

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

In the Matter of	)	
Facilitating Opportunities for Advanced Air	)	WT Docket No. 24-629
Mobility	)	
Petition for Rulemaking to Permit the	)	RM-11912 (terminated)
Transmission of Data in Air-Ground Radio	)	
Telephone Automated Service Channels Between	)	RM-11819 (terminated)
454.675-454.975 MHz and 459.675-459.975 MHz	)	
	)	RM-11985 (terminated)
Secondary Use of the 24.25-24.65 GHz Band for	)	
Radiolocation Services	)	
	)	
Gogo Business Aviation, LLC Petition for	)	
Rulemaking to Modernize the Air-ground	)	
Radiotelephone Service Rules	)	
	)	
	)	

**NOTICE OF PROPOSED RULEMAKING**

**Adopted: January 13, 2025**

**Released: January 17, 2025**

**Comment Date: (30 days after date of publication in the Federal Register)**

**Reply Comment Date: (60 days after date of publication in the Federal Register)**

By the Commission: Chairwoman Rosenworcel and Commissioner Starks issuing separate statements; Commissioner Gomez approving in part and not participating as to Air-Ground Communications in the 450 MHz Band (Part II and related portions).

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## I. INTRODUCTION

1. Advanced Air Mobility (AAM) is a rapidly evolving new sector of the aviation industry that includes novel kinds of propulsion and flight controls and which is expected to rely increasingly on automated technologies.<sup>1</sup> AAM is expected to support accessible and convenient transportation of people and cargo for a range of purposes including transportation of personnel and medical supplies to hard-to-reach areas in emergencies, regional air mobility to connect remote communities to the national aviation system, and shuttle services between urban areas and to and from airports. AAM systems may be either crewed or uncrewed, with personnel either piloting the aircraft on board or through remotely piloted or automated techniques.<sup>2</sup> Uncrewed aircraft systems (UAS) support a variety of public and private functions including infrastructure inspection, search and rescue operations, and package delivery, and hold the potential for expanded functionalities, such as long-range, large cargo deliveries.<sup>3</sup> In 2021, there

<sup>1</sup> See Advanced Air Mobility Coordination and Leadership Act § 2(i)(1), Pub. L. No. 117-203, 136 Stat. 2227, 2229 (2022) (“The terms ‘advanced air mobility’ and ‘AAM’ mean a transportation system that transports people and property by air between two points in the United States using aircraft with advanced technologies, including electric aircraft or electric vertical take-off and landing aircraft, in both controlled and uncontrolled airspace.”). Additionally, Section 951 of the 2024 FAA Reauthorization Act states that the terms “advanced air mobility” and “AAM: mean a transportation system that is comprised of urban air mobility and regional air mobility using manned or unmanned aircraft.” FAA REAUTHORIZATION ACT OF 2024, Pub. L. 118-63, May 16, 2024, 138 Stat. 1025, § 951(1). The FAA Reauthorization Act also defines regional air mobility as “the movement of passengers or property by air between 2 points using an airworthy aircraft that (A) has advanced technologies, such as distributed propulsion, vertical takeoff and landing, powered lift, nontraditional power systems, or autonomous technologies, (B) has a maximum takeoff weight of greater than 1,320 pounds, and (C) is not urban air mobility. *Id.* § 951(3). Finally, the FAA Reauthorization Act defines urban air mobility as “the movement of passengers or property by air between 2 points in different cities or 2 points within the same city using an airworthy aircraft that (A) has advanced technologies, such as distributed propulsion, vertical takeoff and landing, powered lift, nontraditional power systems, or autonomous technologies; and (B) has a maximum takeoff weight of greater than 1,320 pounds. *Id.* § 951(4). The Federal Aviation Administration (FAA) describes AAM as “a rapidly-emerging, new sector of the aerospace industry which aims to safely and efficiently integrate highly automated aircraft into the [National Airspace System]. AAM is not a single technology, but rather a collection of new and emerging technologies being applied to the aviation transportation system, particularly in new aircraft types.” Federal Aviation Administration, Aeronautical Information Manual, [https://www.faa.gov/air\\_traffic/publications/atpubs/aim\\_html/chap11\\_section\\_6.html](https://www.faa.gov/air_traffic/publications/atpubs/aim_html/chap11_section_6.html) (last visited Nov. 1, 2024).

<sup>2</sup> FAA regulations use the term “unmanned” for similar systems. See 14 CFR § 107.3 (defining terms that include the word *unmanned*).

<sup>3</sup> See, e.g., Airport Technology, FAA approves large commercial drone BVLOS use, (May 17, 2024), <https://www.airport-technology.com/news/faa-approves-large-commercial-drone-bvlos-use/>; *MightyFly* Receives Industry First FAA Flight Corridor Approval for Large Autonomous Cargo Evtol, (Apr. 30, 2024),

(continued....)

were 2 million UAS in the United States, and, by 2030, that number is anticipated to triple to 6.5 million.<sup>4</sup> Further, the UAS market is projected to grow at a rate of 14.6 percent, and by 2027 is expected to be valued between \$29 billion and \$54.2 billion.<sup>5</sup> The global AAM market has been consistently valued at more than \$8 billion as of 2022; projections of its compound annual growth rate range from 20% to 35.2% for the subsequent decade, resulting in a 2032 valuation between \$50 billion and \$68.1 billion.<sup>6</sup> The continued growth and operation of these important aviation technologies will depend on the availability of reliable wireless communications technologies to support flight control and, for AAM transporting passengers, reliable in-aircraft broadband. In addition to wireless communications used by and in these aircraft, the availability of detection technologies is critical to ensure that, as UAS and AAM operations continue to expand, they do so safely.

2. In this Notice of Proposed Rulemaking (*NPRM*) we explore several areas of the Commission's service rules that are well suited for modernization to facilitate the deployment of various manifestations of AAM and UAS operations. To that end, we propose and seek comment on amendments to the rules that govern the operations of three distinct bands of spectrum. As described in detail throughout, the bands addressed in this *NPRM* are allocated for a range of different services. But the changes we propose for each band will advance the goal of the safe and effective facilitation of facets of AAM and UAS services.

3. We first propose and seek comment on changes to the service rules that apply to 650 kilohertz of spectrum in the 450 MHz band. In their current form, these site-based rules confine air-ground communications in the band to voice communications with aircraft traveling at high altitudes. We propose to replace the current rigid framework with rules that embrace more flexible use of the band while minimizing the possibility for harmful interference by creating a single nationwide license. Specifically, our proposals would update these rules with the aim of enabling expanded UAS operations at a range of altitudes, including lower altitudes, by allowing use of the band for control and non-payload communications of uncrewed aircraft systems (UAS CNPC).

4. Next, we propose and seek comment on rule changes to permit radiolocation operations in the 24.45–24.65 GHz band. Radiolocation operations entail the detection of, for example, UAS, without the further use of that information for navigation purposes. By permitting radiolocation operations in the 24.45–24.65 GHz band, we endeavor to facilitate UAS detection at sensitive sites that include stadiums, prisons, the U.S. border, and critical infrastructure (e.g., utilities). We thereby intend to elevate the potential of an underused segment of spectrum while minimizing the risk of harmful interference.

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<https://mightyfly.com/press-release/mightyfly-receives-industry-first-faa-flight-corridor-approval-for-large-autonomous-cargo-evtol/> (announcing FAA approval of a flight corridor to begin A-to-B flight testing with an altitude of up to 5,000 feet).

<sup>4</sup> International Civil Aviation Organization, *Increased Use of Unmanned Aircraft Systems (UAS), Annual Report 2021*, <https://www.icao.int/annual-report-2021/Pages/emerging-and-cross-cutting-aviation-issues-increased-use-of-unmanned-aircraft-systems-uas.aspx> (last visited Nov. 1, 2024) (ICAO UAS Report).

<sup>5</sup> See ICAO UAS Report; IndustryARC, *Unmanned Aircraft Systems Market Overview*, <https://www.industryarc.com/Report/15014/unmanned-aircraft-systems-market.html> (last visited Nov. 1, 2024); see also International Trade Administration, *Civil/Commercial, Unmanned Aircraft Systems*, <https://www.trade.gov/unmanned-aircraft-systems> (last visited Nov. 1, 2024).

<sup>6</sup> See, e.g., Global Market Insights, *Advanced Air Mobility Market*, <https://www.gminsights.com/industry-analysis/advanced-air-mobility-market> (last visited Nov. 1, 2024); Custom Market Insights, *Global Advanced Air Mobility Market 2024-2033*, <https://www.custommarketinsights.com/report/advanced-air-mobility-market/> (last visited Nov. 1, 2024); Grand View Research, *Advanced Air Mobility Market Size & Share Report, 2035*, <https://www.grandviewresearch.com/industry-analysis/advanced-air-mobility-aam-market-report> (last visited Nov. 1, 2024).

5. Finally, we propose and seek comment on modernizing the rules governing Commercial Aviation Air-Ground Systems. These legacy rules impose power limits that have fallen out of step with the realities of operations in this band. Namely, our rules currently require that operational power be determined by peak power. We propose instead to measure and regulate the effective radiated power of Commercial Aviation Air-Ground Systems operations according to their average power. The changes we propose would bring these rules into harmony with those that govern similar operations in other bands, and they would enable more efficient use of the spectrum, and promote technology neutrality.

## II. AIR-GROUND COMMUNICATIONS IN THE 450 MHZ BAND

6. We propose to facilitate 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 for local, regional, and nationwide UAS networks. We propose 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. We propose to assign new rights and new obligations to a single geographic license with nationwide coverage, with the goal of facilitating new services 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 and uncrewed aircraft system operations. Specifically, we propose to adopt additional service rules that would provide UAS operators with the ability to conduct control and non-payload operations in the band, which could facilitate AAM.

### A. Background

7. 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 Table of Allocations.<sup>7</sup> Currently, the band is primarily used for Air-Ground Radiotelephone Service (AGRAS) to provide communications capabilities to aviation subscribers.<sup>8</sup> In 1992, the Commission, seeking to streamline the process by which part 22 licensees could request additional channels for existing systems, proposed the general aviation-ground rules governing the 450 MHz band.<sup>9</sup> The Commission issued a Report and Order in the part 22 proceeding in 1994, which adopted the general aviation air-ground provisions and allocated channels for the provision of radiotelephone service to airborne mobile subscribers in general aviation aircraft.<sup>10</sup> 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.<sup>11</sup> The Commission's

<sup>7</sup> 47 CFR § 2.106(d)(32) (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) (US 64).

<sup>8</sup> Neighboring uses include Remote Pickup, Low Power Auxiliary, Public Mobile, Maritime, Private Land Mobile, and MedRadio operations. *See generally* 47 CFR § 2.106.

<sup>9</sup> *Revision of Part 22 of the Commission's Rules Governing the Public Mobile Services*, Notice of Proposed Rulemaking, CC Docket No. 92-115, 7 FCC Rcd 3658 (1992) (*Part 22 Rewrite NPRM*).

<sup>10</sup> *See Revision of Part 22 of the Commission's Rules Governing the Public Mobile Services*, Report and Order, CC Docket Nos. 92-115, 94-46, and 94-201, 9 FCC Rcd 6513 (1994) (*Part 22 Rewrite R&O*); *see also id.*, Appendix A at 6570 (also adopting other rules for general aviation air-ground stations, but without discussion or reference to specific commenters). The Commission stated that, “[i]n general,” the parties' comments supported the proposed new [general aviation air-ground] rules. *Id.*, 9 FCC Rcd at 6570. Subsequently, the Commission received 37 petitions for reconsideration of the *Part 22 Rewrite R&O*, but did not report any that opposed or otherwise addressed the general aviation air-ground rules. *See Revision of Part 22 of the Commission's Rules Governing the Public Mobile Services*, CC Docket No. 92-115, Memorandum Opinion and Order on Reconsideration, 15 FCC Rcd 7463, 7464 (2000).

<sup>11</sup> 47 CFR § 22.805.

Universal Licensing System (ULS) database shows that, as of December 2, 2024, there are 53 active licensed locations, all of which are held by AURA Network Systems OpCo, LLC (AURA).<sup>12</sup> AURA is the only incumbent licensee and operator in the 450 MHz general aviation air-ground band.

8. 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-based facilities and to build out their existing networks.<sup>13</sup> Specifically, the Division waived: (1) the distance separation requirement for ground transmitters operating on the same channel; (2) a limitation of six channel pair assignments within a 320 kilometer (199 mile) radius; (3) the construction requirement; and (4) a channel assignment policy limiting assignment of one channel in an area to a given carrier per application cycle, up to a maximum of six channels per carrier within the same area.<sup>14</sup> In 2021, the Division granted a waiver of relevant part 22 rules to AURA, allowing it to provide additional ancillary services, including services to UAS, to meet the needs of a broader base of aviation subscribers.<sup>15</sup> In compliance with a condition of the *2021 Order*, AURA filed a petition for rulemaking seeking updates to the Commission's rules to allow for UAS CNPC operations in the 450 MHz band.<sup>16</sup> On August 25, 2021, the Consumer and Governmental Affairs Bureau released a Public Notice seeking comment on the AURA Petition.<sup>17</sup> In response to the Public Notice, the Commission received 18 comments and one reply comment. The record in response to the public notice overwhelmingly supports the rule changes that AURA requests.<sup>18</sup>

9. On January 17, 2025, the Wireless Telecommunications 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.<sup>19</sup>

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<sup>12</sup> Based on an FCC Universal Licensing System Advanced License Search on December 2, 2024 using the following search parameters: Service Group = All, Match only the following radio service(s): CG - General Aviation Air-ground Radiotelephone, Status = Active, Authorization Type = All. See FCC, *Universal Licensing System, Advanced License Search*, <https://wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp> (last visited Dec. 2, 2024).

<sup>13</sup> 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). Stratophone, LLC and SkyTel Spectrum, LLC are the predecessor entities of A2G. AGRAS is a technology standard.

<sup>14</sup> *2010 Order*, 25 FCC Rcd at 8587, para. 13 (waiving 47 CFR §§ 22.813(a), 22.813(b), 22.815, 22.817).

<sup>15</sup> *AURA Network Systems OpCo, LLC and A2G Communications, LLC Request for Waiver*, WT Docket No. 20-185, Order, 36 FCC Rcd 262, 267, para. 13 (WTB-MD 2021) (*2021 Order*).

<sup>16</sup> Petition of A2G Communications, LLC and AURA Network Systems OpCo, LLC, WT Docket No. 20-185, at 2 (filed Feb. 16, 2021) (AURA Petition).

<sup>17</sup> *Petition for Rulemaking to Permit the Transmission of Data in Air-Ground Radio Telephone Automated Service Channels Between 454.675-454.975 MHz and 459.675-459.975 MHz*, RM-11912, Public Notice Report No. 3181 (CGB 2021).

<sup>18</sup> See AURA Comments, Choctaw Nation Comments, Fleet Space Comments, DRONERESPONDERS Comments, Boeing Comments, Utilities Technology Council et al Comments, EEI Comments, EWA Comments, Lone Star UAS Center of Excellence Comments, NPSTC Comments, GA-ASI Comments, Aerospace Industries Association Comments, Commercial Drone Alliance Comments, Northern Plains UAS Test Site Comments, Elroy Air Comments, University of Maryland UAS Test Site Comments.

<sup>19</sup> See *Wireless Telecommunications Bureau Announces Temporary Filing Freeze on Applications in the 450 MHz Band*, WT Docket No. 24-629, Public Notice, DA 25-39 (WTB Jan. 17, 2025).

## B. Discussion

10. We seek to update our rules governing the use of the 450 MHz band to create new service rules that allow for UAS CNPC operations in the band, which could support AAM operations at a range of altitudes. Specifically, we propose to: (1) update the U.S. Table of Frequency Allocations (U.S. Table) to allow for certain UAS data communications in the 450 MHz band; (2) transition to a geographic licensing structure with a single, nationwide license made available through a voluntary transition process; and (3) adopt flexible licensing, operating, and technical rules that will facilitate robust use of the band in the public interest and will minimize interference to neighboring operations.

### 1. Allocating the 450 MHz Band for Command and Control of Uncrewed Aircraft

11. *Allocation.* We propose to amend our allocation in the 450 MHz band to add a non-federal primary Aeronautical Mobile (Route) Service ((AM(R)S)) allocation in order to permit UAS CNPC operations in the band in addition to the existing air-ground radiotelephone service. As a co-primary service, the AM(R)S service will have priority over secondary services in the band. Our current allocation and definitions in the rules limit communications in the band to the provision of air-ground radiotelephone service to subscribers in aircraft and prohibit the transmission of data.<sup>20</sup> Making this band available for UAS CNPC would facilitate more intensive use of 650 kilohertz of low band spectrum allocated for air-ground communications.<sup>21</sup> We believe this update to the allocation table is necessary because the band currently does not have a mobile or AM(R)S allocation. We seek comment on this proposal.

12. The record in response to AURA's Petition for Rulemaking supports our proposal to add an allocation that will permit UAS CNPC. For instance, Boeing urges the Commission "to make any necessary adjustments to the Table of Frequency Allocations—whether revising the allocation or adding a footnote to make UAS CNPC operations primary in the band, or otherwise."<sup>22</sup> NPSTC states that it "analyzed the 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."<sup>23</sup> We seek comment on our proposal. In addition, we seek comment on whether we should limit non-voice transmissions to UAS CNPC services in the band. Should the allocation be expanded to allow other data uses beyond UAS CNPC or would such an allocation make the band less valuable or reliable for UAS CNPC operation? Commenters should discuss the costs and benefits of the proposed allocation and any alternatives.

13. Under section 303(y) of the Communications Act of 1934, as amended, the Commission is permitted to allocate spectrum for flexible 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, systems or the development of technologies; and

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<sup>20</sup> 47 CFR § 2.106(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."); *id.* § 22.99 (defining radiotelephone service as "[t]ransmission of sound from one place to another by means of radio."); *see id.* § 22.805 (stating that "the channels are allocated for the provision of radiotelephone service to airborne mobile subscribers in general aviation aircraft.").

<sup>21</sup> *See* AURA Petition at 2-3 (stating that the band is well suited for UAS CNPC links because the band already features an aviation allocation to accommodate air-to-ground communications, the band's propagation characteristics make it highly cost-effective for providing nationwide coverage (including in rural areas) at all altitudes for beyond visual line of sight (BVLOS), and the band can be used to securely offer UAS CNPC services on a specialized, private carrier, and nationwide basis, reducing the likelihood of network security issues and harmful interference.); EEI Comments at 3.

<sup>22</sup> Boeing Comments at 4.

<sup>23</sup> National Public Safety and Telecommunications Council (NPSTC) Comments at 2.

(3) such use would not result in harmful interference among uses.<sup>24</sup> We anticipate that our proposal to add CNPC usage rights to the 450 MHz band in the U.S. Table would meet these criteria. We tentatively conclude that our proposal would serve the public interest by allowing use of the band for UAS CNPC, which supports the safety or regularity of the UA flight. The Commission has previously concluded that UA operating safely will offer extensive public interest benefits, including wide-ranging medical,<sup>25</sup> public safety, and environmental applications.<sup>26</sup> The record in response to the Petition also states that expanding the band's operations to UAS CNPC is in the public interest particularly in rural and Tribal areas, "given these areas' lack of broad access to cellular networks and other wireless technology," which could support UAS operations.<sup>27</sup> Our proposed allocation would remove unnecessary technological restraints and allow for more robust use of the spectrum. We seek comment on our proposal to add this allocation and on our initial assessment that doing so is consistent with the requirements of section 303(y).

14. *Control and Non-payload Communications.* In addition to adding a non-federal primary AM(R)S allocation to the U.S. Table in order to permit UAS CNPC operations in the 450 MHz band, we propose to define UAS CNPC as "Any transmission that is sent between the UA component and the UAS ground station of the UAS and that supports the safety or regularity of the UA's flight."<sup>28</sup> This definition is consistent with our rules governing the 5030–5091 MHz band.<sup>29</sup> In turn, consistent with our rules governing the 5030–5091 MHz band, we propose to define a UA as "an aircraft operated without the possibility of direct human intervention from within or on the aircraft," and to define UAS as "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."<sup>30</sup> We seek comment on these proposed definitions and on any alternatives. As we noted in the *UAS Report and Order*, we anticipate that our proposed definitions "can encompass a variety of operations, including Urban Air Mobility and Advanced Air Mobility," and that we do not need to distinguish among such operations in the rules at this time.<sup>31</sup> Do our proposed definitions adequately encompass potential use cases in the band? We also tentatively conclude that our part 22 definitions must also include definitions of the terms UAS CNPC, UAS, and UA. There is record support for updating the definitions in our part 22 rules.<sup>32</sup> We seek comment on this tentative conclusion and on the costs and benefits of our proposal. We also seek comment on whether our proposal fully enables UAS CNPC service in the 450 MHz band or whether other rule changes are also necessary. We

<sup>24</sup> See 47 U.S.C § 303(y).

<sup>25</sup> "In light of the COVID-19 pandemic, UAS have the potential to deliver payloads of medical equipment and supplies." DRONERESPONDERS Public Safety Alliance Comments at 2.

