposals.[226]

82. Commenters mainly address the proposal to eliminate the channel siting requirements, with EWA, AURA, and EEI in support of this proposal. First, EWA strongly agrees with our proposal to remove the channel siting requirements in sections 22.813 and 22.817 and reasons that these rules "have no practical purpose today given AURA's position in the band and would have no relevance in a nationwide geographic licensing framework."[227] Likewise, AURA contends that the channel siting requirements are unnecessary and inconsequential because these requirements serve a site-based licensing regime while the nationwide licensee will not register individual site locations.[228] Therefore, AURA asserts that we should provide the nationwide licensee with maximal flexibility.[229] Finally, EEI advocates for allowing "ground-based transmitters to be located less than 80 kilometers apart" and asserts that the risk of harmful interference is insignificant due to AURA holding a nationwide license.[230]

83. Based on the record, we adopt our proposal to not apply the channel siting requirements for the 450 MHz Air-Ground Service.[231] We agree with commenters above that the channel siting requirements are irrelevant in light of the new nationwide license. The nationwide licensee will hold the sole license in the 450 MHz band, and can manage its own system to avoid harmful interference to its own operations since the licensee possesses significant expertise and knowledge of the band. By not applying these rules to the 450 MHz Air-Ground Service, we remove unnecessary technological restraints, reduce administrative burdens, enable more robust use of this spectrum, and afford the licensee more flexibility.

84. *Transmitter Locations.* Our rules afford Public Mobile licensees authority to operate an array of transmitters, including signal boosters, on their licensed spectrum without prior Commission approval if certain conditions are met.[232] In the *AAM NPRM*, the Commission proposed and sought comment on retaining the transmitter location rules for the 450 MHz Air-Ground Service.[233] The Commission tentatively concluded that retaining the transmitter location rules provides the licensee flexibility and sought comment on this tentative conclusion.[234] Further, the Commission proposed and sought comment on applying this rule to licensees that acquire their licenses through partitioning or disaggregation.[235] AURA is the sole commenter who addresses this rule and recommends that we eliminate it because the licensee with a single geographic area license would not be registering individual site locations and maximum flexibility is required to locate antennas within the license area.[236] We agree

[225] *AAM NPRM*, 40 FCC Rcd at 765, para. 47; 47 CFR § 1.929(e)(1).

[226] *AAM NPRM*, 40 FCC Rcd at 765, para. 47.

[227] EWA Comments at 4.

[228] AURA Comments at 25.

[229] *See id.*

[230] EEI Comments at 8.

[231] Because we do not apply the channel siting requirement, we also adopt the Commission's proposal to remove section 1.929(e)(1).

[232] *See* 47 CFR § 22.165 (providing that "[a] licensee may operate additional transmitters at additional locations on the same channel or channel block as its existing system without obtaining prior Commission approval" subject to certain conditions).

[233] *AAM NPRM*, 40 FCC Rcd at 765, para. 48.

[234] *Id.*

[235] *Id.*

[236] AURA Comments at 25.

with AURA that this rule is now unnecessary, as we have adopted a nationwide license, and do not retain it for the 450 MHz Air-Ground Service.

85. *General Part 22 Rules.* Next, the Commission proposed and sought comment on applying general part 22 rules to the 450 MHz Air-Ground Service.[237] The additional technical rules applicable to all part 22 services include 22.377 (Certification of transmitters) and 22.383 (In-building radiation systems).[238] The Commission also proposed and sought comment on applying these rules to licensees that acquire their licenses through partitioning or disaggregation.[239] While we received no comments pertaining to these rules, we determine that it is beneficial to adopt both of these proposals. The 450 MHz Air-Ground Service rules will be located in part 22. Because the rules listed above apply to all part 22 services, we find it to be in the public interest to apply these rules to the 450 MHz Air-Ground Service. Sections 22.377 and 22.383 encompass certification and compliance obligations as well as operation protocol for part 22 licensees. Application of these general rules will harmonize our part 22 rules and provide consistency and uniformity.

86. *International Coordination.* Current operations in the 450 MHz band are in accordance with an August 2013 Statement of Intent signed by the United States and Canada that established a Sharing Zone in which each country has 6 of the 12 communications channels designated for its primary use.[240] Part 22 of our rules also contains an international coordination rule.[241] While the Commission designed the proposed rules to provide operational flexibility, it recognized that the Sharing Zone stems from our Statement of Intent with Canada.[242] The Commission stated that any rules adopted stemming from the *AAM NPRM* would be subject to current and future international agreements and that nothing in the *AAM NPRM* was meant to conflict with any international agreements in place.[243] The nationwide licensee must continue to comply with the Sharing Zone and any other relevant international coordination agreements.[244] The Commission sought comment on how to ensure the nationwide licensee is in compliance with international agreements.[245]

87. Only AURA addresses international coordination, and AURA expressed its commitment to adhering to the international coordination rule and existing Sharing Zone.[246] AURA contends that the Commission's rule itself should be sufficient to ensure that operations do not breach international

[237] *AAM NPRM*, 40 FCC Rcd at 765, para. 49. While the Commission sought comment on applying 47 CFR §§ 22.365 and 22.379, we note that the Commission repealed these sections, pursuant to direct final rule. *See Delete Delete Delete,* GN Docket No. 25-133, Direct Final Rule, 40 FCC Rcd 8686, 8692, 8701 (2025) (*Direct Final Rule*).

[238] 47 CFR §§ 22.377, 22.383.

[239] *AAM NPRM*, 40 FCC Rcd at 765, para. 49.

[240] *See* Letter from Roger S. Noel, Chief, Mobility Division, Wireless Telecommunications Bureau, to Albert Gencarella, President, Stratophone, LLC, and Michael R. Carper, Senior Vice President Corporate Development, SkyTel Spectrum, LLC, ULS File No. 0004552869 (WTB-MD July 27, 2016); *2021 Waiver Order*, 36 FCC Rcd at 263, para. 84; *see also* Statement of Intent of the Federal Communications Commission of the United States of America and the Department of Industry of Canada Related to the Sharing and Use of the Frequency Bands 454.6625–454.9875 MHz and 459.6625–459.9875 MHz for Mobile and Fixed Services Along the United States-Canada Border, https://transition.fcc.gov/ib/sand/agree/files/Statement_of_Intent.pdf (last visited Oct. 8, 2026).

[241] 47 CFR § 22.169.

[242] *AAM NPRM*, 40 FCC Rcd at 765–66, para. 50.

[243] *Id.*

[244] *Id.*

[245] *Id.*

[246] AURA Comments at 25.

agreements.[247] Finally, AURA notes that, in the future,"[t]he existing Sharing Zone should be addressed through bi-lateral negotiations" and that this "could make additional channels available for domestic use."[248] We agree with AURA that section 22.169 of the Commission's rules will ensure that operations in the 450 MHz band will not violate any international agreements.[249] Under section 22.169, part 22 operations and channel assignments "are subject to the applicable provisions and requirements of treaties and other international agreements between" the federal government and the governments of Canada and Mexico.[250] Because this rule now applies to the 450 MHz Air-Ground Service as a part 22 service, the nationwide licensee must adhere to it.

88. *RTCA Standards.* The Radio Technical Commission for Aeronautics (RTCA) is a standards development organization that works with the FAA to develop standards that can be used as a means of compliance with FAA regulations.[251] In other proceedings, the Commission has adopted RTCA standards when they align with the goals of the proceeding and the service.[252] Thus, the Commission sought comment on incorporating the RTCA standards into our rules for the 450 MHz Air-Ground Service.[253] The Commission also sought comment on whether, in the event the standards are adopted, its requirements will be consistent with the general aviation air-ground technical requirements as the Commission proposed to amend them, and if not, what revisions if any should the Commission adopt to accommodate the standard among other incorporation questions.[254]

89. A few commenters address our questions on the RTCA standards. AURA supports incorporating RTCA standards but expresses concern about how quickly the Commission's rules could be revised to reflect the updated RTCA standards, which, it asserts, are generally updated more frequently than the Commission's rules.[255] AURA asks us to "at most" implement "a rule that requires compliance with 'relevant industry standards,' but leave the specific standards open-ended."[256] Similarly, Reliable Robotics supports the reliance on DO-406 as a standard for airborne radios operating in the 450 MHz band, highlights RTCA's long-term success in effectively crafting standards based on industry consensus, and argues that "[l]everaging existing work that RTCA has completed on DO-406 will accelerate the utilization of the 450 MHz band for UAS operations."[257] FPVFC requests that the Commission supply DO-406 to the public for free for public comment.[258]

90. In fall 2024, RTCA approved DO-406 for UAS, and these standards were published for industry stakeholders to purchase.[259] Based on the record, we find it in the public interest to incorporate

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[247] *Id.*

[248] *Id.* at 25–26.

[249] *Id.* at 25; 47 CFR § 22.169.

[250] *Id.*

[251] *See* RTCA, *About Us*, https://www.rtca.org/about/ (last visited Oct. 8, 2026); RTCA, *Standards*, https://www.rtca.org/standards/ (last visited Oct. 8, 2026).

[252] *See, e.g.*, *UAS Report and Order*, 39 FCC Rcd at 10029, para. 54 (incorporating by reference RTCA DO-362A standards).

[253] *AAM NPRM*, 40 FCC Rcd at 766, para. 51.

[254] *Id.*

[255] AURA Comments at 26.

[256] *Id.*

[257] Reliable Robotics Comments at 2.

[258] FPVFC Comments.

[259] Special Committee 228, RTCA, *DO-406—Minimum Operational Performance Standards for Ultra High Frequency Airborne Radio Systems Supporting UAS C2 Link Systems* (Sept. 26, 2024) (RTCA DO-406),

(continued….)

by reference the DO-406 standard into our rules. DO-406 provides minimum performance standards for airborne radio systems that support UAS CNPC links in the relevant spectrum.[260] We find that the uniform support in the record for reliance on DO-406, including from the sole incumbent licensee, coupled with the allocated aviation use of the band supports our conclusion that incorporating DO-406's requirements into our rules will facilitate rapid deployment of 450 MHz services.

91. New section 22.837 of the Commission's rules references DO-406 and applies it to the 450 MHz Air-Ground Service.[261] We do not adopt FPVFC's suggestion to provide DO-406 to the public for free.[262] However, we make available the standards for public inspection at the Commission and the National Archives and Records Administration.[263] Further, we decline to adopt AURA's recommendation to incorporate the RTCA standards without referencing the specific standard in our rules; however, we seek to simplify how this rule will be revised through a delegated authority process. RTCA standards are often updated more frequently than the Commission's rules, and we anticipate that our rules will need to be amended in the future to ensure that the most relevant and current standards apply to the 450 MHz Air-Ground Service. To facilitate expedited revisions to our technical rules based on evolving technical standards, we find it in the public interest to delegate joint rulemaking authority to the Bureau and Office of Engineering and Technology to incorporate into the Commission's rules, after notice and an opportunity for public comment if necessary or appropriate, any updated version of a previously incorporated technical standard applicable to UAS operations for the 450 MHz Air-Ground Service.[264]

7. Temporary Filing Freeze on 450 MHz Band Applications

92. As noted above, the Bureau announced a freeze on the acceptance and processing of new applications to conduct part 22 general aviation air-ground service operations in the 450 MHz band effective January 17, 2025.[265] The Commission implemented a freeze to maintain the existing licensing landscape in this band and to allow the incumbent licensee to submit necessary filings while considering potential amendments to its rules that would permit new operations.[266] Because we adopt this *Report and Order*, we find that it is no longer necessary to preserve this freeze.

III. UAS DETECTION IN THE 24.45–24.65 GHZ BAND

93. The *Airspace Sovereignty Executive Order*, released June 6, 2025, provides that "[i]t is the policy of the United States to ensure control over our national airspace and to protect the public, critical infrastructure, mass gathering events, and military and sensitive government installations and

(Continued from previous page)
https://my.rtca.org/productdetails?id=a1BPP0000082GDl2AM (last visited Oct. 8, 2026); Commercial UAV News, *AURA Networks and the Secret Sauce That Would Enable BVLOS Flights* (Oct. 4, 2024), https://www.commercialuavnews.com/aura-networks-and-the-secret-sauce-that-would-enable-bvlos-flights (last visited Oct. 8, 2026).

[260] *See* Special Committee 228, RTCA, DO-406—Minimum Operational Performance Standards for Ultra High Frequency Airborne Radio Systems Supporting UAS C2 Link Systems (Sept. 26, 2024).

[261] *See infra* Appx. A (new section 22.837) (incorporating DO-406 into our rules for the 450 MHz Air-Ground Service).

[262] We regularly rely on private entities, like RTCA, to develop standards that industry stakeholders can utilize for their operations, and these private entities charge a fee for obtaining the standards. *See, e.g.*, *UAS Report and Order*, 39 FCC Rcd at 10028–32, paras. 52–59.

[263] *See infra* Appx. A (new section 22.837).

[264] *Cf. UAS Report and Order*, 39 FCC Rcd at 10036–37, paras. 67–68.

[265] *See supra* para. 11; *see also 2025 Freeze Public Notice*, 40 FCC Rcd at 331.

[266] *2025 Freeze Public Notice*, 40 FCC Rcd at 331.

operations from threats posed by the careless or unlawful use of UAS."[267] As the Executive Order recognizes, one critical resource to counter such threats is technology enabling UAS detection and tracking.[268] Consistent with the policy established in the Executive Order, we now make the 24.45–24.65 GHz band available for federal and non-federal radiolocation operations, including UAS detection, to help ensure American sovereignty over its airspace and to protect the Nation from the malicious and rogue use of drones.

A. Background

94. Radiodetermination—the determination of the position, velocity, and/or other characteristics of an object, or the obtaining of information relating to these parameters, by means of the propagation properties of radio waves—consists of radionavigation, which is radiodetermination for the purposes of navigation (including obstruction warning), and radiolocation, which is radiodetermination for purposes other than radionavigation.[269] The 24.45–24.65 GHz band is currently allocated to federal and non-federal inter-satellite and radionavigation services.[270] Radiolocation currently is not authorized in the band.

95. The adjacent 24.25–24.45 GHz band is allocated for non-federal fixed and mobile services on a co-primary basis,[271] and is home to more than twenty different licensees that together hold several hundred licenses in the lower 24 GHz segment of Upper Microwave Flexible Use Spectrum (UMFUS).[272] The other adjacent band, 24.65–24.75 GHz, is allocated to co-primary, federal and non-federal, inter-satellite and radiolocation-satellite (Earth-to-space) services.[273] As of August 26, 2026, there are no active non-federal licensees in the 24.65–24.75 GHz band.

96. *Echodyne Petition for Rulemaking*. On October 24, 2018, Echodyne Corporation (Echodyne) filed a petition for rulemaking to allow radiolocation operations in the 24.45–24.65 GHz band on a secondary basis.[274] Echodyne explained that it had developed a ground-based radar for both "Detect-and-Avoid" (DAA) and security/surveillance applications after federal and non-federal customers expressed interest in it.[275] Under the Commission's rules, DAA, which falls under the category of radionavigation, is authorized in the band, but surveillance applications, including counter-UAS surveillance, fall under the category of radiolocation, which is not authorized.[276] Echodyne argued that

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[267] *See Restoring American Airspace Sovereignty*, Exec. Order 14305, 90 Fed. Reg. 24719 (June 6, 2025) (*Airspace Sovereignty Executive Order*), https://www.whitehouse.gov/presidentialactions/2025/06/restoring-american-airspace-sovereignty/.

[268] *See id.* at § 7(a) (directing executive departments and agencies, to the extent permitted by law and consistent with the Fourth Amendment, to use "all available existing authorities to employ equipment to detect, track, and identify drones and drone signals").

[269] See 47 CFR §§ 2.1, 87.5.

[270] 47 CFR § 2.106(a).

[271] *Id*.

[272] *See, e.g.*, *Auctions of Upper Microwave Flexible Use Licenses for Next-Generation Wireless Services; Notice and Filing Requirements, Minimum Opening Bids, Upfront Payments, and Other Procedures for Auctions 101 (28 GHz) and 102 (24 GHz)*, AU Docket No. 18-85, Public Notice, 33 FCC Rcd 7575, 7579–80, para. 9 (2018); *Auction of 24 GHz Upper Microwave Flexible Use Service Licenses Closes; Winning Bidders Announced for Auction 102*, AU Docket No. 18-85, Public Notice, 34 FCC Rcd 4294 (OEA 2019) (*Auction 102 Closing Public Notice*).

[273] 47 CFR § 2.106(a).

[274] Petition of Echodyne Corp. for Rulemaking, RM-11819 (filed Oct. 24, 2018), *available at* https://www.fcc.gov/ecfs/document/102459526386/1 (Echodyne Petition).

[275] *Id*.

[276] *See* 47 CFR § 2.106(a); *see also* Echodyne Petition at 2–3.

radiolocation operations in the 24.45–24.65 GHz band would facilitate users' ability to better detect UAS at sensitive sites, including stadiums, prisons, and at the U.S. border.[277] Echodyne therefore asked the Commission to amend its rules to permit radiolocation operations in the 24.45–24.65 GHz band. Echodyne specifically requested the addition of and revisions to portions of parts 87 and 90 of the rules.[278] The Commission sought comment on the Echodyne Petition on October 30, 2018.[279] Two commenters supported the proposal; none opposed.[280]

97. *AAM NPRM.* Given the positive response on the Echodyne Petition, the Commission proposed in the *AAM NPRM* to amend the U.S. Table and the Commission's part 90 service rules to expand use of the 24.45–24.65 GHz band to include federal and non-federal radiolocation operations on a secondary basis.[281] The *AAM NPRM* further proposed to generally apply part 90 licensing and service rules to radiolocation operations in the 24.45–24.65 GHz band.[282] The *AAM NPRM* proposal was designed "to provide adequate mechanisms to monitor increased UAS deployment in sensitive areas while promoting public safety and the avoidance of harmful interference."[283]

98. *Waivers.* To date, the Bureau has granted requests from Echodyne and MatrixSpace, Inc. (MatrixSpace) for limited waivers to conduct ground-based radiolocation operations in the 24.45–24.65 GHz band on a site-specific basis, subject to the resolution of the rulemaking proceeding.[284] These waiver orders provide for a five-year term with the possibility of extension, and they include several conditions.[285]

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[277] *Id*. at 4.

[278] *See id.* at 6–10.

[279] *Consumer & Governmental Affairs Bureau Reference Information Center Petition for Rulemakings Filed: Echodyne Corp. Petition for Rulemaking for Secondary Use of the 24.25–24.65 GHz Band for Radiolocation Services*, RM-11819, Public Notice Report No. 3107 (CGB 2018).

[280] Black Sage Technologies supported Echodyne's petition because it deemed the technology promising in a "significant market segment where there are few competitive solutions." Black Sage Technologies Comments, RM-11819, at 1–2. In-Q-Tel also offered its support, emphasizing the radiolocation radar's potential efficiency and cost effectiveness. *See* In-Q-Tel Comments, RM-11819.

[281] *See AAM NPRM*, 40 FCC Rcd at 767, 769, paras. 53, 60; *id.* at Appx. A.

[282] *Id.* at 771–74, paras. 66–72.

[283] *See id.* at 769, para. 60.

[284] *See Echodyne Corporation; Request for Waiver of Part 2 and Part 87 of the Commission's Rules*, WT Docket No. 17-352, Order, 34 FCC Rcd 4830, 4830, para. 1 (WTB-MD 2019) (*Echodyne Waiver Order*); *Echodyne Corporation; Request for Waiver of Part 2 and Part 87 of the Commission's Rules*, WT Docket No. 17-352, Order, 39 FCC Rcd 5793 (WTB-MD 2024) (*Echodyne Extension Order*) (granting Echodyne's request for a five-year extension of its limited waiver); *MatrixSpace, Inc.*; *Request for Waiver of Section 2.106 and for Sections 87.471 and 87.475 of the Commission's Rules*, WT Docket No. 23-216, Order, 39 FCC Rcd 5788, 5788, para. 1 (WTB-MD 2024) (*MatrixSpace Waiver Order*).

[285] The conditions were as follows: (1) the waivers are limited to five years, but the grantees may request an extension, if necessary, and any such request would be evaluated by the Commission in conjunction with the FAA and NTIA; (2) the radars must operate using the characteristics described in the requests and supporting documents; (3) the grantees must obtain an equipment authorization for the radars; (4) radar units must be licensed on a site-specific basis (i.e., the transmitters would be licensed for specific, fixed locations) as radionavigation land stations; (5) licensees must comply with the part 87 technical and service rules, aside from those confining operations in the band to radionavigation; (6) the radars' operation is on a secondary basis; and (7) the radars' sales to non-federal users are capped at 15,000 units for the waiver period. *See Echodyne Waiver Order*, 34 FCC Rcd at 4832–33, para. 8; *see also MatrixSpace Waiver Order*, 39 FCC Rcd at 5791, para. 10. Echodyne's radar received equipment authorization in 2019, so condition (3) was removed from the order granting its five-year extension. *Echodyne Extension Order*, 39 FCC Rcd at 5796, para. 8.

B. Discussion

1. Radiolocation Allocation

99. We conclude that it is in the public interest to amend the U.S. Table and allocate the 24.45–24.65 GHz band for federal and non-federal ground-based radiolocation services on a secondary basis, as proposed in the *AAM NPRM*, which would facilitate the UAS/AAM surveillance and counter-UAS operations for which ground-based radiolocation is often used. The general proposal was universally supported by all of the commenters who participated in this aspect of the rulemaking, including the National Telecommunications and Information Administration (NTIA).[286] Supporters agree that adding a secondary radiolocation allocation in the band will benefit public safety, put under-utilized spectrum to beneficial use, and drive innovation in drone detection technology, while ensuring that safety-of-life radionavigation services in the band have priority.[287] EEI highlights the need for "commercially available, high-performance, and cost-effective radar solutions specifically tailored for drone detection," particularly at critical infrastructure sites.[288] Given similarities between the technologies involved in radiolocation and those used for the radionavigation service already authorized in the band, as well as the scarcity of licenses in the band and the success of waiver-based radiolocation endeavors in the 24.45–24.65 GHz band, we expect this additional allocation will be compatible with existing uses and will yield significant public benefits.[289]

2. Licensing and Operating Rules

100. Consistent with our amendment to the U.S. Table, and as proposed in the *AAM NPRM*, we add the 24.45–24.65 GHz band to the list of frequencies in part 90 of our rules that are available for licensing to the radiolocation service, and we limit radiolocation stations in this band to secondary status.[290] Because authorization under our rules concerns spectrum access, it does not confer, expand, restrict, or otherwise alter any separate statutory or other legal authority that may be required to detect, track, identify, mitigate, or disable UAS; entities remain responsible for ensuring such activities are conducted pursuant to applicable authorities. In addition, consistent with the position of NTIA, we limit radiolocation stations in the 24.45–24.65 GHz band to ground-based stations only.[291] Echodyne argues that the Commission should also authorize airborne radiolocation stations in the 24.45–24.65 GHz band under part 87.[292] We decline at this time to adopt its proposed part 87 changes. We note that NTIA supports only authorization of ground-based stations,[293] and no other commenter besides Echodyne

[286] *See* AIRT Comments at 2; AUVSI Comments at 2; AX Enterprize Comments at 1; Echodyne Comments at 1; EEI Comments at 8–9; MatrixSpace Comments at 2; NPSTC Comments at 3; NTIA Comments at 2; Reliable Robotics Comments at 2.

[287] *See* Echodyne Reply at 2–3; *see also* AUVSI Comments at 1–2; MatrixSpace Comments at 3–4; NTIA Comments at 6 (arguing that "radiolocation can facilitate AAM, provided . . . it remains secondary to uses protecting air safety").

[288] EEI Comments at 10. We also recognize the potential value of such technologies for protecting sensitive federal facilities and installations, including critical infrastructure, when used pursuant to applicable authorities.

[289] *See* MatrixSpace Comments at 2 (noting that waiver-based operations "have demonstrated both the market demand for radiolocation solutions in the [b]and and the fact that such operations do not raise the risk of interference to incumbent and adjacent-band users"). We further note that there are several other instances within the U.S. Table of the radionavigation and radiolocation services successfully sharing a band, including at 1240–1350 MHz, 2700–3100 MHz, 5350–5650 MHz, and 9.0–9.5 GHz. *See* 47 CFR § 2.106(a); Echodyne Petition at 5.

[290] *See AAM NPRM*, 40 FCC Rcd at 711, para. 66.

[291] *See* NTIA Comments at 2, 10.

[292] *See* Echodyne Comments at 8; *see also AAM NPRM*, 40 FCC Rcd at 771–72, para. 66 (seeking comment on Echodyne proposal to add to certain part 87 provisions language that would permit airborne radiolocation devices).

[293] *See* NTIA Comments at 2.

appears to argue for authorizing airborne stations.[294] In addition, the waivers granted both to Echodyne and MatrixSpace were limited to ground stations, and accordingly, provide no experience to support authorization of airborne stations.[295] Further, licensing rules under part 87 are significantly different from those under part 90, with part 87 airborne stations being licensed by rule with no site or area service restrictions,[296] and we find inadequate discussion in the record on whether and how coordination with federal users in the band would be accomplished, as well as whether and how interference risks from airborne radiolocation are or can be adequately addressed.[297]

101. *Site-based Licensing.* We find that it is in the public interest to license radiolocation devices in the 24.45–24.65 GHz band using site-based licensing, consistent with the treatment of other radiolocation services under part 90.[298] A site-based licensing model is helpful in a shared use situation as fixed, well-defined areas of operation simplify coordination during the application process for services requiring frequency coordination, facilitate intensive spectrum sharing, and enable the Commission and interested stakeholders to quickly identify licensees in the band and their specific areas of operation in the event interference issues arise, which allows parties to resolve such issues in the shortest timeframe practicable.[299] In particular, we find that part 90 site-based licensing gives the Commission an appropriately specific level of information about the deployment of ground-based radiolocation devices in the 24.45–24.65 GHz band. As NTIA points out, site-based licensing under part 90 has the distinct advantage of providing an easy mechanism for federal coordination—thereby alerting NTIA and its federal partners to the prospective license and allowing them the opportunity to assess for interference in this shared Federal/non-Federal band.[300]

102. Consistent with NTIA's comments, we limit stations in the band to fixed stations and decline to authorize mobile stations (i.e. stations operating while in motion) in the band.[301] We find that permitting radar stations operating while in motion may create risks of interference for primary airborne navigational systems in the band that are difficult to identify or mitigate. To provide licensees with the flexibility to address temporary, uncertain, or changing locations, we instead authorize the use of

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[294] *See*, *e.g.*, MatrixSpace Comments at 3 (asserting that "[i]ndustry stakeholders are eager to use 24 GHz radars for radiolocation to support a variety of public safety-enhancing missions *on the ground*") (emphasis added); *id.* at 4 (asserting that "the proliferation of UAS and concerns about securing critical infrastructure have fueled demand among federal and state government users, as well as private industry, for ground-based radars that are capable of detecting incoming UAS").

[295] *See Echodyne Waiver Order*, 34 FCC Rcd at 4833 para. 8; *MatrixSpace Waiver Order*, 39 FCC Rcd at 5791, para. 10.

[296] *See* 47 CFR § 87.18(b).

[297] *See*, *e.g.*, MatrixSpace Reply at 6 (asserting that radar mounted on flying UAS carry a higher risk of interference than ground-based radiolocation operations). We note that, aside from part 87, part 90 also contemplates the potential use of airborne radiolocation stations. *See* 47 CFR § 90.423 ("Operation on board aircraft"); *id.* at § 90.423(d) ("Operation of radiolocation mobile stations may be authorized regard to limitations and conditions set forth in paragraphs (a) and (b) of this section."). Given the considerations discussed above, and the absence of any proposal to authorize airborne stations under part 90, we decline to do so at this time.

[298] *See* 47 CFR § 90.103(b); *see also* 47 CFR § 1.907 (listing the part 90 Radiolocation Service among "Covered Site-based Licenses").

[299] *See Allocation of Spectrum for Non-Federal Space Launch Operations*, *et al.*, ET Docket No. 13-115, Report and Order and Further Notice of Proposed Rulemaking, 36 FCC Rcd 7764, 7795, para. 78 (2021).

[300] NTIA Comments at 4 (noting that "[t]o the extent 24.45–24.65 GHz radars serve as ground-based security and surveillance radars, IRAC coordination will allow Federal agencies to analyze these locations carefully to avoid interference with 24.45–24.65 GHz Detect-and-Avoid (DAA) in UAS").

[301] *See* NTIA Comments at 10 (deleting the words "or mobile" from the proposed radiolocation service listing at 47 CFR § 90.103 for the 24.45–24.65 GHz band).

temporary fixed locations (including through transportable systems), subject to certain conditions to help ensure that primary systems are protected.[302]

103. Given the flexibility that we provide through the use of licenses for temporary locations, we are not persuaded by Echodyne's argument that the site-specific licensing rules in part 90 will "impose a rigidity inconsistent with the flexibility and deployment scale necessary for drone detection technologies."[303] For example, Echodyne argues that state governments may opt for a vehicle or trailer-based system so that they can respond to unexpected drone incursions, or experience seasonal variations in coverage.[304] Licenses for operation at temporary locations, however, permit the use of such transportable systems and flexibility in the location of the station in circumstances when the precise fixed location may be uncertain or changing over time.[305]

104. We therefore decline to adopt Echodyne's proposal that we instead employ geographic area-based licensing or some non-location-based licensing approach combined with the separate obligation to register the sites of radar deployments.[306] We note that the Commission has found site-based licensing appropriate for part 90 radiolocation, and Echodyne does not point to any case in which its approach has been adopted for such deployments in the past. Further, while Echodyne acknowledges "the need to coordinate deployment with Federal users through the NTIA's Interdepartment Radio Advisory Committee (IRAC)," it does not explain how such coordination would work in the context of its proposals, or identify exactly how applicants would "provide more specific details to IRAC if a specific deployment requires greater scrutiny."[307] While we understand Echodyne's desire to maximize the flexibility of ground-based radiolocation station use in the 24.45–24.65 GHz band, we observe again that the part 90 site-based licensing system we apply to 24.45–24.65 GHz band radiolocation stations provides significant flexibility, and we find that, to the extent this licensing approach imposes additional costs, these costs are outweighed by the need for compatibility, protection of primary services, and coordination with federal entities and other licensees in this shared band.[308]

105. *Related Operating Rules.* We find that it is in the public interest to adopt the license term, application, and renewal provisions proposed in the *AAM NPRM*. Therein, the Commission proposed to apply the existing part 90 rules to ground-based radiolocation in the 24.45–24.65 GHz band.[309] These rules include license terms of ten years upon initial grant or renewal, and a requirement that license applications must comply with our part 1 rules.[310] Using the existing licensing provisions creates a simple, streamlined, and consistent licensing approach across the part 90 services.

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[302] *See infra* Appx. A (sections 90.103(c)(31), 90.137).

[303] Echodyne Comments at 5.

[304] *See id.*

[305] *See* 47 CFR § 90.137(a)(1) ("When one or more individual transmitters are to be operated by a licensee as a base station or as a fixed station at unspecified or temporary locations for indeterminate periods, such transmitters may be considered to comprise a single station intended to be operated at temporary locations.").

[306] *See* Echodyne Comments at 2, 6.

[307] Echodyne Reply at 4–5.

[308] *See*, *e.g.*, NTIA Comments at 2–3 (discussing federal uses, including DHS use of the geolocation devices in the band "to detect and identify UAS used by drug traffickers and other bad actors seeking to harm the United States infrastructure and its residents").

[309] *AAM NPRM*, 40 FCC Rcd at 772, para. 67.

[310] *Id*.; *see, e.g*., 47 CFR §§ 1.913, 1.915; *see also id*. §§ 90.119 (requiring submission of license applications that comply with part 1, subpart F), 90.127 (submission and filing of applications), 90.129 (supplemental information), 90.135 (modifications of licenses), 90.149 (ten-year license term).

106. We also conclude that it is in the public interest to apply the additional licensing and operating rules that apply generally to part 90 services to radiolocation operations in the 24.45–24.65 GHz band. These rules govern, for example, foreign ownership, construction requirements, and applications for temporary permits.[311] The Commission proposed to apply these general part 90 rules to radiolocation operations in the 24.45–24.65 GHz band, MatrixSpace supports the proposal, and no commenter specifically opposes applying such provisions.[312] Accordingly, these generally-applicable part 90 rules will apply to radiolocation in the 24.45–24.65 GHz band. Although AIRT requests that we also "[d]esignate Public Safety as a Priority User Category" in the band, we decline to impose such prioritization, consistent with the rules for radiolocation in other bands.[313]

3. Technical Rules

107. We find that it is in the public interest to largely adopt the Commission's proposals regarding the technical rules that apply to radiolocation operations in the 24.45–24.65 GHz band, with certain exceptions discussed below. We generally believe that codification of our proposals will enable more effective UAS detection in the 24.45–24.65 GHz band while avoiding harmful interference. We note that NTIA suggested several additional technical restrictions "[t]o ensure that in-band radionavigation services neighboring passive satellite services can operate unimpeded"[314]—power, bandwidth, and emission maximums, an out-of-band emissions limit of -39 dBW on top of the emissions mask, and a much lower frequency stability limit.[315] NTIA also recommends adoption of a density limit.[316] We are concerned, however, that adopting overly narrow and proscriptive technical provisions would have the effect of stifling innovation and flexibility in the band, and that NTIA's proposals go beyond what is needed for interference protection. We discuss these proposals further below.

108. *Power, emissions, bandwidth, and density.* For radiolocation operations in the 24.45–24.65 GHz band, we find that it is in the public interest to maintain consistency with other part 90 licenses and to consider and authorize requested transmitter power on a case-by-case basis.[317] Similarly, we apply the flexible emission type and bandwidth rules that govern part 90 radiolocation operations generally.[318] Under these rules, for example, any type of emission may be authorized upon a satisfactory showing of need, and bandwidths for stations operating above 2500 MHz will be similarly reviewed and authorized on a case-by-case basis.[319]

109. NTIA suggests that the Commission incorporate a transmit power limit of 33 dBm, Effective Isotropic Radiated Power (EIRP) limit of 24 dBW, and a bandwidth limit of 45 megahertz, in order to provide "some general technical requirements" and avoid "time-consuming one-off engineering studies to justify adding or modifying restrictions" during IRAC coordination.[320] NTIA asserts that these

[311] *See, e.g.*, 47 CFR §§ 90.115 (foreign ownership), 90.137 (applications for operation at temporary locations), 90.155 (one-year operation requirement), 90.159 (temporary and conditional permits).

[312] *See AAM NPRM*, 40 FCC Rcd at 772, para. 68; MatrixSpace Reply at 7–8.

[313] *See* AIRT Comments at 2; 47 CFR pt 90 subpt. F.

[314] *See* NTIA Comments at 8.

[315] *Id.* at 8–10.

[316] *See* NTIA Comments at 6–8.

[317] *See* 47 CFR § 90.205(r) ("Requested transmitter power will be considered and authorized on a case by case basis.").

[318] *See* 47 CFR §§ 90.207(k), 90.209(b)(5).

[319] *See id.* §§ 90.207(k) (providing rule for all "radiolocation operations as may be authorized in accordance with subpart F"), 90.209(b)(5).

[320] NTIA Comments at 8.

limits are "commensurate with the system representations Echodyne . . . has made[.]"[321] We agree with Echodyne and MatrixSpace that the existing flexible approach under the part 90 rules is better suited to fostering radiolocation in the band than fixing specific limits, particularly ones selected with one provider's equipment in mind.[322]

110. We also decline to adopt NTIA's recommendation that the Commission apply a density limit of 4 units per square kilometer unless the applicant can demonstrate that no harmful interference to radionavigation if that limit is exceeded.[323] NTIA's proposal would create a presumption that higher density will result in harmful interference, but we find no evidence supporting that presumption in the record.[324] The lack of interference issues over the years since Echodyne and MatrixSpace have deployed radiolocation radar devices in the band further support the conclusion that specific density limits are premature, and we agree with MatrixSpace that case-by-case review of license applications and the secondary status of radiolocation will adequately ensure that radiolocation deployments do not cause harmful interference to radionavigation operations in the band.[325]

111. *Out-of-Band Emissions.* In the *AAM NRPM*, the Commission proposed to specify that Emission Mask B would apply to all radiolocation equipment in the 24.45–24.65 GHz band.[326] We note that in the text of the *AAM NPRM*, the Commission proposed to apply Emission Mask B by specifying that equipment must meet section 90.210(b), which currently imposes Emission Mask B on equipment with an audio low pass filter.[327] However, the proposed rules did not specify any amendment to section 90.210(b) or any other part of section 90.210, reflecting by default an intention to impose Emission Mask B pursuant to the catch-all provision, section 90.210(n).[328]

112. Echodyne and MatrixSpace support the specific application of Emission Mask B.[329] MatrixSpace argues that it is consistent with the part 87 emissions limit that has applied to them under the waivers, and that, over the seven years since the Commission first authorized radiolocation devices in the

[321] *See id.*

[322] *See* Echodyne Reply at 5–6; MatrixSpace Comments at 8–9; MatrixSpace Reply at 10–11, 13–14.

[323] *See* NTIA Comments at 7.

[324] While NTIA asserts the 4 unit/square kilometer limit is based on Echodyne's original waiver application, Echodyne disputes the assertion, *see* Echodyne Reply at 6, and we do not find such a limit discussed in Echodyne's request. Rather, the technical analysis in Echodyne's original request for waiver concluded that 16 airborne radar per square kilometer could operate without interference, and that ground-based radar could operate "at the same or higher densities." *See* Request by Echodyne Corp. for Limited Waiver, Appx. B at 1–2 (filed Oct. 27, 2017), *available at* https://ecfsapi.fcc.gov/file/12142648129656/17-352.pdf. Nor was any density limit imposed on the waivers granted to Echodyne and MatrixSpace. MatrixSpace also notes that cases of higher density in a given area will likely involve only one licensee, making it easier to manage any potential interference. *See* MatrixSpace Reply at 12.

[325] *See* MatrixSpace Comments, GN Docket No. 26-74, at 17–18 (arguing that "it is too soon for the Commission to adopt additional technical regulations that are not backed by either technical studies or actual evidence of harmful interference" and urging the Commission "to adopt a wait-and-see approach rather than applying overly restrictive density limitations on a new and growing service"); *see also* MatrixSpace Reply at 13.

[326] *See AAM NPRM*, 40 FCC Rcd at 773, para. 71.

[327] *See id.*; 47 CFR § 90.210(b).

[328] *See AAM NPRM*, 40 FCC Rcd at Appx. A (Part 90). Section 90.210(n) provides in part that "[t]ransmitters designed for operation under this part on frequencies other than listed in this section must meet the emission mask requirements of Emission Mask B." 47 CFR § 90.210(n). In turn, the section includes a Table that lists frequencies to which the masks apply, which currently includes no entry for specific frequencies higher than 5895–5925 MHz. *See id.*, Table 1.

[329] *See* Echodyne Comments at n.6; MatrixSpace Comments at 9; Echodyne Petition at 7–8.

band by waiver, there has been no reported incident of harmful interference from OOBE.[330] We find this argument for Emission Mask B persuasive.

113. We find it appropriate to specify that radiolocation devices in the 24.45–24.65 GHz band must meet OOBE limits specified in section 90.210(n), as reflected in the proposed rules of the *AAM NPRM*. In addition to imposing Emission Mask B, section 90.210(n) also provides that "[e]quipment operating under this part on frequencies allocated to but shared with the Federal Government, must meet the applicable Federal Government technical standards."[331] Given that the 24.45–24.65 GHz band will be shared with the federal government, application of this part 90 requirement is warranted. Indeed, as with section 90.210(n) overall, this requirement would apply to radiolocation licensees in the band by default if we made no amendments to section 90.210. For clarity, however, we expressly provide for the application of section 90.210(n), including Emission Mask B, to radiolocation stations in the 24.45–24.65 GHz band.[332]

114. As suggested by NTIA, we will require that 24.45–24.65 GHz radiolocation devices also meet an OOBE limit of -39 dbW.[333] Given the unique technical characteristics of adjacent band operations, we conclude that imposing this additional limit is warranted to ensure adequate protection of the adjacent 23.6–24.0 GHz passive band.

115. *Frequency Stability*. We are not adopting the frequency stability limit as proposed in the *AAM NPRM*.[334] We agree with NTIA that a 5000 ppm frequency stability rule would not be adequate in this instance where the channel bandwidth may be so wide that it would allow significant movement of the emission, potentially out of the authorized band.[335] Instead, we will amend section 90.213(a) to require that the entire fundamental emission remain in the 24.45–24.65 GHz band. We find this approach is more appropriate in this instance where wide bandwidth radars of potentially varying bandwidths are possible. Because 24.45–24.65 GHz radiolocation equipment approved pursuant to the Echodyne and MatrixSpace waivers are already deployed under the 5000 ppm limit, we grandfather that equipment to allow its continued use because it has operated successfully for years under the existing limit in part 87.[336]

116. We note that Echodyne and MatrixSpace argue that section 90.213, the frequency stability rule, does not currently impose any frequency stability requirement for stations in spectrum bands above 2.45 GHz, including radiolocation stations, and that the Commission should therefore not impose any frequency stability requirement for radiolocation in 24.45–24.65 GHz.[337] Conversely, NTIA supports a frequency stability requirement, but argues that the Commission should impose a stricter standard of 10 ppm, given the 200 megahertz width of the allocation and the need for users of the band to "protect the fixed and mobile services and inter-satellite and radiolocation-satellite (Earth-to-space) services operating below and above this allocation."[338] Contrary to the Echodyne/MatrixSpace position, we find that it is appropriate and technically reasonable to design radars that maintain a stable state under

[330] *See* MatrixSpace Comments at 9.

[331] *See* 47 CFR § 90.210(n).

[332] *See* Echodyne Petition at 7. Table 1 could be read, in the absence of contrary text, to indicate that Emission Mask C applies to radiolocation equipment in the band if such equipment does not have an audio low pass filter. *See* 47 CFR § 90.210, Table 1. Consistent with our determinations, we amend the rule to expressly provide that the requirements under section 90.210(n) apply to all radiolocation equipment in the band.

[333] *See* NTIA Comments at 9 & n.30.

[334] *See AAM NPRM*, 40 FCC Rcd at 773–74, para. 72 (referencing 47 CFR § 90.213(a) n.10).

[335] *See* NTIA Comments at 9.

[336] *See* 47 CFR § 87.133.

[337] *See* Echodyne Comments at 8; MatrixSpace Reply at 14.

[338] *See* NTIA Comments at 9.

all operating conditions. However, due to the wide potential variability of radar signal bandwidths, we will not adopt a specific ppm level for frequency stability as requested by NTIA, but instead require radiolocation transmitters operating in the 24.45–24.65 GHz band, to ensure that the entire fundamental occupied emission remains within 24.45–24.65 GHz under all normal operating conditions.

4. Waiver-based Equipment Certifications and Licenses

117. Because we now authorize 24.45–24.65 GHz radiolocation under the part 90 rules, we will terminate the waivers granted to Echodyne and MatrixSpace as of the effective date of the rules.[339] We therefore must address the treatment of legacy equipment authorizations and licenses granted pursuant to the waivers prior to that effective date.

118. With regard to equipment authorizations, the Commission, in the *AAM NPRM*, proposed to require that devices intended for radiolocation operations in the 24.45–24.65 GHz band that were authorized under part 87 pursuant to the waivers be re-authorized under part 90, consistent with other part 90 licensees.[340] The Commission suggested that this would help ensure that radiolocation operations in the band are conducted in compliance with the applicable part 90 technical requirements, and that having a complete, searchable list in the Equipment Authorization System of devices capable of such operations will facilitate tracking and accountability to that end.[341]

119. We are persuaded to modify this approach, however, by the arguments of Echodyne and MatrixSpace. They argue that part 90 technical requirements are consistent with the applicable part 87 requirements under which their equipment was tested and approved, and that, accordingly, requiring such equipment to go through a full testing and re-certification process just to add a part 90 authorization would provide little benefit in demonstrating compliance with the part 90 rules, and would not be worth the additional burdens to the equipment authorization grantees and Commission staff.[342] Echodyne and MatrixSpace recommend instead that the Commission adopt a streamlined approach for manufacturers to add a part 90 authorization or otherwise provide for the continued marketing and use of previously certified equipment under the new part 90 rules.[343] MatrixSpace suggests in particular the approach taken by the Commission in the Supplemental Coverage from Space (SCS) proceeding, in which the Commission waived relevant rule provisions to provide a simplified process for existing equipment authorization grantees to modify their terrestrial equipment certifications to reflect the addition of a part 25 authorization for SCS that minimized the administrative burdens associated with a new equipment certification application.[344]

120. Under this waiver, filings to add the part 25 authorization would be accepted consistent with the existing procedures for permissive changes.[345] The Commission found the waiver warranted

[339] Both the Echodyne and MatrixSpace waivers were granted subject to the resolution of the associated issues in this rulemaking proceeding. *See Echodyne Waiver Order*, 34 FCC Rcd at 4832, para. 8; *MatrixSpace Waiver Order* 39 FCC Rcd at 5791, para. 10.

[340] *See AAM NPRM*, 40 FCC Rcd at 773, para. 72.

[341] *See id.*

[342] *See* Echodyne Comments at 6–7; MatrixSpace Reply at 8–9 & n.26 ("Given that Part 87 imposes stricter technical requirements than those in Part 90, requiring grantees to repeat the equipment authorization process in this instance would yield little more than the resubmission and analysis of information that has already been provided and deemed sufficient for certification by the Commission."); *see also* Echodyne Petition at 7–8.

[343] *See* Echodyne Comments at 7; MatrixSpace Reply at 8–9 & n.26.

[344] *See* MatrixSpace Reply at 9 n.26; *Single Network Future: Supplemental Coverage from Space, Space Innovation*, GN Docket No. 23-65, et al., Report and Order and Further Notice of Proposed Rulemaking, 39 FCC Rcd 2622, 2717–19, paras. 218–23 (2024) (*SCS R&O*). Specifically, the Commission waived sections 2.1043(c), and 2.911(c) and (e) of the Commission's rules, 47 CFR §§ 2.1043(c), and 2.911(c) and (e). *See id.* at 2734, para. 270.

[345] *See SCS R&O*, 39 FCC Rcd at 2719, para. 221.

because "it would be overly burdensome . . . to require all of the technical information needed for a new equipment authorization application and such requirement would provide no tangible benefits given that no technical application review is necessary to effectuate the relevant change."[346] MatrixSpace argues that similar reasoning applies here.[347]

121. We agree that a streamlined mechanism for adding a part 90 authorization to existing part 87 equipment authorizations granted under the Echodyne or MatrixSpace waivers is justified, and find that the SCS approach will provide appropriate streamlining while still meeting the Commission's goals. Accordingly, similar to the SCS approach, we grant Echodyne and MatrixSpace a waiver of sections 2.1043(c), and 2.911(c) and (e) of the Commission's rules, 47 CFR §§ 2.1043(c), and 2.911(c) and (e), solely for the purpose of permitting the addition of a part 90 designation to equipment certifications that were granted under part 87 pursuant to the *Echodyne Waiver Order*, the *Echodyne Extension Order*, or the *MatrixSpace Waiver Order* on or before the effective date of the part 90 rules adopted in this Report and Order. We emphasize that any other equipment for radiolocation service in the 24.45–24.65 GHz band must be authorized under part 90 in compliance with the full certification process under the Commission's rules.