<sup>26</sup> *Spectrum Rules & Policies for the Operation of Unmanned Aircraft Sys.; Petition of AIA for Rulemaking to Adopt Serv. Rules for Unmanned Aircraft Sys. Command & Control in the 5030-5091 MHz Band*, WT Docket No. 22-323, Notice of Proposed Rulemaking, 38 FCC Rcd. 474, para. 1 (2023) (*UAS NPRM*); *Spectrum Rules and Policies for the Operation of Unmanned Aircraft Systems*, WT Docket No. 22-323, Report and Order, FCC 24-91, 2024 WL 4010734, \*1, para. 1 (rel. Aug. 29, 2024) (*UAS Report and Order*); *2021 Order*, 36 FCC Rcd at 269, para. 16; see also DRONERESPONDERS Public Safety Alliance Comments at 2 ("UAS are impactful in the public safety sector: they can conduct natural disaster assessments, assist with law enforcement and firefighting, and help in search-and-rescue missions."); EEI Comments at 2 ("UAS technology gives electric utilities the ability to conduct...inspections without endangering personnel.").

<sup>27</sup> See Choctaw Nation of Oklahoma Comments at 2.

<sup>28</sup> *UAS Report and Order*, 2024 WL at \*67, para. 13.

<sup>29</sup> *Id.*

<sup>30</sup> *Id.*

<sup>31</sup> *UAS Report and Order*, 2024 WL at \*4, para. 11.

<sup>32</sup> "Thus, the Commission should update its part 22 rules to reflect the development of the technology as well as to acknowledge the FAA's rules for integrating UAS into the National Airspace." EEI Comments at 7.

note that in the UAS proceeding, the Commission proposed to create a new part 88 for UAS service rules.<sup>33</sup> To the extent the Commission adopts part 88 for this purpose, should the rules governing UAS CNPC operations at 450 MHz be contained in part 88? For example, should part 22 include a reference indicating UAS operations must comply with part 88 and relevant UAS definitions? Further, should any UAS restrictions we ultimately adopt for the 450 MHz Air-Ground Service be located in part 88?

## 2. Voluntary Transition to a Nationwide License

15. We seek comment on transitioning the 450 MHz band from a site-based licensing structure to a single geographic license with nationwide coverage encompassing the contiguous United States (CONUS), Alaska, Hawaii, and the U.S. territories.<sup>34</sup> Transitioning to a geographic licensing structure with one nationwide license aligns with the Commission's goal of putting spectrum to its highest and most efficient use given the unique qualities of the band. We tentatively conclude that a geographic licensing structure with a nationwide license is in the public interest for several reasons. First, a single incumbent currently holds all existing site-based licenses nationwide, thus effectively creating nationwide coverage at high altitude. The 450 MHz band is comprised of only 650 kilohertz of spectrum and only one party, AURA, has incumbent operations in the band. Specifically, AURA provides general aviation air-to-ground services using its 53 sites across the United States and certain territories. Our current rules have co-channel separation requirements and limit the number of ground transmitter locations that are possible in the United States.<sup>35</sup> The operation of existing co-channel and dispersion rules, along with AURA's site locations, create white spaces that are unusable, absent waiver, by AURA or others, at lower altitudes. By contrast, a nationwide license coupled with flexible technical rules would permit nationwide operations at both high and low altitudes.<sup>36</sup> Referring to the record in the *2021 Waiver Order*, the Division noted, "other parties have not shown interest in operating in the band and have overwhelmingly supported Petitioners' steps to grow and modernize their existing network"<sup>37</sup> under the existing licensing framework. The record to the AURA Petition for Rulemaking also supports AURA's efforts to expand its network in the band.<sup>38</sup> Second, the additional rights we propose to assign are most efficiently accomplished as a modification to existing license authority. Third, creating the technical protections necessary to assign additional rights to a third party would be complex, delay the expanded operations in the band, and unnecessarily restrict innovation. For these reasons, we tentatively conclude that our proposed voluntary transition ensures that spectrum is put to highest use because the incumbent is in the best position to rapidly deploy operations. While the incumbent does not maintain sites in all of the United States territories at present, we tentatively conclude that given the incumbent's extensive operations throughout the United States, it is in the best position to construct facilities and offer service in these additional areas. We believe in this particular case that it is more efficient to allow the incumbent to

<sup>33</sup> *UAS NPRM*, 38 FCC Rcd at 542.

<sup>34</sup> The U.S. territories are Puerto Rico, the U.S. Virgin Islands, American Samoa, Guam, and the Commonwealth of Northern Mariana Islands.

<sup>35</sup> 47 CFR § 22.813(a) (prohibiting a ground transmitters from being located less than 800 kilometers (497 miles) from the antenna location of the nearest co-channel ground transmitter); *id.* § 22.817.

<sup>36</sup> *2021 Order*, 36 FCC Rcd at 263-64, para. 4.

<sup>37</sup> *Id.* at 266, para. 12.

<sup>38</sup> See EEI Comments at 4 ("EEI supports the Petition's request that the Commission make certain changes to its part 22 rules so that the 450 MHz AGRAS band may be used for aviation operations, including UAS operations."); NPSTC Comments at 2 (stating that rule changes "will help AURA and A2G to offer communications support on the AGRAS channels for at least a portion of public safety and other critical UAS command and control applications"); Choctaw Nation Comments at 2 ("[W]e are fully supportive of AURA's efforts to build a nationwide command and nonpayload communications network for both UAS and manned operations in the 450 MHz general aviation band.").

expand its operations to the additional territories rather than have piecemeal operations with different licensees. We seek comment on our tentative conclusions.

16. We also tentatively conclude that a geographic licensing structure with a single nationwide license is in the public interest because of the public safety need for UAS CNPC across the country. As NPSTC notes, UAS CNPC “applications potentially include emergency operations such as search and rescue, air medical, post-hurricane and wildfire response,” which are not localized to specific geographic portions of the country.<sup>39</sup> EEI states that UAS gives electric utilities the ability to safely assess damage to equipment after a storm.<sup>40</sup> We seek comment on our proposal to adopt a single nationwide license and this tentative conclusion.

17. In the alternative, we seek comment on licensing the 450 MHz band using a smaller geographic license size. Specifically, we seek comment on whether licensing the band on a Regional Economic Area Grouping (REAG)-basis strikes a balance between promoting wide area airborne operations and offering the flexibility for multiple regional licenses.<sup>41</sup> The Commission previously has used REAGs to achieve the “expansion of service to as many people as practicable.”<sup>42</sup> Notwithstanding the flexibility potentially offered by regional licenses, we note that REAG-based licenses may raise complications in this context as compared to a nationwide license, and we seek comment on these and other potential considerations. For example, given that we envision airborne service at a range of altitudes, would the REAG boundaries need to be precisely defined in the vertical dimension? If so, we seek comment on how to do so. How could interference among neighboring REAG licensees be avoided? The Commission has previously stated that “[i]mposing a signal strength maximum at a licensee’s service area boundary is a tried and true mechanism for managing and limiting co-channel interference as well as defining rights, obligations and expectations of all licensees in the band.”<sup>43</sup> If we were to license on a REAG-basis, should we apply a signal strength limit at each REAG boundary, and if so, how should we define the limit in a way that promotes airborne service at a range of altitudes? Are there other technical means better suited for protecting neighboring operations? Should we instead allow licensees to manage interference at the license boundary by mutual agreement? Additionally, we seek comment on the type and nature of protections that would be necessary to promote continued incumbent high altitude operations under a REAG licensing regime. Would REAGs or another geographic licensing area support nationwide UAS CNPC operations in the 450 MHz band? Commenters supporting a REAG licensing approach, or other geographic licensing approaches, should address any necessary changes in the licensing, operating, and technical rules that we propose in this *NPRM*. Commenters also should discuss the cost and benefits of any proposed geographic licensing area.

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<sup>39</sup> NPSTC Comments at 2.

<sup>40</sup> EEI Comments at 2.

<sup>41</sup> 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. *Auctions Glossary*, FCC <https://www.fcc.gov/auctions/auctions-glossary> (last visited Nov. 1, 2024). 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, REAG 12 is the Gulf of Mexico. A map of the defined REAGs can be found on the Commission’s website. *Regional Economic Area Groupings (REAGs) and Their Constituent MEAs*, FCC <https://transition.fcc.gov/oet/info/maps/bea/reagwsc.pdf> (last visited Nov. 1, 2024).

<sup>42</sup> *Service Rules for 698-746, 747-762, and 777-792 MHz Bands*, Second Report and Order, 22 FCC Rcd 15289, 15351, at para. 164 (2007) (*700 MHz Second Report and Order*). In the 700 MHz Service, for example, the Commission divided the nation, including its territories, into 12 REAG areas. See 47 CFR § 27.6(b).

<sup>43</sup> *Amendment of Parts 1, 21, 73, 74 and 101 of the Commission’s Rules*, WT Docket No. 03-66, Report and Order and Further Notice of Proposed Rulemaking, 19 FCC Rcd 14165, 14208, para. 106 (2004).

18. *Band-Specific Eligibility Criteria.* We propose certain eligibility restrictions an entity must meet in order to qualify for the geographic license with nationwide coverage. We propose to define “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<sup>44</sup> 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. Our covered incumbent eligibility criteria intends to ensure expanded operations are expeditiously deployed in the band, putting the spectrum to its highest and most efficient use. We believe that a licensee meeting the proposed covered incumbent criteria will have extensive knowledge of the band’s characteristics and usage and is best positioned to rapidly put the band to a more robust use. We seek comment on our proposed eligibility criteria. Should we impose additional criteria to enable an entity to apply for a nationwide license? We seek comment on the costs and benefits of any eligibility criteria we might adopt.

19. *Request to Modify License.* We propose to transition to a geographic license framework by converting a single incumbent’s site-based licenses into a nationwide license. Under our proposed approach, a covered incumbent seeking the 450 MHz Air-Ground Service nationwide license would 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 would be completely voluntary. We seek comment on this approach. In proposing this approach, we rely on the Commission’s authority under section 309 of the Communications Act, which governs the Commission’s process for granting licenses under Title III. 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 licensing proceedings.”<sup>45</sup> Section 309 gives the Commission discretion to adopt spectrum management approaches tailored to specific bands.<sup>46</sup> We believe a license modification process is the least burdensome manner of transitioning to a geographic licensing framework and, therefore, is in the public interest. We seek comment on this conclusion as well as on alternative methods for transitioning the band to geographic licensing. What are the costs and benefits of our proposed approach or any alternative approaches?

20. The Commission used a similarly tailored transition approach in the 900 MHz broadband proceeding, 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.<sup>47</sup> Our proposed approach falls squarely within Commission precedent from that proceeding.<sup>48</sup> First, our proposed approach and the 900 MHz broadband proceeding both involve a transition through voluntary means.<sup>49</sup> Second, both transitions involve turning in existing spectrum rights in order to gain additional spectrum rights. In the 900 MHz broadband proceeding, an incumbent had a majority of the spectrum rights in the band and gained more spectrum through a negotiation and trade-in process.<sup>50</sup> Here, the incumbent in the 450 MHz band already holds all of the available spectrum rights at high altitude, and would be turning in those rights for a single nationwide license with both high and low altitude rights. Third, both transitions provide the incumbent with expanded flexibilities. In the 900 MHz broadband

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<sup>44</sup> See Letter from Michele C. Farquhar, Counsel to AURA Network Systems, Inc. to Shiva Goel, Wireless Legal Advisor to Commissioner Starks, FCC, RM-11912, at 3 (filed Sept. 12, 2022) (AURA *Ex Parte* Sept. 12, 2022).

<sup>45</sup> 47 U.S.C. § 309(j)(6)(E).

<sup>46</sup> *Id.* § 309.

<sup>47</sup> 900 MHz *Report and Order*, 35 FCC Rcd 5204, para. 45.

<sup>48</sup> See *id.* at 5207, para. 53.

<sup>49</sup> *Id.*

<sup>50</sup> *Id.*

proceeding, the Commission required the applicant eligible for a broadband license to return its licensed, non-contiguous 900 MHz spectrum, which was not capable of providing broadband, in order to obtain valuable, contiguous spectrum capable of providing broadband.<sup>51</sup> Here, we propose that the incumbent would convert its existing radiotelephone licenses into a license authorized for radiotelephone and UAS CNPC operations. For these reasons, we tentatively conclude that our proposed transition approach is consistent with Commission precedent in the *900 MHz Report and Order*. We seek comment on this tentative conclusion and on our proposed transition approach generally.

21. *Certifications.* We propose 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). Our proposed criteria for a covered incumbent are: (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. We propose that, in order to meet the first prong of covered incumbent criteria, 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. We propose that the covered incumbent can meet the second prong of the covered incumbent criteria by providing 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. We propose to require the covered incumbent to submit the Eligibility Certification and coverage map in ULS. We seek comment on our proposal. Should other elements be included in the Eligibility Certification? What are the costs and benefits of this proposal? We seek comment on the proposed application criteria. We also propose to direct the Bureau to issue a public notice with instructions for how to submit the Eligibility Certification.

22. *License Valuation.* We tentatively conclude that our proposed, voluntary transition in the 450 MHz band will not create undo enrichment to the covered incumbent. In order to take advantage of increased license flexibility and to offer new UAS CNPC services, the covered licensee will have to make significant network investments and will face economic risks and uncertainty regarding the demand for such services. In addition, we recognize that we do not want to discourage licensees from identifying and seeking value-enhancing license flexibility, as this can provide significant public interest benefits. As such, we need to balance promoting innovation with the public interest benefit of maximizing effective use of this of this scarce public resource. We seek comment on both (1) our tentative conclusion that the voluntary transition will not create undo enrichment to the covered incumbent and (2) the investments and economic risks the covered incumbent would face.

23. In some instances where the Commission granted additional spectrum usage rights, the Commission has required the new licensee to make a "windfall payment" to the U.S. Treasury.<sup>52</sup> There are several potential differences between these past cases when windfall payments were required and the present circumstances. First, in the previous cases, the entities required to make payments were gaining access to spectrum that was held in Commission inventory, while in this case, the white space spectrum gained by the covered incumbent is not in Commission inventory and cannot reasonably be made available to others without causing harmful interference to existing operations in the band.<sup>53</sup> 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. Here, the flexibility being granted would be for a service that does not currently exist and for which there is considerably more uncertainty about the likely future demand, whether other providers will offer

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<sup>51</sup> *Id.* at 5221, para. 89.

<sup>52</sup> *Id.*

<sup>53</sup> *Id.*

competing services in other bands, and the value of spectrum allocated to this service.<sup>54</sup> Finally, the amount of spectrum that would be granted additional flexibility in this proceeding is substantially less than prior proceedings where windfall payments were required, and this raises the question of whether a windfall payment would fall below a de minimis threshold.<sup>55</sup> These factors lead us tentatively to conclude that there will not be a windfall to the new nationwide licensee and we seek comment on this tentative conclusion.

24. Notwithstanding our tentative conclusion, however, we also recognize that our proposal could result in an increase in the value of the spectrum and could potentially increase flexibility by providing a national license. In order to establish a sufficient record in the event we nonetheless determine our proposals create a windfall, we seek comment on the magnitude of any such benefit conferred to the proposed nationwide licensee as a result of our proposals. Commenters should address whether they believe there would be a windfall to the covered incumbent and whether we should require the new licensee to make a payment to the U.S. Treasury. For example, do commenters think that the following factors increase the value of the spectrum such that a windfall payment might be warranted: (1) increased deployment flexibility that allows the licensee to deploy in the current white spaces; (2) increased flexibility in permissible services allowed in the band; and (3) an exclusive-use national license? With respect to the first factor, we note that, while AURA currently has a nationwide network providing general aviation air-to-ground services,<sup>56</sup> the distance separation for co-channel ground stations requirements in our rules currently limit access to large areas at lower altitudes. We propose below to remove or modify certain rules, which will allow the nationwide licensee greater operational flexibility at lower altitudes.<sup>57</sup> Such geospatial opportunities could increase the value of the spectrum. As to the second factor, under our current rules, the 450 MHz band may only be used for the transmission of sound to subscribers in aircraft.<sup>58</sup> We propose above to update our allocation to allow for additional permissible services in the band. This too potentially increases the spectrum's value. Further, we propose to transition the site-based licenses in the band into a geographic, nationwide exclusive-use license, which may also increase the value of the spectrum. We note that the FCC is considering use of flexible-use spectrum bands for UAS communications, including command and control, telemetry, and payload communications, in the UAS proceeding,<sup>59</sup> which could also affect the value of 450 MHz spectrum.

25. We therefore seek comment on the risk that a covered incumbent seeking a nationwide license would realize an undue windfall. To the extent that commenters believe that such a risk might be present on the basis of the proposals in this *NPRM*, we ask them to discuss what actions may be necessary to mitigate such risk. Is a windfall likely to be realized to a covered incumbent? Are the actions we propose to take in this proceeding sufficiently analogous to past proceedings where windfalls were required to warrant such payments in this proceeding? Is there a de minimis threshold below which the compliance and collection costs would outweigh the amount of revenue collected and does the likely amount in this proceeding fall below such a threshold? If we do collect a windfall payment, how should we calculate the increase in spectrum value due to the three factors we identified above? Are there other factors that should be considered? Would the auction 65 results for two nationwide 800 MHz air-ground radiotelephone service licenses serve as a reasonable basis for estimating the value of the 450 MHz

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<sup>54</sup> *Id.*

<sup>55</sup> *Id.*

<sup>56</sup> *2021 Order*, at 263-64, para. 4. Currently our rules define Air-Ground Radiotelephone Service as “A radio service in which licensees are authorized to offer and provide radio telecommunications service for hire to subscribers *in aircraft*.” 47 CFR § 22.99 (emphasis added).

<sup>57</sup> See 47 CFR §§ 22.813, 22.817.

<sup>58</sup> See *id.* §§ 2.106(d)(32), 22.99.

<sup>59</sup> See *UAS Report and Order*, 2024 WL at \*2, para. 4 n.6.

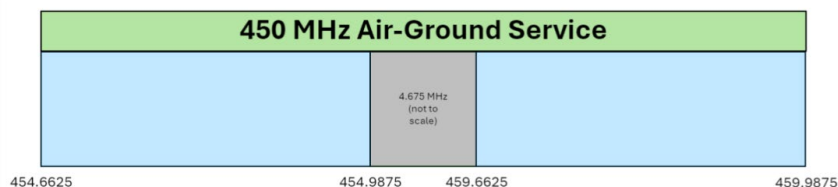
spectrum?<sup>60</sup> We seek comment on these questions and any other factors that should be considered in our determination of whether a windfall payment should be required, and if so, what an appropriate windfall payment amount would be. Commenters should discuss the costs and benefits of their proposed approaches.

26. We seek comment on whether it would be appropriate, either as an alternative to or in conjunction with the windfall payment, to impose a holding period on the single, nationwide license, i.e., during which it may not be assigned or transferred to another entity. To the extent commenters believe a holding period is appropriate, we seek comment on the parameters of such a period. How long should the holding period be? How many years would be most beneficial for a holding period? What purpose would a holding period serve for this band? If we implement a holding period, should we require the licensee to demonstrate completion of certain buildout requirements before allowing a transfer of control? We seek comment on the advantages and disadvantages of a holding period. Additionally, we seek comment on whether we should allow exceptions to this holding period restriction if implemented (e.g., *pro forma* transactions). Are there any additional requirements or protections we should impose? Commenters should discuss the costs and benefits of this approach as well as any alternatives.

### 3. Band Plan

27. 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.<sup>61</sup> Currently, in the U.S. Table, 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.<sup>62</sup> We propose to reconfigure the band plan into a single 650 kilohertz nationwide license. Specifically, we propose that the band edge should be the edge of the frequencies in the allocation in NG32 of the U.S. Table, 454.6625–454.9875 MHz and 459.6625–459.9875 MHz.<sup>63</sup> We seek comment on our proposal and any alternatives, including the costs and benefits of any proposal. We do not propose any further configurations within the band. We tentatively conclude that this approach is in the public interest because the nationwide licensee would be best positioned to manage its network. We do not believe it is in the public interest to be overly prescriptive and divide the band further with channels. As AURA notes, sole licensees and operators in a band have the ability and incentive to manage the internal boundaries between channels in their networks to prevent interference.<sup>64</sup> We seek comment on this conclusion and any alternatives.

**Figure 1: Band Plan**



<sup>60</sup> Auction 65: 800 MHz Air-Ground Radiotelephone Service, FCC <https://www.fcc.gov/auction/65> (last visited Nov. 1, 2024).

<sup>61</sup> See 47 CFR § 22.805.

<sup>62</sup> *Id.* § 2.106(d) (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.).

<sup>63</sup> *Id.*

<sup>64</sup> AURA Petition at 10.

#### 4. Licensing and Operating Rules

28. *General Eligibility.* We propose to apply the eligibility standard in part 22 of the Commission's rules to the 450 MHz Air-Ground Service. Currently, 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."<sup>65</sup> While we propose specific eligibility criteria for the covered incumbent to modify one of its site-based licenses into a nationwide license, we propose to maintain the existing part 22 general eligibility standard for licenses in the 450 MHz band. We seek comment on this proposal. Commenters should discuss the costs and benefits of maintaining the part 22 eligibility criteria.

29. *Nationwide Licensing.* We propose to license the 450 MHz band on an exclusive, nationwide license basis. AURA has constructed a nationwide network providing general aviation air-to-ground services from 53 sites across the United States and some of its territories.<sup>66</sup> The current distance separation and channel assignment policies contained in the Commission's rules for this band effectively prohibit any other parties from receiving a license, which, in turn, gives AURA exclusive use of the band nationwide.<sup>67</sup> We tentatively conclude that a nationwide license promotes more efficient spectrum use than the current patchwork of site-based licenses AURA holds. We seek comment on this conclusion. Should we instead consider other geographic license sizes? Commenters should discuss the costs and benefits of a nationwide license and any proposed alternatives.