122. With regard to licenses, and consistent with the conditions of the waivers, we generally find that all radiolocation services in the band should occur under part 90 licenses consistent with the rules we adopt today.[348] We also find, however, that it is in the public interest to provide a one-year grace period from the effective date of the rule for holders of licenses granted under the waivers on or before the effective date of the part 90 rules adopted in this *Report and Order* to apply for new licenses in accordance with these rules. During this period, parties that received waiver-based licenses on or before the effective date of the part 90 rules may continue to operate pursuant to these licenses.[349] Further, if such a licensee submits an application for a part 90 license under the new rules within the 1-year grace period, that period will be extended to the later of one year from the effective date of the new part 90 rules or 60 days after the final disposition of their application. We direct the Bureau to publish notices in the Federal Register when the end of the one-year grace period is near and when it has taken place.

IV. UPDATING THE 800 MHZ COMMERCIAL AVIATION AIR-GROUND SERVICE TO FACILITATE NEXT-GENERATION NETWORKS

123. In this section, we update the rules governing 800 MHz Commercial Aviation Air-Ground Systems, which provide mobile communications to persons on board aircraft. These changes modernize the applicable power limit rules to better support wireless broadband, adopt measures to protect licensees in adjacent bands from harmful interference, and remove certain unnecessary or obsolete provisions. Together, these steps will facilitate the delivery of improved Internet access and other services to persons on board aircraft, including consumers traveling on commercial airlines, while protecting public safety communications and other neighboring operations.

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[346] *See id.* at 2719, para. 221.

[347] *See* MatrixSpace Reply at n.26.

[348] Both the Echodyne and MatrixSpace waivers specifically provided that licensees under the waiver would be subject to the rules adopted in the rulemaking proceeding "but will be permitted to operate pursuant to this waiver *until a final decision in the rulemaking proceeding takes effect*." *MatrixSpace Waiver Order*, 39 FCC Rcd at 5791 n.32 (emphasis added); *see also Echodyne Waiver Order*, 39 FCC Rcd at 4832 n.25.

[349] During the grace period, legacy part 87 licensees may continue to use part 87 certified equipment. After the grace period, radiolocation users in the band, including legacy licensees, may only operate pursuant to part 90 licenses, using part 90 certified equipment, but this may include legacy part 87 certified equipment provided that the equipment has also been certified under part 90.

A. Background

124. Commercial Aviation Air-Ground Systems are part of the Air-Ground Radiotelephone Service, defined as a "radio service in which licensees are authorized to offer and provide radio telecommunications service for hire to subscribers in aircraft."[350] The Commercial Aviation Air-Ground service was created to enable the provision of mobile telecommunications service to commercial airline passengers, but providers are permitted to provide mobile telecommunications services, including both voice and data services, to persons on board aircraft generally.[351]

125. Commercial Aviation Air-Ground Systems are authorized in the 849–851 MHz and 894–896 MHz bands (collectively, the "Commercial ATG Band").[352] The 849–851 MHz band is used for ground station transmit, and is adjacent to the Cellular Radiotelephone service B Block at 846.5–849 MHz and public safety part 90 narrowband system mobile receivers in the 851–854 MHz band.[353] The 894–896 MHz band is used for airborne transmitters, and is adjacent to the Cellular Radiotelephone service B Block at 891.5–894 MHz and part 90 narrowband system base station receivers in 896–897.5 MHz.[354]

126. In 2005, the Commission adopted a revised licensing regime for providers of Commercial Aviation Air-Ground Systems, determining that nationwide licenses would be assigned to the entities and their respective band plans receiving the highest gross aggregate bid at auction.[355] In 2006, the Commission auctioned nationwide licenses for this band under the revised rules; Gogo Business Aviation LLC (Gogo) won a nationwide exclusive license for three megahertz and LiveTV, LLC (LiveTV) won a nationwide exclusive license for the remaining one megahertz.[356] In 2013, Gogo acquired LiveTV and became the sole nationwide licensee in the Commercial ATG band.[357] Through use of its licenses in the band, Gogo provides a variety of in-flight airborne services, including broadband Internet access, Wi-Fi-based entertainment services, interconnected and non-interconnected Voice over Internet Protocol (VoIP),

[350] 47 CFR pt. 22, subpt. G & § 22.99.

[351] *See Revision of Part 22 of the Commission's Rules Governing the Public Mobile Services et al.*, CC Docket No. 92-115, Report and Order, 9 FCC Rcd 6513, 6570 (1994) (*1994 Part 22 Revision Order*); 47 CFR § 22.857 (authorizing commercial aviation air-ground systems to provide "radio telecommunications service, including voice and/or data service, to persons on board aircraft").

[352] *See* 47 CFR § 22.857.

[353] *See* 47 CFR § 22.905(b), 90.613; *Amendment of Part 22 of the Commission's Rules to Benefit the Consumers of Air-Ground Telecommunications Services et al.*, WT Docket No. 03-103, Report and Order and Notice of Proposed Rulemaking, 20 FCC Rcd 4403, 4435, para. 66 (2005) (*2005 Air-Ground Order*); *Improving Public Safety Communications in the 800 MHz Band*, WT Docket 02-55, Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order, and Order, 19 FCC Rcd 14969, 14984, para. 23 (2004) (*800 MHz Public Safety Report and Order*) (moving dedicated public safety band from 821–824/966–869 MHz to 806–809/851–854 MHz); *see also* Motorola Comments, at 3 (noting that Gogo's stations in the 849–851 MHz band are "a potential source of interference into public safety mobile and portable handsets that are tuned to receive public safety base station transmissions originating in the 851–854 MHz band").

[354] *See* 47 CFR § 22.905(b); *2005 Air-Ground Order*, 20 FCC Rcd at 4435, para. 65; Motorola Comments at 3.

[355] *See 2005 Air-Ground Order*, 20 FCC Rcd at 4405, 4418–22, paras. 1, 24–32.

[356] *Auction of 800 MHz Air-Ground Radiotelephone Service Licenses Closes, Winning Bidder Announced for Auction No. 65*, Public Notice, 21 FCC Rcd 6304, Attach. A (WTB 2006). The entity bidding in this auction on behalf of Gogo was AC BidCo, LLC (AC BidCo), a wholly-owned subsidiary of Gogo. *See id.*; *Application of AC BidCo, LLC, Gogo, Inc., and LiveTV, LLC for Consent to Assign Commercial Aviation Air-Ground Radiotelephone (800 MHz Band) License, Call Sign WQFX729*, WT Docket No. 12-155, Memorandum Opinion and Order, 28 FCC Rcd 3362, 3362, para. 1 (WTB 2013) (*Gogo-LiveTV Order*). AC BidCo continues to hold the applicable Commercial Aviation Air-Ground System licenses on behalf of Gogo.

[357] *See id.* at 3362, paras. 1–2.

inflight portals for e-commerce applications, and flight operations communications services.[358] To provide this in-flight connectivity, Gogo has relied on a 3G network using Code Division Multiple Access Evolution-Data Optimized (CDMA EV-DO) technology and consisting of approximately 260 base stations throughout the United States and Canada.[359]

127. On May 26, 2021, Gogo sought a waiver of section 22.867 of the Commission's rules, which establishes limits on the permissible peak effective radiated power (ERP) of Commercial Aviation Air-Ground System stations.[360] Specifically, section 22.867 limits airborne mobile stations to a peak ERP of 12 Watts and ground stations to a peak ERP of 500 Watts.[361] In its request, Gogo asked that the current ERP limits be applied as limits on average power rather than peak power.[362] Gogo argued that this waiver would harmonize the power limits with the rules for other part 22 mobile services as well as similar mobile broadband services operating under other rule parts.[363] Gogo stated that it was seeking to upgrade its current CDMA EV-DO network to LTE, which relies on Orthogonal Frequency Division Multiplex (OFDM) technology.[364] Gogo asserted that because OFDM-based waveforms have a higher peak-to-average ratio (PAR) than other waveforms, using peak detection would unduly constrain average operational power, causing coverage holes and service interruptions, with no discernible benefit over an average power limit in terms of reducing the risk of harmful interference to other operators.[365]

128. On June 21, 2022, the Mobility Division (Division) of the Wireless Telecommunications Bureau (Bureau) granted Gogo's waiver request, subject to certain conditions.[366] These included a condition requiring Gogo to file a petition for rulemaking seeking rule changes that would permit more flexible use of the Commercial ATG band, including any changes that may be necessary for Gogo's services to be provided over the band.[367]

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[358] *See Gogo Business Aviation LLC Request for Waiver of 47 CFR 22.857 Applicable to 849–851 MHz and 894–896 MHz Bands*, WT Docket No. 21-282, Order, 37 FCC Rcd 7437, 7438, para. 4 (WTB-MD 2022) (*Gogo Waiver Order*).

[359] *See* Letter from Michele C. Farquhar, et al., Counsel to Gogo Business Aviation LLC, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 21-282, Attach. A at 2 (filed July 22, 2022), https://www.fcc.gov/ecfs/document/10722724123897/1 (Gogo Petition for Rulemaking).

[360] Gogo Business Aviation LLC Request for Waiver of Section 22.867 Applicable to the 849–851 MHz and 894–896 MHz Bands, WT Docket No. 21-282, at 1 (filed May 26, 2021), https://www.fcc.gov/ecfs/document/10713999829548/1 (Gogo Waiver Request); *see also* 47 CFR § 22.867.

[361] *See* 47 CFR § 22.867.

[362] Gogo Waiver Request at 1, 4.

[363] *See* Gogo Waiver Request at 1.

[364] *See* Gogo Waiver Request at 3; Letter from Michele C. Farquhar, et al., Counsel to Gogo Business Aviation LLC, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 21-282, at 1–2 (filed June 15, 2022) (Gogo June 15, 2022 *Ex Parte*).

[365] *See* Gogo Waiver Request at 5; Letter from Michele C. Farquhar, et al., Counsel to Gogo Business Aviation LLC, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 21-282, Attach. B (filed Jan. 21, 2022) (Gogo Jan. 21, 2022 *Ex Parte*).

[366] *Gogo Waiver Order*, 37 FCC Rcd at 7444, paras. 14, 15. APCO subsequently filed a petition for reconsideration of the *Gogo Waiver Order*, which remains pending. *See* APCO International Petition for Reconsideration of Gogo's Waiver, WT Docket No. 21-282 (filed July 22, 2022) (APCO Petition for Reconsideration). Because we terminate the *Gogo Waiver Order* upon the effectiveness of the rules adopted here, we dismiss the APCO Petition for Reconsideration seeking reconsideration of that order as moot. *See Rates for Interstate Inmate Calling Services*, WC Docket No. 12-375, 37 FCC Rcd 11900, 11937, n. 238 (2022).

[367] *See Gogo Waiver Order*, 37 FCC Rcd at 7444, para. 14. The Bureau imposed six other waiver conditions in addition to the condition that Gogo file a petition for rulemaking: (1) Gogo must attenuate emissions into the 851–

(continued….)

129. *Gogo's Petition for Rulemaking.* On July 22, 2022, Gogo filed a petition asking the Commission to initiate a rulemaking to amend the rules for Commercial Aviation Air-Ground Systems.[368] More specifically, Gogo proposed formally amending section 22.867, the power limit rule, to provide for the power limit to be measured as average power, with an appropriate Peak-to-Average Ratio (PAR) limit, instead of as peak power.[369] Gogo further recommended modifying additional rules to enable more flexible use of Commercial Aviation Air-Ground Systems and remove unnecessary or obsolete requirements.[370]

130. In the *AAM NPRM*, in response to Gogo's petition, the Commission tentatively concluded that revising the power limit rule for Commercial Aviation Air-Ground Systems to regulate on the basis of average power would serve the public interest by promoting technological neutrality, harmonizing the power requirements with other legacy service power rules, and enabling Gogo to more efficiently utilize the band.[371] It further tentatively concluded that the revised rules would protect public safety licensees from interference.[372] Accordingly, the Commission proposed certain rule changes to the power limits generally consistent with the Gogo Petition for Rulemaking.[373] It further proposed eliminating certain other rules on the grounds that they were obsolete or no longer relevant for Commercial Aviation Air-Ground Systems.[374] We address all these proposals below.

B. Discussion

1. Power limits and related rules

131. *Limits on peak vs. average radiated power.* The Commission's rules currently establish permissible ERP limits for Commercial Aviation Air-Ground Systems as limits on peak power. Specifically, section 22.867 requires that "[t]he peak ERP of airborne mobile station transmitters must not exceed 12 Watts," and "[t]he peak ERP of ground station transmitters must not exceed 500 Watts."[375] The *AAM NPRM* proposed to amend this rule to provide for measuring the power limits for Commercial Aviation Air-Ground Systems as limits on average power rather than peak power.[376] The Commission

(Continued from previous page)
854 MHz public safety band by at least 50 + 10 log (P) dB; (2) Gogo must maintain a 24/7 contact number that licensees in the 851–854 MHz and 869–897.5 MHz bands can use to report any instances of interference; (3) Gogo must notify, by email and certified mail (or telephonically, if preferred over certified mail), licensees in the 851–854 MHz band that are within a 10-mile radius of each Gogo base station of (a) the date that Gogo intends to deploy its new system; (b) the 24/7 Gogo contact number and the web address for submitting any interference complaints; and (c) Gogo's commitment to loan, at no cost, a spectrum analyzer with instructions for its use; (4) upon APCO's request, Gogo shall conduct field testing with APCO in advance of the deployment of its new OFDM technology; (5) Gogo shall provide to licensees in the 851–854 MHz and 896–897.5 MHz bands, upon their request, instructions on how to ascertain through the use of a spectrum analyzer whether Gogo's transmissions are the source of harmful interference; and (6) Gogo shall receive and respond to harmful interference complaints from part 90 operators in the 896–897.5 MHz band in a manner consistent with the requirements protecting adjacent part 90 non-Cellular 800 MHz licensees in sections 22.877 through 22.879 of the Commission's rules. *See Gogo Waiver Order,* 37 FCC Rcd at 7443–44, para. 14.

[368] Gogo Petition for Rulemaking at 1.

[369] *See id.* at 4–9.

[370] *See id.* at 1, 9–14.

[371] *See AAM NPRM*, 40 FCC Rcd at 777, para. 81.

[372] *See id.*

[373] *See AAM NPRM*, 40 FCC Rcd at 778–84, paras. 82–97.

[374] *See AAM NPRM*, 40 FCC Rcd at 784–86, paras. 98–100.

[375] 47 CFR § 22.867(a), (b).

[376] *See AAM NPRM*, 40 FCC Rcd at 778, para. 82.

observed that the use of peak power disadvantages wider bandwidth technologies, which tend to produce very short duration power spikes above the average power level, which is not the case for narrower bandwidth technologies.[377] It tentatively found that this circumstance would force Commercial Aviation Air-Ground System operators using wideband technologies to operate at lower average power in order to meet the peak power limits and unnecessarily curtail the utility of these services.[378] Accordingly, the Commission tentatively concluded that regulating under average rather than peak power limits would promote operational flexibility and efficient spectrum usage.[379] It further tentatively concluded that replacing peak power limits with average power limits would be consistent with prior Commission decisions taking the same step for other similar wireless services, and would harmonize these various service rules.[380]

132. Recognizing that permitting parties to meet the power limits on an average power basis would allow for emissions higher than permitted under the current peak power basis, the Commission also tentatively concluded that it would serve the public interest to adopt a PAR limit, which restricts the magnitude of temporary power spikes, to mitigate the potential for undesirable interference.[381] Specifically, consistent with the rules for several other wireless broadband services, the Commission proposed to adopt a PAR limit of 13 dB.[382]

133. Gogo supports the Commission's proposals, asserting that they will help to enable the development of its next-generation Commercial Aviation Air-Ground System network, which it states will deliver higher capacity and higher quality broadband connectivity to aircraft operating in the United States.[383] APCO, Motorola, NPSTC, and NRPC, while not objecting to the adoption of power limits based on average power, express concerns about the potential of this change to increase the risk of harmful interference to adjacent operations, particularly public safety operations in the 851–854 MHz band.[384] To address this risk, APCO, Motorola, and NRPC recommend adopting a PAR limit of 9 dB (rather than the 13 dB limit proposed by the Commission), a more stringent out-of-band emissions (OOBE) limit than the current rules require, and new interference mitigation procedures.[385] NPSTC and Motorola recommend that the Commission codify the waiver conditions.[386]

134. We conclude that it is in the public interest to amend section 22.867 to regulate ERP on an average power basis. Regulating on an average power basis is supported by Commission decisions to similarly permit licensees in many other wireless broadband services, including 700 MHz commercial services, Personal Communications Services (PCS), Advanced Wireless Services (AWS), Wireless Communication Services (WCS), the Upper Microwave Flexible Use Service (UMFUS), and the Cellular Radiotelephone Service, to meet radiated power limits on an average basis, and will help to harmonize the

[377] *See AAM NPRM*, 40 FCC Rcd at 779, para. 85.

[378] *See id.*

[379] *See id.*

[380] *See AAM NPRM*, 40 FCC Rcd at 779–80, para 86.

[381] *See AAM NPRM*, 40 FCC Rcd at 781–82, para. 91.

[382] *See id.* at 782, para. 92.

[383] *See* Gogo Reply at 2–3.

[384] *See* Motorola Comments at 3–7; NPSTC Comments at 5; APCO Reply at 5–6 ("APCO supports the harmonization and modernization of the [Commercial Aviation Air-Ground System rules] subject to modifications and provisions to protect adjacent public safety licensees."); NRPC Reply at 3 (supporting the proposed rule changes provided that public safety use of the adjacent spectrum is protected from interference).

[385] *See* Motorola Comments at 6–7; APCO Reply at 2–5; NRPC Reply at 2.

[386] *See* NPSTC Comments at 5; *see also* Motorola Comments at 1–2.

regulation of similar services.[387] Further, as the Commission has previously concluded, the "average" measurement approach for power limits is a more accurate measure of the interference potential of wideband, non-constant envelope technologies, such as OFDM-based technologies, than reliance on peak power limits, which inaccurately suggests a much higher overall operational power, compared to actual power levels, due to brief power spikes.[388] The continued use of the current peak power approach would therefore unnecessarily constrain the deployment and operation of such technologies in the Commercial ATG band to the detriment of airborne consumers. While some commenters raise concerns about possible increased interference to adjacent services, particularly to public safety operations, we find, as further discussed below, that these concerns are addressed by various measures, including new measures that we adopt today to further protect adjacent services. To the extent that there is a minimal increase in the risk of interference, we find that the applicable interference mitigation procedures should ensure that such rare instances are quickly addressed. Therefore, we find that the benefits of updating the power limits far outweigh the minimal risks. Accordingly, we adopt the proposal to regulate power for Commercial Aviation Air-Ground Systems on an average power basis.

135. As proposed in the *AAM NPRM*, we will require Commercial Aviation Air-Ground Systems to meet a PAR of no more than 13 dB.[389] Because permitting these systems to meet the specified power limits on an average power basis will allow for emissions that are temporarily higher than are currently allowed under the peak power limit, we find a PAR limit is warranted to mitigate the potential for harmful interference from transient power spikes. We find a PAR of 13 dB specifically is supported by the Commission's selection of a similar PAR limit for other wireless broadband services, including 700 MHz commercial services, PCS, AWS, and Cellular Radiotelephone services.[390]

136. We decline to adopt the lower PAR of 9 dB suggested by Motorola and APCO. Motorola argues that OFDM technologies operate well below the Commission's 13 dB proposal and below even the 9 dB value, and that reducing PAR should therefore have little to no impact on Gogo's LTE operation

[387] *See Service Rules for the 698–746, 747–762 and 777–792 MHz Bands et al.*, WT Docket No. 06-150, Report and Order and Further Notice of Proposed Rulemaking, 22 FCC Rcd 8064, 8103, para. 105 (2007) (*700 MHz Order*); *Biennial Regulatory Review—Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services*, WT Docket No. 03-264, Third Report and Order, 23 FCC Rcd 5319, 5336–37, paras. 40–41 (2008) (*PCS and AWS Order*); *Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band et al.*, WT Docket No. 07-293, Report and Order and Second Report and Order, 25 FCC Rcd 11710, 11765, para. 132 (2010) (*WCS Order*); *Amendment of Parts 1 and 22 of the Commission's Rules with Regard to the Cellular Service, Including Changes in Licensing of Unserved Area et al.*, WT Docket No. 12-40, Second Report and Order, Report and Order, and Second Further Notice of Proposed Rulemaking, 32 FCC Rcd 2518, 2552, para. 94 (2017) (*Cellular Service Order*).

[388] *See 700 MHz Order*, 22 FCC Rcd at 8103, para. 105 (for non-constant envelope technologies, "the 'average' measurement approach is a more accurate measure of the interference potential for these technologies"); *PCS and AWS Order*, 23 FCC Rcd at 5337, para. 40; *WCS Order*, 25 FCC Rcd at 11765, para. 132; *see also 700 MHz Order*, 23 FCC Rcd at 5334–35, para. 36 (noting Motorola's support for power limits based on average power because "'the measurement of average values with non-constant envelope technologies avoids the possibility that impulse-like transient surges of extremely short-durations will unnecessarily govern the operating power of such stations.'").

[389] *See AAM NPRM*, 40 FCC Rcd at 782, para. 92. The Commission proposed in the *AAM NPRM* to define PAR as "the ratio of a radiated emission's peak power to its average power," and provide that the PAR limit shall apply to the highest peak power density relative to the highest average power density measured over the entire occupied bandwidth. *See id.* No commenter addressed these specific proposals, and we adopt these measures as proposed.

[390] *See 700 MHz Order*, 22 FCC Rcd at 8103–04, para. 106 (finding that 13 dB struck the right balance between "enabling licenses to use modulation schemes with high PARs (such as OFDM) and protecting other licensees from high PAR transmissions"); *PCS and AWS Order*, 23 FCC Rcd at 5337, para. 42 (finding that 13 dB limit "furthers our goal of facilitating the deployment of advanced technologies in the PCS and AWS bands, while limiting the potential for harmful interference that might result from high PAR transmissions"); *Cellular Service Order*, 32 FCC Rcd at 2552–53, paras. 95–96.

while providing public safety licensees with greater assurance of interference protection.[391] APCO similarly argues that 9 dB is technically feasible, will reduce the potential for interference in adjacent public safety spectrum while still allowing Gogo to maximize their use of the Commercial ATG band, and is warranted because of the absence of a guard band between the Commercial ATG band and public safety spectrum.[392]

137. We find that the arguments for a lower PAR limit are unpersuasive. First, we observe again that the Commission has consistently adopted 13 dB as an appropriate PAR limit for the average power limits of similar broadband services, and this consistent approach for other mobile broadband services weighs heavily in favor of a 13 dB PAR limit for Commercial Aviation Air-Ground Systems. In particular, the Commission has found that a 13 dB limit strikes the right balance between enabling licensees to use modulation schemes with high PARs and protecting other licensees from high peak transmissions, and is the appropriate PAR limit for LTE and OFDM technologies generally.[393] APCO and Motorola's assertions to the contrary do not persuade us to reject the Commission's earlier conclusions, and we conclude that the Commission's determinations in connection with the selection of a PAR limit for other services apply equally to the selection of a 13 dB PAR limit for Commercial Aviation Air-Ground Systems.

138. The nature of the Commercial Aviation Air-Ground deployments further bolsters our confidence that 13 dB PAR limit will be sufficient to address public safety interference concerns, notwithstanding the lack of a guard band between the services. We anticipate that, as has been the case over the history of this service, harmful interference from ground stations in the 849–851 MHz band to adjacent ground-based receivers in the 851–854 MHz band is likely to be rare due to the fact that there are relatively few Commercial Aviation Air-Ground ground stations, and, because they communicate exclusively with airborne stations, these ground stations use up-tilted antennas transmitting away from the ground.[394] Therefore, we find that a 13 dB limit should in nearly all cases be sufficient to protect adjacent public safety operations in the 851–854 MHz band as well as other adjacent operations, particularly when taken together with other measures in the service rules, including the strict OOBE limit for emissions into public safety spectrum that we adopt today. Further, as discussed above, to the extent that rare instances of harmful interference may occur, we expect that they will be rapidly addressed through the established interference mitigation procedures applicable to Commercial Aviation Air-Ground Systems. Using the standard PAR limit applicable to other broadband technologies will also address Gogo's concern that a reduced PAR limit may restrain its ability to rely on commercially available cellular technologies for future upgrades to its services. Accordingly, we adopt the PAR limit of 13 dB. We further provide that measurement of average power must be made during a period of continuous transmission based on Commission-approved average power techniques.[395] Licensees should consult the FCC Laboratory's

[391] *See* Motorola Comments at 6–7; *see also* NRPC Reply at 2 (supporting Motorola's proposal).

[392] *See* APCO Reply at 2–3.

[393] *See 700 MHz Report and Order*, 22 FCC Rcd at 8103–4, para. 106; *see also Cellular Service Order*, 32 FCC Rcd at 2552–53, para. 95 (finding that 13 dB limit "would better enable the use of technologies such as LTE"); *WCS Order*, 25 FCC Rcd at 11725, para. 34 (adopting PAR limit of 13 dB "to better enable the use of technologies such as [OFDM]"); *PCS and AWS Order*, 23 FCC Rcd at 5337, para. 42 (finding that 13 dB limit would "further[] our goal of facilitating the deployment of advanced technologies in the PCS and AWS bands, while limiting the potential for harmful interference that might result from high PAR transmissions").

[394] *See 2005 Air-Ground Order*, 20 FCC Rcd at 4435–36, para. 66; *see also Gogo Waiver Order*, 37 FCC Rcd at 7442, para. 11.

[395] *See Cellular Service Order*, 32 FCC Rcd at 2553, para. 96.

Knowledge Database (KDB) website for the latest recommended procedures concerning Commission-approved average power measurement techniques.[396]

139. *Out-of-band emission limits.* Under the current OOBE limits applicable to Commercial Aviation Air-Ground Systems, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.[397] In the *Gogo Waiver Order*, however, the Division required Gogo, as a condition of the waiver permitting compliance with the power limits on an average power basis, to attenuate emissions into the 851–854 MHz public safety spectrum by a stricter OOBE limit of at least 50 + 10 log (P) dB.[398]

140. In the *AAM NPRM*, the Commission sought comment on whether, if average power limits are adopted for Commercial Aviation Air-Ground Systems, any additional measures should be implemented to protect other licensed operations, including public safety operations, and whether it should codify the waiver conditions.[399] In response, commenters on the issue uniformly support the codification of the *Gogo Waiver Order* OOBE limit condition. Motorola "strongly recommends" that the Commission adopt an OOBE limit of 50 + 10 log (P) dB consistent with Gogo's obligations under the *Gogo Waiver Order* and with Motorola's earlier advocacy for a stricter OOBE limit as a waiver condition.[400] Motorola argues the more stringent OOBE limit is justified because the proposed rule changes "will raise the noise floor in the public safety band," and "the potential risk to public safety operations warrants additional consideration for mitigating measures."[401] APCO, NRPC, and NPSTC similarly support the more stringent limit for emissions into public safety spectrum.[402] APCO argues that a more restrictive limit is justified because the licensees in the adjacent spectrum are public safety entities responsible for mission-critical, life-safety communications.[403] APCO further argues that these public safety systems rely on narrowband technologies that are particularly susceptible to adjacent band interference.[404] Gogo states that it does not object to establishing an OOBE limit of 50 + 10 log (P) dB for its base station transmissions in the 849–851 MHz band.[405]

141. Considering the general record support and the importance of protecting public safety narrowband operations in the 851–854 MHz band, we conclude that codifying the *Gogo Waiver Order*'s more stringent OOBE limit on emissions into the adjacent public safety spectrum is in the public interest. Accordingly, we adopt a requirement that power of any emission into the 851–854 MHz band must be attenuated below the transmitting power (P) by a factor of at least 50 + 10 log (P) dB.

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[396] Recommended measurement procedures are available at the FCC Laboratory's KDB website (https://apps.fcc.gov/oetcf/kdb/index.cfm). Because we provide that licensees should consult the FCC Laboratory's KDB website for the recommended procedures, we find it is unnecessary to further specify a measurement bandwidth or other measurement specifications. *See AAM NPRM*, 40 FCC Rcd at 780, para. 88 (seeking comment on the resolution bandwidth).

[397] *See* 47 CFR § 22.861(a).

[398] *See Gogo Waiver Order*, 37 FCC Rcd at 7443, para. 14.

[399] *See AAM NPRM*, 40 FCC Rcd at 780, para. 88.

[400] *See* Motorola Comments at 3–4; *see also id.* at 4 (describing the 50 + 10 log (P) db OOBE limit for emissions into public safety spectrum as the "primary condition" of the *Gogo Waiver Order*).

[401] *See* Motorola Comments at 6.

[402] *See* NPSTC Comments at 5 (recommending, given public safety concerns, that at a minimum, the Commission codify the waiver conditions); APCO Reply at 3; NRPC Reply at 3.

[403] *See* APCO Reply at 3.

[404] *See id.*

[405] *See* Gogo Reply at 7; *see also id.* at 2 ("Gogo accepts the need for the Commission to adopt an appropriate OOBE limit . . . which will adequately protect public safety operations.").

142. We will otherwise retain the current OOBE limit applicable to Commercial Aviation Air-Ground System stations, including such stations operating in the 894–896 MHz band. We find retaining the existing OOBE limit for emissions into other spectrum bands is consistent with the requests in this proceeding justifying stricter OOBE limits specifically based on potential risks to operations in the public safety spectrum (851–854 MHz).[406] Further, part 90 operations in 896–901 MHz have not generally received the same elevated protection, as reflected in the fact that the interference mitigation framework for Commercial Aviation Air-Ground Systems is limited to station emissions from the ATG Band's 849–851 MHz spectrum (and therefore does not include emissions from the 894–896 MHz band).[407] In addition, because Commercial Aviation Air-Ground System stations adjacent to 896–897.5 MHz are airborne stations normally operating at altitude well above part 90 base stations, "[d]istance separation will normally serve to protect 900 MHz SMR base station receivers[.]"[408] We also note that, in the Gogo waiver proceeding, Motorola, addressing conditions necessary to protect part 90 licensees in the 896–897.5 MHz band, advocated for retaining the current level of attenuation proscribed by the rules.[409] Motorola stated that this condition, together with certain other requests unrelated to OOBE limits, "would fully allay MSI's concerns about interference to 900 MHz narrowband licensees . . . ."[410] In light of these factors, we find that the current OOBE limit of 43 + 10 log (P) remains adequate to protect operations adjacent to the 894–896 MHz band.

143. *Power spectral density limit.* Power spectral density (PSD) describes the amount of ERP that would be allowed per unit of bandwidth from a base station antenna, such that wideband emissions would be permitted more power commensurate with their bandwidth than narrowband emissions.[411] PSD limits in the Commission's rules typically impose limits on the Watts/MHz emitted from a base station antenna.[412] They contrast with a "per emissions" limit, such as the limits currently applicable to Commercial Aviation Air-Ground Systems, which imposes a specified numerical power limit on an emission regardless of the bandwidth of the emission.[413] In the *AAM NPRM*, the Commission proposed to add the option of meeting a PSD limit to the rules for Commercial Aviation Air-Ground Systems, tentatively finding that this would enable licensees to make efficient use of wideband technologies in the band, and would also advance the Commission's goal of harmonizing the Commission's rules across commercial wireless services to the extent practicable, taking into account the unique features of each service band.[414]

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[406] *See* NPSTC Comments at 5; APCO Reply at 3; *see also* Motorola Comments at 4 (arguing that stricter OOBE limit is justified because of zero guard band at the border with public safety spectrum); *id.* at 6 ("MSI believes that the potential risk to public safety operations warrants additional consideration for mitigating measures."); *see also* Gogo Reply at 7 n.26.

[407] *See* 47 CFR §§ 22.877–22.879.

[408] *See 2005 Air-Ground Order*, 20 FCC Rcd at 4435, para. 69; *see also Gogo Waiver Order*, 37 FCC Rcd at 7442, para. 11 ("[I]t is unlikely that A/G aircraft that transmit only above 3,000 feet altitude utilizing Gogo's service would cause receiver overload . . . to part 90 base stations receiving in the 896–901 MHz band due to spatial, power, and antenna diversity."); Gogo Waiver Request at 8–9 ("[I]t is improbable that transmissions from aircraft could cause receiver overload to . . . Part 90 base stations receiving in the 896–901 MHz band on the ground.").

[409] *See* Letter from Frank Korinek, Motorola Solutions Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 21-282, at 3 & n.10 (filed Dec. 15, 2021) (Motorola Dec. 15, 2021 *Ex Parte*).

[410] *See id.* at 4.

[411] *See AAM NPRM*, 40 FCC Rcd at 782, para. 94.

[412] *See*, *e.g.*, 47 CFR § 22.913(a)(1)(ii).

[413] *See*, *e.g.*, 47 CFR § 22.867(b) (establishing power limit of "500 Watts").

[414] *See AAM NPRM*, 40 FCC Rcd at 782–84, paras. 94–97.

144. APCO and NRPC support the use of a PSD model, although neither urges its adoption or proposes any specific PSD limit.[415] Gogo, however, argues that because channels in the Commercial ATG band are only 2 megahertz by 2 megahertz wide, they do not raise the same concerns as other wideband channel uses that warrant adoption of a PSD model.[416]

145. After consideration of the record, we decline to add a PSD limit to the Commercial Aviation Air-Ground System power limit rule. We note that an important purpose of a PSD limit is to provide licensees with the flexibility to deliver wideband services efficiently and without unnecessarily disfavoring that choice over narrowband. Given that PSD limits are intended to give flexibility to the licensee, we give weight to the opinion of Gogo, as the only service licensee in the band, that a PSD limit is unnecessary in the Commercial ATG band given the limited bandwidth available. PSD limits also help to avoid concentrating too much energy in a narrow sliver of the band and impacting co-channel licensees, but because there is only one licensee here, we find that that is not a concern and that the OOBE limits will ensure adjacent band users are protected. In addition, the record is sparse as to what, if any, specific PSD limits would be appropriate and would strike the right balance between promoting broadband services and achieving the necessary interference protection. APCO and NRPC support a PSD limit, but say nothing about what PSD value they recommend. Further, there is a countervailing benefit to avoiding unnecessarily complicating the power limit rule. Accordingly, on the current record, we decline to adopt a PSD limit for Commercial Aviation Air-Ground System stations at this time.

146. *ERP vs. EIRP.* We adopt the Commission's proposal to continue expressing power limits as ERP, as in the current rules, rather than equivalent isotropically radiated power (EIRP), as in some of the Commission's power rules.[417] Radiated limits below 1 GHz have typically been referenced to ERP and above 1 GHz to EIRP.[418] Consistent with this practice, the power limits for the Commercial Aviation Air-Ground System rules are expressed in ERP.[419] In the *AAM NPRM*, the Commission tentatively concluded that continuing to express the power limits for Commercial Aviation Air-Ground Systems in ERP would ensure consistency and minimize difficulty for measuring operational power in the Commercial ATG band.[420] Only Gogo comments on the Commission's proposal, stating that it does not oppose the proposal.[421] We adopt the Commission's tentative conclusions, find no reason in the record to depart from the Commission's long practice of expressing power limits for Commercial Aviation Air-Ground Systems in terms of ERP, and so adopt the Commission's proposal.[422]

147. *Interference mitigation procedures.* In the *AAM NPRM*, the Commission sought comment on whether any additional measures should be implemented to protect other licensed

[415] *See* NRPC Comments at 2; APCO Reply at 3.

[416] *See* Gogo Reply at 11.

[417] ERP and EIRP are determined as the product of the power supplied to the antenna and the antenna gain; for ERP, the antenna gain is expressed relative to an ideal half-wave dipole antenna and, for EIRP, the antenna gain is expressed relative to an ideal (theoretical) isotropic antenna. *See AAM NPRM*, 40 FCC Rcd at 781, para 89. Through mathematical process, each of the two power specifications can converted to the other. *See id.* at 781, n.236.

[418] *See*, *e.g.*, 47 CFR §§ 27.50(b), (c), (d) (specifying power limits for various part 27 service, specifying limits for 600 MHz and 700 MHz services referenced to ERP and various AWS bands above 1 GHz to EIRP).

[419] *See AAM NPRM*, 40 FCC Rcd at 781, para. 89 & n.238.

[420] *See AAM NPRM*, 40 FCC Rcd at 781, para. 90.

[421] *See* Gogo Reply at 10–11.

[422] *See Cellular Service Order*, 32 FCC Rcd at 2562–63, para. 130 (finding, "[g]iven that Cellular licensees are long accustomed to ERP limits under the existing [rule]," that continuing to express power limits in terms of ERP would "avoid unnecessary confusion and maintain consistency for Cellular licensees").

operations.[423] NRPC argues that changes to the power limits must include methods for public safety users in adjacent spectrum to identify and report any interference should it occur.[424] NRPC specifically proposes that licensees in the Commercial ATG band be required to maintain a 24/7 contact number where public safety entities can report interference, and that licensees must address any reports of interference immediately and take all steps necessary to resolve the matter up to and including ceasing operations until a solution is agreed to by the reporting public safety agency.[425] APCO similarly argues that the Commission should adopt a new interference mitigation framework applicable to Commercial Aviation Air-Ground Systems to protect public safety operations.[426] Specifically, it recommends that the Commission require that (1) Gogo must incorporate some means of identification into its signal so that public safety entities can easily identify when Gogo is the source of interference; (2) Gogo must designate a point of contact for public safety entities to notify and report instances of potential interference, and provide public safety entities with the name, title, phone, and email of the designated contact, who must be available at all times; (3) Gogo must immediately respond to any reports of interference from public safety entities, and (4) Gogo must mitigate reported interference to the satisfaction of the reporting public safety entity, and in the interim, pending such resolution, must immediately cease operations on the channel(s) causing interference to the public safety entity.[427] Gogo, however, argues that these requirements are unnecessary in light of the existing interference mitigation process in the rules.[428]

148. We agree with Gogo that the adoption of a new interference mitigation process is unnecessary because the current rules for Commercial Aviation Air-Ground Systems already establish a comprehensive framework for the reporting and resolution of harmful interference to public safety stations in the 851–854 MHz band.[429] Section 22.877 establishes a specific standard for unacceptable interference from Commercial Aviation Air-Ground Systems to part 90 non-cellular licensees in the 800 MHz band,[430] and section 22.878 requires Commercial Aviation Air-Ground System licensees transmitting in the 849–851 MHz band (adjacent to public safety spectrum), to the extent they cause or contribute to unacceptable interference, to "abate the interference, with full cooperation and utmost diligence, in the shortest time practicable."[431] Further, section 22.879 establishes specific procedures for the resolution of complaints of unacceptable interference.[432] These include a process for initial notification of the interference by an established electronic means, which is sent to Commercial Aviation Air-Ground System licensees as well as to part 90 ESMR licensees and Cellular Radiotelephone Service

[423] *See AAM NPRM*, 40 FCC Rcd at 780, para. 88.

[424] *See* NRPC Comments at 2.

[425] *See id.*

[426] *See* APCO Reply at 4–5.

[427] *See id.* at 5. We address the issue of signal or station identification requirements below.

[428] *See* Gogo Reply at 7–9.

[429] *See* 47 CFR §§ 22.877–22.879.

[430] *See* 47 CFR § 22.877. In this context, the "800 MHz band" refers to 806–824/851–869 MHz. *See 800 MHz Public Safety Report and Order*, 19 FCC Rcd at 14971 n.2 (defining "800 MHz band" for purposes of the interference abatement obligations adopted in the proceeding); *2005 Air-Ground Order*, 20 FCC Rcd at 4436, para. 67 (providing that licensees of Commercial Aviation Air-Ground Systems "will be subject to the same interference abatement obligation rules adopted for the cellular service in the" *800 MHz Public Safety Report and Order*). Accordingly, it includes the public safety spectrum at 851–854 MHz, but does not include the 896–897.5 MHz band adjacent to the Commercial Aviation Air-Ground System's 894–896 MHz spectrum. *See 2005 Air-Ground Order*, 20 FCC Rcd at 4436–37, para. 69.

[431] *See* 47 CFR §§ 22.877, 22.878(a).

[432] *See* 47 CFR § 22.879.

licensees with base stations within 5000 feet of the incident.[433] The rule further requires that Commercial Aviation Air-Ground System licensees must respond to such notification "as soon as possible and no later than 24 hours after receipt of notification[.]"[434] These procedures also establish standards and requirements for the subsequent analysis and resolution of the interference report, including a requirement that Commercial Aviation Air-Ground System licensees "shall perform a timely analysis of the interference to identify the possible source" and that, generally, "[i]nterference analysis must be completed and corrective action initiated within 48 hours of the initial complaint[.]"[435] Regarding the mitigation steps, section 22.879 reaffirms that Commercial Aviation Air-Ground System licensees found to contribute to unacceptable interference must resolve it "in the shortest time practicable," and must "provide all necessary test apparatus and technical personnel skilled in the operation of such equipment as may be necessary to determine the most appropriate means of timely eliminating the interference."[436] These procedures have governed the resolution of complaints by public safety licensees in the 851–854 MHz band alleging interference from Commercial Aviation Air-Ground System licensees since their application to the latter in 2005.[437] The commenters seeking new procedures do not address the existing procedures, let alone demonstrate their inadequacy, and we find that these procedures should quickly resolve any unacceptable interference from Commercial Aviation Air-Ground Systems, if any occurs.

149. We further find that the proposed new procedures would eliminate certain important balancing safeguards in the process. Notably, the existing procedures do not assume that any particular licensee receiving a complaint is in fact causing interference or require a licensee to shut down operations immediately upon receipt of the complaint, but rather provide a 48-hour period for analysis to determine the source and for correction. In contrast, APCO's proposals would require a Commercial Aviation Air-Ground System licensee receiving a notification of interference (but no other commercial licensee that receives the notification) to mitigate any "reported interference," and further require them to immediately cease operations on the channels allegedly causing interference pending such mitigation.[438] These measures inappropriately presume that they are the source of interference based solely on a report, prior to any opportunity by them to analyze and determine the cause. Further, under the existing rules, in the event a licensee is found to cause or contribute to unacceptable interference, they are subject to a strict obligation to abate the interference, but the rules leave the specific means by which interference is abated to the discretion of the licensee, with any remaining question of sufficiency in abatement determined, if necessary, through Commission review.[439] In contrast, APCO's proposal would effectively give public safety licensees the authority to determine both means and sufficiency.[440] We find that the existing procedures, including procedural safeguards for Commercial Aviation Air-Ground System licensees, better balance the competing interests of the parties.[441] Accordingly, we decline to adopt the proposed new procedures for interference mitigation.

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[433] *See* 47 CFR §§ 22.879(a), 22.879(a)(1), 90.674(a).

[434] *See* 47 CFR § 22.879(a)(2).

[435] *See* 47 CFR § 22.879(b).

[436] *See* 47 CFR § 22.879(c)(1).

[437] *See 2005 Air-Ground Order*, 20 FCC Rcd at 4436, para. 67.

[438] *See* APCO Reply at 5.

[439] *See* 47 CFR § 22.479(c)(1).

[440] *See* APCO Reply at 5 ("Gogo must mitigate reported interference to the satisfaction of the reporting public safety entity, and in the interim, pending such resolution, Gogo must immediately cease operations on the channel(s) causing interference to the public safety entity."); NRPC Reply at 2.

[441] Our action is also consistent with the Commission's original decision to apply the mitigation procedures to Commercial Aviation Air-Ground Systems. In that decision, the Commission also rejected requests from commenters in 2005 to add to the existing requirements, finding the additional proposed requirements were

(continued….)

150. We note that, while the interference mitigation framework applies only to Commercial Aviation Air-Ground System emissions from 849–851 MHz, the *Gogo Waiver Order* required, as a waiver condition, that Gogo also follow this framework in connection with emissions from its 894–896 MHz spectrum into the 896–897.5 MHz band.[442] As mentioned above, NPSTC proposes that the Commission should codify all the waiver conditions, although they do not call out this particular condition for support.[443] We decline, however, to extend the current scope of the interference mitigation framework to include emissions into the 896–897.5 MHz band. This framework was adopted specifically to ensure protection of narrowband part 90 operations in specific sub-bands of the 800 MHz spectrum that do not include 896–897.5 MHz, and we are not persuaded that the part 90 operations in the 896–897.5 MHz band warrant the same approach.[444] In 2005, the Commission found that application of these procedures to Commercial Aviation Air-Ground Systems, limited to interference in the 800 MHz band, was "prudent" based on the fact that there had been "substantial efforts of Nextel, APCO, public safety entities, and land mobile organizations to solve the interference problems in the 800 MHz band . . . ."[445] We find that that extraordinary history continues to distinguish the 800 MHz band, and justifies limiting those procedures to their originally intended context, particularly given the very limited record advocating or supporting such a change. Indeed, even the definition of unacceptable interference under these procedures was adopted with part 90 licensees in the 800 MHz band in mind, and it is not clear or addressed in the record whether any changes are warranted for part 90 licensees in 896–901 MHz.[446] Accordingly, we decline at this time to extend the 800 MHz interference mitigation framework to these licensees.

151. *Other conditions.* Aside from the measures adopted above, we decline to adopt additional requirements based on the conditions of the *Gogo Waiver Order*. As noted above, Motorola and NPSTC argue that, if the Commission changes the peak power limit to an average power limit, it should also codify all the conditions that the Bureau imposed in the *Gogo Waiver Order*.[447] We find, however, that the additional conditions are redundant, unnecessary to protect adjacent licensees, or otherwise unsupported by the record.

152. Two waiver conditions relate to notification and testing of new deployments. First, the *Gogo Waiver Order* required that, upon APCO's request, Gogo shall conduct field testing with APCO in advance of the deployment of its new OFDM technology.[448] Second, it required Gogo to notify, by email and certified mail (or telephonically, if preferred over certified mail), licensees in the 851–854 MHz band that are within a 10-mile radius of each Gogo base station of (1) the date that Gogo intends to deploy its new system; (2) the 24/7 Gogo contact number and the web address for submitting any interference complaints; and (3) Gogo's commitment to loan, at no cost, a spectrum analyzer with instructions for its use.[449] The commitment to loan spectrum analyzers relates to yet another condition that requires that

(Continued from previous page)
"unnecessary in light of our application of the interference abatement and resolution procedures established in the 800 MHz order to the air-ground service . . . ." *See 2005 Air-Ground Order*, 20 FCC Rcd at 4436, para. 68.

[442] *See Gogo Waiver Order,* 37 FCC Rcd at 7444, para. 14 ("Gogo shall receive and respond to harmful interference complaints from part 90 operators in the 896–897.5 MHz band in a manner consistent with the requirements protecting adjacent part 90 non-Cellular 800 MHz licensees in sections 22.877 through 22.879 of the Commission's rules[.]").

[443] *See* NPSTC Comments at 5.

[444] *See supra* n.432.

[445] *See 2005 Air-Ground Order*, 20 FCC Rcd at 4436, para. 67.

[446] *See* 47 CFR §§ 22.877, 22.970(a).