30. *License Term.* We seek comment on the appropriate license term for the nationwide license. Currently, site-based licenses in the band have a license term of 10 years.<sup>68</sup> In light of the performance benchmarks we propose below, we tentatively conclude that the license term for the nationwide license should be 15 years. We seek comment on this conclusion. Is 15 years the appropriate license term for a nationwide license in the 450 MHz band? Does a 15-year license term provide enough time to engage in, and recoup costs for, long-term investments that may be necessary for nationwide deployment of advanced aviation services? Commenters in favor of a different license term should provide reasoning for their proposed term as well as an explanation for why a 15-year license term is not suitable in this band. Commenters should discuss the costs and benefits of their proposed license terms.

31. *License Renewal.* Next, we seek comment on the appropriate license renewal term for the 450 MHz Air-Ground service. Currently, 450 MHz band licensees must comply with part 1 of the Commission's rules that generally apply to Public Mobile Services, including renewal.<sup>69</sup> We propose to continue 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.<sup>70</sup> We seek comment on this approach. Does the new nationwide license require any deviation from our existing renewal rules? Commenters that do not support our proposal should explain why a change to our renewal rules is necessary for the 450 MHz band. We seek comment on the costs and benefits of this approach.

32. *Performance Benchmarks.* In addition to a renewal standard, the Commission also establishes performance requirements to ensure that spectrum is used intensely and *efficiently*.<sup>71</sup> The

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<sup>65</sup> 47 CFR § 22.7.

<sup>66</sup> 2021 Order, 36 FCC Rcd at 263, para. 4.

<sup>67</sup> *Id.*; 2010 Order, 25 FCC Rcd at 8588, para. 16.

<sup>68</sup> *See, e.g.*, AURA Network Systems OpCo, LLC, Call Sign WQZP766 (granted June 29, 2017) (showing that the license expires on June 29, 2027).

<sup>69</sup> 47 CFR § 22.801.

<sup>70</sup> *Id.* § 1.949.

<sup>71</sup> *See* 47 U.S.C. § 309(j) (emphasis added).

Commission has applied different performance and construction requirements to different spectrum bands based on considerations relevant to those bands.<sup>72</sup> We continue to believe that performance requirements play a critical role in ensuring that licensed spectrum does not lie fallow and thus seek detailed comment on certain performance requirements for the 450 MHz Air-Ground Service. Given the unique attributes of this service, we propose a novel performance metric based on both high altitude and low altitude parameters. We propose to define high-altitude as 25,000 feet, where the incumbent in the band is currently providing service. Currently, our rules define Air-Ground Radiotelephone Service as a “radio service in which licensees are authorized to offer and provide radio telecommunications service for hire to subscribers *in aircraft*.”<sup>73</sup> We tentatively conclude that providing reliable signal coverage and offering service at 25,000 feet is a reasonable performance metric for such high altitude service. We propose to define low altitude service as providing reliable signal coverage and offering service at 400 feet. A low altitude metric of 400 feet is consistent with Federal Aviation Administration (FAA) regulations.<sup>74</sup> 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.<sup>75</sup> Additionally, 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 400 feet in controlled airspace around airports.<sup>76</sup> Our proposed performance requirement seeks to ensure there is robust use of the band, therefore, we tentatively conclude that we should use the altitude at which UAS operators are already flying under FAA regulations. We also tentatively conclude that our proposed 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. We seek comment on our tentative conclusions and on our proposed definitions. Would other definitions be more appropriate for defining performance for high and low altitude service in the 450 MHz band? What are the costs and benefits of such definitions?

33. Further, we propose to measure service on a REAG basis in order to ensure the licensee distributes low altitude coverage widely across the United States and its territories.<sup>77</sup> We tentatively conclude that it is in the public interest to have operations evenly deployed across all of the United States and its territories, including in rural areas, given the public safety applications of UAS CNPC service. We seek comment on our tentative conclusion. The Commission has previously used REAGs to achieve

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<sup>72</sup> See, e.g., *Service Rules for Advanced Wireless Services H Block—Implementing Section 6401 of the Middle Class Tax Relief and Job Creation Act of 2012 Related to the 1915-1920 MHz and 1995-2000 MHz Bands*, WT Docket No. 12-357, Report and Order, 28 FCC Rcd 9483, 9558-59, para. 195 (2013) (requiring 40% population coverage within four years of initial grant and 75% population coverage within 10 years of initial grant); see also *AWS-3 Report and Order*, 29 FCC Rcd at 4659-60, para. 135 (requiring 40% population coverage within six years of initial grant and 75% population coverage within 12 years of initial grant); *Expanding the Economic and Innovation Opportunities of Spectrum through Incentive Auctions*, GN Docket No. 12-268, Report and Order, 29 FCC Rcd 6567, 6877-78, para. 764 (2014) (*Incentive Auctions Report and Order*).

<sup>73</sup> 47 CFR § 22.99 (emphasis added).

<sup>74</sup> See FAA, *Small Unmanned Aircraft Systems (UA) Regulations (Part 107)*, (Oct. 6, 2022) <https://www.faa.gov/newsroom/small-unmanned-aircraft-systems-uas-regulations-part-107>; see also *UAS Data Exchange (LAANC)*, FAA, [https://www.faa.gov/uas/getting\\_started/laanc](https://www.faa.gov/uas/getting_started/laanc) (last visited Nov. 1, 2024).

<sup>75</sup> See FAA, *Small Unmanned Aircraft Systems (UA) Regulations (Part 107)*, (Oct. 6, 2022), <https://www.faa.gov/newsroom/small-unmanned-aircraft-systems-uas-regulations-part-107>.

<sup>76</sup> See FAA, *UAS Data Exchange (LAANC)*, [https://www.faa.gov/uas/getting\\_started/laanc](https://www.faa.gov/uas/getting_started/laanc) (last visited Nov. 1, 2024).

<sup>77</sup> See *supra* note 41 (defining REAGs).

the “expansion of service to as many people as practicable.”<sup>78</sup> We tentatively conclude that REAGs will promote nationwide coverage. We seek comment on our tentative conclusion and any alternatives. Are REAGs sufficient to ensure service is deployed in rural areas? How else can the Commission ensure that the licensee provides coverage in rural areas? Commenters should address the costs and benefits of their proposals.

34. We propose to allow the licensee to meet our performance requirements through one of two options, either through a combination of high altitude and low altitude service (Option 1) or significant coverage and service at low altitude (Option 2). These options are summarized in Figure 2, below.

**Figure 2**

	Interim Requirement at 4 Years	Final Requirement at 8 Years
Option 1	Service at 25,000 feet above CONUS, Alaska, and Hawaii <u>And</u> Service at 400 feet above 17.5% of each individual REAG	Service at 25,000 feet above CONUS, Alaska, and Hawaii <u>And</u> 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

35. We propose under either option to have an interim and final performance requirement. In our proposed Option 1, to meet the interim performance benchmark, the licensee must continue to provide service at 25,000 feet over CONUS, Alaska, and Hawaii and service at 400 feet covering 17.5 percent or more of each REAG geographic area. To meet the final performance requirement under proposed Option 1, the licensee must provide service in CONUS, Alaska, and Hawaii at 25,000 feet and service at 400 feet covering 35 percent or more of each individual license area REAG geographic area. Under our proposed Option 2, to meet the interim performance benchmark, the licensee must provide service at 400 feet covering 35 percent or more of each individual REAG geographic area. To meet the final performance requirement under this option, the licensee must provide service covering 70 percent or more of each individual license area REAG geographic area. We propose that the licensee may choose to fulfill its performance requirement either by a combination of high and low altitudes services under Option 1 or significant service at low altitude under Option 2. We tentatively conclude that creating an option to meet our performance requirements either through a combination of high altitude and low altitude service or significant low altitude service will give the licensee flexibility to meet market demands. We seek comment on our tentative conclusion. We propose to allow the licensee to make its election at the time it files its Notice of Construction. We seek comment on this proposal.

36. In an effort to provide the nationwide licensee with operational flexibility while ensuring robust service, we tentatively conclude that, if the licensee intends to decrease its high altitude service then it should provide low altitude service to a significant portion of the United States and its territories. Our new 450 MHz Air-Ground Service will allow for legacy air-ground radiotelephone operations<sup>79</sup> at high altitude and UAS CNPC at low altitude. As explained above, we propose that an entity is eligible for the voluntary transition to a geographic license with a nationwide footprint if it provides service at

<sup>78</sup> *Service Rules for 698-746, 747-762, and 777-792 MHz Bands et al.*, WT Docket No. 06-150 et al., Second Report and Order, 22 FCC Rcd 15289, 15351, para. 164 (2007) (*700 MHz Second Report and Order*).

<sup>79</sup> Currently our rules define Air-Ground Radiotelephone Service as “A radio service in which licensees are authorized to offer and provide radio telecommunications service for hire to subscribers *in aircraft*.” 47 CFR § 22.99 (emphasis added).

25,000 feet over CONUS, Alaska, and Hawaii using all available communication frequencies. Under the proposed voluntary transition, the licensee would receive additional rights, including the ability to operate UAS CNPC service at low altitude. By creating this voluntary transition process, we seek to increase the level and diversity of 450 MHz Air-Ground service available to the public, therefore, we propose either a combination of high altitude and low altitude service or a significant level of low altitude service. Under proposed Option 1, we seek to give the licensee increased operational flexibility while maintaining existing legacy service. If the licensee chooses to cease providing service at 25,000 feet over CONUS, Alaska, and Hawaii using all available communication frequencies, then we propose that it must provide significant coverage at low altitude because the proposed voluntary transition mechanism is premised on the incumbent's existing service coverage at altitude. Compared to the 70 percent low altitude coverage proposed if the licensee elects to provide low altitude service only, we tentatively conclude that half of that coverage, or 35 percent low altitude coverage, is reasonable if the licensee retains its high-altitude coverage. We seek comment on this tentative conclusion and on our proposal. Would other performance requirements better achieve the Commission's goal of nationwide coverage in the 450 MHz Air-Ground Service? Commenters should discuss the costs and benefits of their proposals.

37. In addition, we propose performance benchmarks of 4 years and 8 years for interim and final performance requirements, respectively. Benchmarks of 4 years and 8 years are consistent with performance benchmarks in other services with 15-year license terms.<sup>80</sup> The Commission has previously found that benchmarks of 4 years and 8 years are appropriate when technology for deployment is already available and in the marketplace.<sup>81</sup> We note that the Division granted AURA a waiver in 2021 to "authorize the provision of additional services, such as service to public safety, commercial, and large UAS for BVLOS and other expanded operations."<sup>82</sup> We tentatively conclude 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. We seek comment on this proposal. Are other benchmarks more appropriate for this band? Commenters should discuss the costs and benefits of their proposals.

38. *Failure to Meet Performance Requirements.* Along with performance benchmarks, we propose to adopt meaningful and enforceable penalties for failure to meet the benchmarks. We propose 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 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. We propose 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. We seek comment on this proposal and on which penalties and enforcement mechanisms will most effectively ensure timely buildout. We recognize that our proposal could result in a licensee losing the nationwide license due to failure to meet the performance requirement in one REAG. We seek comment on whether this result is appropriate, or whether there are other ways to structure performance incentives and penalties in order to ensure intensive use of this spectrum, nationwide, at a range of altitudes. Commenters should discuss the costs and benefits of the proposed approach and any alternatives.

39. *Compliance Procedures.* We propose a rule requiring licensees 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. Should we require a specific methodology for creating the coverage map? Should we require that the licensee submit its raw data?

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<sup>80</sup> *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, para. 122 (2021) (*3.45 GHz Band Second R&O*).

<sup>81</sup> *Id.* at 6031, para. 123.

<sup>82</sup> AURA Petition at 4.

We propose that the covered incumbent must notify the Commission by filing FCC Form 601 when it meets its construction obligations within the construction period. We propose that the notification must be filed within 15 days of the expiration of the applicable construction period. Our proposal is similar to our compliance rules in the Wireless Radio Service.<sup>83</sup> We seek comment on this proposal and any alternatives. We also seek comment on whether a covered incumbent has any special or unique issues such that they would require additional time to comply. What are the costs and benefits associated with this proposal and any alternatives?

40. *Partitioning and Disaggregation.* While we propose to license this spectrum on a nationwide basis, we recognize that it is possible that a licensee may opt to deploy in a service area smaller than a nationwide market. Further, we recognize that a licensee may find that it is unnecessary to utilize all of its licensed bandwidth in order to deploy a system, and may wish to disaggregate its excess capacity. Secondary markets are important to ensuring that spectrum is put to its highest use. Accordingly, we propose to permit partitioning and disaggregation by the nationwide licensee in the 450 MHz band. We note, however, that we do not propose to adopt detailed technical protections in the context of this proceeding, given that we propose to authorize a single nationwide licensee. Thus, if we ultimately allow partitioning or disaggregation in the 450 MHz Service, we propose to require that the nationwide licensee demonstrate how co-channel and adjacent channel licensees will be protected under any partition or disaggregation. We propose that any criteria in the licensee's demonstration filing would be binding on the parties to the transaction. We seek comment on this proposal and any alternatives, including the costs and benefits.

41. *Leasing.* We propose to allow spectrum leasing in the band pursuant to part 1 of the Commission's rules and we propose to add UAS CNPC as an included service in our spectrum leasing rules.<sup>84</sup> We seek comment on this proposal. We propose to require a nationwide licensee seeking to lease its spectrum to receive prior approval from the Commission. We seek comment on whether we should require the nationwide licensee seeking to lease its spectrum to lease the entirety of the nationwide license or allow it to lease a portion of it. In requesting approval to lease all or part of the nationwide license, we propose that the lessor must demonstrate how the parties will provide the interference protections along the lease boundary and to neighboring operations. We propose that the licensee can demonstrate interference protection through power flux density limits and strategic site placements. We seek comment on this proposal. What other factors should we consider in granting a lease application? We seek comment on the costs and benefits of our proposal and any alternatives.

42. *General Applicability of Other Part 22 and Part 1 Rules.* We propose 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<sup>85</sup> and permanent discontinuance of operations.<sup>86</sup> We also propose 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.<sup>87</sup> FAA rules presently regulate remote identification of UAS, so we propose not to adopt duplicative rules.<sup>88</sup> We ask 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. We seek comment on this proposal. Are there reasons that the nationwide licensee in this band should not be subject to these general part 22 and part 1 requirements? We ask proponents of the various

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<sup>83</sup> 47 CFR § 1.946.

<sup>84</sup> *Id.* § 1.9005.

<sup>85</sup> 47 U.S.C. § 310; 47 CFR § 22.5.

<sup>86</sup> 47 CFR § 1.953.

<sup>87</sup> *Id.* § 22.313(a); *see also* Appendix A.

<sup>88</sup> *See* 14 CFR §§ 89.105, 89.110, 89.115, 89.305, 89.315.

mechanisms described above whether there are issues specifically related to the application of these rules to operations in the 450 MHz band and their preferred approach. We also ask commenters that support modifying certain part 22 rules as applied to licensees in the 450 MHz band to articulate the reasons why different treatment here is justified.

## 5. Technical Rules

43. We propose to update the technical rules applicable to 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. We seek comment on our proposals and any alternatives.

44. *Power Levels.* We seek comment on the appropriate power levels in the 450 MHz band. 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.<sup>89</sup> In its Petition for Rulemaking, AURA states that the radiated power level requirements are “unnecessarily high and inconsistent with current technology.”<sup>90</sup> No commenters in the record oppose AURA’s statement. 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.<sup>91</sup> We seek comment on the appropriate power levels for the 450 MHz band under the nationwide licensing regime. Should we eliminate section 22.809 entirely?<sup>92</sup> If not, what are the appropriate power levels? Should there be a peak-to-average ratio (PAR)? If so, what should it be? Commenters in support of a PAR should explain why they support a particular PAR. Commenters should explain how their proposed power levels are consistent with the needs of modern technologies and sufficient to protect adjacent band licensees. Commenters should present quantitative and reproducible RF link budget calculations and interference risk calculations that demonstrate that the likelihood of real-world interference to neighboring radio services is sufficiently low from, (a) UAS CNPC fundamental power (causing blocking/selectivity impairment to incumbent receivers), and (b) UAS CNPC out-of-band-emissions (OOBE) (causing co-channel impairment to incumbent receivers). Commenters should discuss the costs and benefits of their proposed power levels.

45. *Channel Plan.* 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.<sup>93</sup> In its Petition for Rulemaking, AURA argues the prescribed channelization is “not necessary in this instance because Petitioners are the sole licensees and operators in the band and thus have the ability and incentive to manage the internal boundaries between these channels in AURA’s network to prevent interference.”<sup>94</sup> The record also supports removing internal guard bands because they are “not necessary to protect against intra-network interference when AURA will hold licenses for multiple contiguous channels and this would allow for more efficient use of scarce spectrum.”<sup>95</sup> We propose to eliminate the 20 kilohertz channel requirement in order to provide increased flexibility to the nationwide licensee. We do not propose to designate uplink and downlink frequencies in our rules to

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<sup>89</sup> 47 CFR § 22.809.

<sup>90</sup> AURA Petition at 11.

<sup>91</sup> 2021 Order, 36 FCC Rcd at 269, para. 17.

<sup>92</sup> Note that in Appendix A § 22.809 has been renumbered but otherwise not changed in the proposed rules. See Appendix A § 22.813.

<sup>93</sup> 47 CFR § 22.805.

<sup>94</sup> AURA Petition at 10.

<sup>95</sup> EEI Comments at 7. “The Commission should eliminate guard bands between channels which would allow AURA to operate at power levels consistent with the demand of its service.” *Id.*

further promote licensee flexibilities.<sup>96</sup> We seek comment on this approach and on the costs and benefits of our proposal.

46. *Out-of-Band Emissions.* Next, we seek comment on the appropriate OOB requirements that would protect services in adjacent bands while still allowing full commercial use in the 450 MHz band. Under part 22, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power by at least  $43 + 10 \log (P)$  dB.<sup>97</sup> Under the current rules, the band is made up of 13 channels.<sup>98</sup> The channels have a bandwidth of 20 kilohertz and are designated by their center frequencies in megahertz.<sup>99</sup> The authorized operating frequency range is measured from the last channel at either edge of the band.<sup>100</sup> Therefore, the existing band edges are 454.665 MHz and 454.985 MHz and 459.665 MHz and 459.985 MHz. For the purposes of this *NPRM*, we refer to the band edges as defined under our current rules as the “legacy band edges.” The existing OOB limit in our rules protects neighboring operations by applying  $43 + 10 \log (P)$  dB at the edge of last channel at the legacy band edges. We propose to continue to apply this OOB limit at the legacy band edges for the 450 MHz Air-Ground Service. Should we require a measurement bandwidth? We note that ITU-R Regulations for out-of-band measurements in the 30 MHz–1 GHz band require a 100 kilohertz measurement bandwidth.<sup>101</sup> Would 100 kilohertz be an appropriate measurement bandwidth for the 450 MHz band? We seek comment on this proposal and its costs and benefits. Is an emissions limit attenuated below the transmitting power by at least  $43 + 10 \log (P)$  dB the best option for protecting neighboring operations? In this *NPRM*, we propose to extend the band to the edge of the allocation 454.665 MHz and 454.985 MHz and 459.665 MHz and 459.985 MHz. Rather than continue to apply the OOB limit at the legacy band edge, should we instead apply it at the edge of the allocated band? We recognize that the 450 MHz band is situated in between neighboring operations.<sup>102</sup> NPSTC does not believe UAS CNPC operations will cause interference to nearby public safety operations.<sup>103</sup> Do commenters agree with NPSTC’s conclusion? We ask commenters that disagree with NPSTC’s conclusion to discuss what measures would protect public safety from interference, how public safety should complain about UAS interference, and what measures would lead to fast resolution of interference complaints. We tentatively conclude that our proposed technical rules are sufficient to protect neighboring operations. Commenters should discuss the costs and benefits of their proposals.

47. *Channel Siting.* We propose to eliminate the channel siting requirement in our rules. We believe that the channel siting criteria in our rules will no longer be necessary under a nationwide

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<sup>96</sup> We note, however, that the 450 MHz Air-Ground Service license 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).

<sup>97</sup> 47 CFR § 22.861.

<sup>98</sup> *Id.* § 22.805.

<sup>99</sup> *Id.*

<sup>100</sup> *Id.* §§ 22.99, 22.805.

<sup>101</sup> See ITU Radio Regulations No. 4.1.

<sup>102</sup> Under part 95 of the Commission’s rules, MedRadio transmitters operate in the 451–457 MHz band, so MedRadio is both adjacent and co-exists with the legacy AGRAS band. 47 CFR § 95.2563.

<sup>103</sup> “NPSTC also analyzed the 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.” NPSTC Comments at 2.

licensing framework because there will be no co-channel licensees that require harmful interference protection within the 450 MHz band. Section 22.813(a) prohibits the Commission from granting applications for proposed ground transmitter locations unless the ground transmitter location is “at least 800 kilometers (497 miles) from the antenna location of the nearest co-channel ground transmitter in the United States.”<sup>104</sup> Section 22.813(b) states that the Commission “may grant an application requesting assignment of a communication channel pair . . . if there are no more than five different communication channel pairs already assigned to ground transmitters . . . within a 320 kilometer (199 mile) radius of the proposed antenna location.”<sup>105</sup> The technical channel assignment criteria set forth in section 22.813 are intended to ensure “substantial service volumes over areas” with high demand, while also maintaining “continuous nationwide in-route coverage” to general aviation air-ground subscribers.<sup>106</sup> Section 22.817(f) of our rules limits six channel assignments per carrier in a given 350 kilometer area. Section 22.817’s additional channel policies are designed to foster competition among multiple carriers in the band.<sup>107</sup> We propose to remove our rules assigning channel pairs and seek comment on this proposal. We believe the underlying purpose of these rules is no longer served with a nationwide licensee. As EEI notes, “[t]here is no need to prohibit ground transmitters less than [800] kilometers from the antenna location of the nearest channel ground transmitter because there is no significant risk of harmful interference when AURA effectively occupies the entire 450 MHz AGRAS band.”<sup>108</sup> Given our proposal to eliminate the technical channel assignment criteria set forth in section 22.813, we also propose to eliminate section 1.929(e) of our rules which designates a request to relocate an existing ground station as major.<sup>109</sup> We seek comment on this proposal. We seek comment on the costs and benefits of our proposal.