[447] *See* Motorola Comments at 1–2; NPSTC Comments at 5.

[448] *See Gogo Waiver Order*, 37 FCC Rcd at 7443, para. 14.

[449] *See id.*

Gogo provide "to licensees in the 851–854 MHz and 896–897.5 MHz bands, upon their request, instructions on how to ascertain through the use of a spectrum analyzer whether Gogo's transmissions are the source of harmful interference."[450]

153. We decline to adopt these conditions as rule requirements. With regard to the condition authorizing APCO to participate in field testing, we note that APCO itself, while agreeing that Gogo should conduct field testing, objected to the *Gogo Waiver Order* condition as inappropriately inserting APCO into the process and APCO did not agree to be a party to it.[451] Further, there is no record for some alternative mandate of third-party participation in a Commercial Aviation Air-Ground System licensee's field testing of new deployments. Accordingly, we decline to adopt the *Gogo Waiver Order* condition or an alternative field testing participation requirement.

154. With regard to the notification of new deployments, we find that, as with the interference mitigation issue, the existing rules already provide for such a requirement. Specifically, section 22.880 provides that "public safety/[Critical Infrastructure Industry or CII] licensees may notify a commercial aviation air-ground system licensee that they wish to receive prior notification of the activation or modification of a commercial aviation air-ground system ground station site in their area."[452] It further provides that "[t]hereafter, the commercial aviation air-ground system licensee must provide" location and specified technical information regarding the new deployment.[453] We find this existing requirement appropriately and adequately addresses the interests of licensees in the 851–854 MHz band in being aware of new Commercial Aviation Air-Ground System deployments.[454]

155. We further decline to codify either loan or instructional requirements with regard to spectrum analyzers or other specific equipment serving the purpose of identifying the source of interference to adjacent licensees. We find no adequate reason to impose such a unique obligation on Commercial Aviation Air-Ground System licensees, and mandating such loans would raise a number of ancillary questions regarding loan terms that the record does not address. We further note that public safety licensees are entitled to interference mitigation under the rules without having to perform any interference analysis. Given that they do not require spectrum analyzers to vindicate their rights, there is even less cause to mandate the loan of or instruction regarding such equipment.[455] Nevertheless, we encourage Gogo to continue, on a voluntary basis, its efforts to assist public safety licensees.

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[450] *See id.*

[451] *See* APCO Petition for Reconsideration, WT Docket No. 21-282, at 3.

[452] *See* 47 CFR § 22.880(a).

[453] *See id.*

[454] The existing information exchange requirement provides that prior notification of ground station activation or modification is for informational purposes only, and does not afford adjacent licensees a right to reject the station or require changes in its operating parameters. *See* 47 CFR § 22.880(b). Nevertheless, the information exchange provides important benefits for interference mitigation, as it will "[a]llow a public safety licensee to advise the commercial aviation air-ground system licensee whether it believes a proposed ground station will generate unacceptable interference," "[p]ermit commercial aviation air-ground system licensee(s) to make voluntary changes in ground station parameters when a public safety licensee alerts them to possible interference," and help parties "[r]apidly identify the source if interference is encountered when the ground station is activated." *Id.*

[455] In its Petition for Reconsideration of the *Gogo Waiver Order*, APCO, in criticizing the spectrum analyzer condition, echoes our observation, arguing that "[i]f interference occurs to public safety communications, public safety agencies should not have to devote resources to employing spectrum analyzers on behalf of Gogo" because the rules provide that "it is the responsibility of service providers like Gogo, not the victim public safety licensees . . . to identify the possible source" of interference. *See* APCO Petition for Reconsideration, WT Docket No. 21-282, at 3 (internal quotations omitted).

2. Unnecessary or obsolete rules

156. *Station identification.* As proposed in the *AAM NPRM*, we amend section 22.313 of the rules to exempt Commercial Aviation Air-Ground Systems from the station identification requirements of that provision. Section 22.313 requires covered licensees to transmit station call signs at regular intervals, specifically providing that "[t]he licensee of each station in the Public Mobile Services must ensure that the transmissions of that station are identified in accordance with the requirements of this section."[456] "Public mobile services" include all the services regulated under part 22.[457] Subsection 22.313(a), however, specifically exempts several part 22 services, such as the Cellular Radiotelephone service, from the signal identification requirements.[458] When the Commission first adopted rules for Air-Ground Radiotelephone services in the Commercial ATG band in 1990, it also included an exemption from station identification requirements for all Air-Ground Radiotelephone stations in 800 MHz, which would encompass the Commercial Aviation Air-Ground Systems.[459] In 1994, however, as part of a broader revision of part 22 rules, the Commission dropped the exemption of 800 MHz Air-Ground Radiotelephone stations and instead included an exemption for "General aviation ground stations in the Air-ground Radiotelephone Service[.]"[460] The Commission did not discuss why it no longer exempted 800 MHz Air-Ground Radiotelephone stations from station identification requirements.[461]

157. In the *AAM NPRM*, the Commission tentatively concluded that the station identification requirement for Commercial Aviation Air-Ground Systems was "outdated and uniquely burdensome" and accordingly proposed to include stations operating in the Commercial Aviation Air-Ground Service to the station identification exemption list in subsection (a).[462] Gogo supports exemption, arguing that station identification is unnecessary because Gogo is the only licensee authorized to operate in the 849–851 MHz band.[463] Further, Gogo agrees with the Commission's tentative conclusion that, because the Commission has previously removed this requirement for similar services, its retention for Commercial Aviation Air-Ground Systems would be both outdated and uniquely burdensome.[464] APCO opposes the change, however, arguing that any inconvenience to the licensee is outweighed by the need to ensure interference-free operation for public safety users in adjacent spectrum.[465] APCO asserts that, if interference occurs, station identification should be a tool that public safety entities can rely upon to swiftly determine the

[456] *See* 47 CFR § 22.313.

[457] *See* 47 CFR § 22.99 (defining terms "used in this part," and providing that "public mobile services" is defined as "[r]adio services in which licensees are authorized to offer and provide mobile and related fixed radio telecommunication services for hire to the public").

[458] *See* 47 CFR § 22.313(a).

[459] *See Amendment of the Commission's Rules Relative to Allocation of the 849–851/894–896 MHz Bands*, GN Docket No. 88-96, Report and Order, 5 FCC Rcd 3861, 3877, Appx. A (1990) (*1990 Air-Ground Order*) (section 22.213, providing that "[s]tations in the 800 MHz Air-Ground Radiotelephone Service shall not be required to identify the station").

[460] *See Revision of Part 22 of the Commission's Rules Governing the Public Mobile Services et al.*, CC Docket No. 92-115, Report and Order, 9 FCC Rcd 6513, Appx. B (1994) (*1994 Part 22 Revision Order*). The Commission made certain other changes to the rule not relevant here, and none involved limiting any of the exemptions. *See id.* at 6556.

[461] The Commission indicated that the new rule was "based on old § 22.213" and did not discuss narrowing any of the pre-existing exemptions. *See id.* at 6556.

[462] *See AAM NPRM*, 40 FCC Rcd at 785–86, para. 99.

[463] *See* Gogo Reply at 10.

[464] *See* Gogo Reply at 10.

[465] *See* APCO Reply at 4.

source of interference.[466] NRPC does not address section 22.313 specifically, but recommends that a Commercial Aviation Air-Ground System be required to "incorporate a means of identification of its signal that it can be readily identified by public safety system technical staff."[467]

158. After review of the record, we find it is in the public interest to exempt Commercial Aviation Air-Ground Systems from section 22.313's station identification requirement. It has been the Commission's policy for more than thirty years that licensees in commercial mobile services operating on an exclusive basis in Commission-defined service areas should generally be exempt from station identification requirements.[468] This policy reflects the view that such licensees can readily be identified based on service area information contained in the Commission's licensing records and other publicly available sources.[469] As the Commercial Aviation Air-Ground service bands, after 2005, were "designated for paired nationwide exclusive assignment," we find that this long-standing policy has been applicable to this service since the 2005 revisions.[470] We therefore agree with the Commission's tentative conclusion that the continuing application of this rule to Commercial Aviation Air-Ground service is both outdated and uniquely burdensome. Indeed, we find the Commission's policy particularly applicable here. The band includes only nationwide exclusive licenses, making licensee identification from station transmissions even more straightforward than where the nation may be served by multiple providers in different areas, and as a practical matter, we anticipate that there will continue to be only a single provider in the entire band for the foreseeable future.[471] Elimination of station identification requirements also furthers the goal of regulatory symmetry by ensuring that similarly situated licensees will be treated consistently.

159. APCO argues that, "[i]f interference occurs, the responsibility for identifying its source will fall on public safety entities" and that public safety entities therefore need all possible tools for identifying the source.[472] As discussed above, we find that station identification is not necessary as Commercial Aviation Air-Ground System transmissions can be readily identified without a specific identifying transmission. We also disagree with APCO's premise. As APCO itself has noted in other contexts, under the interference mitigation framework applicable to Commercial Aviation Air-Ground Systems, public safety entities in the 851–854 MHz band are not responsible for identifying the source of

[466] *See id.*

[467] NRPC Reply at 2.

[468] *See Implementation Of Sections 3(n) and 332 of the Communications Act et al.,* GN Docket No. 93-252, Third Report and Order, 9 FCC Rcd 7988, 8092, para. 216 (1994) (*CMRS Third Report and Order*).

[469] *See id.*

[470] Although the Commission eliminated the exemption for stations in the 800 MHz Air-Ground Radiotelephone service in 1994, this action pre-dated the creation of nationwide exclusive licenses in the Commercial ATG band by a decade and accordingly, the same policy would not have applied. Accordingly, even assuming the deletion in 1994 was not inadvertent, we see no conflict between our determination today and the 1994 decision.

[471] We acknowledge that there is an important public interest in the rapid source identification and mitigation of any harmful interference to public safety licensees in the 851–854 MHz band. We do not find, however, that the retention of the station identification requirement is justified because of this interest. While a station identification (which amounts to the periodic broadcast of a licensee's "call sign," *see* 47 CFR § 22.313(c)) might help in some circumstances to confirm the license associated with a transmission, it would generally not be sufficient without further analysis to confirm whether that licensee's transmissions were the cause of harmful interference in a particular case, and for the reasons discussed above, provides even less benefit here where the call sign associated with a transmission in the Commercial ATG band (as well as the licensee itself) can be readily identified without the need for a station identification signal.

[472] *See* APCO Reply at 4.

harmful interference.[473] Rather, once they experience such interference, they may immediately send an electronic notification of the interference simultaneously to the Cellular Radiotelephone, part 90 Enhanced Specialized Mobile Radio (ESMR), and Commercial Aviation Air-Ground System licensees, and it is the obligation of the notified licensees to analyze the cause of the interference, and, if a licensee is responsible, to resolve the interference "in the shortest time practicable."[474] In light of these procedures, there is even less need for station identification. Accordingly, for the reasons discussed above, we adopt an exemption from the station identification requirements for all Commercial Aviation Air-Ground System stations.

160. *Spectrum holding rule (22.853).* We adopt the Commission's proposal to eliminate section 22.853, which prohibits a Commercial Aviation Air-Ground System licensee from holding more than three of the four megahertz of spectrum in the Commercial ATG band.[475] When the Commission adopted this restriction in the *2005 Air-Ground Order*, it determined that no more than three megahertz of spectrum was required for a licensee to deliver high-speed air-ground services using then-existing broadband technologies.[476] It further found that a service offered over one megahertz of spectrum could provide a meaningful competitive alternative to other air-ground services, including satellite services.[477] It concluded that it was in the public interest to promote competition by ensuring that at least two parties will have opportunity to provide service in the band.[478]

161. In the 2013 *Gogo-LiveTV Order*, however, the Bureau granted Gogo a waiver of section 22.853 to allow it to hold both the three megahertz and one megahertz licenses in the Commercial ATG band, which enabled Gogo's acquisition of LiveTV and its 1 megahertz license.[479] The Bureau found that as a result of developments since 2004, there was sufficient competition for the relevant services from outside the Commercial ATG band and that granting the waiver would afford Gogo the opportunity to make full use of the Commercial ATG band post-transaction and ensure that the one megahertz license did not lie fallow.[480]

162. In the *AAM NPRM*, the Commission tentatively concluded similarly that elimination of section 22.853 would maximize use of the spectrum and ensure that the additional one megahertz did not remain fallow.[481] No commenter objects to the deletion of the rule. Accordingly, we adopt the Commission's tentative conclusion, and eliminate section 22.853 of the Commission's rules.

163. *Grandfathered systems rule (22.859) and referencing rules (1.929(e)(2), 22.165(f), 22.878, 22.879).* Section 22.859 of the Commission's rules established rules governing grandfathered systems in the Commercial ATG band that were authorized before January 1, 2004, following the

[473] *See* APCO Petition for Reconsideration, WT Docket No. 21-282, at 3 ("[T]he rules require, [and] it is the responsibility of service providers like Gogo, not the victim public safety licensees, to perform a timely analysis of the interference to identify the possible source.") (internal quotations omitted).

[474] *See* 47 CFR §§ 22.879(a)(1), (b) ("Commercial aviation air-ground system licensees—who receive an initial notification . . . —shall perform a timely analysis of the interference to identify the possible source."), (c)(1).

[475] *See* 47 CFR § 22.853 (providing that "[n]o individual or entity may hold, directly or indirectly, a controlling interest in licenses authorizing the use of more than three megahertz of spectrum (either shared or exclusive) in the 800 MHz commercial aviation Air-Ground Radiotelephone Service frequency bands").

[476] *See 2005 Air-Ground Order*, 20 FCC Rcd at 4425, para. 41.

[477] *See id.*

[478] *See id.*

[479] *See Gogo-LiveTV Order*, 28 FCC Rcd at 3362, para. 2.

[480] *See id.* at 3368, para. 17.

[481] *See AAM NPRM*, 40 FCC Rcd at 784–85, para. 98.

adoption of the *2005 Air-Ground Order*.[482] The *AAM NPRM* proposed to delete this provision, as well as certain rule provisions referencing it, on the grounds that the incumbents referred to in the rule no longer operate in the band.[483] The Commission has since repealed section 22.859 as well as section 22.165(f), which referenced it, by direct final rule, finding that the provisions regulated obsolete technology.[484] We now address three additional requirements with now-obsolete references to section 22.859 or the incumbents addressed by it that were proposed for removal in the *AAM NPRM*.

164. First, the *AAM NPRM* proposed the deletion of section 1.929(e)(2).[485] Section 1.929 overall clarifies which applications and amendments to applications for stations in the wireless radio services are classified as "major," which triggers a requirement of Commission pre-approval under section 1.947.[486] Section 1.929(e)(2) provides that, in addition to categories of "major" actions that apply under subsection (a), applications are major if they "[r]equest the first authorization for a new Commercial Aviation ground station at a location other than those listed in § 22.859 of this chapter."[487] This provision is doubly obsolete, as section 22.859 ceased to include a list of station locations when it was revised in 2005 to address incumbent protection, and is now deleted in its entirety per the Commission's decision above. We further find that no commenter objects to its removal. Accordingly, section 1.929(e)(2) is deleted as proposed.

165. In addition to removing this reference to section 22.859, we further take this opportunity, as proposed in the *AAM NPRM*, to amend two provisions, sections 22.878 and 22.879, to remove now-obsolete references to licensees authorized prior to January 1, 2004, as no such licensees remain in the band. Section 22.878 establishes an obligation to abate unacceptable interference to non-cellular part 90 licensees in 800 MHz spectrum, applicable to Commercial Aviation Air-Ground ground stations transmitting in the 849–851 MHz band "other than commercial aviation ground stations operating under the authority of a license originally granted prior to January 1, 2004."[488] Similarly, section 22.879 establishes interference resolution procedures applicable to commercial aviation ground stations transmitting in the 849–851 MHz band, "other than commercial aviation ground stations operating under the authority of a license originally granted prior to January 1, 2004."[489] No commenter objects to the *AAM NPRM*'s proposal to remove these obsolete references to licenses originally granted prior to January 1, 2004, and we delete them as proposed.

166. *Technical rule changes to account for common ownership of licenses (22.861, 22.863).* In the *AAM NPRM*, the Commission proposed to amend two technical rules, sections 22.861 and 22.863, to allow for more flexible use of the Commercial ATG band in cases where the technical requirements, which help to ensure that the service of one licensee does not cause harmful interference to another licensee, would apply to the internal boundary between two licenses that are owned by the same licensee.[490] Section 22.861 establishes an OOBE limit applicable to any emission "outside of the authorized operating frequency ranges . . . ."[491] Section 22.863 provides that the frequency stability of

[482] *See id.* at 785, para. 99.

[483] *See id.* at 785–86, paras. 99, 100.

[484] *See Direct Final Rule*, 40 FCC Rcd at 8688, n.6.

[485] *See AAM NPRM*, 40 FCC Rcd at 784–85, para. 98.

[486] *See* 47 CFR §§ 1.947, 1.929.

[487] *See* 47 CFR § 1.929(e)(2).

[488] *See* 47 CFR § 22.878.

[489] *See* 47 CFR § 22.879.

[490] *See AAM NPRM*, 40 FCC Rcd at 785–86, para. 99.

[491] *See* 47 CFR § 22.861(a).

Commercial Aviation Air-Ground System equipment must be sufficient to ensure that the occupied bandwidth of the fundamental emissions remains within the authorized frequency bands of operation.[492] In 2013, the Bureau granted Gogo a partial waiver of these two rules, waiving application at the internal boundaries between Gogo's two licenses, but continuing to require compliance with regard to adjacent channel licensees.[493] The Bureau found that the waiver would serve the public interest because it would allow Gogo more flexibility to integrate operations across the spectrum covered by its two licenses without any offsetting harms.[494]

167. In the *AAM NPRM*, the Commission tentatively concluded that amending these provisions to account for instances of common control of air-ground licenses would serve the public interest by clarifying and modernizing the rules and allowing more flexibility for licensees.[495] In its comments, Gogo supports the proposal and argues that these technical restrictions are not needed to regulate operations between contiguous blocks held by a single licensee.[496] No commenter opposes the Commission's proposed changes to sections 22.861 and 22.863, and we agree with Gogo that the requirements in these rules are not necessary to regulate operations between contiguous blocks held by the same licensee. We further find that the proposed changes will provide additional flexibility to a Commercial Aviation Air-Ground System licensee to make productive use of its spectrum without any additional risk of harmful interference to other licensees. Accordingly, we adopt the changes as proposed.

V. COST-BENEFIT ANALYSIS

168. The rule changes we adopt support advanced aviation technologies and improve in-flight connectivity, while preserving protections for public safety and other existing spectrum users. The rule changes would: (1) repurpose the outdated 450 MHz (454.6625–454.9875 MHz and 459.6625–459.9875 MHz) air-ground voice band to facilitate more intensive use of 650 kilohertz of low-band spectrum; (2) allow ground-based drone-detection radar to operate in the 24.45–24.65 GHz band by adding a new secondary radiolocation allocation; and (3) update the 800 MHz (849–851 MHz and 894–896 MHz) Commercial Aviation Air-Ground rules to measure transmit power using average power. Taken together, the rule changes will impose negligible costs while creating economic benefits through greater certainty, more efficient spectrum usage, and greater support for innovative services, as detailed below.

169. The Commission finds that the voluntary transition of the 450 MHz air-ground voice band from multiple legacy site-based licenses held by AURA to a single nationwide license will remove outdated technological constraints and promote more efficient use of the 650 kilohertz of spectrum. Assigning new rights and obligations to the single nationwide licensee will enable deployment of new and innovative services at a wider range of altitudes. Because current uses of the band will remain largely unchanged and interference risks are low, we further anticipate that transition-related costs will be negligible.

170. The Commission also determines that allowing ground-based drone-detection radar to operate on a secondary basis in the 24.45–24.65 GHz band will facilitate deployment of emerging technologies demanded by federal and non-federal customers. The change supports the deployment and greater availability of UAS detection technologies that guard against potentially dangerous drones at sensitive sites, while simultaneously creating more efficient use of an underused spectrum band. Establishing long-term service rules provides greater certainty than relying on limited-term waivers. Given the protections adopted to reduce harmful interference to primary and adjacent band operations, we

[492] *See* 47 CFR § 22.863.

[493] *See Gogo-LiveTV Order*, 28 FCC Rcd at 3371, para. 27.

[494] *See id.*

[495] *See AAM NPRM*, 40 FCC Rcd at 785–86, para. 99.

[496] *See* Gogo Petition for Rulemaking at 13.

expect costs associated with this rule change to be negligible and the overall economic effect to be beneficial. The estimated value of the North American drone-detection market is approximately $582 million.[497] Given the incremental nature of this rule change, we assume a 1% to 5% increase in market size, resulting in an estimated positive economic impact of approximately $6 million to $29 million.

171. Finally, updating the 800 MHz Commercial Aviation Air-Ground rules will allow the incumbent licensee, Gogo, to deliver higher capacity, higher quality broadband connectivity to aircraft with minimal increased risk of interference by modifying power limits to use average power. These improvements are not expected to fundamentally alter the service but should provide enhancements in performance. We estimate the value of the North American business aircraft in-flight Internet market to be approximately $304 million,[498] and assume a positive impact on the industry equal to 1% to 5% of the market value given the marginal nature of the rule change, thus resulting in an approximately $3 million to $15 million economic impact due to this rule change. Accordingly, costs associated with this rule change are expected to be negligible, while benefits are expected to accrue through improved broadband services provided by the incumbent licensee.

VI. PROCEDURAL MATTERS

172. *Regulatory Flexibility Act.* The Regulatory Flexibility Act of 1980, as amended (RFA),[499] requires that an agency prepare a regulatory flexibility analysis for notice and comment rulemakings, unless the agency certifies that "the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities."[500] Accordingly, the Commission has prepared a Final Regulatory Flexibility Analysis (FRFA) concerning the possible impact of the rule and policy changes in this *Report and Order*. The FRFA is set forth in Appendix B

173. *Paperwork Reduction Act.* This document contains new or modified information collection requirements. All such new or modified requirements will be submitted to the Office of Management and Budget (OMB) for review under section 3507(d) of the PRA. OMB, the general public, and other federal agencies will be invited to comment on any new or modified information collections contained in this proceeding. Additionally, this document may contain non-substantive modifications to approved information collections. Any such modifications will be submitted to OMB for review pursuant to OMB's non-substantive modification process. 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 previously sought specific comment on how it might "further reduce the information collection burden for small business concerns with fewer than 25 employees." In Appendix B, we have assessed the effects of the required collection of information on these small entities.

174. *Congressional Review Act.* The Commission has determined, and the Administrator of the Office of Information and Regulatory Affairs, Office of Management and Budget, concurs, that this

[497] Fortune Business Insights, *Drone Detection Market* (Oct. 5, 2026), https://www.fortunebusinessinsights.com/drone-detection-market-115392.

[498] According to Fortune Business Insights, the North American in-flight Internet market is valued at approximately $1.8 billion. Fortune Business Insights, *In Flight Internet Market Size* (Oct. 5, 2026), https://www.fortunebusinessinsights.com/in-flight-internet-market-114578. We then calculate that business aviation accounts for approximately 17% of the aviation market, resulting in an estimate of approximately $304 million for the value of the North American business aircraft in-flight Internet market. Mordor Intelligence, *Aviation Market Size & Share Analysis—Growth Trends and Forecast (2025–2030)* (Nov. 28, 2025), https://www.mordorintelligence.com/industry-reports/aviation-market; Mordor Intelligence, *Business Aviation Services Market Size & Share Analysis—Growth Trends and Forecast (2026–2031)* (June 8, 2026), https://www.mordorintelligence.com/industry-reports/business-aviation-services-market.