48. *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.<sup>110</sup> We propose to retain the transmitter location rules for the 450 MHz Air-Ground Service. We tentatively conclude that retaining the transmitter location rules provides licensee flexibility. Further, we propose to apply this rule to licensees that acquire their licenses through partitioning or disaggregation (to the extent the service rules permit such aggregation). We seek comment on our proposals, including specific costs and benefits.

49. *General Part 22 Rules.* 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). We propose to apply these general part 22 rules to the 450 MHz Air-Ground Service. Further, we propose to apply these rules to licensees that acquire their licenses through partitioning or disaggregation (to the extent the service rules permit such licenses). We seek comment on our proposals, including specific costs and benefits.

50. *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

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<sup>104</sup> 47 CFR § 22.813(a).

<sup>105</sup> *Id.* § 22.813(b).

<sup>106</sup> *Id.* § 22.813.

<sup>107</sup> 2021 Order, 36 FCC Rcd at 270, para 20.

<sup>108</sup> EEI Comments at 8.

<sup>109</sup> 47 CFR § 1.929(e).

<sup>110</sup> *See id.* § 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”).

use.<sup>111</sup> Part 22 of our rules also contains an international coordination rule.<sup>112</sup> While our proposed rules are designed to provide operational flexibility, we recognize that the Sharing Zone exist from our Statement of Intent with Canada. Any rules adopted stemming from this *NPRM* would be subject to current and future international agreements. Nothing in this *NPRM* is meant to conflict with any international agreements in place. The nationwide licensee must continue to comply with the Sharing Zone and any other relevant international coordination agreements. We seek comment on how to ensure the nationwide licensee is in compliance with international agreements.

51. *RTCA Standards.* We note that the Radio Technical Commission for Aeronautics, now referred to simply as “RTCA,” is working to develop standards for UAS. RTCA is a standards development organization that works with the FAA to develop standards that can be used as means of compliance with FAA regulations.<sup>113</sup> In other proceedings, the Commission has adopted RTCA standards when they align with the goals of the proceeding and the service.<sup>114</sup> We note that the RTCA published DO-406 outlining minimum performance standards for UHF airborne radio systems supporting UAS C2 link systems.<sup>115</sup> We seek comment on incorporating RTCA standards in to our rules for the 450 MHz band. We seek comment on whether, in the event the standards are adopted, its requirements will be consistent with the AGRAS technical requirements as we propose to amend them, and if not, what revisions if any should the Commission adopt to accommodate the standard? For example, how might incorporation of the RTCA standard impact a licensee’s ability to engage in partitioning and disaggregation in the 450 MHz Service? In the event that accessing the standards is fee-based, should the Commission still incorporate the standards into its rules for the 450 MHz band? Are there any other relevant standards that the Commission should consider adopting for the 450 MHz Air-Ground Service? Commenters should consider the costs and benefits of their proposed standards.

## 6. Alternative Proposals

52. As discussed above, we propose to use a nationwide licensing scheme for the 450 MHz spectrum band, but we seek comment on alternative methods that would permit the filing of mutually

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<sup>111</sup> 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 n.8.

<sup>112</sup> Operation of systems and channel assignments under this part are subject to the applicable provisions and requirements of treaties and other international agreements between the United States government and the governments of Canada and Mexico. 47 CFR § 22.169.

<sup>113</sup> See RTCA, *About Us*, <https://www.rtca.org/about/> (last visited Nov. 1, 2024). RTCA Special Committees (SCs) develop Minimum Operational Performance Standards (MOPS) among other standards documents related to aviation. See RTCA, *Standards & Guidance Materials Descriptions*, <https://www.rtca.org/standards/standards-guidance-materials/> (last visited Nov. 1, 2024). According to RTCA’s website, “MOPS provide standards for specific equipment(s) useful to designers, manufacturers, installers and users of the equipment. . . . MOPS provide the information needed to understand the rationale for equipment characteristics and requirements stated, describe typical equipment applications and operational goals, and establish the basis for required performance under the standard. Definitions and assumptions essential to proper understanding are provided as well as installed equipment tests and operational performance characteristics for equipment installations.” *Id.* RTCA MOPS are often referenced as a basis for equipment certification in FAA technical standard orders. See *id.* Technical standard orders establish minimum performance standards for specified materials, parts, and appliances used on civil aircraft. See FAA, *Technical Standard Orders (TSO)*, [https://www.faa.gov/aircraft/air\\_cert/design\\_approvals/tso/](https://www.faa.gov/aircraft/air_cert/design_approvals/tso/) (last visited Nov. 1, 2024).

<sup>114</sup> See, e.g., *UAS Report and Order*, 2024 WL at \*20, para. 54 (incorporating by reference RTCA DO-362A standards).

<sup>115</sup> See SC-228, Minimum Operational Performance Standards for Ultra High Frequency Airborne Radio Systems Supporting UAS C2 Link Systems, <https://products.rtca.org/2332jum/> (last visited Nov. 1, 2024).

exclusive applications. On March 9, 2023, the Commission's authority to issue licenses through systems of competitive bidding (i.e., auction authority) expired.<sup>116</sup> Accordingly, in the event we determine to adopt an alternative mutually exclusive application approach, we seek comment on how the Commission should resolve mutually exclusive applications for new initial licenses in the 450 MHz band in light of the lapse in our authority to use competitive bidding. In the event that the Commission's statutory authority with respect to auctions is restored, we delegate authority to the Bureau and the Office of Economics and Analytics to seek comment on appropriate competitive bidding rules and procedures, consistent with prior Commission guidance to inform the Commission's decision on issues discussed in this *NPRM*.

### III. UAS DETECTION IN THE 24.45–24.65 GHz BAND

53. We seek comment on proposed changes to our rules to expand use of the 24.45–24.65 GHz band to include federal and non-federal radiolocation operations that would better facilitate the detection of UAS, including AAM operations. We seek comment on proposed changes to our rules to expand use of the 24.45–24.65 GHz band to include radiolocation operations that would facilitate counter UAS detection systems in this band. These operations would be secondary in the band to the existing primary aeronautical radionavigation systems used for detect and avoid (DAA) systems onboard aircraft or on the ground. We seek comment on how best to carry out this expansion, how to do so without causing harmful interference to co-channel and adjacent-channel operations, and whether the changes that we propose will achieve these objectives, or if we should consider alternative approaches. We view these updates to our rules as an important step to ensure that, as UAS operations continue to expand, they do so safely.

#### A. Background

54. *Allocation.* The U.S. Table assigns the 200 megahertz of spectrum in the 24.45–24.65 GHz band to radionavigation and inter-satellite services on a primary basis for federal and non-federal use; there is no allocation for secondary services, and the band is not divided into channels.<sup>117</sup> Radionavigation is radiodetermination<sup>118</sup> for the purposes of navigation, including obstruction warning.<sup>119</sup> The Commission's rules authorize airborne use of the 24.45–24.65 GHz band for aeronautical radionavigation, including obstruction warning, as well as ground-based radionavigation in limited circumstances.<sup>120</sup> Radiolocation, which is radiodetermination for purposes other than radionavigation, is not presently permitted in the band.<sup>121</sup>

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<sup>116</sup> 47 U.S.C. § 309(j)(11) (“The authority of the Commission to grant a license or permit under this subsection shall expire March 9, 2023, except that, with respect to the electromagnetic spectrum identified under section 1004(a) of the Spectrum Pipeline Act of 2015, such authority shall expire on September 30, 2025, and with respect to the electromagnetic spectrum identified under section 90008(b)(2)(A)(ii) of the Infrastructure Investment and Jobs Act, such authority shall expire on the date that is 7 years after November 15, 2021.”). Congress has not otherwise changed the Commission's auction authority since it lapsed.

<sup>117</sup> See 47 CFR § 2.106.

<sup>118</sup> Radiodetermination is “[t]he 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.” *Id.* § 2.1; see also *id.* § 90.7.

<sup>119</sup> See 47 CFR §§ 2.1, 90.7.

<sup>120</sup> See *id.* § 87.173(b); *id.* § 87.187(x) (“The frequency bands [24.45–24.65 GHz] and 32300–33400 MHz are available for airborne radionavigation devices.”); *id.* § 87.471(a) (“Transmission by radionavigation land stations must be limited to aeronautical navigation, including obstruction warning.”); *id.* § 87.475(b)(14) (“In the [ ] [24.45–24.65 GHz] band [ ], land-based radionavigation aids are permitted where they operate with airborne radionavigation devices.”).

<sup>121</sup> See 47 CFR §§ 2.1, 90.7.

55. The 24.45–24.65 GHz band is bordered by the 24.25–24.45 GHz and 24.65–24.75 GHz bands. The 24.25–24.45 GHz band is allocated for non-federal fixed and mobile services on a co-primary basis.<sup>122</sup> The 24.25–24.45 GHz band is divided into two 100-MHz channels, and it 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).<sup>123</sup> The 24.65–24.75 GHz band is allocated to co-primary, federal and non-federal, inter-satellite and radiolocation-satellite (Earth-to-space) services; there is no secondary allocation.<sup>124</sup> As of December 2, 2024, there are no active non-federal licensees in the 24.65–24.75 GHz band.

56. *Echodyne Petition for Rulemaking.* On October 24, 2018, Echodyne Corporation (Echodyne) filed a petition for rulemaking to allow permanent radiolocation operations in the 24.45–24.65 GHz band on a secondary basis.<sup>125</sup> Echodyne explained that it had developed a radar designed for airborne DAA operations in the 24.45–24.65 GHz band, and that such operations fall under the radionavigation service.<sup>126</sup> Echodyne stated that it developed a ground-based version of the radar after federal and non-federal customers expressed interest in it.<sup>127</sup> But although that radar could permissibly perform ground-based DAA functions in the band, a similar device could not, under our rules, be deployed as a ground-based radiolocation operation, such as counter-UAS surveillance.<sup>128</sup>

57. Echodyne contended that “whether used for radionavigation or radiolocation, the radar itself is performing the exact same radiodetermination function from an RF perspective,” and that SSRs performing radiolocation operations offer various public interest benefits.<sup>129</sup> Specifically, Echodyne argued that 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.<sup>130</sup> To allay potential interference concerns, Echodyne explained that its radars avoid interference among themselves in a variety of ways, and that the Commission could ensure that all transmitters can coexist with one another before authorizing them.<sup>131</sup> Further, Echodyne noted the relative absence of primary users operating in the band.<sup>132</sup> As for adjacent band users, Echodyne explained that its airborne DAA radar had received an equipment authorization from the Commission, that its ground-based radar demonstrated similar emissions characteristics to the airborne device, and that its application for an authorization for the ground-based radar was pending.<sup>133</sup>

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<sup>122</sup> *Id.* § 2.106.

<sup>123</sup> 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 (2019) (*Auction 102 Closing Public Notice*).

<sup>124</sup> 47 CFR § 2.106.

<sup>125</sup> Petition of Echodyne Corp. for Rulemaking, CG RM-11819 (filed Oct. 24, 2018), available at <https://www.fcc.gov/ecfs/document/102459526386/1> (Echodyne Petition).

<sup>126</sup> *Id.* at 1-2.

<sup>127</sup> *Id.* at 2.

<sup>128</sup> *Id.*

<sup>129</sup> *Id.* at 3-4.

<sup>130</sup> *Id.* at 4.

<sup>131</sup> *Id.* at 5.

<sup>132</sup> *Id.* at 4-5.

<sup>133</sup> That authorization was granted on July 30, 2019, under FCC ID 2ANLB-MESASSR00053.

58. 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.<sup>134</sup> The Commission sought comment on the Petition on October 30, 2018.<sup>135</sup> Black Sage Technologies supported Echodyne’s petition because it deemed the technology promising in a “significant market segment where there are few competitive solutions.”<sup>136</sup> In-Q-Tel also offered its support, emphasizing the radiolocation radar’s potential efficiency and cost effectiveness.<sup>137</sup> There were no other comments.

59. *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, as Aviation Radionavigation Land stations (service code AR, station class code RNV).<sup>138</sup> These grants provide for a five-year term with the possibility of extension, and they are subject to several conditions.<sup>139</sup>

## B. Discussion

60. Radiolocation operations in the 24.45–24.65 GHz band have the potential to augment the safe and secure operation of certain sites, including those that host large public gatherings or are by their nature targets for illicit surveillance or contraband delivery. To date, aside from some theoretical co-existence concerns, we have received no indication that radiolocation operations in this band would pose a threat to existing operations. Although we recognize that the public comment record in response to Echodyne’s petition was somewhat limited, that record was entirely supportive. Further, with minor exceptions that are described in more detail below, the same is essentially true of Echodyne’s and MatrixSpace’s waiver requests.<sup>140</sup> Accordingly, we propose to amend the U.S. Table and our rules to provide adequate mechanisms to monitor increased UAS deployment in sensitive areas while promoting public safety and the avoidance of harmful interference. Such upgraded opportunities to enforce safe and lawful UAS deployment will help promote community acceptance of advanced aviation.

<sup>134</sup> See Echodyne Petition at 6-10.

<sup>135</sup> *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).

<sup>136</sup> Black Sage Technologies Comments at 1-2.

<sup>137</sup> In-Q-Tel Comments.

<sup>138</sup> 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 (WTB-MD June 12, 2019) (*Initial 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, DA 24-523 (WTB-MD June 4, 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, DA 24-522 (WTB-MD June 4, 2024) (*MatrixSpace Waiver Order*).

<sup>139</sup> 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., that the transmitters would be licensed for specific, fixed locations); (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 are capped at 15,000 units for the waiver period. See *Initial Echodyne Waiver Order*, 34 FCC Rcd at 4832-33, para. 8; see also *MatrixSpace Waiver Order* at 4, para. 10. Echodyne’s radar was authorized in 2019, so condition (3) was removed from the order granting its five-year extension. *Echodyne Extension Order* at 3-4, para. 8.

<sup>140</sup> See, e.g., U.S. Border Patrol Comments, In-Q-Tel Comments, AT&T Reply Comments.

61. Allowing radiolocation operations in the 24.45–24.65 GHz band would put this sparsely used spectrum to expanded use that will facilitate UAS/AAM surveillance and counter UAS. With this proceeding, we aim to ensure co-existence between future secondary radiolocation operations in the band and those of existing primary users, including co-channel licensees and adjacent-channel operations. We seek comment on these proposed amendments to the U.S. Table and to our service rules; and on whether there are any additional issues or proposals that we should consider in this undertaking.

### 1. Radiolocation Allocation

62. We propose to add to the U.S. Table federal and non-federal secondary allocations for radiolocation operations in the 24.45–24.65 GHz band, which is currently allocated only to radionavigation and inter-satellite services. Those allocations are co-primary, federal and non-federal, and there is no secondary allocation.<sup>141</sup> Although there are relatively few current primary licensees in the band, we propose to add a secondary allocation in order to best ensure the protection of existing licensees. We seek comment on our proposal.

63. The National Telecommunications and Information Administration (NTIA) supports adding a federal as well as non-federal secondary allocation for radiolocation in this band.<sup>142</sup> NTIA notes that the Department of Homeland Security (DHS) maintains 185 assignments for radar systems throughout the United States and its possessions on a secondary non-interference basis in this band.<sup>143</sup> DHS advises that these have proven invaluable in the detection and identification of small UAS used by cartels and other nefarious actors intending to cause harm to United States infrastructure.<sup>144</sup> These critical radar systems have been operating for over five years.<sup>145</sup> There are no reported cases of harmful interference to incumbent services in the band.<sup>146</sup> We tentatively conclude that federal and non-federal radiolocation operations can coexist on a secondary basis in this band. We therefore seek comment on adopting federal and non-federal secondary allocations for radiolocation operations in the band, including how to best promote coexistence between federal and non-federal users. What coexistence measures should we adopt if we add both a federal and non-federal secondary allocation for radiolocation

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<sup>141</sup> The band is also subject to this footnote: “[t]he inter-satellite service shall not claim protection from harmful interference from airport surface detection equipment stations of the radionavigation service.” 47 CFR § 2.106 n.5.533.

<sup>142</sup> NTIA is the Executive Branch agency principally responsible for the development of communications policies pertaining to the Nation’s economic and technological advancement and to the regulation of the communications industry, for the coordination of the communications activities of the Executive Branch, and for the effective presentation of the views of the Executive Branch to the Commission. See 47 U.S.C. § 902(b)(2).

<sup>143</sup> Letter from Sean Conway, Deputy Chief Counsel, NTIA to Marlene H, Dortch, Secretary, FCC, RM-11819, at 1 (filed Nov. 7, 2024) (NTIA *Ex Parte* Nov. 7, 2024).

<sup>144</sup> See Office of Intelligence and Analysis, DHS, *Homeland Threat Assessment 2024*, at 14 (Sept. 14, 2023), [https://www.dhs.gov/sites/default/files/2023-09/23\\_0913\\_ia\\_23-333-ia\\_u\\_homeland-threat-assessment-2024\\_508C\\_V6\\_13Sep23.pdf](https://www.dhs.gov/sites/default/files/2023-09/23_0913_ia_23-333-ia_u_homeland-threat-assessment-2024_508C_V6_13Sep23.pdf) (mentioning use of UAS for drug trafficking); DHS, *Privacy Impact Assessment for the Border Surveillance Systems*, at 2-3, 7 (Aug. 29, 2014), [https://www.dhs.gov/sites/default/files/publications/privacy\\_pia\\_CBP\\_BSS\\_August2014.pdf](https://www.dhs.gov/sites/default/files/publications/privacy_pia_CBP_BSS_August2014.pdf) (describing specific radar systems used to monitor activity at U.S. borders); see also DHS, *Privacy Impact Assessment Update for the Border Surveillance Systems*, at 2-4, 7, 8 (Aug. 21, 2018), <https://www.dhs.gov/sites/default/files/publications/privacy-pia-cbp022-bss-september2018.pdf> (providing an update on the radar systems used to monitor activity at U.S. borders).

<sup>145</sup> See, e.g., Echodyne, *Echodyne Awarded \$20M IDIQ Contract from the U.S. Department of Homeland Security (DHS) Customs and Border Protection (CBP) Agency’s Innovation Team*, (Nov. 2, 2021), <https://www.echodyne.com/resources/news-events/20m-idiq-contract-us-department-of-homeland-security-dhs-customs-and-border-protection-cbp-agency-s-innovation-team/> (announcing a five-year agreement for DHS’s Customs and Border Protection Agency to expand deployments of Echodyne’s radar systems).

<sup>146</sup> See NTIA *Ex Parte* Nov. 7, 2024 at 2.

operations in the 24.45–24.65 GHz band? Are there additional considerations for a federal allocation in addition to the non-federal allocation? Commenters should discuss the costs and benefits of this approach. In order to promote sound, data-driven Commission decision-making, we encourage parties in favor of adding a radiolocation allocation in the band to submit data, analyses, studies, test results, or other relevant information supporting their positions, including the effect on cross-border operations.

64. We also observe that commenters in the Echodyne and MatrixSpace waiver proceedings raised potential concerns regarding interference between radiolocation operations in the 24.45–24.65 GHz band and UMFUS operations in the 24.25–24.45 GHz band. In 2018, when the auction of UMFUS licenses had been announced but not yet conducted,<sup>147</sup> AT&T raised potential long-term coexistence issues in response to Echodyne’s initial waiver request.<sup>148</sup> In 2023, T-Mobile—which won many UMFUS licenses in Auction 102—mentioned similar concerns in response to MatrixSpace’s waiver request.<sup>149</sup> However, neither AT&T nor T-Mobile ultimately opposed the requests to which they responded because they deemed any coexistence concerns to be manageable in light of Echodyne’s and MatrixSpace’s technical submissions.<sup>150</sup>

65. Urban Air Mobility and AAM have the potential to significantly increase the use of aeronautical radionavigation systems used for DAA. We seek comment on the potential for harmful interference that could result from radiolocation operations in the 24.45–24.65 GHz band. To the extent possible, commenting parties should support with data any concerns—or the absence of concern—related to harmful interference. Where they exist, do interference concerns relate primarily to co-channel operations, adjacent-channel operations, or both? How should such concerns be accounted for in our technical rules? What mechanisms should the Commission employ to address any interference concerns, e.g., a density limitation, power control, licensee coordination, others? For example, should the Commission adopt a density limitation restricting the number of radiolocation devices in a specified geographic area as a means to protect primary radionavigation operations from secondary radiolocation operations?<sup>151</sup> If so, what is an appropriate density limitation?<sup>152</sup> Commenters should discuss the costs and benefits of their proposed approaches. Does interference need to be addressed in a different manner than is described in the proposed technical rules, discussed below? We also seek comment on the costs and benefits that might result from this proposal. Finally, are there potential issues not raised in this *NPRM* that might arise if we adopt the proposal?

## 2. Licensing and Operating Rules

66. *Frequencies.* We propose to add the 24.45–24.65 GHz band to the list of frequencies that are available to the Radiolocation Service in part 90 of our rules, and in accord with our proposed addition to the U.S. Table, we propose to establish that such radiolocation operations will be on a secondary basis.<sup>153</sup> We seek comment on these proposals—which would align only in part with Echodyne’s Petition—and their implications.<sup>154</sup> To that end, we note that Echodyne asks in its Petition

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<sup>147</sup> Bidding in Auction 102 concluded on May 28, 2019. *Auction 102 Closing Public Notice*, 34 FCC Rcd at 4294, para. 1.

<sup>148</sup> AT&T Reply Comments at 1-2.

<sup>149</sup> *See generally* T-Mobile Petition to Deny. T-Mobile later withdrew that petition.

<sup>150</sup> *See, e.g.*, AT&T Reply Comments at 1-2, T-Mobile Motion for Approval to Withdraw Petition to Deny at 3-4.

<sup>151</sup> *See* NTIA *Ex Parte* Nov. 7, 2024 at 2 (noting that federal radiolocation operations in the band are subject to a density limitation and recommending that future federal and non-federal radiolocation operations be subject to a similar limitation).

<sup>152</sup> *See id.*

<sup>153</sup> We propose to add the 24.45–24.65 GHz band to the table of frequencies available in section 90.103, along with a limitation noting that it will be on a secondary basis. *See* Appendix A.

<sup>154</sup> *See* Echodyne Petition at 8-10.

for amendment of certain provisions of part 87 of our rules as well.<sup>155</sup> At this time, we believe that such amendments are not necessary to enable radiolocation operations in the band, and that they would instead create redundancies and potential confusion for prospective licensees. We seek comment on our proposal to amend part 90 but not part 87. Should we, as Echodyne suggests, add to certain part 87 provisions language that would permit airborne radiolocation devices? What are the potential benefits or drawbacks to such an approach? What would distinguish a request to conduct radiolocation operations under part 87 from a request to do so under part 90?

67. *License Term, Performance Requirements, Renewal.* In order to streamline the application and authorization process for prospective licensees, we propose to make use of our existing licensing rules to enable secondary radiolocation operations in the 24.45–24.65 GHz band. These rules include, for example, that license applications must comply with our part 1 rules, and that licenses will be granted for a term of ten years upon initial grant or renewal.<sup>156</sup> Given the purely operational nature of this proposed expansion to the band, we believe that deployment of the familiar application and authorization process and terms will lend efficiency to the licensing of prospective new radiolocation operations in the band. We seek comment on this proposal. Is there any reason to depart from the Commission’s established licensing framework for secondary radiolocation operations in the 24.45–24.65 GHz band?

68. *Applicability of Related Part 90 Rules.* We further propose to apply to nascent radiolocation operations in the 24.45–24.65 GHz band the additional licensing and operating rules that apply generally to part 90 services. These are the rules that govern, for example, foreign ownership, construction requirements, and applications for temporary permits.<sup>157</sup> We seek comment on our proposal to apply these general part 90 rules to radiolocation operations in the 24.45–24.65 GHz band. We note that Echodyne petitions for an addition to section 90.103 that would permit licensees to deploy multiple fixed stations over a given geographic area without precise fixed locations.<sup>158</sup> We nevertheless propose not to depart from our existing part 90 site-based licensing regime for radiolocation operations in the 24.45–24.65 GHz band. The geographic approach that Echodyne proposes is akin to how we have handled part 90 operations at temporary locations.<sup>159</sup> We believe that a traditional site-based approach is better suited to the long-term radiolocation operations that we propose to license after this proceeding. We seek comment on this proposal, and whether a more flexible geographic approach might offer benefits or drawbacks to these new operations. As noted above, we also seek comment on the relevance and applicability of part 87 to our proposal, including its general licensing and operating rules.

### 3. Technical Rules

69. We further propose to preserve and apply, with minimal amendment, provisions of the Commission’s technical rules to enable more effective UAS detection in the 24.45–24.65 GHz band while avoiding harmful interference.<sup>160</sup> We endeavor to tailor these changes as narrowly as necessary to deploy secondary radiolocation operations in the band. We seek comment on the proposed technical rules, and we ask commenters to address whether additional provisions should be amended in order to effectively implement the expansion of the band’s usage. Conversely, we seek comment on whether any of the proposed changes might be unnecessary or present technical challenges. We encourage commenters to

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<sup>155</sup> See *id.* at 9-10 (seeking amendments to 47 CFR §§ 87.187, 87.471, and 87.475).

<sup>156</sup> 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).

<sup>157</sup> 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).

<sup>158</sup> See Echodyne Petition at 8-9.

<sup>159</sup> See 47 CFR § 90.137.

<sup>160</sup> See Appendix A.

offer alternative proposals, and to be specific about the provisions and changes that they recommend, including the rationale for such proposals and their costs and benefits.

70. *Power Levels and Emissions.* For radiolocation operations in the 24.45–24.65 GHz band, we propose to consider and authorize requested transmitter power on a case-by-case basis, consistent with other part 90 licenses.<sup>161</sup> We further propose to retain the emission type limitations that govern radiolocation operations; essentially, such limitations would be determined on a case-by-case basis and established upon a satisfactory showing of need.<sup>162</sup> In its Petition, Echodyne requested retention of these flexible, case-by-case standards,<sup>163</sup> submitting that they can “accommodate use of this band” for radiolocation, and we seek comment on the appropriateness of extending them to potential new radiolocation operations.

71. *Out-of-Band Emissions.* We propose to apply the existing out-of-band emissions limit in section 90.210(b) of our rules (Emission Mask B) to radiolocation operations in the 24.45–24.65 GHz band.<sup>164</sup> We seek comment on this proposal, which Echodyne argued would be sufficient to protect neighboring licensees from interference resulting from secondary radiolocation operations.<sup>165</sup> Are there any technical considerations distinct to radiolocation versus radionavigation operations that merit a different out-of-band emissions limit? Commenters should specifically address, as appropriate, the potential impacts on existing primary operations in the 24.45–24.65 GHz band, as well as those of UMFUS licensees operating in the neighboring 24.25–24.45 GHz band, and any other potentially affected operations. As noted above, we seek comment on the implications of preserving this out-of-band-emissions limit, whether it is sufficient, or if a more stringent requirement might be necessary to avoid harmful interference that might result from new radiolocation operations. We also seek comment on the costs and benefits attendant to this proposal.

72. *Other Technical Rules.* Finally, we propose to apply the general part 90 technical rules, with certain amendments, to radiolocation operations in the 24.45–24.65 GHz band. These rules govern authorization of equipment, bandwidth limitations, and frequency stability. We propose to leave unchanged the rules requiring equipment authorization.<sup>166</sup> In its Petition, Echodyne seeks an addition to section 90.103 to note that transmitters that have received part 87 authorization need not receive separate part 90 authorization.<sup>167</sup> We propose not to adopt this change, and instead to require that devices intended for radiolocation operations in the 24.45–24.65 GHz band be re-authorized under part 90, consistent with other part 90 licensees. We believe that this proposal 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 our Equipment Authorization System of devices capable of such operations will facilitate tracking and accountability to that end. We seek comment on this proposal and any alternatives. What, if any, amendments to our part 90 rules might be necessary to effect this proposal? What costs and benefits will result from our re-authorization proposal? Further, we presently review and authorize, on a case-by-case basis, bandwidth limits for stations that operate in all frequency bands above 2500 MHz, and we propose to leave that provision unchanged.<sup>168</sup> We propose to add radiolocation

<sup>161</sup> See 47 CFR § 90.205(r) (“Requested transmitter power will be considered and authorized on a case by case basis.”).

<sup>162</sup> See *id.* § 90.207(k); see also Appendix A.

<sup>163</sup> See Echodyne Petition at 7-8.

<sup>164</sup> See 47 CFR § 90.210(b).

<sup>165</sup> See Echodyne Petition at 7.

<sup>166</sup> See 47 CFR §§ 90.5(c), 90.203.

<sup>167</sup> See Echodyne Petition at 8.

<sup>168</sup> 47 CFR § 90.209(b)(5) n.2 (“Bandwidths for . . . stations operating in bands subject to this footnote will be reviewed and authorized on a case-by-case basis.”).

operations in the 24.45–24.65 GHz band to the table in section 90.213 of our rules to establish the frequency stability standard that will govern such operations.<sup>169</sup> We note that the part 90 frequency stability table does not currently impose a particular frequency stability standard for operations above 2.45 GHz; we seek comment on whether the status quo should be altered, as we propose, for the 24.45–24.65 GHz band only.<sup>170</sup>

73. We seek comment on all of these proposed changes to, and applications of, our existing service rules. Are these proposals sufficient to enable radiolocation operations in the 24.45–24.65 GHz band? Should we consider modification of additional rule provisions? Are any of the proposed changes unnecessary, or do they present potential technical, operational, cost-intensive, or regulatory issues? Commenters who suggest that we amend part 87 as well as part 90 should also address whether and to what extent part 87's technical rules should be amended in order to enable radiolocation in the band.

#### IV. COMMERCIAL AVIATION AIR-GROUND SYSTEMS

74. Finally, we seek to facilitate the provision of broadband service on commercial aircraft by modernizing legacy power rules for Commercial Aviation Air-Ground Systems. AAM is anticipated to strengthen regional air travel, and Commercial Aviation Air-Ground Systems could be beneficial for passengers taking AAM flights.<sup>171</sup> For example, connectivity on these flights would allow passengers to check the status of a connecting flight, coordinate transportation for after the flight, and maintain communication with others.<sup>172</sup> We propose and seek comment on regulating power via average rather than peak values, which would permit the use of wideband technologies while maintaining extensive system coverage. We also propose and seek comment on adopting a peak-to-average ratio (PAR) as well as implementing a power spectral density (PSD) model.

##### A. Background

75. Commercial Aviation Air-Ground Systems operate in the 849–851 MHz and 894–896 MHz band and are governed by part 22 of the Commission's rules.<sup>173</sup> In 2005, the Commission adopted a revised regime for air-ground operations, determining that nationwide licenses would be assigned to the entities and their respective band plans receiving the highest gross aggregate bid at auction.<sup>174</sup> In adopting these rules, the Commission sought to “promote key spectrum policy objectives that would lead to greater technical, economic, and marketplace efficiency” while responding to evolving market demands.<sup>175</sup>

76. In 2006, the Commission auctioned nationwide licenses for this band; Gogo Business Aviation LLC (Gogo) won a license for three megahertz and LiveTV, LLC won a license for one megahertz.<sup>176</sup> In 2013, Gogo acquired LiveTV, LLC, and became the sole nationwide licensee in this

<sup>169</sup> See *id.* § 90.213(a); see also Appendix A.

<sup>170</sup> See 47 CFR § 90.213(a) n.10.

<sup>171</sup> See Ramya Mahalingam, Adam Mitchell, Robin Riedel, *How Customer Experience Will Make or Break Advanced Air Mobility*, (Mar. 7, 2023), <https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/future-air-mobility-blog/how-customer-experience-will-make-or-break-advanced-air-mobility>.

<sup>172</sup> See *id.*

<sup>173</sup> 47 CFR §§ 2.106(b)(318), 22.853-22.882.

<sup>174</sup> *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 et al., Report and Order and Notice of Proposed Rulemaking, 20 FCC Rcd 4403, 4405, 4418-22, paras. 1, 24-32 (2005) (*2005 Air-Ground Order*).

<sup>175</sup> *Id.* at 4407, para. 3.

<sup>176</sup> *Auction of 800 MHz Air-Ground Radiotelephone Service Licenses Closes, Winning Bidder Announced for Auction No. 65*, DA 06-1197, Public Notice, 21 FCC Rcd 6304, Attach. A (2006). Note that the bidding entity in this auction was AC BidCo, LLC, a wholly-owned subsidiary of Gogo. *Application of AC BidCo, LLC, Gogo, Inc.*, (continued....)

band.<sup>177</sup> Through use of the Commercial Aviation Air-Ground Systems band, Gogo provides a variety of in-flight airborne services, such as broadband Internet, Wi-Fi-based entertainment services, interconnected and non-interconnected Voice over Internet Protocol (VoIP), inflight portals for e-commerce applications, and flight operations communications services.<sup>178</sup> When operating, commercial aircraft connect to ground station transmitters, which then power Gogo's commercial services.<sup>179</sup> For this band, effective radiated power (ERP) is measured by peak power.<sup>180</sup>

### 1. Procedural History

77. *Gogo's Waiver Request.* On May 26, 2021, Gogo sought a waiver of section 22.867 of the Commission's rules, which regulates how ERP is measured for Commercial Aviation Air-Ground Systems.<sup>181</sup> In its waiver request, Gogo sought to measure ERP by average power rather than by peak power, as specified by the Commission's rules.<sup>182</sup> Gogo argued that this waiver would be necessary for it to transition from its then-current system, which operated using Code Division Multiple Access (CDMA) Evolution-Data Optimized technology, to its next generation system which uses Orthogonal Frequency Division Multiplex technology (OFDM), to enhance throughput, coverage, and reliability for inflight connectivity.<sup>183</sup> Further, Gogo explained that a waiver was crucial because it would allow Gogo to maximize the utility of its OFDM technology so that it could continue to meet users' increasing demand for its in-flight commercial airborne services.<sup>184</sup> Finally, Gogo highlighted that OFDM-based waveforms have a higher PAR than other common waveforms.<sup>185</sup> Thus, Gogo argued that without the waiver and with the prescribed peak power measurement technique, the average operational power of Gogo's OFDM technology would be unduly constrained, and the overall utility of the band would be unnecessarily hindered.<sup>186</sup>

78. On July 7, 2021, the Bureau sought comment on Gogo's waiver request.<sup>187</sup> Following discussions with stakeholders, on June 21, 2022, the Division granted Gogo's waiver request.<sup>188</sup> The Division found that for non-constant envelope technologies like OFDM, applying the peak power

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*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) (*2013 Gogo Waiver Order*).

<sup>177</sup> *2013 Gogo Waiver Order*, 28 FCC Rcd at 3368, para. 16 n.61.

<sup>178</sup> *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*).

<sup>179</sup> See *Gogo Business Aviation LLC Petition for Rulemaking*, WT Docket No. 21-282, at 2 (filed July 21, 2022), <https://www.fcc.gov/ecfs/document/10722724123897/1> (Gogo Petition for Rulemaking).

<sup>180</sup> See 47 CFR § 22.867.

<sup>181</sup> *Gogo Business Aviation LLC Request for Waiver of Section 22.867*, 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.

<sup>182</sup> *Gogo Waiver Request* at 1.

<sup>183</sup> *Id.*

<sup>184</sup> *Id.* at 1, 2.

<sup>185</sup> *Id.* at 5.

<sup>186</sup> *Id.*

<sup>187</sup> *Wireless Telecommunications Bureau Seeks Comment on Request by Gogo Business Aviation LLC for Waiver of 800 MHz Air-Ground Service Power Measurement Rule*, WT Docket No. 21-282, Public Notice, 36 FCC Rcd 10395 (WTB 2021).

<sup>188</sup> *Gogo Waiver Order*, 37 FCC Rcd at 7444, para. 15.

measurement technique in section 22.867 would force Gogo's average operating power to be lower due to the occurrence of very short duration spikes in signal strength that do not represent a significant interference threat, but rather are characteristic of spectrally efficient higher order modulation techniques.<sup>189</sup> Measuring such modulation techniques by average operational power with a limit on the PAR of the modulation used would allow Gogo to maintain sufficient capacity to meet the expected and re-emerging growth in the competitive general aviation market and regional commercial airline market.<sup>190</sup> Presently, Gogo is able to regulate by average power with an appropriate PAR limit pursuant to this waiver grant.<sup>191</sup>

79. *Gogo's Petition for Rulemaking.* As a condition of the grant, on July 21, 2022, Gogo filed a petition asking the Commission to initiate a rulemaking to modernize the legacy power rules for the 849–851 MHz and 894–896 MHz band.<sup>192</sup> More specifically, Gogo proposes amending the rule measuring ERP by peak power to instead measure by average power with an appropriate PAR limit and requests power regulation relief similar to that given to other legacy services, including the Personal Communications Service (PCS), Advanced Wireless Service (AWS), and 800 MHz Cellular Radiotelephone Service (Cellular Service).<sup>193</sup> Furthermore, Gogo recommends modifying seven additional rules to enable more flexible use of the Commercial Aviation Air-Ground Systems band.<sup>194</sup> On June 20, 2024, the Bureau placed Gogo's petition for rulemaking on public notice.<sup>195</sup> In response to the Public Notice, the Commission received one comment and one reply comment, and both commenters support proceeding with an NPRM.<sup>196</sup>

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<sup>189</sup> *Id.* at 7441, para. 9.

<sup>190</sup> *Id.*

<sup>191</sup> Four commenters supported the grant based on the conditions imposed on the waiver while the Association of Public-Safety Communications Officials International (APCO) continued to oppose the waiver. *Id.* at 7439-40, para. 6; see APCO International's Petition for Reconsideration of Gogo's Waiver, WT Docket No. 21-282 (filed July 22, 2022), <https://www.fcc.gov/ecfs/document/10722515321505/1> (APCO Petition for Reconsideration). The conditions imposed on Gogo include requirements to: (1) attenuate emissions in the 851–854 MHz band by at least  $50 + 10\text{Log}(P)$  dB; (2) provide a 24/7 contact for reporting interference; (3) notify licensees in the 851–854 MHz band within a 10-mile radius of each Gogo base station information about deployment of its OFDM system; (4) conduct mandatory fielding testing with APCO in advance of deploying its OFDM technology; (5) provide licensees instructions, upon request, on how to ascertain through use of a spectrum analyzer whether Gogo's transmissions are the source of harmful interference; (6) respond to complaints of harmful interference from part 90 operators consistent with the requirements in sections 22.877 to 22.879; and (7) file a Petition for Rulemaking seeking rule changes that would permit more flexible use of this band. *Gogo Waiver Order*, 37 FCC Rcd at 7443-44, para. 14. Gogo appreciates the regulatory relief granted by the *Gogo Waiver Order* but acknowledges that a more extensive "rule refresh" would help it continue to provide "critical inflight broadband connectivity in the long term." Gogo Business Aviation LLC Reply, WT Docket No. 24-184, at 5 (rec. Aug. 6, 2024) (Gogo Reply).

<sup>192</sup> Gogo Petition for Rulemaking at 1.

<sup>193</sup> *Id.* at 4, 6-9; see generally *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 (2008) (*2008 PCS and AWS 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 Nos. 12-40, 10-112, 16-138, Second Report and Order, Report and Order, and Second Further Notice of Proposed Rulemaking, 32 FCC Rcd 2518 (2017) (*2017 Cellular Service Order*).

<sup>194</sup> Gogo Petition for Rulemaking at 1, 9-14.

<sup>195</sup> *Wireless Telecommunications Bureau Seeks Comment on Gogo's Petition for Rulemaking to Enable More Flexible Use of the 800 MHz Commercial Air-Ground Service*, WT Docket No. 24-184, RM 11895, Public Notice, DA 24-586 (WTB 2024).

<sup>196</sup> Association of Public-Safety Communications Officials International Comments, WT Docket No. 24-184, at 7 (rec. July 22, 2024) (APCO Comments) ("APCO supports the Commission moving forward with a Notice of

(continued....)

80. *APCO's Petition for Reconsideration of Gogo's Waiver.* On July 22, 2022, APCO filed a petition seeking reconsideration of Gogo's waiver grant, which permits Gogo to measure ERP by average power, rather than peak power.<sup>197</sup> In its petition, APCO argues that the Bureau should strengthen the waiver's conditions related to Gogo's responsibility to identify and resolve interference to public safety operations, analyze the interference potential, and address the peak power rule through a rulemaking proceeding instead.<sup>198</sup> On August 1, 2022, Gogo filed in opposition to this petition, defending against the arguments in APCO's petition and asserting that the petition was procedurally defective because it was filed one day after the deadline.<sup>199</sup> On August 5, 2022, APCO responded to Gogo's opposition.<sup>200</sup> The Bureau has not taken action on APCO's petition for reconsideration.<sup>201</sup>

## B. Discussion

81. We tentatively conclude that it would be in the public interest to revise the power rules for Commercial Aviation Air-Ground Systems. We believe that reforming these rules would provide flexibility for operational power in this band and promote technology neutrality.<sup>202</sup> Further, by amending these rules, we would harmonize Commercial Aviation Air-Ground Systems power rules with other legacy service power rules, including PCS, AWS, and the Cellular Service.<sup>203</sup> Additionally, we believe these proposed rules would advance the Commission's longstanding commitment to ensuring that spectrum is put to its highest and best use, as Gogo would be able to more efficiently utilize this band.<sup>204</sup> Finally, we tentatively conclude that revising our rules would protect public safety licensees from interference due to operations in the Commercial Aviation Air-Ground Systems band. We seek comment on these tentative conclusions.

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Proposed Rulemaking to evaluate Gogo's proposed rule changes in accordance with the above recommendations."); Gogo Reply, WT Docket No. 24-184, at 6 ("[T]he Commission should grant the Petition [for Rulemaking] and adopt an NPRM.").

<sup>197</sup> APCO Petition for Reconsideration at 1.

<sup>198</sup> *Id.* at 2-5. In response to Gogo's Petition for Rulemaking, APCO reiterated its ongoing concerns with the *Gogo Waiver Order*. APCO Comments, WT Docket No. 24-184, at 2-3; *see generally* Letter from Jeffrey S. Cohen, Chief Counsel, APCO International, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 21-282 (filed July 5, 2022) (opposing the *Gogo Waiver Order*).

<sup>199</sup> Opposition of Gogo Business Aviation LLC, WT Docket No. 21-282, at 6-14 (Aug. 1, 2022), <https://www.fcc.gov/ecfs/document/108021879921945/1>.