[499] 5 U.S.C. §§ 601–612. The RFA was amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[500] 5 U.S.C. § 605(b).

rule is non-major under the Congressional Review Act, 5 U.S.C. § 804(2). The Commission will send a copy of this Report and Order to Congress and the Government Accountability Office pursuant to 5 U.S.C. § 801(a)(1)(A).

175. *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.

176. *Additional Information.* For additional information on this proceeding, contact Christine Parola, Mobility Division, Wireless Telecommunications Bureau, at 202-418-7851, or by email at Christine.Parola@fcc.gov.

VII. ORDERING CLAUSES

177. Accordingly, IT IS ORDERED, pursuant to sections 1, 4, 301, 303, 307–310, 316, 318, and 332 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 154, 301, 303, 307–310, 316, 318, and 332, that this Report and Order IS HEREBY ADOPTED.[501]

178. IT IS FURTHER ORDERED that this Report and Order, including the rules as set forth in Appendix A, SHALL BE EFFECTIVE thirty (30) days after publication in the Federal Register, with the exception of sections 22.831, 22.833, and 22.834, which may contain new or modified information collection requirements that require review by the Office of Management and Budget (OMB) under the Paperwork Reduction Act and will take effect after the Wireless Telecommunications Bureau publishes a notice in the Federal Register announcing the completion of such review and the relevant effective date(s).

179. IT IS FURTHER ORDERED that the waivers granted by *Echodyne Extension Order* and the *MatrixSpace Waiver Order* are terminated as of the date on which all of the part 90 rules adopted in this Report and Order are effective, and licenses granted pursuant to the *Echodyne Waiver Order*, the *Echodyne Extension Order*, or the *MatrixSpace Waiver Order* are terminated as of one year after the date on which all of the part 90 rules adopted in this Report and Order are effective, except as otherwise provided in this Report and Order.

180. IT IS FURTHER ORDERED that, pursuant to section 1.3 of the Commission's rules, 47 CFR § 1.3, the following rules are waived, effective immediately upon adoption of this Report and Order, to the limited extent and as described herein: sections 2.1043(c), and 2.911(c) and (e) of the Commission's rules, 47 CFR §§ 2.1043(c), and 2.911(c) and (e). This waiver is granted to Echodyne Corporation and MatrixSpace, Inc. only for the purpose of adding a part 90 designation to equipment certifications granted, on or before the date on which all of the part 90 rules adopted in this Report and Order are effective, under part 87 pursuant to the *Echodyne Waiver Order*, the *Echodyne Extension Order*, or the *MatrixSpace Waiver Order*.

181. IT IS FURTHER ORDERED that the waiver granted by the *Gogo Waiver Order* is terminated as of the date on which all of the rules adopted in this Report and Order that are applicable to Commercial Aviation Air-Ground Systems are effective.

182. IT IS FURTHER ORDERED that the Commission's Office of the Secretary, SHALL SEND a copy of this *Report and Order*, including the Final Regulatory Flexibility Analysis, to the Chief Counsel for the Small Business Administration (SBA) Office of Advocacy.

[501] Pursuant to Executive Order 14215, 90 Fed. Reg. 10447 (Feb. 24, 2025), this regulatory action has been determined to be significant under Executive Order 12866, 58 Fed. Reg. 51735 (Oct. 4, 1993).

183. IT IS FURTHER ORDERED that the Commission SHALL SEND a copy of this Report and Order in a report to be sent to Congress and the Government Accountability Office pursuant to the Congressional Review Act, see 5 U.S.C. § 801(a)(1)(A).

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A

Final Rules

The Federal Communications Commission proposes to amend 47 CFR parts 0, 1, 2, 22, and 90 to read as follows:

PART 0 — COMMISSION ORGANIZATION

1. The authority citation for part 0 continues to read as follows:

Authority: 47 U.S.C. 151, 154(i), 154(j), 155, 225, 409, and 1754, unless otherwise noted.

2. Amend § 0.241 by adding paragraph (a)(1)(iv) to read as follows:

§ 0.241 Authority delegated.

(a) * * *

(1) * * *

(iv) The Chief of the Office of Engineering and Technology is delegated authority, along with the Chief of the Wireless Telecommunications Bureau, by notice-and-comment rulemaking if required by statute or in the public interest, to issue an order amending rules in part 22 of this chapter that reference industry standards to specify revised versions of the standards. These delegations are limited to modifying rules to reference revisions to standards that are already in the rules and not to incorporate a new standard into the rules, and are limited to the approval of changes that do not raise major compliance issues.

* * * * *

3. Amend § 0.331 by revising paragraph (d) to read as follows:

§ 0.331 Authority delegated.

* * * * *

(d) *Authority concerning rulemaking proceedings*. The Chief, Wireless Telecommunications Bureau, shall not have the authority to act upon notices of proposed rulemaking and inquiry, final orders in rulemaking proceedings and inquiry proceedings, and reports arising from any of the foregoing except such orders involving ministerial conforming amendments to rule parts, or orders conforming any of the applicable rules to formally adopted international conventions or agreements where novel questions of fact, law, or policy are not involved. Orders conforming any of the applicable rules in part 17 of this chapter to rules formally adopted by the Federal Aviation Administration also need not be referred to the Commission if they do not involve novel questions of fact, law, or policy. In addition, revisions to the airport terminal use list in § 90.35(c)(61) of this chapter and revisions to the Government Radiolocation list in § 90.371(b) of this chapter need not be referred to the Commission. Adoption of certain technical standards applicable to hearing aid compatibility under § 20.19 of this chapter made together with Chief of the Office of Engineering and Technology, as specified in § 20.19(k) of this chapter, also need not be referred to the Commission. Adoption of amendments to rules in part 22 of this chapter by notice-and-comment rulemaking, along with the Chief of the Office of Engineering and Technology as specified in § 0.241(a)(1)(iv), that reference industry standards to specify revised versions of the standards, need not be referred to the Commission, however, these delegations are limited to modifying rules to reference revisions to standards that are already in the rules and not to incorporate a new standard into the rules, and are limited to the approval of changes that do not raise major compliance issues. Adoption of

amendments to rules in part 88 of this chapter by notice-and-comment rulemaking, along with the Chief of the Office of Engineering and Technology as specified in § 0.241(a)(1)(iii), that reference industry standards to specify revised versions of the standards, need not be referred to the Commission, however, these delegations are limited to modifying rules to reference revisions to standards that are already in the rules and not to incorporate a new standard into the rules, and are limited to the approval of changes that do not raise major compliance issues. Also, the addition of new Marine VHF frequency coordination committee(s) to § 80.514 of this chapter need not be referred to the Commission if they do not involve novel questions of fact, policy or law, as well as requests by the United States Coast Guard to:

* * * * *

PART 1 — PRACTICE AND PROCEDURE

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

Authority: 47 U.S.C. chs. 2, 5, 9, 13; 28 U.S.C. 2461 note; 47 U.S.C. 1754, unless otherwise noted.

5. Amend § 1.907 by revising the definitions of "Covered geographic licenses" and "Covered Site-based Licenses" to read as follows:

§ 1.907 Definitions.

* * * * *

Covered geographic licenses. Covered geographic licenses consist of the following services: 1.4 GHz Service (part 27, subpart I, of this chapter); 1.6 GHz Service (part 27, subpart J); 24 GHz Service and Digital Electronic Message Services (part 101, subpart G, of this chapter); 218–219 MHz Service (part 95, subpart F, of this chapter); 220–222 MHz Service, excluding public safety licenses (part 90, subpart T, of this chapter); 600 MHz Service (part 27, subpart N); 700 MHz Commercial Services (part 27, subparts F and H); 700 MHz Guard Band Service (part 27, subpart G); 800 MHz Specialized Mobile Radio Service (part 90, subpart S); 900 MHz Specialized Mobile Radio Service (part 90, subpart S); 900 MHz Broadband Service (part 27, subpart P); 3.45 GHz Service (part 27, subpart Q); 3.7 GHz Service (part 27, subpart O); Advanced Wireless Services (part 27, subparts K and L); Air-Ground Service (450 MHz Air-Ground Service and Commercial Aviation Air-Ground Systems) (part 22, subpart G, of this chapter); Broadband Personal Communications Service (part 24, subpart E, of this chapter); Broadband Radio Service (part 27, subpart M); Cellular Radiotelephone Service (part 22, subpart H); Citizens Broadband Radio Service (part 96, subpart C, of this chapter); Dedicated Short Range Communications Service, excluding public safety licenses (part 90, subpart M); Educational Broadband Service (part 27, subpart M); H Block Service (part 27, subpart K); Local Multipoint Distribution Service (part 101, subpart L); Multichannel Video Distribution and Data Service (part 101, subpart P); Multilateration Location and Monitoring Service (part 90, subpart M); Multiple Address Systems (EAs) (part 101, subpart O); Narrowband Personal Communications Service (part 24, subpart D); Paging and Radiotelephone Service (part 22, subpart E; part 90, subpart P); VHF Public Coast Stations, including Automated Maritime Telecommunications Systems (part 80, subpart J, of this chapter); Upper Microwave Flexible Use Service (part 30 of this chapter); and Wireless Communications Service (part 27, subpart D).

Covered site-based licenses. Covered site-based licenses consist of the following services: 220–222 MHz Service (site-based), excluding public safety licenses (part 90, subpart T of this chapter); 800/900 MHz (SMR and Business and Industrial Land Transportation Pool) (part 90, subpart S); Aeronautical Advisory Stations (Unicoms) (part 87, subpart G); Air-Ground Service (General Aviation) (part 22, subpart G); Alaska-Public Fixed Stations (part 80, subpart O); Broadcast Auxiliary Service (part 74, subparts D, E, F, and H); Common Carrier Fixed Point-to-Point, Microwave Service (part 101, subpart I); Industrial/Business Radio Pool (part 90, subpart C); Local Television Transmission Service

(part 101, subpart J); Multiple Address Systems (site-based), excluding public safety licenses (part 101, subpart H); Non-Multilateration Location and Monitoring Service (part 90, subpart M); Offshore Radiotelephone Service (part 22, subpart I); Paging and Radiotelephone Service (site-based) (part 22, subpart E); Private Carrier Paging (part 90, subpart P); Private Operational Fixed Point-to-Point Microwave Service, excluding public safety licenses (part 101, subpart H); Public Coast Stations (site-based) (part 80, subpart J); Radiodetermination Service Stations (Radionavigation and Radiolocation Land Stations) (part 87, subpart Q); Radiolocation Service (part 90, subpart F); and Rural Radiotelephone Service (including Basic Exchange Telephone Radio Service) (part 22, subpart F).

* * * * *

§ 1.929 Classification of filings as major or minor.

6. Amend § 1.929 by removing paragraph (e) and redesignating paragraphs (f) through (k) as paragraphs (e) through (j).

7. Amend § 1.950 by adding paragraphs (b)(1)(iv) and (b)(2)(v) to read as follows:

§ 1.950 Geographic partitioning and spectrum disaggregation.

* * * * *

(b) * * *

(1) * * *

(iv) 450 MHz Air-Ground Service Licensees must comply with § 22.834 of this chapter.

(2) * * *

(v) 450 MHz Air-Ground Service Licensees must comply with § 22.834 of this chapter.

* * * * *

8. Amend § 1.9005 by adding paragraph (qq) to read as follows:

§ 1.9005 Included services.

* * * * *

(qq) The 450 MHz Air-Ground Service in the 450 MHz band (part 22 of this chapter).

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

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

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

10. Amend § 2.106 by:

a. Revising pages 28, 55, and 59 of the Table of Frequency Allocations; and

b. Revising paragraph (d)(32).

The revisions read as follows:

§ 2.106 Table of Frequency Allocations.

* * * * *

410-420 FIXED MOBILE except aeronautical mobile SPACE RESEARCH (space-to-space) 5.268			410-420 FIXED MOBILE SPACE RESEARCH (space-to-space) 5.268 US13 US55 US64 G5	410-420 US13 US55 US64	Private Land Mobile (90) MedRadio (95I)
420-430 FIXED MOBILE except aeronautical mobile Radiolocation 5.269 5.270 5.271			420-450 RADIOLOCATION G2 G129 5.286 US64 US87 US230 US269 US270 US397 G8	420-450 Amateur US270 5.282 5.286 US64 US87 US230 US269 US397	Private Land Mobile (90) MedRadio (95I) Amateur Radio (97)
430-432 AMATEUR RADIOLOCATION 5.271 5.274 5.275 5.276 5.277	430-432 RADIOLOCATION Amateur 5.271 5.276 5.277 5.278 5.279				
432-438 AMATEUR RADIOLOCATION Earth exploration-satellite (active) 5.279A 5.138 5.271 5.276 5.277 5.280 5.281 5.282	432-438 RADIOLOCATION Amateur Earth exploration-satellite (active) 5.279A 5.271 5.276 5.277 5.278 5.279 5.281 5.282				
438-440 AMATEUR RADIOLOCATION 5.271 5.274 5.275 5.276 5.277 5.283	438-440 RADIOLOCATION Amateur 5.271 5.276 5.277 5.278 5.279				
440-450 FIXED MOBILE except aeronautical mobile Radiolocation 5.269 5.270 5.271 5.284 5.285 5.286					
450-455 FIXED MOBILE 5.286AA 5.209 5.271 5.286 5.286A 5.286B 5.286C 5.286D 5.286E			450-454 5.286 US64 US87	450-454 LAND MOBILE 5.286 US64 US87 NG112 NG124	Remote Pickup (74D) Low Power Auxiliary (74H) Private Land Mobile (90) MedRadio (95I)
			454-456	454-455 FIXED AERONAUTICAL MOBILE (R) LAND MOBILE US64 NG32 NG112 NG148	Public Mobile (22) Maritime (80) MedRadio (95I)
455-456 FIXED MOBILE 5.286AA 5.209 5.271 5.286A 5.286B	455-456 FIXED MOBILE 5.286AA MOBILE-SATELLITE (Earth-to-space) 5.286A 5.286B 5.286C	455-456 FIXED MOBILE 5.286AA 5.209 5.271 5.286A 5.286B	US64	455-456 LAND MOBILE	Remote Pickup (74D) Low Power Auxiliary (74H) MedRadio (95I)

5.286C 5.286E	5.209	5.286C 5.286E		US64	

International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
456-459 FIXED MOBILE 5.286AA 5.271 5.287 5.288			456-459 US64 US287 US288	456-460 FIXED AERONAUTICAL MOBILE (R) LAND MOBILE	Public Mobile (22) Maritime (80) Private Land Mobile (90) MedRadio (95I)
459-460 FIXED MOBILE 5.286AA 5.209 5.271 5.286A 5.286B 5.286C 5.286E	459-460 FIXED MOBILE 5.286AA MOBILE-SATELLITE (Earth-to-space) 5.286A 5.286B 5.286C 5.209	459-460 FIXED MOBILE 5.286AA 5.209 5.271 5.286A 5.286B 5.286C 5.286E	459-460	US64 US287 US288 NG32 NG112 NG124 NG148	
460-470 FIXED MOBILE 5.286AA Meteorological-satellite (space-to-Earth) 5.287 5.288 5.289 5.290			460-470 Meteorological-satellite (space-to-Earth) US73 US209 US287 US288 US289	460-462.5375 FIXED LAND MOBILE US209 US289 NG124	Private Land Mobile (90)
				462.5375-462.7375 LAND MOBILE US289	Personal Radio (95)
				462.7375-467.5375 FIXED LAND MOBILE US73 US209 US287 US288 US289 NG124	Maritime (80) Private Land Mobile (90)
				467.5375-467.7375 LAND MOBILE US287 US288 US289	Maritime (80) Personal Radio (95)
				467.7375-470 FIXED LAND MOBILE US73 US288 US289 NG124	Maritime (80) Private Land Mobile (90)
470-694 BROADCASTING	470-512 BROADCASTING Fixed Mobile 5.292 5.293 5.295	470-585 FIXED MOBILE 5.296A BROADCASTING 5.291 5.298	470-608	470-512 FIXED LAND MOBILE BROADCASTING NG5 NG14 NG66 NG115 NG149	Public Mobile (22) Broadcast Radio (TV)(73) LPTV, TV Translator/Booster (74G) Low Power Auxiliary (74H) Private Land Mobile (90)
	512-608 BROADCASTING 5.295 5.297	585-610 FIXED MOBILE 5.296A BROADCASTING RADIONAVIGATION 5.149 5.305 5.306 5.307		512-608 BROADCASTING NG5 NG14 NG115 NG149	Broadcast Radio (TV)(73) LPTV, TV Translator/Booster (74G) Low Power Auxiliary (74H)
	608-614 RADIO ASTRONOMY Mobile-satellite except aeronautical mobile-satellite (Earth-to-space)	610-890 FIXED MOBILE 5.296A 5.313A 5.317A	608-614 LAND MOBILE (medical telemetry and medical telecommand) RADIO ASTRONOMY US74		Personal Radio (95)

		BROADCASTING	US246	

* * * * *

Table of Frequency Allocations — 24.45-31.8 GHz (SHF/EHF) — Page 55

International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
24.45-24.65 FIXED INTER-SATELLITE MOBILE except aeronautical mobile 5.338A 5.532AB	24.45-24.65 FIXED 5.532AA INTER-SATELLITE MOBILE except aeronautical mobile 5.338A 5.532AB RADIONAVIGATION 5.533	24.45-24.65 FIXED INTER-SATELLITE MOBILE 5.338A 5.532AB RADIONAVIGATION 5.533	24.45-24.65 INTER-SATELLITE RADIONAVIGATION Radiolocation 5.533		RF Devices (15) Satellite Communications (25) Private Land Mobile (90)
24.65-24.75 FIXED FIXED-SATELLITE (Earth-to-space) 5.532B INTER-SATELLITE MOBILE except aeronautical mobile 5.338A 5.532AB	24.65-24.75 FIXED 5.532AA INTER-SATELLITE MOBILE except aeronautical mobile 5.338A 5.532AB RADIOLOCATION-SATELLITE (Earth-to-space)	24.65-24.75 FIXED FIXED-SATELLITE (Earth-to-space) 5.532B INTER-SATELLITE MOBILE 5.338A 5.532AB	24.65-24.75 INTER-SATELLITE RADIOLOCATION-SATELLITE (Earth-to-space)		
24.75-25.25 FIXED FIXED-SATELLITE (Earth-to-space) 5.532B MOBILE except aeronautical mobile 5.338A 5.532AB	24.75-25.25 FIXED 5.532AA FIXED-SATELLITE (Earth-to-space) 5.535 MOBILE except aeronautical mobile 5.338A 5.532AB	24.75-25.25 FIXED FIXED-SATELLITE (Earth-to-space) 5.535 MOBILE 5.338A 5.532AB	24.75-25.25	24.75-25.25 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE NG65	RF Devices (15) Satellite Communications (25) Upper Microwave Flexible Use (30)
25.25-25.5 FIXED 5.534A INTER-SATELLITE 5.536 MOBILE 5.338A 5.532AB Standard frequency and time signal-satellite (Earth-to-space)			25.25-25.5 FIXED INTER-SATELLITE 5.536 MOBILE Standard frequency and time signal-satellite (Earth-to-space)	25.25-25.5 Inter-satellite 5.536 Standard frequency and time signal-satellite (Earth-to-space)	RF Devices (15)
25.5-27 EARTH EXPLORATION-SATELLITE (space-to-Earth) 5.536B FIXED 5.534A INTER-SATELLITE 5.536 MOBILE 5.338A 5.532AB SPACE RESEARCH (space-to-Earth) 5.536C Standard frequency and time signal-satellite (Earth-to-space) 5.536A			25.5-27 EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED INTER-SATELLITE 5.536 MOBILE SPACE RESEARCH (space-to-Earth) Standard frequency and time signal-satellite (Earth-to-space) 5.536A US258	25.5-27 SPACE RESEARCH (space-to-Earth) Inter-satellite 5.536 Standard frequency and time signal-satellite (Earth-to-space) 5.536A US258	
27-27.5 FIXED INTER-SATELLITE 5.536 MOBILE 5.338A 5.532AB	27-27.5 FIXED 5.534A FIXED-SATELLITE (Earth-to-space) INTER-SATELLITE 5.536 5.537 MOBILE 5.338A 5.532AB		27-27.5 FIXED INTER-SATELLITE 5.536 MOBILE	27-27.5 Inter-satellite 5.536	
27.5-28.5 FIXED 5.537A FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.539 MOBILE 5.538 5.540			27.5-30	27.5-28.35 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE	RF Devices (15) Satellite Communications (25) Upper Microwave Flexible Use (30) Fixed Microwave (101)
				28.35-29.1 FIXED-SATELLITE (Earth-to-space) NG165 NG527A	RF Devices (15) Satellite Communications (25)

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Table of Frequency Allocations — 24.45-31.8 GHz (SHF/EHF) — Page 55

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24.65-24.75 FIXED FIXED-SATELLITE (Earth-to-space) 5.532B INTER-SATELLITE MOBILE except aeronautical mobile 5.338A 5.532AB	24.65-24.75 FIXED 5.532AA INTER-SATELLITE MOBILE except aeronautical mobile 5.338A 5.532AB RADIOLOCATION-SATELLITE (Earth-to-space)	24.65-24.75 FIXED FIXED-SATELLITE (Earth-to-space) 5.532B INTER-SATELLITE MOBILE 5.338A 5.532AB	24.65-24.75 INTER-SATELLITE RADIOLOCATION-SATELLITE (Earth-to-space)		
24.75-25.25 FIXED FIXED-SATELLITE (Earth-to-space) 5.532B MOBILE except aeronautical mobile 5.338A 5.532AB	24.75-25.25 FIXED 5.532AA FIXED-SATELLITE (Earth-to-space) 5.535 MOBILE except aeronautical mobile 5.338A 5.532AB	24.75-25.25 FIXED FIXED-SATELLITE (Earth-to-space) 5.535 MOBILE 5.338A 5.532AB	24.75-25.25	24.75-25.25 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE NG65	RF Devices (15) Satellite Communications (25) Upper Microwave Flexible Use (30)
25.25-25.5 FIXED 5.534A INTER-SATELLITE 5.536 MOBILE 5.338A 5.532AB Standard frequency and time signal-satellite (Earth-to-space)			25.25-25.5 FIXED INTER-SATELLITE 5.536 MOBILE Standard frequency and time signal-satellite (Earth-to-space)	25.25-25.5 Inter-satellite 5.536 Standard frequency and time signal-satellite (Earth-to-space)	RF Devices (15)
25.5-27 EARTH EXPLORATION-SATELLITE (space-to-Earth) 5.536B FIXED 5.534A INTER-SATELLITE 5.536 MOBILE 5.338A 5.532AB SPACE RESEARCH (space-to-Earth) 5.536C Standard frequency and time signal-satellite (Earth-to-space) 5.536A			25.5-27 EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED INTER-SATELLITE 5.536 MOBILE SPACE RESEARCH (space-to-Earth) Standard frequency and time signal-satellite (Earth-to-space) 5.536A US258	25.5-27 SPACE RESEARCH (space-to-Earth) Inter-satellite 5.536 Standard frequency and time signal-satellite (Earth-to-space) 5.536A US258	
27-27.5 FIXED INTER-SATELLITE 5.536 MOBILE 5.338A 5.532AB	27-27.5 FIXED 5.534A FIXED-SATELLITE (Earth-to-space) INTER-SATELLITE 5.536 5.537 MOBILE 5.338A 5.532AB		27-27.5 FIXED INTER-SATELLITE 5.536 MOBILE	27-27.5 Inter-satellite 5.536	
27.5-28.5 FIXED 5.537A FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.539 MOBILE			27.5-30	27.5-28.35 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE	RF Devices (15) Satellite Communications (25) Upper Microwave Flexible Use (30)

			Fixed Microwave (101)
5.538 5.540		28.35-29.1 FIXED-SATELLITE (Earth-to-space) NG165 NG527A	RF Devices (15) Satellite Communications (25)

* * * * *

(d) * * *

(32) NG32 Frequencies in the bands 454.6625–454.9875 MHz and 459.6625–459.9875 MHz may be assigned to domestic public land and mobile stations to provide a two-way air-ground public radiotelephone service. In these bands Aeronautical Mobile (Route) Service (AM(R)S) shall have priority over any two-way air-ground public radiotelephone service or any other use of these frequencies.