<sup>200</sup> APCO International's Reply to Opposition to Petition for Reconsideration, WT Docket No. 21-282 (Aug. 5, 2022), <https://www.fcc.gov/ecfs/document/1080539449758/1>.

<sup>201</sup> We take no action on APCO's Petition for Reconsideration, which remains pending.

<sup>202</sup> *See, e.g., 2017 Cellular Service Order*, 32 FCC Rcd at 2520, 2526, paras. 2, 18; *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, Report and Order and Further Notice of Proposed Rulemaking, 29 FCC Rcd 14100, 14126, 14135, 14146, paras. 76, 105, 135 (2014) (*2014 Cellular Service Further Notice*); *2008 PCS and AWS Order*, 23 FCC Rcd at 5325, 5344, paras. 13, 59; *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, Report and Order and Further Notice of Proposed Rulemaking, 20 FCC Rcd 13900, 13925, 13926, paras. 53, 56 (2005) (*2005 PCS and AWS Further Notice*).

<sup>203</sup> *See, e.g., 2017 Cellular Service Order*, 32 FCC Rcd at 2526, 2553, paras. 18, 96; *2014 Cellular Service Further Notice*, 29 FCC Rcd at 14138, para. 110; *2008 PCS and AWS Order*, 23 FCC Rcd at 5320, 5321, 5333, paras. 1, 4, 32; *2005 PCS and AWS Further Notice*, 20 FCC Rcd at 13901, 13907, paras. 1, 12.

<sup>204</sup> *See* Memorandum of Understanding Between the Federal Communications Commission and the National Telecommunications and Information Administration, at 2 (Jan. 31, 2003), <https://docs.fcc.gov/public/attachments/DOC-230835A2.pdf>; *see also* Gogo Petition at 14-15.

### 1. Power Measurement: Peak vs. Average

82. We propose to regulate power for Commercial Aviation Air-Ground Systems on an average basis. The Commission's Commercial Aviation Air-Ground Systems rules currently measure permissible ERP on a peak basis.<sup>205</sup> Specifically, section 22.867 restricts peak ERP for airborne mobile station transmitters to 12 watts ERP and ground station transmitters to 500 watts ERP in the 849–851 MHz and 894–896 MHz band.<sup>206</sup> In its petition for rulemaking, Gogo proposes that the Commission amend section 22.867 to regulate based on average power rather than on peak power.<sup>207</sup> Gogo asserts that employing peak power unnecessarily impedes the overall utility of its in-flight services without reducing the risk of harmful interference to co-channel or adjacent channel licensees.<sup>208</sup> Further, it argues that revising this rule would align it with the power rules for other legacy services.<sup>209</sup> Finally, Gogo asserts that changing this rule and the related ones will serve the public interest and allow it to deploy its next generation technology “to deliver higher capacity, higher quality broadband connectivity to several thousand aircraft operating throughout the United States and Canada.”<sup>210</sup>

83. When narrowband technologies were prevalent, legacy wireless telecommunications services used frequency or phase modulation to transmit analog voice and/or tone modulation.<sup>211</sup> The emissions from these older technologies had a “constant envelope,” meaning that there were no peaks or valleys in the envelope of the modulated waveform.<sup>212</sup> As a result, the peak power of such emissions was equal to the average power, so the Commission's power rules for private and public land mobile services did not need to specify either “peak power” or “average power” since the two were equal.<sup>213</sup>

84. In more recent years, the Commission has allowed greater technical flexibility in many of our wireless services so that licensees could utilize newer technologies without having to obtain Commission approval.<sup>214</sup> Accordingly, licensees in these services have employed a variety of innovative and more efficient digital technologies, many of which produce an emission where the modulation envelope does not maintain constant amplitude.<sup>215</sup> A number of these newer digital technologies, including OFDM, produce an emission with sub-microsecond power spikes, and its peak power therefore is always higher, often significantly, than its average power.<sup>216</sup> PAR is the ratio of a radiated emission's peak power to its average power.<sup>217</sup> Since the PAR can vary from 0 dB to as much as 13 dB depending on the technology used and the modulation conditions, stations having equal average radiated powers could have substantially different peak radiated powers.<sup>218</sup> Because receivers often begin to exhibit

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<sup>205</sup> See 47 CFR § 22.867.

<sup>206</sup> *Id.*

<sup>207</sup> Gogo Petition for Rulemaking at 4-9.

<sup>208</sup> *Id.* at 4-5.

<sup>209</sup> *Id.* at 5.

<sup>210</sup> *Id.* at 14; see Gogo Reply, WT Docket No. 24-184, at 5.

<sup>211</sup> 2005 PCS and AWS Further Notice, 20 FCC Rcd at 13931, para. 68.

<sup>212</sup> *Id.*

<sup>213</sup> *Id.*

<sup>214</sup> *Id.* at 13931, para. 69.

<sup>215</sup> *Id.*; 2008 PCS and AWS Order, 23 FCC Rcd at 5334, para. 35.

<sup>216</sup> 2008 PCS and AWS Order, 23 FCC Rcd at 5334, para. 35; 2017 Cellular Service Order, 32 FCC Rcd at 2551, para. 89.

<sup>217</sup> 2005 PCS and AWS Further Notice, 20 FCC Rcd at 13931, para. 69.

<sup>218</sup> *Id.*

interference effects when the power of an undesired signal exceeds a certain value, even if only for a short duration, the peak radiated power of the emission can be an important factor in evaluating the interference potential of a transmitting station.<sup>219</sup> Consequently, the Commission adopted rules that limited peak radiated power rather than average radiated power.<sup>220</sup>

85. We tentatively conclude that it would serve the public interest to amend section 22.867 to change the manner in which power levels are measured for Commercial Aviation Air-Ground Systems. The Commission's long-standing policy has been to promulgate rules that are technology neutral in order to allow "competing telecommunications technologies to succeed or fail in the marketplace on the basis of their merits and other market factors, and not primarily because of government regulation."<sup>221</sup> As the Commission explained in the *2005 PCS and AWS Further Notice*, "'technology neutral' means that our rules should neither penalize nor give advantage to any particular technology unnecessarily."<sup>222</sup> When the Commission promulgated the peak power rule for Commercial Aviation Air-Ground Systems in 2005, narrowband technologies were prevalent. More recently, wireless network operators have transitioned to wideband technologies in order to improve network efficiencies.<sup>223</sup> Peak power, however, is not technologically neutral because the rule disadvantages wider bandwidth technologies, which tend to produce larger power spikes, where peak power is higher than average power, which is not the case for narrower bandwidth technologies.<sup>224</sup> As a result, operators such as Gogo, must operate at lower average operating power due to the occurrence of these very short duration spikes in signal strength.<sup>225</sup> Further, as explained by Gogo, the wideband technology's average operational power can be excessively constrained, and the utility of the in-flight commercial airborne services can be unnecessarily curtailed.<sup>226</sup> We tentatively conclude that our proposal promotes operational flexibility and efficient spectrum usage, as the use of wideband technologies would not be hampered under an average power measurement technique, as compared to a peak power measurement technique.

86. Furthermore, we tentatively conclude that amending our rules to regulate by average power would be consistent with prior Commission decisions for similar legacy services and would harmonize the legacy service rules.<sup>227</sup> For example, the Commission revised the peak power rules for PCS and AWS in 2008, and for the Cellular Service in 2017, replacing peak power with average power,

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<sup>219</sup> *Id.* at 13931-32, para. 69. The Commission reiterated this observation in the *2008 PCS and AWS Order*. *2008 PCS and AWS Order*, 23 FCC Rcd at 5334, para. 35.

<sup>220</sup> *2005 PCS and AWS Further Notice*, 20 FCC Rcd at 13932, para. 69; see also *Facilitating the Provision of Spectrum-Based Services to Rural Areas and Promoting Opportunities for Rural Telephone Companies to Provide Spectrum-Based Services et al.*, WT Docket No. 02-381 et al., Report and Order and Further Notice of Proposed Rule Making, 19 FCC Rcd 24084 (2004) (revising the power rules for PCS to reflect peak power measurement); *Amendment of the Commission's Rules to Establish Part 27, the Wireless Communications Service ("WCS")*, GN Docket No. 96-228, Memorandum Opinion and Order, 12 FCC Rcd 3977 (1997) (establishing the power rule for AWS to reflect peak power measurement).

<sup>221</sup> *2005 PCS and AWS Further Notice*, 20 FCC Rcd at 13926, para. 56.

<sup>222</sup> *Id.* (emphasis in original).

<sup>223</sup> See *2017 Cellular Service Order*, 32 FCC Rcd at 2551-53, paras. 89-96.

<sup>224</sup> *2008 PCS and AWS Order*, 23 FCC Rcd at 5334, para. 35.

<sup>225</sup> *Gogo Waiver Order*, 37 FCC Rcd at 7441, para. 9.

<sup>226</sup> Gogo Waiver Request at 5.

<sup>227</sup> See, e.g., *2017 Cellular Service Order*, 20 FCC Rcd 2518 (amending the peak power rules for the Cellular Service); *2008 PCS and AWS Order*, 23 FCC Rcd 5319 (amending the peak power rules for PCS and AWS). Gogo also highlights that this proposed change would harmonize the Commission's rules with the Canadian air-ground rules. Gogo Reply, WT Docket No. 24-184, at 5.

primarily due to the increased pervasiveness of wideband technologies.<sup>228</sup> In reforming the radiated power rules for PCS and AWS, the Commission concluded that, for non-constant envelope technologies, such as OFDM, CDMA, and Wideband Code Division Multiple Access (WCDMA), limiting PCS and AWS power on an average basis would more accurately predict the interference potential for such technologies, and the Commission reiterated this finding in revising the Cellular Service rules.<sup>229</sup> The record in the PCS and AWS proceeding demonstrated that using peak power measurements for non-constant envelope technologies inaccurately suggested a much higher overall operational power, compared to average power levels, due to short duration power spikes.<sup>230</sup> The current rules for PCS, AWS, and the Cellular Service reflect these conclusions.<sup>231</sup> We tentatively conclude that the Commission's conclusions in these prior proceedings are applicable to Commercial Aviation Air-Ground Systems, as its peak power rule is incompatible with modern, more efficient wideband technologies, such as OFDM, and application of this rule would hamper operations, thereby shrinking coverage of Gogo's in-flight commercial services.<sup>232</sup>

87. In its comments regarding Gogo's Petition for Rulemaking, APCO specifically asks us to scrutinize Gogo's proposal to replace peak power regulation with average power regulation.<sup>233</sup> In particular, APCO is concerned that Gogo does not provide a technical analysis with respect to the potential risk of interference to adjacent public safety licensees due to Gogo's change in operations.<sup>234</sup> To this end, APCO urges the Commission to evaluate Gogo's interference assumptions to confirm that Gogo's proposals do not increase the potential for interference to public safety entities, conduct a comprehensive and independent technical analysis to be included in an applicable rulemaking proceeding, and ensure we receive technical studies that can be made available for comment.<sup>235</sup>

88. Ultimately, we propose to depart from the current peak power rule to measure instead by average radiated power for the Commercial Aviation Air-Ground Systems band. We seek comment on our proposal, including its costs and benefits. Generally, we request that commenters consider the advantages and disadvantages of peak and average radiated power limits in terms of controlling the interference potential of stations, conforming to current industry measurement procedures using available measuring instruments, minimizing the burden of compliance with the rules, and having applicability to the wide range of technologies in use currently and which may be in use in the future. Further, we seek comment on requiring measurement of average power to be made during a period of continuous transmission and what the resolution bandwidth should be. We also seek comment on the potential impact that our proposal to regulate by average power could have on adjacent licensees, including public safety licensees, and whether any additional measures should be implemented to protect other licensed operations, including public safety operations. Finally, we seek comment on any other issues related to measuring by peak or average radiated power that commenters believe are related and pertinent. Commenters are encouraged to submit technical analyses or other data to support their power-related proposals.

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<sup>228</sup> See *2008 PCS and AWS Order*, 23 FCC Rcd at 5333-37, paras. 33-40; *2017 Cellular Service Order*, 32 FCC Rcd at 2551-53, paras. 89-96.

<sup>229</sup> *2008 PCS and AWS Order*, 23 FCC Rcd at 5336-37, para. 40; *2017 Cellular Service Order*, 32 FCC Rcd at 2551, 2552, paras. 89, 94.

<sup>230</sup> *2008 PCS and AWS Order*, 23 FCC Rcd at 5336-37, para. 40.

<sup>231</sup> *Id.* at 5321, 5333-37, paras. 33-40; *2017 Cellular Service Order*, 32 FCC Rcd at 2551-53, paras. 89-96.

<sup>232</sup> See *Gogo Waiver Order*, 37 FCC Rcd at 7438, para. 4.

<sup>233</sup> APCO Comments, WT Docket No. 24-184, at 4.

<sup>234</sup> *Id.* APCO contends that Gogo is "rel[y]ing on assumptions based on the nature of its proposed operations and interferences from the rules for other bands." *Id.*

<sup>235</sup> *Id.* at 4-5.

## 2. ERP vs. EIRP

89. We propose continuing to express power limits as ERP for Commercial Aviation Air-Ground Systems band. ERP and equivalent isotropically radiated power (EIRP) are 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.<sup>236</sup> When the Commission revised its rules for air-ground operations in 2005, it determined that a ground station maximum power limit of 500 watts ERP and an airborne mobile station maximum power limit of 12 watts ERP would provide a licensee with sufficient flexibility to deploy its technology while limiting potential harmful interference to services operating in adjacent spectrum.<sup>237</sup> While there is not complete uniformity in how the radiated power limits are expressed in the various commercial wireless service bands, the power limits for AWS and the Cellular Service are expressed in terms of ERP.<sup>238</sup> Most recently, in the *2017 Cellular Service Order*, the Commission determined that it served the public interest to continue to express non-PSD limits and the newly adopted PSD limits in terms of ERP because it would avoid unnecessary confusion and maintain consistency for licensees.<sup>239</sup>

90. We propose continuing to express power limits as ERP in the Commercial Aviation Air-Ground Systems band, instead of adopting EIRP. We tentatively conclude that it serves the public interest to continue to express limits in ERP for the Commercial Aviation Air-Ground Systems band as prescribed by section 22.867 because it will ensure consistency and minimize difficulty for measuring operational power in this band. We seek comment on our proposal to maintain power limits in terms of ERP or whether we should convert this power requirement to EIRP. Finally, given our proposal to change power measurements for this band, we seek comment on whether this proposal would create any interference issues for part 90 licensees in the 800 MHz band with respect to section 22.877.<sup>240</sup> Commenters should address the costs and benefits of their recommendations.

## 3. Peak-to-Average Ratio (PAR)

91. We propose to implement 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.<sup>241</sup> Because regulating on an average power basis will allow for

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<sup>236</sup> FCC, Office of Engineering and Technology, Laboratory Division, *Guidelines for Determining the Effective Radiated Power (ERP) and Equivalent Isotropically Radiated Power (EIRP) of an RF Transmitting System* (Aug. 7, 2015), [https://apps.fcc.gov/kdb/GetAttachment.html?id=fzlsGm%2Fe68Ymx58IAmzNbw%3D%3D&desc=412172%20D01%20Determining%20ERP%20and%20EIRP%20v01r01&tracking\\_number=47469](https://apps.fcc.gov/kdb/GetAttachment.html?id=fzlsGm%2Fe68Ymx58IAmzNbw%3D%3D&desc=412172%20D01%20Determining%20ERP%20and%20EIRP%20v01r01&tracking_number=47469). These two power specifications only entail a simple mathematical conversion from one to another. *2014 Cellular Service Further Notice*, 29 FCC Rcd at 14149, para. 144.

<sup>237</sup> 47 CFR § 22.867; *2005 Air-Ground Order*, 20 FCC Rcd at 4432, 4431-37, paras. 57-58, 52-72. In promulgating these rules, the Commission sought to allow more flexibility “to deploy the technologies, both now and in the future, that it believe[d] w[ould] best enable [licensees] to provide services desired by consumers.” *2005 Air-Ground Order*, 20 FCC Rcd at 4431, para. 55. These new technical rules were crafted to ensure sufficient power to provide robust air-ground services while limiting the potential for harmful interference to services operating in adjacent spectrum. *Id.*

<sup>238</sup> *2017 Cellular Service Order*, 32 FCC Rcd at 2562, para. 130. We note that the power limits for PCS are expressed in terms of EIRP. *Id.*

<sup>239</sup> *Id.* at 2562-63, para. 130.

<sup>240</sup> 47 CFR § 22.877 (specifying certain conditions that must be met for there to be deemed unacceptable interference to non-cellular part 90 licenses in the 800 MHz band).

<sup>241</sup> *2008 PCS and AWS Order*, 23 FCC Rcd at 5334, 5337, paras. 35, 40; *2017 Cellular Service Order*, 32 FCC at 2551, para. 89 & n.220 (reiterating the *2008 PCS and AWS Order*'s conclusions regarding the PAR limit).

emissions higher than permitted under the current peak power basis, we tentatively conclude that it serves the public interest to adopt a PAR limit to mitigate the potential for undesirable interference that could result otherwise. The Commission reached this same conclusion in the *2008 PCS and AWS Order* and *2017 Cellular Service Order* when adopting an average power measurement technique and a PAR limit of 13 dB for each service.<sup>242</sup> In the *2008 PCS and AWS Order*, the Commission found that utilizing a 13 dB PAR limit when average EIRP is measured furthered its goal of facilitating the deployment of advanced technologies in this band while reducing the potential for harmful interference that might result from high PAR transmissions.<sup>243</sup> Likewise, in the *2017 Cellular Service Order*, the Commission determined this PAR limit would better enable the use of technologies, such as LTE, and that it struck the right balance between enabling licensees to use modulation schemes with high PARs and protecting other licensees from high PAR transmissions.<sup>244</sup> We tentatively conclude that these conclusions are equally applicable to adopting a PAR limit to accompany average power measurement for Commercial Aviation Air-Ground Systems.

92. We propose to implement a PAR, specifically a PAR limit of 13 dB, to accompany the proposed average power measurement technique. Additionally, we propose for the limit to apply to the highest peak power density relative to the highest average power density measured over the entire occupied bandwidth. Finally, we propose to define PAR as “the ratio of a radiated emission’s peak power to its average power.”<sup>245</sup> In its Petition for Rulemaking, Gogo urges us to adopt a PAR limit of 13 dB because this limit would reduce the risk of harmful interference while striking the right balance between enabling use of modulation schemes with high PARs and protecting other licensees from high PAR transmissions.<sup>246</sup> We tentatively conclude it would serve the public interest to adopt a PAR limit of 13 dB because it will mitigate harmful interference by restricting the magnitude of power spikes occurring due to regulating by average power while also allowing more flexible operational power in the band.

93. We seek comment on whether, if we adopt an average power requirement, it should be accompanied by a PAR limit. We also seek comment on whether 13 dB is an appropriate PAR limit or if some other value is more appropriate. If we adopt a PAR to be applied over an emission’s bandwidth, we seek comment on applying that limit to the highest peak power density relative to the highest average power density measured over the entire occupied bandwidth. We also seek comment on adding our proposed definition of PAR to section 22.99.<sup>247</sup> Finally, we seek comment on whether any other part 22 rules regarding equipment standards and measurement need to be updated or modified to be consistent with the equipment certification rules in part 2. We seek detailed and specific comments on all questions and issues mentioned above regarding adopting a PAR limit and any other issues that commenters believe are related and pertinent. Commenters should address the costs and benefits of any recommendations.

#### 4. Power Spectral Density (PSD) Model

94. We propose to adopt a PSD model for Commercial Aviation Air-Ground Systems. 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.<sup>248</sup> Calculating power per megahertz is important as bandwidth changes depending on the use of the

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<sup>242</sup> *2008 PCS and AWS Order*, 23 FCC Rcd at 5337, para. 42; *2017 Cellular Service Order*, 32 FCC Rcd at 2552-53, para. 95.

<sup>243</sup> *2008 PCS and AWS Order*, 23 FCC Rcd at 5337, para. 42.

<sup>244</sup> *2017 Cellular Service Order*, 32 FCC Rcd at 2552-53, para. 95.

<sup>245</sup> See 47 CFR § 22.99 (providing definitions for part 22 services).

<sup>246</sup> Gogo Petition for Rulemaking at 7 (quoting *2017 Cellular Service Order*, 32 FCC Rcd at 2552-53, para. 94).

<sup>247</sup> 47 CFR § 22.99 (definitions).

<sup>248</sup> *2017 Cellular Service Order*, 32 FCC Rcd at 2522, para. 8; 47 CFR § 22.99 (defining “power spectral density”).

bandwidth. As stated in the *2008 PCS and AWS Order* and *2017 Cellular Service Order*, our goal is to promote spectral efficiency and provide licensees with flexibility to select the technology that best suits their needs, whether narrowband or wideband, without being disfavored.<sup>249</sup> The Commission adopted a PSD model for PCS, AWS, and the Cellular Service to utilize spectrum more efficiently and accommodate newer wideband technologies.<sup>250</sup> Implementing a PSD model for these services also fostered technology neutrality, as existing narrowband emission technologies carry three to eight voice conversations per emission, while existing wideband emission technologies carry as many as 20 to 40 voice conversations per emission.<sup>251</sup> When a power rule makes no distinction between wideband and narrowband emissions, it applies the same peak radiated power limit to both.<sup>252</sup> Consequently, a wideband emission system is allowed to provide only about one fifth of the radiated power for each voice conversation that a narrowband emission system is allowed to provide, assuming that each system is operating at the maximum power permitted by rule.<sup>253</sup> Thus, the average voice conversation on a wideband emission system would have a lower signal-to-noise ratio, which, despite the partially compensating processing gain provided by signal spreading, would reduce the coverage range.<sup>254</sup>

95. Adding a PSD model would also advance the Commission's long-standing goal of harmonizing our rules across commercial wireless services to the extent practicable, taking into account the unique features of each service band.<sup>255</sup> Simultaneously, we are mindful of the need to protect licensees in the immediately adjacent bands.<sup>256</sup> The Commission has previously balanced these same interests and instituted a PSD model for several legacy services. For example, carriers deployed LTE on their PCS and AWS spectrum, and our rules governing those services now provide for use of a PSD model.<sup>257</sup> Similarly, for the Cellular Service, the Commission acknowledged that the existing Cellular PSD limits restricted power for deployment of wideband technologies, which would result in reduced coverage if carriers deployed LTE on Cellular frequencies using the non-PSD limits.<sup>258</sup> Accordingly, the Commission sought to provide flexibility for wideband technologies and, to the extent practicable, regulatory parity for licensees through a PSD model to facilitate efficient use of more advanced wideband technologies without increasing the potential for unacceptable interference to 800 MHz public safety operations.<sup>259</sup>

96. In bands with similar propagation characteristics to the Commercial Aviation Air-Ground Systems band, the Commission has transitioned to PSD limits where PSD limits were not initially adopted, including in the 800 MHz Cellular Radiotelephone Service.<sup>260</sup> The 800 MHz Cellular Service

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<sup>249</sup> See *2017 Cellular Service Order*, 32 FCC Rcd at 2592, para. 27; *2008 PCS and AWS Order*, 23 FCC Rcd at 5321, para. 4; see also *2014 Cellular Service Further Notice*, 29 FCC Rcd at 14138, para. 110.

<sup>250</sup> *2017 Cellular Service Order*, 32 FCC Rcd at 2535-37, paras. 40-44; *2008 PCS and AWS Order*, 23 FCC Rcd at 5329-30, paras. 24-25.

<sup>251</sup> *2005 PCS and AWS Further Notice*, 20 FCC Rcd at 13927, para. 58.

<sup>252</sup> *Id.*

<sup>253</sup> *Id.*

<sup>254</sup> *Id.*

<sup>255</sup> See *2017 Cellular Service Order*, 32 FCC Rcd at 2569, para. 149; *2008 PCS and AWS Order*, 23 FCC Rcd at 5321, 5333, paras. 4, 32; see also *2014 Cellular Service Further Notice*, 29 FCC Rcd at 14138, para. 110.

<sup>256</sup> *2014 Cellular Service Further Notice*, 29 FCC Rcd at 14138, para. 110.

<sup>257</sup> *Id.* at 14136-37, para. 108.

<sup>258</sup> *2017 Cellular Service Order*, 32 FCC Rcd at 2536, para. 40.

<sup>259</sup> *Id.* at 2535-36, para. 41.

<sup>260</sup> See generally *id.*

band is adjacent to the Commercial Aviation Air-Ground Systems band.<sup>261</sup> Prior to adopting PSD limits in 2017, the base station power limit for the Cellular Service was 500 watts ERP.<sup>262</sup> In the *2017 Cellular Service Order*, the Commission determined that this 500 watts ERP equated to PSD limits of 400 watts/MHz ERP in non-rural areas and 800 watts/MHz ERP in rural areas and, thus, implemented these PSD limits for the Cellular Service.<sup>263</sup> The Commission's reasoning for adopting these PSD limits was to provide enhanced technological flexibility for Cellular carriers while also protecting public safety communications from increased interference, and these are goals that we seek to achieve in the Commercial Aviation Air-Ground Systems band as well.<sup>264</sup> Currently, the Commercial Aviation Air-Ground Systems band limits airborne mobile station transmitters to 12 watts and ground station transmitters to 500 watts.<sup>265</sup>

97. Consistent with the Commission's previous decisions to adopt PSD limits, we propose to revise the Commercial Aviation Air-Ground Systems power rules to implement power measurement of airborne mobile station transmitters and ground station transmitters using a PSD model.<sup>266</sup> We tentatively conclude it serves the public interest to adopt a PSD model because it will allow for efficient use of wideband technologies in this band. We seek comment on implementing a PSD model for the Commercial Aviation Air-Ground Systems band, as we have for other wireless services utilizing wideband technologies, and, if implemented, what those limits should be.<sup>267</sup> We also seek comment on whether we should implement guardrails for the 800 MHz band to prevent or address interference. Additionally, we seek comment on how we should craft the power measurement rules to accommodate the various technologies used in the band and others that may be used in the future. Finally, we seek detailed and specific comments on any other issues that commenters believe are related and pertinent, including costs and benefits of any proposals.

## 5. Other Related Rules

98. We propose eliminating certain rules that are obsolete or no longer relevant for Commercial Aviation Air-Ground Systems. First, we propose eliminating section 22.853, which restricts a licensee from holding more than three megahertz of spectrum in the Commercial Aviation Air-Ground Systems band.<sup>268</sup> Gogo argues that this rule is too restrictive because the additional one megahertz of spectrum would otherwise be unused due to previous licensees' inability "to develop an economically viable use of the spectrum" and highlights that the Bureau granted Gogo's request for waiver of this rule.<sup>269</sup> We tentatively conclude that we should act consistent with the Bureau's findings in the *2013*

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<sup>261</sup> Cellular Service licensees operate in the 824–849 MHz and 869–894 MHz band and are adjacent to the Commercial Aviation Air-Ground Systems band (849–851 MHz and 894–896 MHz).

<sup>262</sup> *2017 Cellular Service Order*, 32 FCC Rcd at 2522-23, para. 9.

<sup>263</sup> *Id.* at 2536, para. 42; see 47 CFR § 22.913. If we implement a PSD limit for the Commercial Aviation Air-Ground Systems band, we will not institute distinct PSD limits for rural and non-rural areas.

<sup>264</sup> *2017 Cellular Service Order*, 32 FCC Rcd at 2536, para. 43.

<sup>265</sup> 47 CFR § 22.867.

<sup>266</sup> See *2008 PCS and AWS Order*, 23 FCC Rcd at 5324-31, paras. 12-26 (adopting a PSD model for PCS and AWS); *2017 Cellular Service Order*, 32 FCC Rcd at 2547-49, paras. 76-82 (adopting a PSD model for the Cellular Service). We note that while Gogo's petition for rulemaking proposed amending the Commission's rules to measure by average power accompanied by a PAR, Gogo did not seek a PSD model; however, we believe it is important to propose adoption of a PSD model for Commercial Aviation Air-Ground Systems.

<sup>267</sup> See 47 CFR § 22.867.

<sup>268</sup> *Id.* § 22.853 (eligibility to hold interest in licenses limited to 3 MHz of spectrum).

<sup>269</sup> Gogo Petition for Rulemaking at 10-11 (quoting *2013 Gogo Waiver Order*, 28 FCC Rcd at 3368, para. 17); see Gogo Reply, WT Docket No. 24-184, at 4.

*Gogo Waiver Order*, which allows Gogo to operate in all four megahertz of commercial air-ground spectrum, because it maximizes use of this spectrum and ensures the additional one megahertz does not remain fallow.<sup>270</sup> Additionally, we propose deleting section 22.859, which concerns continued incumbent operations in Commercial Aviation Air-Ground Systems that were authorized before January 1, 2004 following the adoption of the *2005 Air-Ground Order*.<sup>271</sup> In its Petition for Rulemaking, Gogo asserts that this section is obsolete due to the completed transition of the incumbents out of the band.<sup>272</sup> We tentatively conclude that section 22.859 should be deleted because it does not serve its intended purpose since the incumbents referred to in the rule no longer operate in the Commercial Aviation Air-Ground Systems band.<sup>273</sup> We also propose deleting section 22.165(f) because the cross-reference is no longer relevant. Finally, we propose to remove section 1.929(e)(2), which addresses whether a filing is classified as major or minor.<sup>274</sup> Gogo urges removal of this section because, following the *2005 Air-Ground Order*, the rule contains a cross-reference to a list of ground stations that no longer exists.<sup>275</sup> Therefore, we tentatively conclude that section 1.929(e)(2) is obsolete. We tentatively conclude these proposals serve the public interest because they revise obsolete and irrelevant rules. We seek comment on whether we should remove these sections from the Commission's rules and any other issues that commenters believe are related and pertinent.

99. Additionally, we propose amending sections 22.313 (station identification), 22.861 (emission limitations), and 22.863 (frequency stability) to allow for more flexible use of the Commercial Aviation Air-Ground Systems band. More specifically, Gogo urges us to reincorporate the station identification exemption for commercial air-ground operators in section 22.313 and include language in sections 22.861 and 22.863 to account for common control of air-ground licenses held by the same licensee.<sup>276</sup> These proposed rule changes can be found in Appendix A.<sup>277</sup> In response to Gogo's Petition for Rulemaking, APCO urges us to scrutinize Gogo's proposal to "add commercial [air-ground] operations to the station identification exemption list."<sup>278</sup> In reply, Gogo asserts that "[a] signal identifier alone lacks sufficient information to determine whether a signal is the source of harmful interference" and that it is unnecessary as Gogo is the sole licensee in the band.<sup>279</sup> Consistent with Gogo's argument, we tentatively conclude that maintaining section 22.313 as it currently exists would leave a rule that is "outdated and uniquely burdensome."<sup>280</sup> To this end, the Commission previously has eliminated this requirement for similar radio services.<sup>281</sup> Therefore, we propose to amend section 22.313 to include

<sup>270</sup> See *2013 Gogo Waiver Order*, 28 FCC Rcd at 3368, para. 17.

<sup>271</sup> 47 CFR § 22.859 (incumbent commercial aviation air-ground systems).

<sup>272</sup> Gogo Petition for Rulemaking at 11; see Gogo Reply, WT Docket No. 24-184, at 4-5.

<sup>273</sup> See *2005 Air-Ground Order*, 20 FCC Rcd at 4407-08, 4482-83, paras. 4, 59 (promulgating section 22.859 for incumbents in this band prior to January 1, 2004 and granting Verizon Airfone, the sole licensee in the Commercial Aviation Air-Ground Systems band at this time, a non-renewable license for a five-year term); *2013 Gogo Waiver Order*, 28 FCC Rcd at 3364 & n.23 (acknowledging indirectly that Verizon Airfone no longer operates in this band).

<sup>274</sup> 47 CFR § 1.929(e)(2) (classification of filings as major or minor).

<sup>275</sup> Gogo Petition for Rulemaking at 12; see Gogo Reply, WT Docket No. 24-184, at 4-5.

<sup>276</sup> Gogo Petition for Rulemaking at 9-10, 13-14; see 47 CFR §§ 22.313 (station identification), 22.861 (emission limitations), 22.863 (frequency stability); see also Gogo Reply, WT Docket No. 24-184, at 4, 5.

<sup>277</sup> See Appendix A (Proposed Rules).

<sup>278</sup> APCO Comments, WT Docket No. 24-184, at 4.

<sup>279</sup> Gogo Reply, WT Docket No. 24-184, at 3.

<sup>280</sup> *Id.* (citing section 22.313(a)(1)).

<sup>281</sup> See *Revision of Part 22 of the Commission's Rules Governing the Public Mobile Services et al.*, CC Docket No. 92-115 et al., Report and Order, 9 FCC Rcd 6513, 6582 (1994) (establishing the new section 22.313); *Revision of Part 22 and Part 90 of the Commission's Rules to Facilitate Future Development of Paging Systems et al.*, WT

(continued....)

stations operating in the Commercial Aviation Air-Ground Systems band to the station identification exemption list. We seek comment on our proposal for section 22.313. We tentatively conclude our proposed modifications to sections 22.313, 22.861, and 22.863 serve the public interest by clarifying and modernizing our rules and allowing more flexibility for licensees. We seek comment on amending these sections.

100. We also take the opportunity to eliminate an outdated reference to licensees authorized in the Commercial Aviation Air-Ground Systems band prior to January 1, 2004.<sup>282</sup> This reference appears in both sections 22.878 and 22.879, but these licensees no longer exist in this band, so the language distinguishing them is now obsolete.<sup>283</sup> We tentatively conclude that this change would clarify and simplify our rules. Therefore, we seek comment on amending sections 22.878 and 22.879 to remove the reference to licensees authorized prior to January 1, 2004. We seek comment on whether there are additional rules that should be amended or adopted concerning operations for Commercial Aviation Air-Ground Systems.<sup>284</sup> Overall, we seek detailed and specific comments on all questions and issues regarding these related rules and any other issues that commenters believe are relevant and pertinent, including any costs and benefits.

101. Finally, we seek comment on APCO's continuing concerns regarding the potential impact to public safety entities as a result of Gogo's operations.<sup>285</sup> Are there additional rules that should be amended or adopted to protect public safety entities?<sup>286</sup> For example, should we require Gogo to respond to reports of interference in a timely manner, as APCO recommends?<sup>287</sup> Given that Gogo has been operating pursuant to its waiver, we invite stakeholders to opine on whether additional measures are necessary to protect public safety licensees and/or help them identify sources of harmful interference, without disproportionately burdening Gogo.<sup>288</sup> We also seek comment on whether to codify in our rules any of the conditions stipulated in the *Gogo Waiver Order*.<sup>289</sup>

(Continued from previous page)

Docket No. 96-18 et al., Second Report and Order and Further Notice of Proposed Rulemaking, 12 FCC Rcd 2731, 2844 (1997) (amending the station exemption list); *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 et al., Report and Order and Notice of Proposed Rulemaking, 20 FCC Rcd 4403, 4477 (2005) (revising the station exemption list); *see also* Gogo Reply, WT Docket No. 24-184, at 3.

<sup>282</sup> 47 CFR §§ 22.878 (obligation to abate unacceptable interference), 22.879 (interference resolution procedures).

<sup>283</sup> *See also* 2005 *Air-Ground Order*, 20 FCC Rcd at 4407-08, 4482-83, paras. 4, 59 (promulgating section 22.859 regarding incumbent licensees in this band prior to January 1, 2004 and granting Verizon Airfone, the sole licensee in the Commercial Aviation Air-Ground Systems band at this time, a non-renewable license for a five-year term); 2013 *Gogo Waiver Order*, 28 FCC Rcd at 3364 & n.23 (acknowledging indirectly that Verizon Airfone no longer operates in this band).

<sup>284</sup> For example, APCO provides a potential example: "requiring Gogo to attenuate emissions into the 851–854 MHz band at more stringent levels than" currently required by the rules. APCO Comments, WT Docket No. 24-184, at 5.

<sup>285</sup> *See generally id.*

<sup>286</sup> *See id.* at 5.

<sup>287</sup> *See id.* at 6. The Commission's rules already contain rules about abating interference to non-cellular part 90 licensees, but these rules only apply to the 849–851 MHz band. 47 CFR §§ 22.878 (obligation to abate unacceptable interference), 22.879 (interference resolution procedures).

<sup>288</sup> Gogo Reply, WT Docket No. 24-184, at 3.

<sup>289</sup> *See Gogo Waiver Order*, 37 FCC Rcd at 7443-44, para. 14.

## V. DIGITAL EQUITY AND INCLUSION

102. The Commission, as part of its continuing effort to advance digital equity for all,<sup>290</sup> including people of color, persons with disabilities, persons who live in rural or Tribal areas, and others who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality, invites comments on any equity-related considerations<sup>291</sup> and benefits (if any) that may be associated with the proposals and issues discussed herein. Specifically, we seek comment on how our proposals may promote or inhibit advances in diversity, equity, inclusion, and accessibility, as well as the scope of the Commission’s relevant legal authority.

## VI. PROCEDURAL MATTERS

103. *Ex Parte Presentations.* This proceeding shall be treated as a “permit-but-disclose” proceeding in accordance with the Commission’s *ex parte* rules.<sup>292</sup> Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within two business days after the presentation (unless a different deadline applicable to the Sunshine period applies). Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentation must: (1) list all persons attending or otherwise participating in the meeting at which the *ex parte* presentation was made, and (2) summarize all data presented and arguments made during the presentation. If the presentation consisted in whole or in part of the presentation of data or arguments already reflected in the presenter’s written comments, memoranda or other filings in the proceeding, the presenter may provide citations to such data or arguments in his or her prior comments, memoranda, or other filings (specifying the relevant page and/or paragraph numbers where such data or arguments can be found) in lieu of summarizing them in the memorandum. Documents shown or given to Commission staff during *ex parte* meetings are deemed to be written *ex parte* presentations and must be filed consistent with rule 1.1206(b). In proceedings governed by rule 1.49(f) or for which the Commission has made available a method of electronic filing, written *ex parte* presentations and memoranda summarizing oral *ex parte* presentations, and all attachments thereto, must be filed through the electronic comment filing system available for that proceeding, and must be filed in their native format (e.g., .doc, .xml, .ppt, searchable .pdf). Participants in this proceeding should familiarize themselves with the Commission’s *ex parte* rules.

104. *Comment Period and Filing Procedures.* Pursuant to sections 1.415 and 1.419 of the Commission’s rules, 47 CFR §§ 1.415, 1.419, interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. Parties may file by any of the following methods:

- Electronic Filers: Comments may be filed electronically using the Internet by accessing the Commission’s Electronic Comment Filing System (ECFS): <https://www.fcc.gov/ecfs/>. See *Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

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<sup>290</sup> Section 1 of the Communications Act of 1934 as amended provides that the FCC “regulat[es] interstate and foreign commerce in communication by wire and radio so as to make [such service] available, so far as possible, to all the people of the United States, without discrimination on the basis of race, color, religion, national origin, or sex.” 47 U.S.C. § 151.

<sup>291</sup> We define the term “equity” consistent with Executive Order 13985 as the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality. See Exec. Order No. 13985, 86 Fed. Reg. 7009, Executive Order on Advancing Racial Equity and Support for Underserved Communities Through the Federal Government (Jan. 20, 2021).

<sup>292</sup> 47 CFR § 1.1200 *et seq.*

- Paper Filers: Parties who choose to file by paper must file an original and one copy of each filing.
  - Filings can be sent by hand or messenger delivery, by commercial courier, or by the U.S. Postal Service. **All filings must be addressed to the Secretary, Federal Communications Commission.**
  - Hand-delivered or messenger-delivered paper filings for the Commission's Secretary are accepted between 8:00 a.m. and 4:00 p.m. by the FCC's mailing contractor at 9050 Junction Drive, Annapolis Junction, MD 20701. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes and boxes must be disposed of before entering the building.
  - Commercial courier deliveries (any deliveries not by the U.S. Postal Service) must be sent to 9050 Junction Drive, Annapolis Junction, MD 20701.
  - Filings sent by U.S. Postal Service First-Class Mail, Priority Mail, and Priority Mail Express must be sent to 45 L Street NE, Washington, DC 20554.

105. *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](mailto:fcc504@fcc.gov) or call the Consumer & Governmental Affairs Bureau at 202-418-0530 (voice).

106. *Regulatory Flexibility Act.* The Regulatory Flexibility Act of 1980, as amended (RFA),<sup>293</sup> 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.”<sup>294</sup> Accordingly, the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) concerning the possible impact of the rule and policy changes addressed in this *NPRM*. The IRFA is set forth in Appendix B. The Commission invites the general public, particularly small businesses, to comment on the IRFA. Comments must be filed by the deadlines for comments on the *Notice of Proposed Rulemaking* indicated on the first page of this document and must have a separate and distinct heading designating them as responses to the IRFA.

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

108. *Providing Accountability Through Transparency Act.* Consistent with the Providing Accountability Through Transparency Act, Public Law 118-9, a summary of this Notice of Proposed Rulemaking will be available on <https://www.fcc.gov/proposed-rulemakings>.

109. *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](mailto:Christine.Parola@fcc.gov).

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<sup>293</sup> 5 U.S.C. § 603. The RFA, 5 U.S.C. §§ 601–612, was amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

<sup>294</sup> *Id.* § 605(b).

**VII. ORDERING CLAUSES**

110. 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 Notice of Proposed Rulemaking IS HEREBY ADOPTED.

111. IT IS FURTHER ORDERED that the Petition for Rulemaking filed by A2G Communications, LLC and AURA Network Systems OpCo, LLC in the Commission's rulemaking proceeding RM-11912 is GRANTED to the extent specified herein, that RM-11912 is incorporated into this proceeding, WT Docket No. 24-629, and that RM-11912 is TERMINATED.

112. IT IS FURTHER ORDERED that the Petition for Rulemaking filed by Echodyne Corp. in the Commission's rulemaking proceeding RM-11819 is GRANTED to the extent specified herein, that RM-11819 is incorporated into this proceeding, WT Docket No. 24-629, and that RM-11819 is TERMINATED.

113. IT IS FURTHER ORDERED that the Petition for Rulemaking filed by Gogo Business Aviation LLC in the Commission's rulemaking proceeding RM-11985 is GRANTED to the extent specified herein, that RM-11985 is incorporated into this proceeding, WT Docket No. 24-629, and that RM-11985 is TERMINATED.

114. IT IS FURTHER ORDERED that the Commission's Office of the Secretary SHALL SEND a copy of this Notice of Proposed Rulemaking, including the Initial Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch  
Secretary

## APPENDIX A

## Proposed Rules

The Federal Communications Commission proposes to amend parts 1, 2, 22, and 90 of the Code of Federal Regulations (CFR) as follows:

**PART 1 – PRACTICE AND PROCEDURE**

1. 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.

2. 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 (Unicom) (part 87, 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).

\* \* \* \* \*

3. In § 1.929, remove paragraph (e) and redesignate paragraphs (f) through (k) as paragraphs (e) through (j).

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

**§ 1.950 Geographic partitioning, spectrum disaggregation, and reaggregation.**

\* \* \* \* \*

(b)(1)(iv) 450 MHz Air-Ground Service Licensees must comply with § 22.811 of this chapter.