* * * * *

PART 22 — PUBLIC MOBILE SERVICES

11. The authority citation for part 22 continues to read as follows:

Authority: 47 U.S.C. 154, 222, 303, 309, and 332.

12. Amend § 22.99 by adding in alphabetical order definitions for "450 MHz Air-Ground Service," "Control and non-payload communications of uncrewed aircraft systems," "Flight safety-related data services," "Peak-to-average ratio (PAR)," "Uncrewed aircraft (UA)," "Uncrewed aircraft station," and "Uncrewed aircraft system (UAS)" to read as follows:

§ 22.99 Definitions.

450 MHz Air-Ground Service. A radio service in which licensees are authorized to provide two-way air-ground radiotelephone service to airborne mobile subscribers in general aviation aircraft, control and non-payload communications of uncrewed aircraft systems, and other flight safety-related data operations.

* * * * *

Control and non-payload communications of uncrewed aircraft systems. Any transmission that is sent between the uncrewed aircraft (UA) component and the uncrewed aircraft system (UAS) ground station and that supports the safety or regularity of the UA's flight.

* * * * *

Flight safety-related data services. Data communications services relating to safety and regularity of flight used permanently or temporarily for the safeguarding of human life and property.

* * * * *

Peak-to-average ratio (PAR). The ratio of a radiated emission's peak power to its average power

* * * * *

Uncrewed aircraft (UA). An aircraft operated without the possibility of direct human intervention from within or on the aircraft.

Uncrewed aircraft station. A mobile station authorized under this part and located on board a UA.

Uncrewed aircraft system (UAS). A UA and its associated elements (including an uncrewed aircraft station, communication links, and the components not on board the UA that control the UA) that are required for the safe and efficient operation of the UA in the airspace of the United States.

* * * * *

13. Amend § 22.313 by revising paragraphs (a)(2) and (3), and (c)(2) to read as follows:

§ 22.313 Station identification.

* * * * *

(a) * * *

(2) General aviation ground stations providing Air-Ground Service; and ground and mobile stations providing control and non-payload communications of uncrewed aircraft systems or other flight safety-related data services in the 450 MHz Air-Ground Service;

(3) Commercial aviation air-ground systems in the Air-Ground Service.

* * * * *

(c) * * *

(2) For general aviation airborne mobile stations in the 450 MHz Air-Ground Service, the official FAA registration number of the aircraft;

* * * * *

14. Amend § 22.359 by revising the introductory text to read as follows:

§ 22.359 Emission limitations.

The rules in this section govern the spectral characteristics of emissions in the Public Mobile Services, except for the Air-Ground Service (see § 22.861, instead), the Cellular Radiotelephone Service (see § 22.917, instead), and the 450 MHz Air-Ground Service (see § 22.836, instead).

* * * * *

15. Revise the title of subpart G to read as follows:

Subpart G—Air-Ground Service

16. Revise § 22.801 to read as follows:

§ 22.801 Scope.

The rules in this subpart govern the licensing and operation of air-ground stations and systems providing two-way air-ground radiotelephone service to airborne mobile subscribers in general aviation aircraft, control and non-payload communications of uncrewed aircraft systems stations and systems, and other flight safety-related data services. The licensing and operation of these stations and systems is also subject to rules elsewhere in this part and in part 1 of this chapter that generally apply to the Public Mobile Services. In case of conflict, however, the rules in this subpart govern.

17. Following § 22.819, add an undesignated center heading following to read as follows:

450 MHz Air-Ground Service

18. Add § 22.830 to read as follows:

§ 22.830 Initial authorization.

(a) *Frequencies*. The 454.6625–454.9875 MHz and 459.6625–459.9875 MHz bands are available for assignment on a geographic basis.

(b) *Service area.* The service area for the 450 MHz Air-Ground Service is nationwide, including the United States, Guam, the Northern Mariana Island, Puerto Rico, U.S. Virgin Island, and American Samoa.

19. Add § 22.831 to read as follows:

§ 22.831 Eligibility.

(a) *Eligibility*. For an applicant to be eligible for the nationwide 450 MHz Air-Ground Service license, it must demonstrate that:

(1) It provides coverage at 25,000 feet over CONUS, Alaska, and Hawaii using all available communication frequencies; and

(2) The locations of the sites used to provide this coverage prevent the authorization of any other entity to provide contiguous, regional service using multiple communication frequencies.

(b) *Application.*

(1) Applications must be filed in accordance with part 1 of this chapter.

(2) An applicant for the nationwide 450 MHz Air-Ground Service license must submit with its application an Eligibility Certification that:

(i) Lists licenses and frequencies that the applicant holds in the 450 MHz band to demonstrate that it meets the eligibility criteria listed in paragraph (a) of this section; and

(ii) Includes a coverage map which demonstrates how the incumbent's site locations and service prevent the authorization of any other entity to provide contiguous, regional service using multiple communication frequencies.

20. Add § 22.832 to read as follows:

§ 22.832 License period.

Authorizations for 450 MHz Air-Ground Service licenses in the 454.6625–454.9875 MHz and 459.6625–459.9875 MHz bands will have a term not to exceed 15 years from the date of initial issuance or renewal.

21. Add § 22.833 to read as follows:

§ 22.833 Performance requirements.

(a) *Construction notification(s).* The 450 MHz Air-Ground Service licensee shall demonstrate compliance with performance requirements by filing a construction notification with the Commission within 15 days of the expiration of the applicable benchmark in accordance with the provisions set forth in § 1.946(d) of this chapter. The licensee must certify whether it has met the performance requirement, and file supporting documentation, including a description and demonstration of the bona fide service provided, electronic maps accurately depicting the boundaries of the license area and where in the license area the licensee provides service that meets the performance requirement, supporting technical documentation, any assumptions or data used in determining the coverage by a service to the extent any were relied upon, and similar applicable information the Wireless Telecommunications Bureau issued by public notice DA 15-1193.

(b) *Interim Performance Requirement*. A licensee shall provide reliable signal coverage and offer service within four (4) years from the date that a nationwide license is issued by either:

(1) Providing service at 25,000 feet above sea level over 100% of CONUS and Hawaii, and service at 25,000 feet above sea level over 13% of Alaska; and service at 5,000 feet above sea level over 50% of CONUS and Hawaii; or

(2) Providing service at 400 feet above ground level over 35% of CONUS and Hawaii, and service at 400 feet above ground level over 9% of Alaska.

(c) *Final Performance Requirement*. A licensee shall provide reliable signal coverage and offer service within eight (8) years from the date that a nationwide license is issued by either:

(1) Providing service at 25,000 feet above sea level over 100% of CONUS and Hawaii, and service at 25,000 feet above sea level over 25% of Alaska; and service at 5,000 feet above sea level over 90% of CONUS and Hawaii; or

(2) Providing service at 400 feet above ground level over 70% of CONUS and Hawaii, and service at 400 feet above ground level over 19% of Alaska.

(d) *Failure to meet performance requirements.*

(1) Failure of a 450 MHz Air-Ground Service licensee to meet the Interim Performance Requirement results in a two year acceleration of both the Final Buildout Requirement (from 8 to 6 years) and the license term (from 15 to 13 years).

(2) Failure of a 450 MHz Air-Ground Service licensee to meet the Final Performance Requirement results in automatic termination of its license without Commission action.

22. Add § 22.834 to read as follows:

§ 22.834 Geographic partitioning and spectrum disaggregation.

(a) *Eligibility.* A party holding a 450 MHz Air-Ground Service license may request from the Commission an authorization for partial assignment of its license pursuant to § 1.950 of this chapter.

(b) *Technical standards—*

(1) *Partitioning.* The partitioned service area on a schedule to the application. The geographic coordinates must be specified in degrees, minutes, and seconds to the nearest second of latitude and longitude and must be based upon the 1983 North American Datum (NAD83).

(2) *Disaggregation.* Spectrum may be disaggregated in any amount.

(3) *Combined partitioning and disaggregation.* The Commission will consider requests for partial assignment of a license that propose combinations of partitioning and disaggregation.

(4) *Demonstration.* The licensee seeking partitioning and/or disaggregation must include in its application how co-channel licensees will be protected upon partitioning or disaggregation and what performance requirements will be met.

(c) *License term.* The initial license term for a partitioned license area and for disaggregated spectrum shall be the remainder of the partitioner's or disaggregator's license term as provided for in § 22.832.

23. Add § 22.835 to read as follows:

§ 22.835 Power limits.

The transmitting power of ground and airborne mobile transmitters operating in the 450 MHz Air-Ground Service must not exceed the limits in this section.

(a) Ground station transmitters. The effective radiated power of ground stations must not exceed 100 Watts.

(b) Airborne mobile transmitters. The transmitter power output of airborne mobile transmitters must not exceed 25 Watts.

24. Add § 22.836 to read as follows:

§ 22.836 Emission limits.

The rules in this section govern the spectral characteristics of emissions for the 450 MHz Air-Ground Service. Transmitters in the 450 MHz Air-Ground Service may use any type of emission or technology that complies with the technical rules in this subpart.

(a) *Out of band emissions*. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

(b) *Measurement procedure*. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(c) *Interference caused by out of band emissions*. If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

25. Add § 22.837 to read as follows:

§ 22.837 Incorporation by reference.

The standards referenced in this section are incorporated by reference into this subpart with the approval of the Director of the Federal Register in accordance with 5 U.S.C. § 552(a) and 1 CFR part 51. The approved material is available for inspection at the Federal Communications Commission (FCC) and at the National Archives and Records Administration (NARA). Contact the FCC at: 45 L Street NE, Reference Information Center, Room 1.150, Washington, DC 20554; phone: 202-418-0270. For information on the availability of this material at NARA, email fedreg.legal@nara.gov or go to www.archives.gov/federal-register/cfr/ibr-locations. The material may be obtained from RTCA, Inc., 1150 18th Street NW, Suite 910, Washington, DC 20036; phone: 202-833-9339; email: info@rtca.org; website: http://RTCA.org. Each airborne mobile transmitter utilized in the 450 MHz Air-Ground Service for control and non-payload communications of uncrewed aircraft stations and systems must comply with the technical standard set forth in sub paragraph (a) of this section.

(a) RTCA DO-406, Minimum Operational Performance Standards for Ultra High Frequency Airborne Radio Systems Supporting UAS C2 Link Systems, dated September 26, 2024.

(b) [Reserved]

§ 22.853 [Removed and Reserved]

26. Remove and reserve section 22.853.

27. Amend § 22.861 by revising paragraph (a) and adding paragraph (e) to read as follows:

§ 22.861 Emission limitations.

(a) ***Out of band emissions.*** The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB, except that emissions into the 851–854 MHz band must be attenuated by a factor of at least 50 + 10 log (P) dB.

* * * * *

(e) ***Common control exception.*** If each Commercial Aviation Air-Ground System license is under common control, the out-of-band emissions limits in this section shall not apply at the internal boundaries of those licenses (850.5 MHz and 895.5 MHz). Individuals and entities with either *de jure* or *de facto* control of a licensee in these bands will be considered to have a controlling interest in its license(s). For purposes of this rule, the definitions of "controlling interests" and "affiliate" set forth in § 1.2110(c)(2) and (5) of this chapter shall apply.

28. Revise § 22.863 to read as follows:

§ 22.863 Frequency stability.

The rules in this section govern frequency stability in Commercial Aviation Air-Ground Systems.

(a) The frequency stability of equipment used under this subpart shall be sufficient to ensure that, after accounting for Doppler frequency shifts, the occupied bandwidth of the fundamental emissions remains within the authorized frequency bands of operation.

(b) If each Commercial Aviation Air-Ground Systems license is under common control, the frequency stability limitation in this section shall not apply at the internal boundaries of those licenses (850.5 MHz and 895.5 MHz). Individuals and entities with either *de jure* or *de facto* control of a licensee in these bands will be considered to have a controlling interest in the license(s). For purposes of this rule, the definitions of "controlling interests" and "affiliate" set forth in § 1.2110(c)(2) and (5) of this chapter shall apply.

29. Revise § 22.867 to read as follows:

§ 22.867 Effective radiated power limits.

Licensees in this service are subject to the effective radiated power (ERP) limits and other requirements in this section.

(a) *ERP.* The ERP of ground and airborne stations operating on the frequency ranges listed in § 22.857 must not exceed the limits in this section.

(1) The average ERP of airborne mobile station transmitters must not exceed 12 watts per authorized bandwidth.

(2) The average ERP of ground station transmitters must not exceed 500 watts per authorized bandwidth.

(b) *Power measurement.* Measurement of ERP of the airborne mobile station transmitters and ground station transmitters must be made using an average power measurement technique with the limitations set forth in this section. The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB. Measurement of average power must be made based on Commission-approved average power techniques. Licensees should consult the FCC Laboratory's Knowledge Database (KDB) website for the latest recommended procedures concerning Commission-approved average power measurement techniques.

30. Amend § 22.878 by revising the introductory text to read as follows:

§ 22.878 Obligation to abate unacceptable interference.

This section applies only to commercial aviation ground stations transmitting in the 849–851 MHz band.

* * * * *

31. Amend § 22.879 by revising the introductory text to read as follows:

§ 22.879 Interference resolution procedures.

This section applies only to commercial aviation ground stations transmitting in the 849–851 MHz band.

* * * * *

32. Revise § 22.881 to read as follows:

§ 22.881 Air-Ground Service subject to competitive bidding.

Mutually exclusive initial applications for the 450 MHz Air-Ground Service licenses and mutually exclusive initial applications for commercial Air-Ground Service licenses are subject to competitive bidding. The general competitive bidding procedures set forth in part 1, subpart Q, of this chapter will apply unless otherwise provided in this subpart.

PART 90 — PRIVATE LAND MOBILE RADIO SERVICES

33. The authority citation for part 90 continues to read as follows:

Authority: 47 U.S.C. 154(i), 161, 303(g), 303(r), 332(c)(7), 1401–1473.

34. Amend § 90.103 by adding, in chronological order, a row to the table in paragraph (b) and adding a new paragraph (c)(31) to read as follows:

§ 90.103 Radiolocation service.

* * * * *

(b) * * *

Radiolocation Service Frequency Table

Frequency or Band	Class of station(s)	Limitation
	* * * * * * *	
	Megahertz	
	* * * * * * *	
24,450 to 24,650	Radiolocation land	31
	* * * * * * *	

(c) * * *

(31) This frequency band is shared with and is on a secondary basis to the Government and Non-Federal Inter-Satellite Service (part 25) and the Government and Non-Federal Radionavigation Service (part 87). No airborne operations are permitted. Operation of temporary fixed locations are subject to the requirements of § 90.137(d).

* * * * *

35. Amend § 90.137 by adding paragraph (d) to read as follows:

§ 90.137 Applications for operation at temporary locations.

* * * * *

(d) A fixed radiolocation station authorized in the 24,450 to 24,650 MHz band at unspecified or temporary locations under this section shall operate only within an authorized operational radius not to exceed 5 kilometers from the coordinated center point. Licensees of such stations must maintain a stop buzzer point of contact and immediately cease transmissions upon notification of harmful interference to primary radionavigation or federal operations.

36. Amend § 90.210 by revising paragraph (n) to read as follows:

§ 90.210 Emission masks.

* * * * *

(n) ***Other frequency bands***. Transmitters designed for operation under this part on frequencies other than listed in this section must meet the emission mask requirements of Emission Mask B. Equipment operating under this part on frequencies allocated to but shared with the Federal Government must meet the applicable Federal Government technical standards. Transmitters operating in the 24,450 to 24,650 MHz band shall comply with Emission Mask B and, in addition, unwanted emissions falling within the 23,600 to 24,000 MHz band shall not exceed -39 dBW, measured as mean power integrated over any 200 MHz bandwidth.

* * * * *

37. Amend § 90.213 by adding footnote 15 to Table 1 as follows:

§ 90.213 Frequency stability.

* * * * *

Table 1 to § 90.213(a)—Minimum Frequency Stability

[Parts per million (ppm)]

		Mobile stations	
Frequency Range (MHz)	**Fixed and base stations**	**Over 2 watts output power**	**2 watts or less output power**
* * * * * * *			
Above 2450[15]			

* * * * *

(15) For radiolocation transmitters operating in the 24,450–24,650 MHz band, the frequency stability shall be sufficient to ensure that the entire fundamental occupied emission remains within 24,450–24,650 MHz under all normal operating conditions.

* * * * *

APPENDIX B

Final Regulatory Flexibility Analysis

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),[1] the Federal Communications Commission (Commission) incorporated an Initial Regulatory Flexibility Analysis (IRFA) in the *Advanced Air Mobility Notice of Proposed Rulemaking* (*AAM NPRM*) released in January 2025[2] and the *Aviation Safety Notice of Proposed Rulemaking* (*Aviation Safety NPRM*) released in June 2019.[3] The Commission sought written public comment on the proposals in the *AAM NPRM* and *Aviation Safety NPRM*, including comment on the IRFA. No comments were filed in response to either NPRM specifically addressing the IRFAs. This Final Regulatory Flexibility Analysis (FRFA) conforms to the RFA and it (or summaries thereof) will be published in the Federal Register.[4]

A. Need for, and Objectives of, the Rules

2. In the *Report and Order*, the Commission adopts amendments to several areas of its service rules in order to facilitate the deployment of various manifestations of Advanced Air Mobility (AAM) and other uncrewed aircraft systems (UAS) operations. The *Report and Order* addresses operations in three distinct bands of spectrum: the 450 MHz band, the 24.45–24.65 GHz band and the 800 MHz Commercial Aviation Air-Ground Systems band. The *Report and Order* also addresses the waiver request of Gogo Business Aviation, LLC for section 22.867 of the Commission's rules, which establishes limits on the permissible peak effective radiated power (ERP) of Commercial Aviation Air-Ground System stations. The changes the Commission adopts clear the way for continued innovation, development, and operation of these modern, cutting-edge systems and enhance aviation safety for passengers, aircraft, and airports, which will deliver significant benefits to the public.

3. *Air-Ground Communications in the 450 MHz Band.* The *Report and Order* acts, in part, on issues raised in a February 2021 petition for rulemaking by AURA Network Systems OpCo, LLC (AURA) and A2G Communications, LLC (A2G), which recommended that the Commission commence a rulemaking proceeding to amend portions of its rules as necessary to allow the Air-Ground Radiotelephone Service 450 MHz band to be used to provide UAS Control and Non-Payload Communications (CNPC). The *Report and Order* adopts several amendments to rules governing the use of the 450 MHz band by establishing new service rules that allow for UAS CNPC and other flight safety-related data operations in the band. First, the *Report and Order* amends the allocation in the 450 MHz band to include flight safety-related uses, including UAS CNPC, in the existing air-ground radiotelephone service. Next, the *Report and Order* enables a transition to the licensing regime in the 450 MHz band from site-based licensing to a geographic licensing structure with a single nationwide license that has additional rights and greater flexibility. Finally, the *Report and Order* adopts flexible licensing and operating rules and technical rules that will facilitate robust use of the band in the public interest and will minimize interference to neighboring operations. These changes position the 450 MHz band as one of several alternatives for local, regional, and nationwide UAS CNPC used for the safety of flight for UAS. These actions are consistent with the Commission's efforts in other frequency bands to improve spectrum efficiency and expand operational flexibility.

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[1] 5 U.S.C. §§ 601 *et seq*., as amended by the Small Business Regulatory Enforcement and Fairness Act (SBREFA), Pub. L. No. 104-121, 110 Stat. 847 (1996).

[2] *See generally Facilitating Opportunities for Advanced Air Mobility et al.*, WT Docket No. 24-629, Notice of Proposed Rulemaking, FCC 25-7, 40 FCC Rcd 745 (2025) (*AAM NPRM*).

[3] *See generally* A*mendment of the Commission's Rules to Promote Aviation Safety et al.*, WT Docket No. 19-140, Notice of Proposed Rulemaking, 34 FCC Rcd 4984 (2019) (*Aviation Safety NPRM*).

[4] 5 U.S.C. § 604.

4. *UAS Detection in the 24.45–24.65 GHz Band.* The *Report and Order* acts on an October 2018 petition for rulemaking by Echodyne Corporation (Echodyne), which recommended that the Commission permanently allow radiolocation operations in the 24.45–24.65 GHz band on a secondary basis. The *Report and Order* revises the U.S. Table and corresponding amendments to the Commission's rules to enable the detection of UAS by permitting such operations in the band. The Commission's changes in the 24.45–24.65 GHz band thereby facilitate UAS detection at sensitive sites that include stadiums, prisons, the U.S. border, and critical infrastructure (e.g., utilities), and elevate the potential of an underused segment of spectrum while minimizing the risk of harmful interference.

5. *Commercial Aviation Air-Ground Systems.* Finally, the Commission modernizes the legacy rules governing Commercial Aviation Air-Ground Systems. The *Report and Order* acts on the petition for rulemaking filed by Gogo Business Aviation, LLC in July 2022, which recommended amending several of the Commission's rules to enable more flexible air-ground operations in the Commercial Aviation Air-Ground Systems band. In this band, licensees facilitate the provision of broadband service on commercial aircraft. The legacy rules for this band impose power limits that have fallen out of step with the realities of operations in this band. Formerly, the Commission's rules required that operational power be regulated by peak power, which is not technology neutral for broadband technologies. The Commission now measures and regulates the effective radiated power of Commercial Aviation Air-Ground Systems operations according to their average power. Further, the Commission adopts a peak-to-average ratio (PAR) and a power spectral density (PSD) model. These changes bring these rules into harmony with those that govern similar operations in other bands, enable more efficient use of the spectrum, and promote technology neutrality.

B. Summary of Significant Issues Raised by Public Comments in Response to the IRFA

6. No comments were filed addressing the impact of the proposed rules on small entities.

C. Response to Comments by the Chief Counsel for the Small Business Administration Office of Advocacy

7. Pursuant to the Small Business Jobs Act of 2010, which amended the RFA,[5] the Commission is required to respond to any comments filed by the Chief Counsel for the Small Business Administration (SBA) Office of Advocacy, and also provide a detailed statement of any change made to the proposed rules as a result of those comments.[6] The Chief Counsel did not file any comments in response to the proposed rules in this proceeding.

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

8. 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 adopted rules.[7] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[8] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[9] A "small business concern" is one which:

[5] Small Business Jobs Act of 2010, Pub. L. No. 111-240, 124 Stat. 2504 (2010).

[6] 5 U.S.C. § 604 (a)(3).

[7] 5 U.S.C. § 604.

[8] *Id*. § 601(6).

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

(1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.[10] The SBA establishes small business size standards that agencies are required to use when promulgating regulations relating to small businesses; agencies may establish alternative size standards for use in such programs, but must consult and obtain approval from SBA before doing so.[11]

9. Our actions, over time, may affect small entities that are not easily categorized at present. We therefore describe three broad groups of small entities that could be directly affected by our actions.[12] In general, a small business is an independent business having fewer than 500 employees.[13] These types of small businesses represent 99.9% of all businesses in the United States, which translates to 34.75 million businesses.[14] Next, "small organizations" are not-for-profit enterprises that are independently owned and operated and are not dominant in their field.[15] While we do not have data regarding the number of non-profits that meet that criteria, over 99 percent of nonprofits have fewer than 500 employees.[16] Finally, "small governmental jurisdictions" are defined as cities, counties, towns, townships, villages, school districts, or special districts with populations of less than fifty thousand.[17] Based on the 2022 U.S. Census of Governments data, we estimate that at least 48,724 out of 90,835 local government jurisdictions have a population of less than 50,000.[18]

10. The rules adopted in the *Report and Order* will apply to small entities in the industries identified in the chart below by their six-digit North American Industry Classification System (NAICS)[19] codes and corresponding SBA size standard.[20] Where available, we also provide additional information regarding the number of potentially affected entities in the identified industries below.

[10] 15 U.S.C. § 632.

[11] 13 CFR § 121.903.

[12] 5 U.S.C. § 601(3)–(6).

[13] *See* SBA, Office of Advocacy, *Frequently Asked Questions About Small Business* (July 23, 2024), https://advocacy.sba.gov/wp-content/uploads/2024/12/Frequently-Asked-Questions-About-Small-Business_2024-508.pdf.

[14] *Id*.

[15] 5 U.S.C. § 601(4).

[16] *See* SBA, Office of Advocacy, *Small Business Facts, Spotlight on Nonprofits* (July 2019), https://advocacy.sba.gov/2019/07/25/small-business-facts-spotlight-on-nonprofits/.

[17] 5 U.S.C. § 601(5).

[18] *See* U.S. Census Bureau, *2022 Census of Governments—Organization Tables*, https://www.census.gov/data/tables/2022/econ/gus/2022-governments.html, tables 1–11.

[19] The North American Industry Classification System (NAICS) is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. *See* www.census.gov/NAICS for further details regarding the NAICS codes identified in this chart.

[20] The size standards in this chart are set forth in 13 CFR § 121.201, by six-digit NAICS code.

Table 1. 2022 U.S. Census Bureau Data by NAICS Code

Regulated Industry (Footnotes specify potentially affected entities within a regulated industry where applicable)	NAICS Code	SBA Size Standard	Total Firms[21]	Total Small Firms[22]	% Small Firms
Radio and Television Broadcasting and Wireless Communications Equip Manufacturing[23]	334220	1,250 employees	155	136	87.74%
Aircraft Manufacturing[24]	336411	1,500 employees	234	209	89.32%
Wireless Telecommunications Carriers (except Satellite)[25]	517112	1,500 employees	1,184	1,081	91.30%
All Other Telecommunications[26]	517810	$40 million	1,673	1,007	60.19%

[21] *U.S. Census Bureau*, "*Selected Sectors: Employment Size of Firms for the U.S.: 2022*." Economic Census, ECN Core Statistics Economic Census: Establishment and Firm Size Statistics for the U.S., Table EC2200SIZEEMPFIRM, 2025, "*Selected Sectors: Sales, Value of Shipments, or Revenue Size of Firms for the U.S.: 2022*." Economic Census, ECN Core Statistics Economic Census: Establishment and Firm Size Statistics for the U.S., Table EC2200SIZEREVFIRM, 2025.

[22] *Id.*

[23] Affected Entities in this industry include Aviation Radio Equipment Manufacturers, Part 15 Handset Manufacturers, Radio Frequency Equipment Manufacturers, Uncrewed Aircraft Radio Equipment Manufacturers.

[24] Affected Entities in this industry include Uncrewed Aircraft Radio Equipment Manufacturers.

[25] Affected Entities in this industry include, Air-Ground Radiotelephone Services, Future 24 GHz Licensees, Incumbent 24 GHz Licensees, Local Multipoint Distribution Service (LMDS), Location and Monitoring Service (LMS), Low Power Auxiliary Station (LPAS) Licensees, Multichannel Video Distribution and Data Service (MVDDS), Multiple Address Systems, Narrowband Personal Communications Services, Offshore Radiotelephone Service, Personal Radio Services, Private Land Mobile Radio—900 MHz Band, Private Land Mobile Radio Licensees (PLMR), Public Safety Radio Licensees, Wireless Communications Services.

[26] Affected Entities in this industry include Earth Stations (except Satellite Telecommunications Carriers), Internet Service Providers (Non-Broadband), Non-Carrier RespOrgs, Non Licensee Owners of Towers and Other Infrastructure, Online Access Service Providers, Radar Station Operations, Satellite Telemetry Operations, Satellite Tracking Stations, Telecommunications Relay Service (TRS) Providers, Telemetry and Tracking System Operations and VoIP Service Providers (via Client-Supplied Telecommunications Connections).

Regulated Industry (Footnotes specify potentially affected entities within a regulated industry where applicable)	NAICS Code	SBA Size Standard	Total Firms[21]	Total Small Firms[22]	% Small Firms
Uncrewed Aircraft System (UAS) Operators	None[27]	100 employees or less	Unavailable	Unavailable	92.20%[28]

Table 2. Telecommunications Service Provider Data

2025 Universal Service Monitoring Report Telecommunications Service Provider Data[29] (Data as of December 2024)	SBA Size Standard (1500 Employees)		
Affected Entity	**Total # FCC Form 499A Filers**	**Small Firms**	**% Small Entities**
Wireless Telecommunications Carriers (except Satellite)[30]	608	522	85.86

E. Description of Economic Impact and Projected Reporting, Recordkeeping and Other Compliance Requirements for Small Entities

11. The RFA directs agencies to describe the economic impact of adopted rules on small entities, as well as projected reporting, recordkeeping and other compliance requirements, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record.[31]

12. The rules adopted in the *Report and Order* provide new or modified service opportunities in certain bands, subject to spectrum authorization and compliance with the applicable service rules, and do not impose new regulations or mandates on other parties. While the rules provide spectrum authorization for important UAS and C-UAS services, parties seeking to provide these services may also be subject to other federal, state, local, or tribal regulations and restrictions on UAS or C-UAS operations.

[27] UAS operators do not fall into any existing North American Industry Classification System (NAICS) industry. The Federal Aviation Administration (FAA) Remote ID rule assessing the impact of the rule on small entity non-recreational UAS operators provides some guidance on small entities associated with uncrewed aircraft operators. The FAA determined that a majority of entities operating uncrewed aircraft for other than recreational purposes are small based on an analysis relating to part 107 waivers by the Association for Uncrewed Vehicle Systems International (AUVSI) that indicated 92 percent of the waivers issued were to entities with fewer than 100 employees. *See* Federal Aviation Administration, Department of Transportation, Remote Identification of Unmanned Aircraft, 86 Fed. Reg. 4390, 4494 (Jan. 15, 2021) (*Remote ID Rule*).

[28] *Id.*

[29] Federal-State Joint Board on Universal Service, *Universal Service Monitoring Report*, at 25, Table 1.12 (2025), https://docs.fcc.gov/public/attachments/DOC-418505A1.pdf.

[30] Affected Entities in this industry include all reporting wireless carriers and service providers.

[31] 5 U.S.C. § 604(a)(5).

The rules we adopt do not generally exempt parties from compliance with such regulations and restrictions. Accordingly, aside from the impact on parties deploying services under these rules, and equipment manufacturers of equipment for these services, we do not anticipate impacts on small entities. The rules may require small entities that seek to provide service or equipment pursuant to these rules, including potentially state, local, or tribal authorities, to hire attorneys, engineers, consultants, or other professionals to comply with the applicable service rule requirements. Although the Commission cannot quantify the cost of compliance, we note that several of the adopted rules are consistent with and mirror existing policies and requirements used for other part 22 and part 90 licenses. Therefore, small entities with existing licenses in other bands may already be familiar with such policies and requirements and may already have the processes and procedures in place to facilitate compliance, resulting in minimal incremental costs to comply with our requirements. Below is an overview of areas discussed in the *Report and Order* that may lead to modified or additional compliance requirements for small entities.

13. *Air-Ground Communications in the 450 MHz Band.* The *Report and Order* amends the U.S. Table of Allocations to add a co-primary AM(R)S allocation for aviation safety operations. The Report and Order finds that this addition is in the public interest as this allocation is for safety-of-life purposes and will support the safety or regularity of a UA flight, which will provide expansive public and private benefits, allow for more intensive use of this spectrum and maximize the use of the band, will not deter investment, and will not result in harmful interference among uses as a result of the adopted technical rules.

14. *Application Freeze.* The *Report and Order* lifts the application freeze in the 450 MHz band to maintain the existing licensing landscape in this band and to allow the incumbent licensee to submit necessary filings while considering potential amendments to its rules that would permit new operations, as it is no longer necessary.

15. *Voluntary Transition to a Nationwide License*. A covered incumbent seeking the 450 MHz Air-Ground Service nationwide license can apply to modify one of its site-based licenses into the nationwide license and turn in its remaining site-based licenses. This application for modification is completely voluntary. The *Report and Order* establishes certain eligibility criteria an entity must meet in order to qualify for the geographic license with nationwide coverage. Specifically, the *Report and Order* defines "covered incumbent" as an applicant eligible for the nationwide 450 MHz Air-Ground Service license that can demonstrate that: (1) it provides coverage at 25,000 feet[32] over the contiguous United States (CONUS), Alaska, and Hawaii using all available communication frequencies; and (2) the locations of the sites used to provide this coverage prevent the authorization of any other entity to provide contiguous, regional service using multiple communication frequencies. The eligibility criteria ensures expanded operations are expeditiously deployed in the band, putting the spectrum to its highest and most efficient use.

16. *Certification*. The *Report and Order* requires covered incumbents seeking to transition to a nationwide license to submit a certification (Eligibility Certification) that they have satisfied the eligibility criteria for modifying a site-based license in the Universal Licensing System (ULS). To satisfy the eligibility criteria, the Eligibility Certification must list the licenses and frequencies that the applicant holds in the 450 MHz band; additionally, a covered incumbent may also provide a coverage map that demonstrates how the incumbent's site locations and service prevent the authorization of any other entity to provide contiguous, regional service using multiple communication frequencies.

17. *License and Operating Rules*. This *Report and Order* adopts additional service rules that provide UAS operators with the ability to conduct control and non-payload operations in the 450 MHz band. As discussed above, the *Report and Order* also creates specific eligibility criteria for the covered incumbent to modify one of its site-based licenses into a nationwide license maintains the existing part 22

[32] *See* Letter from Michele C. Farquhar, Counsel to AURA Network Systems, Inc. to Shiva Goel, FCC, RM-11912, at 3 (filed Sept. 12, 2022) (AURA *Ex Parte* Sept. 12, 2022).

general eligibility standard for licenses in the 450 MHz band. It also licenses the 450 MHz band on an exclusive, nationwide license basis. Lastly, the *Report and Order* sets the license term for the nationwide license to 15 years.

18. *Performance Benchmarks*. The *Report and Order* allows two options to meet the performance requirements and creates an interim and final performance requirement in each option. In Option 1, to meet the interim performance benchmark at four years, the licensee must continue to provide service at 25,000 feet above sea level over CONUS and Hawaii, service at 25,000 feet above sea level over 13 percent of Alaska, and service at 5,000 feet above sea level over 50 percent of CONUS and Hawaii. To meet the final performance requirement of eight years under Option 1, the licensee must provide service in CONUS and Hawaii at 25,000 feet above sea level, service at 25,000 feet above sea level over 25 percent of Alaska, and service at 5,000 feet above sea level over 90 percent of CONUS and Hawaii. Under Option 2, to meet the interim performance benchmark at four years, the licensee must provide service at 400 feet above ground level covering 35 percent or more of CONUS and Hawaii and service at 400 feet above ground level over 9 percent of Alaska. To meet the eight-year final performance requirement under this option, the licensee must provide service covering 70 percent or more of CONUS and Hawaii at 400 feet above ground level over and service covering 19 percent of Alaska at 400 feet above ground level. The *Report and Order* permits the licensee to choose to fulfill its performance requirement either by a combination of high and medium altitude services under Option 1 or significant service at low altitude under Option 2. The *Report and Order* also notes that in the event the nationwide licensee fails to meet the first performance benchmark in any Regional Economic Area Grouping (REAG), the licensee's second benchmark and license term would be reduced by two years, thereby requiring it to meet the second performance benchmark two years sooner (at 6 years into the license term) and reducing its license term to 13 years. Lastly, the *Report and Order* notes that if the nationwide licensee fails to meet the second performance benchmark in any REAG, its authorization for the license shall terminate automatically without Commission action.

19. *Compliance Procedures*. The *Report and Order* requires licensees to submit electronic coverage maps in the ULS that accurately depict both the boundaries of the licensed area and the coverage boundaries of the actual area to which the licensee provides service. Additionally, the covered incumbent must notify the Commission by filing FCC Form 601 when it meets its construction obligations within the construction period. The notification must be filed within 15 days of the expiration of the applicable construction period.

20. *General Applicability of Other Part 22 and Part 1 Rules.* In addition, the *Report and Order* places the nationwide licensee in the 450 MHz band under our licensing and operating rules that are applicable to all part 22 services, including foreign ownership[33] and permanent discontinuance of operations.[34] The *Report and Order* also retains existing station identification rules for general aviation air-ground stations (ground and mobile) and does not require station identification for ground and mobile stations providing UAS CNPC.[35] FAA rules presently regulate remote identification of UAS, so the *Report and Order* does not adopt duplicative rules.[36]

21. *Technical Rules*. This *Report and Order* also adopts the appropriate power levels in the 450 MHz band and proposes to eliminate the 20 kilohertz channel requirement. It applies the existing applying 43 + 10 log (P) dB out of band emissions limit at the edge of the last channel at the legacy band edges. Additionally, it eliminates the channel siting requirement in the Commission's rules for the 450 MHz band. The *Report and Order* retains the transmitter location rules for the 450 MHz Air-Ground

[33] 47 U.S.C. § 310; 47 CFR § 22.5.

[34] 47 CFR § 1.953.

[35] *Id.* § 22.313(a); *see also infra* Appx. A.

[36] *See* 14 CFR §§ 89.105, 89.110, 89.115, 89.305, 89.315.

Service. The *Report and Order* also notes that there are several additional technical rules applicable to all part 22 services, including sections 22.365 (Antenna structures; air navigation safety), 22.377 (Certification of transmitters) 22.379 (RF Exposure), and 22.383 (In-building radiation systems) and applies those to these general part 22 rules to the 450 MHz Air-Ground Service and to those licensees that acquire their licenses through partitioning or disaggregation (to the extent the service rules permit such licenses).

22. *UAS Detection in the 24.45–24.65 GHz Band.* The *Report and Order* updates the Commission's rules to expand use of the 24.45–24.65 GHz band to include radiolocation operations that would better facilitate the detection of UAS, including AAM operations. These changes primarily impose existing part 90 technical, licensing, and operating compliance requirements on new radiolocation operations in the band. The *Report and Order* also establishes a frequency stability standard on radiolocation operations in the 24.45–24.65 GHz band and requires that the devices used to conduct such operations receive authorization to do so under the Commission's part 90 rules.

23. *Radiolocation Allocation in the 24.45–24.65 GHz Band*. This *Report and Order* adds to the U.S. Table a federal and a non-federal secondary allocation for radiolocation operations in the 24.45–24.65 GHz band. This action is in the public interest as it puts under-utilized spectrum to beneficial use, and drives innovation in drone detection technology. Given similarities between the technologies involved in radiolocation and those used for radionavigation, which are already authorized in the band, the scarcity of licenses in the band, and the success of waiver-based radiolocation endeavors in the 24.45–24.65 GHz band, this additional allocation will be compatible with existing uses and will yield significant public benefits.

24. *Part 90 Licensing and Operating Rules for Radiolocation Operations*. The *Report and Order* adds the 24.45–24.65 GHz band to the list of frequencies available to the Radiolocation Service in part 90 of the Commission's rules and applies the existing part 90 rules related to license applications, term, performance requirements, and license renewal to such operations. Further, it applies to radiolocation operations the additional rules that govern part 90 services generally. Such rules include those that govern foreign ownership, construction requirements, and applications for temporary permits.

25. *Part 90 Technical Rules for Radiolocation Operations*. The *Report and Order* preserves and applies, with minimal amendments, existing provisions of the Commission's part 90 technical rules to radiolocation operations in the 24.45–25.65 GHz band. For example, the *Report and Order* imposes power limits on a case-by-case basis, as described in section 90.205, consistent with comparable part 90 licenses. The *Report and Order* also, per section 90.207, determines emissions-type limitations on a case-by-case basis, and establishes them upon a satisfactory showing of need. The *Report and Order* applies section 90.210's Emission Mask B to radiolocation operations in the 24.45–24.65 GHz band. Finally, the *Report and Order* continues to review and authorize on a case-by-case basis bandwidth limits for stations conducting radiolocation operations in the 24.45–24.65 GHz band, consistent with section 90.209, and to establish a frequency stability standard for such operations in section 90.213.

26. *Commercial Aviation Air-Ground Systems.* The Commission adopts changes to the Commercial Aviation Air-Ground Systems rules to more efficiently utilize this spectrum, harmonize these rules with rules of similar legacy technologies, and promote technology neutrality. More specifically, we amend the rules to regulate by average power rather than by peak power, adopt a PAR limit, and implement a PSD model. While the Commission does not create any new reporting or recordkeeping requirements for this band, we do create compliance requirements for licensees.

27. *Power Measurement.* The Commission now regulates power for Commercial Aviation Air-Ground Systems on an average basis. The rules for this band currently measure permissible ERP on a peak basis. More specifically, section 22.867 is amended to regulate ERP on an average power basis.

28. *Peak-to-Average Ratio.* The Commission implements a PAR limit of 13 dB for Commercial Aviation Air-Ground Systems. When accompanying an average power approach, a PAR limit guards against interference by restricting the magnitude of power spikes. Because regulating on an

average power basis allows for emissions higher than permitted under the previous peak power basis, we conclude that it serves the public interest to adopt a PAR limit to mitigate the potential for undesirable interference that could result otherwise.

29. *Out-of-band emission limits.* The *Report and Order* adopts a requirement that power of any emission into the 851–854 MHz band must be attenuated below the transmitting power (P) by a factor of at least 50 + 10 log (P) dB and otherwise retain the current OOBE limit applicable to Commercial Aviation Air-Ground System stations, including such stations operating in the 894–896 MHz band.

30. *ERP.* The *Report and Order* adopts the Commission's proposal to continue expressing power limits as ERP, as in the current rules, rather than equivalent isotropically radiated power (EIRP), as in some of the Commission's power rules.

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

31. The RFA requires an agency to provide "a description of the steps the agency has taken to minimize the significant economic impact on small entities . . . including a statement of the factual, policy, and legal reasons for selecting the alternative adopted in the final rule and why each one of the other significant alternatives to the rule considered by the agency which affect the impact on small entities was rejected."[37]

32. *Air-Ground Communications in the 450 MHz Band.* The *Report and Order* facilitates more intensive use of 650 kilohertz of low-band spectrum for air-ground communications through flexible rights and policies, in order to position the 450 MHz band as one of several alternatives considered for local, regional, and nationwide UAS networks. This action is critical to modernize the legacy, site-based general aviation air-ground service rules that currently limit service to voice communications with aircraft at high altitudes, thereby prohibiting data communications, and effectively prohibiting wide-area, low-altitude service. The Commission has taken steps to enable it to minimize the economic burden on small entities. Specifically, the Commission sought to identify whether a covered incumbent will face any special or unique issues with respect to the proposed licensing and operating rules such that they would require certain accommodations or additional time to comply by seeking comment on this issue. The Commission also sought to identify and consider other modifications that could be made to our rules regarding administrative processes that would reduce the economic impacts of proposed rule changes on the covered incumbent. Additionally, we sought any information, through comments or otherwise, specific to the interests of small entities, to the Commission with the requisite data it needs to effectively consider the most cost-effective approach to minimize the economic impact for such entities while achieving its statutory objectives.

33. The transition to a geographic licensing regime is completely voluntary, which will minimize impact of the rules on small entities. Further, the *Report and Order* allows the covered incumbent to choose between two performance requirement options. The *Report and Order* sets a license term of 15 years. The certainty of a longer license term will provide a licensee that is a small entity sufficient incentive to make the long-term investments necessary for compliance. Additionally, certain applicable technical rules have been eliminated or remained unchanged, which either reduce or, at least maintain, the existing economic obligations of small entities.

34. The Commission finds an overriding public interest in encouraging investment in wireless networks, facilitating access to scarce spectrum resources, and promoting the rapid deployment of mobile services to both the American public and its small businesses. All licensees, including small entities, play a crucial role in achieving these goals. All licensees, including small entities, play a crucial role in achieving these goals. Therefore, the *Report and Order* considered alternatives and other

[37] 5 U.S.C. § 604(a)(6).

measures that would accommodate the needs and resources of small entities. The Commission carefully considered the effects of its proposals on small entities before adopting final rules in this proceeding.

35. *UAS Detection in the 24.45–24.65 GHz Band.* The *Report and Order* imposes modest rule changes to enable radiolocation operations in the 24.45–24.65 GHz band. We retain and apply relevant, familiar, and generally applicable part 90 licensing, operation, and technical rules. This approach is tailored to minimize any new burden on small entity and all other applicants.

36. *Commercial Aviation Air-Ground Systems.* The Commission sought comment on the adoption of average power regulation, a PAR limit, and a PSD model for Commercial Aviation Air-Ground Systems, as well as considered the advantages and disadvantages of peak and average radiated power limits in terms of controlling the interference potential of stations, and conforming to current industry measurement procedures using available measuring instruments. The Commission believes that these rules will enable the licensee to provide connectivity for passengers on commercial aircraft in a more efficient manner for its broadband technologies, and this connectivity is available to all individuals and entities on board. For example, small businesses are able to utilize this connectivity while on a commercial flight.

37. Additionally, these changes put the Commercial Aviation Air-Ground Systems licensee, regardless of size, more on regulatory par with other wireless service licensees. The Commission has historically valued harmonization in the rules for wireless licensees by eliminating burdensome requirements, as appropriate. These actions align the rules for Commercial Aviation Air-Ground Systems with the rules for the Personal Communications Service, Advanced Wireless Service, and Cellular Radiotelephone Service, which would reduce confusion and ease the regulatory burden on small entities providing or receiving those services. Further, we anticipate that these modernized rules would encourage the licensee to invest in and deploy more advanced technologies as they evolve.

G. Report to Congress

38. The Commission will send a copy of the *Report and Order*, including this Final Regulatory Flexibility Analysis, in a report to Congress pursuant to the Congressional Review Act.[38] In addition, the Commission will send a copy of the *Report and Order*, including this Final Regulatory Flexibility Analysis, to the Chief Counsel for the SBA Office of Advocacy and will publish a copy of the *Report and Order*, and this Final Regulatory Flexibility Analysis (or summaries thereof) in the Federal Register.[39]

[38] 5 U.S.C. § 801(a)(1)(A).

[39] *Id.* § 604(b).

APPENDIX C

List of Commenters in WT Docket No. 24-629

Comments

AIRT, Inc. d/b/a DRONERESPONDERS (AIRT)
Association for Uncrewed Vehicle Systems International (AUVSI)
AURA Network Systems, Inc. (AURA)
AX Enterprize, LLC (AX Enterprize)
Choctaw Nation of Oklahoma (CNO)
Commercial Drone Alliance (CDA)
Dale N. Hatfield (Hatfield)
Echodyne Corp. (Echodyne)
Edison Electric Institute (EEI)
Enterprise Wireless Alliance (EWA)
First Person View Freedom Coalition (FPVFC)
MatrixSpace, Inc. (MatrixSpace)
Motorola Solutions, Inc. (Motorola)
National Public Safety Telecommunications Council (NPSTC)
National Telecommunications and Information Administration (NTIA)
National Wireless Communications Council (NWCC)
Reliable Robotics
Skyports Infrastructure (Skyports)
Universal Solutions International, Inc. (USI)

Reply Comments

Association of Public-Safety Communications Officials International (APCO)
AURA
Hatfield
Echodyne
Gogo Business Aviation LLC (Gogo)
MatrixSpace
National Regional Planning Council (NRPC)

Ex Partes

AURA
Gogo