\* \* \* \* \*

(b)(2)(v) 450 MHz Air-Ground Service Licensees must comply with § 22.811 of this chapter.

\* \* \* \* \*

5. 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**

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

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

7. Amend § 2.106 by revising paragraph (a) U.S. Table of Frequency Allocations pages 28, 29, and 55 to read as follows:

**§ 2.106 Table of Frequency Allocations.**

(a) \* \* \*

\* \* \* \* \*

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	410-420	Private Land Mobile (90) MedRadio (951)
420-430 FIXED MOBILE except aeronautical mobile Radiolocation 5.269 5.270 5.271	420-450 RADIOLOCATION G2 G129	US13 US55 US64 420-450 Amateur US270	Private Land Mobile (90) MedRadio (951) Amateur Radio (97)
430-432 AMATEUR RADIOLOCATION 430-432 RADIOLOCATION Amateur	5.271 5.274 5.275 5.276 5.277	US13 US55 US64 G5	
432-438 AMATEUR RADIOLOCATION Earth exploration-satellite (active) 5.279A	5.271 5.276 5.277 5.278 5.279 5.281 5.282		
5.138 5.271 5.276 5.277 5.280 5.281 5.282	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		
440-450 FIXED MOBILE except aeronautical mobile Radiolocation 5.269 5.270 5.271 5.284 5.285 5.286	5.271 5.276 5.277 5.278 5.279 5.281 5.282	5.286 US64 US87 US230 US269 US270 US397 G8	Remote Pickup (74D) Low Power Auxiliary (74H) Private Land Mobile (90) MedRadio (951)
450-455 FIXED MOBILE 5.286AA	450-454 LAND MOBILE	450-454 LAND MOBILE	
5.209 5.271 5.286A 5.286B 5.286C 5.286D 5.286E 455-456 FIXED MOBILE 5.286AA	5.286 US64 US87 454-456	5.286 US64 US87 NG112 NG124 454-455 FIXED AERONAUTICAL MOBILE (R) LAND MOBILE US64 NG32 NG112 NG148 455-456 LAND MOBILE	Public Mobile (22) Maritime (80) Aviation (87) MedRadio (951)
5.209 5.271 5.286A 5.286B 5.286C 5.286E	US64	US64	Remote Pickup (74D) Low Power Auxiliary (74H) MedRadio (951)

Federal Communications Commission

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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 5.288 459-460 FIXED MOBILE 5.286AA	459-460 FIXED MOBILE 5.286AA	459-460 FIXED MOBILE 5.286AA	456-459 US64 US287 US288 459-460	456-460 FIXED AERONAUTICAL MOBILE (R) LAND MOBILE	Public Mobile (22) Maritime (80) Aviation (87) Private Land Mobile (90) MedRadio (95I)
5.209 5.271 5.286A 5.286B 5.286C 5.286E	5.209 5.271 5.286A 5.286B 5.286C 5.286E	5.209 5.271 5.286A 5.286B 5.286C 5.286E	US64 US287 US288 NG32 NG112 NG124 NG148	US64 US287 US288 NG32 NG112 NG124 NG148	
460-470 FIXED MOBILE 5.286AA Meteorological-satellite (space-to-Earth)	460-470 Meteorological-satellite (space-to-Earth)		460-470 Meteorological-satellite (space-to-Earth)	460-462.5375 FIXED LAND MOBILE US209 US289 NG124 462.5375-462.7375 LAND MOBILE US289 467.5375-467.7375 LAND MOBILE US287 US288 US289 467.7375-470	Private Land Mobile (90)
5.287 5.288 5.289 5.290 470-694 BROADCASTING	470-512 BROADCASTING Fixed Mobile 5.292 5.293 5.295	470-585 FIXED MOBILE 5.296A BROADCASTING 5.291 5.298 585-610 FIXED MOBILE 5.296A BROADCASTING RADIO NAVIGATION 5.149 5.305 5.306 5.307 610-890 FIXED MOBILE 5.296A 5.313A 5.317A BROADCASTING	US73 US209 US287 US288 US289 470-608	470-512 FIXED LAND MOBILE BROADCASTING NG5 NG14 NG66 NG115 NG149 512-608 BROADCASTING NG5 NG14 NG115 NG149	Maritime (80) Private Land Mobile (90) Maritime (80) Personal Radio (95) Maritime (80) Private Land Mobile (90) Maritime (80) Personal Radio (95) Maritime (80) Private Land Mobile (90)
	512-608 BROADCASTING 5.295 5.297 608-614 RADIO ASTRONOMY Mobile-satellite except aeronautical mobile-satellite (Earth-to-space)		608-614 LAND MOBILE (medical telemetry and medical telecommand) RADIO ASTRONOMY US74 US246		Public Mobile (22) Broadcast Radio (TV)(73) LPTV, TV Translator/Booster (74G) Low Power Auxiliary (74H) Private Land Mobile (90) Broadcast Radio (TV)(73) LPTV, TV Translator/Booster (74G) Low Power Auxiliary (74H) Personal Radio (95)

\* \* \* \* \*

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<p>5.538 5.540                  * * * * *</p>		<p>28.35-29.1                  FIXED-SATELLITE (Earth-to-space)                  NG165 NG527A</p>	<p>RF Devices (15)                  Satellite                  Communications                  (25)</p>

**PART 22 – PUBLIC MOBILE SERVICES**

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

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

9. Amend § 22.99 by adding in alphabetical order definitions for “450 MHz Air-Ground Service,” “Control and non-payload communications of uncrewed aircraft systems,” and “Peak-to-average ratio (PAR)” to read as follows:

**§ 22.99 Definitions.**

*450 MHz Air-Ground Service.* A radio service in which licensees are authorized to provide air-ground radiotelephone service and control and non-payload communications of uncrewed aircraft systems.

\* \* \* \* \*

*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 of the UAS and that supports the safety or regularity of the UA’s flight.

*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.

\* \* \* \* \*

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

\* \* \* \* \*

10. In § 22.165, remove and reserve paragraph (f):

**§ 22.165 Additional transmitters for existing systems.**

\* \* \* \* \*

(f) [Reserved]

\* \* \* \* \*

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

**§ 22.313 Station identification.**

\* \* \* \* \*

(a) \* \* \*

\* \* \* \* \*

(2) General aviation ground stations providing air-ground radiotelephone service; and ground and mobile stations providing control and non-payload communications of uncrewed aircraft systems 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;

\*\*\*\*\*

12. Revise § 22.357 to read as follows:

**§ 22.357 Emission types.**

Any authorized station in the Public Mobile Services may transmit emissions of any type(s) that comply with the applicable emission rule, i.e. § 22.359, § 22.861, § 22.917, and § 22.815.

13. 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 Radiotelephone Service (see § 22.861, instead), the Cellular Radiotelephone Service (see § 22.917, instead), and the 450 MHz Air-Ground Service (see § 22.815, instead).

\*\*\*\*\*

14. Revise § 22.379 to read as follows:

**§ 22.379 RF exposure.**

Licenses and manufacturers shall ensure compliance with the Commission's radio frequency exposure requirements in §§ 1.1307(b), 1.1310, 2.1091, and 2.1093 of this chapter, as appropriate. Applications for equipment authorization of mobile or portable devices operating under this section must contain a statement confirming compliance with these requirements. Technical information showing the basis for this statement must be submitted to the Commission upon request.

15. Amend the title of part 22, subpart G of this chapter 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 and control and non-payload communications of uncrewed aircraft systems stations and systems. 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. Revise the undesignated center heading immediately following § 22.801 to read as follows:

**450 MHz Air-Ground Service**

18. Add § 22.803 following the undesignated center heading to read as follows:

**§ 22.803 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. Revise § 22.805 to read as follows:

**§ 22.805 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. Revise § 22.807 to read as follows:

**§ 22.807 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.

21. Revise § 22.809 to read as follows:

**§ 22.809 Performance requirements.**

(a) 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 applicable performance requirements. The licensee must file a description and certification of the areas for which it is providing service. The construction notifications must include electronic coverage maps and supporting technical documentation regarding the type of service it is providing for each licensed area within its service territory and the type of technology used to provide such service, and certify the accuracy of such documentation. Supporting documentation must include the assumptions used to create the coverage maps, including the propagation model and the signal strength necessary to provide reliable service with the licensee's technology.

(b) The 450 MHz Air-Ground Service licensee must meet either a high-altitude and low-altitude combination performance requirement or a significant coverage low-altitude performance requirement. To demonstrate compliance with the performance requirement, 450 MHz Air-Ground Service licensees shall use the Regional Economic Area Groupings (REAGs) as defined in § 90.7 of this chapter.

(1) *Option one (Combination High Altitude and Low Altitude Metric)*

(A) Within 4 years of the license grant the 450 MHz Air-Ground Service licensee shall provide service at 25,000 feet above CONUS, Alaska, and Hawaii and service at 400 feet over 17.5% of each individual REAG.

(B) Within 8 years of the license grant the 450 MHz Air-Ground Service licensee

shall provide service at 25,000 feet above CONUS, Alaska, and Hawaii and service at 400 feet over 35% of each individual REAG.

(2) *Option two (Low Altitude Metric)*

(A) Within 4 years of the license grant the 450 MHz Air-Ground Service licensee shall provide service at 400 feet over 35% of each individual REAG.

(B) Within 8 years of the license grant the 450 MHz Air-Ground Service licensee shall provide service at 400 feet over 70% of each individual REAG.

(c) Failure to meet performance requirements.

(1) If the 450 MHz Air-Ground Service licensee fails to meet the first performance benchmark, we require that the licensee meet the final performance benchmark two years sooner (*i.e.*, at 6 years into the license term) and reduce the license term from 15 years to 13 years.

(2) If the 450 MHz Air-Ground Service licensee fails to meet the second performance benchmark, its authorization for the license shall terminate automatically without Commission action.

22. Add § 22.811 to read as follows:

**§ 22.811 Geographic partitioning and spectrum disaggregation.**

(a) *Eligibility.* A party holding a nationwide 450 MHz Air-Ground Service license may request from the Commission an authorization for partial assignment of its license pursuant to § 1.948 of this chapter.

(b) *Technical standards.*

(1) Partitioning. In the case of partitioning, applicants and licensees must file FCC Form 603 pursuant to § 1.948 of this chapter and list 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 the nationwide license that propose combinations of partitioning and disaggregation.

(4) The licensee seeking partitioning and/or disaggregation must demonstrate in its application how the operations of co-channel licensees will be protected upon partitioning or disaggregation. Those technical protections bind all parties to the partitioning/disaggregation transaction.

(c) *License term.* The license term for a partitioned license area and for disaggregated spectrum shall be the remainder of the nationwide licensee's license term as provided for in § 22.807.

23. Revise § 22.813 to read as follows:

**§ 22.813 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 and must not be less than 50 Watts.

(b) Airborne mobile transmitters. The transmitter power output of airborne mobile transmitters must not exceed 25 Watts and must not be less than 4 Watts.

24. Revise § 22.815 to read as follows:

**§ 22.815 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. Remove and reserve section 22.853:

**§ 22.853 [Reserved]**

26. Remove and reserve section 22.859:

**§ 22.859 [Reserved]**

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

**§ 22.861 Emission limitations.**

\* \* \* \* \*

(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. Section 22.863 is revised 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.**

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

(a) *Maximum 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 XXX watts per authorized bandwidth or XXX watts/MHz.

(2) The average ERP of ground station transmitters must not exceed XXX watts per authorized bandwidth or XXX watts/MHz.

(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.

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. Section 22.881 is revised 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 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
* * *		
<b>Megahertz</b>		
* * *		
24,450 to 24,650	Radiolocation land or mobile	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).

\* \* \* \* \*

35. Amend § 90.213 by adding a row to the table in paragraph (a) as follows:

**§ 90.213 Frequency stability.**

(a) \* \* \*

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

**[Parts per million (ppm)]**

Frequency Range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
* * *			
24,450–24,650	5000	5000	5000

\* \* \* \* \*

## APPENDIX B

## Initial Regulatory Flexibility Analysis

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),<sup>1</sup> the Federal Communications Commission (Commission) has prepared this present Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on a substantial number of small entities by the policies and rules proposed in the *Notice of Proposed Rulemaking (NPRM)*. Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments provided in the *NPRM*. The Commission will send a copy of the *NPRM*, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA).<sup>2</sup> In addition, the *NPRM* and IRFA (or summaries thereof) will be published in the Federal Register.<sup>3</sup>

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

2. In the *NPRM*, the Commission proposes 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 *NPRM* proposes to address 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 changes that the Commission proposes for each band seek to advance its goal of safe and effective facilitation of facets of AAM and UAS services.

3. *Air-Ground Communications in the 450 MHz Band.* The *NPRM* in this proceeding acts, in part, on 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 (AGRAS) 450 MHz band to be used to provide UAS Control and Non-Payload Communications (CNPC). The *NPRM* now proposes and seeks comment on several rule amendments to update the rules governing the use of the 450 MHz band by proposing to create new service rules that allow for UAS CNPC operations in the band. First, the *NPRM* proposes to amend the allocation in the 450 MHz band to include UAS CNPC in addition to the existing air-ground radiotelephone service. Next, the *NPRM* proposes to transition 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 *NPRM* proposes to adopt 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. The objective of this proposal is to 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. This proposal is consistent with the Commission's efforts in other frequency bands to improve spectrum efficiency and expand operational flexibility.

4. *UAS Detection in the 24.45–24.65 GHz Band.* The *NPRM* 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 *NPRM* proposes and seeks comment on revisions to the U.S. Table and corresponding amendments to the Commission's rules that would enable the detection of UAS by permitting such operations in the band. The Commission's objective for the 24.45–24.65 GHz band is to thereby facilitate UAS detection at sensitive sites that include stadiums, prisons, the U.S. border, and critical infrastructure (e.g., utilities), and to elevate the potential of an underused segment of spectrum while minimizing the risk of harmful interference.

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

<sup>2</sup> See 5 U.S.C. § 603(a).

<sup>3</sup> See *id.*

5. *Commercial Aviation Air-Ground Systems.* Finally, the Commission proposes and seeks comment on modernizing the legacy rules governing Commercial Aviation Air-Ground Systems. The *NPRM* 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. Namely, the Commission’s rules currently require that operational power be regulated by peak power, which is not technology neutral for broadband technologies. The Commission proposes instead to measure and regulate the effective radiated power of Commercial Aviation Air-Ground Systems operations according to their average power. Further, the Commission proposes adopting a peak-to-average ratio (PAR) and a power spectral density (PSD) model. The changes the Commission proposes would 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. Legal Basis**

6. The proposed action is authorized 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.

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

7. The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.<sup>4</sup> The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”<sup>5</sup> In addition, the term “small business” has the same meaning as the term “small-business concern” under the Small Business Act.<sup>6</sup> A “small-business concern” is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.<sup>7</sup>

8. *Air-Ground Radiotelephone Service.* Air-Ground Radiotelephone Service is a wireless service in which licensees are authorized to offer and provide radio telecommunications service for hire to subscribers in aircraft.<sup>8</sup> A licensee may provide any type of air-ground service (i.e., voice telephony, broadband Internet, data, etc.) to aircraft of any type, and serve any or all aviation markets (commercial, government, and general). A licensee must provide service to aircraft and may not provide ancillary land mobile or fixed services in the 800 MHz air-ground spectrum.<sup>9</sup>

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<sup>4</sup> See *id.* § 603(b)(3).

<sup>5</sup> See *id.* § 601(6).

<sup>6</sup> See *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.”

<sup>7</sup> See 15 U.S.C. § 632.

<sup>8</sup> 47 CFR § 22.99.

<sup>9</sup> See Federal Communications Commission, Economics and Analytics, Auctions, Auction 65: 800 MHz Air-Ground Radiotelephone Service, Fact Sheet, Permissible Operations, <https://www.fcc.gov/auction/65/factsheet>.

9. The closest industry with an SBA small business size standard applicable to these services is Wireless Telecommunications Carriers (*except Satellite*).<sup>10</sup> The SBA small business size standard for this industry classifies a business as small if it has 1,500 or fewer employees.<sup>11</sup> U.S. Census Bureau data for 2017 show that there were 2,893 firms that operated in this industry for the entire year.<sup>12</sup> Of this number, 2,837 firms employed fewer than 250 employees.<sup>13</sup> Thus under the SBA size standard, the Commission estimates that a majority of licensees in this industry can be considered small.

10. Based on Commission data as of December 2021, there were approximately four licensees with 110 active licenses in the Air-Ground Radiotelephone Service.<sup>14</sup> The Commission's small business size standards with respect to Air-Ground Radiotelephone Service involve eligibility for bidding credits and installment payments in the auction of licenses. For purposes of auctions, the Commission defined "small business" as an entity that, together with its affiliates and controlling interests, has average gross revenues not exceeding \$40 million for the preceding three years, and a "very small business" as an entity that, together with its affiliates and controlling interests, has had average annual gross revenues not exceeding \$15 million for the preceding three years.<sup>15</sup> In the auction of Air-Ground Radiotelephone Service licenses in the 800 MHz band, neither of the two winning bidders claimed small business status.<sup>16</sup>

11. In frequency bands where licenses were subject to auction, the Commission notes that as a general matter, the number of winning bidders that qualify as small businesses at the close of an auction does not necessarily represent the number of small businesses currently in service. Further, the Commission does not generally track subsequent business size unless, in the context of assignments or transfers, unjust enrichment issues are implicated. Additionally, the Commission does not collect data on the number of employees for licensees providing these services therefore, at this time we are not able to estimate the number of licensees with active licenses that would qualify as small under the SBA's small business size standard.

12. *Small Businesses, Small Organizations, Small Governmental Jurisdictions.* Our actions, over time, may affect small entities that are not easily categorized at present. We therefore describe, at the outset, three broad groups of small entities that could be directly affected herein.<sup>17</sup> First, while there are industry specific size standards for small businesses that are used in the regulatory flexibility analysis, according to data from the Small Business Administration's (SBA) Office of Advocacy, in general a

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<sup>10</sup> See U.S. Census Bureau, *2017 NAICS Definition*, "517312 Wireless Telecommunications Carriers (*except Satellite*)," <https://www.census.gov/naics/?input=517312&year=2017&details=517312>.

<sup>11</sup> See 13 CFR § 121.201, NAICS Code 517312 (as of 10/1/22, NAICS Code 517112).

<sup>12</sup> See U.S. Census Bureau, *2017 Economic Census of the United States, Employment Size of Firms for the U.S.: 2017*, Table ID: EC1700SIZEEMPFIEM, NAICS Code 517312, <https://data.census.gov/cedsci/table?y=2017&n=517312&tid=ECNSIZE2017.EC1700SIZEEMPFIEM&hidePreview=false>. At this time, the 2022 Economic Census data is not available.

<sup>13</sup> *Id.* The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

<sup>14</sup> Based on a FCC Universal Licensing System search on December 20, 2021, <https://wireless2.fcc.gov/UlsApp/UlsSearch/searchAdvanced.jsp>. Search parameters: Service Group = All, "Match only the following radio service(s)", Radio Service = CG, CJ; Authorization Type = All; Status = Active. We note that the number of active licenses does not equate to the number of licensees. A licensee can have one or more licenses.

<sup>15</sup> See 47 CFR § 22.223(b).

<sup>16</sup> See Federal Communications Commission, Economics and Analytics, Auctions, Auction 65: 800 MHz Air-Ground Radiotelephone Service, Summary, Closing Charts, Licenses by Bidder, <https://www.fcc.gov/sites/default/files/wireless/auctions/65/charts/65cls2.pdf>.

<sup>17</sup> 5 U.S.C. § 601(3)-(6).

small business is an independent business having fewer than 500 employees.<sup>18</sup> These types of small businesses represent 99.9% of all businesses in the United States, which translates to 33.2 million businesses.<sup>19</sup>

13. Next, the type of small entity described as a “small organization” is generally “any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.”<sup>20</sup> The Internal Revenue Service (IRS) uses a revenue benchmark of \$50,000 or less to delineate its annual electronic filing requirements for small exempt organizations.<sup>21</sup> Nationwide, for tax year 2022, there were approximately 530,109 small exempt organizations in the U.S. reporting revenues of \$50,000 or less according to the registration and tax data for exempt organizations available from the IRS.<sup>22</sup>

14. Finally, the small entity described as a “small governmental jurisdiction” is defined generally as “governments of cities, counties, towns, townships, villages, school districts, or special districts, with a population of less than fifty thousand.”<sup>23</sup> U.S. Census Bureau data from the 2022 Census of Governments<sup>24</sup> indicate there were 90,837 local governmental jurisdictions consisting of general purpose governments and special purpose governments in the United States.<sup>25</sup> Of this number, there were 36,845 general purpose governments (county,<sup>26</sup> municipal, and town or township<sup>27</sup>) with populations of

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<sup>18</sup> See SBA, Office of Advocacy, “What’s New With Small Business?” <https://advocacy.sba.gov/wp-content/uploads/2023/03/Whats-New-Infographic-March-2023-508c.pdf> (Mar. 2023).

<sup>19</sup> *Id.*

<sup>20</sup> 5 U.S.C. § 601(4).

<sup>21</sup> The IRS benchmark is similar to the population of less than 50,000 benchmark in 5 U.S.C § 601(5) that is used to define a small governmental jurisdiction. Therefore, the IRS benchmark has been used to estimate the number of small organizations in this small entity description. See Annual Electronic Filing Requirement for Small Exempt Organizations – Form 990-N (e-Postcard), “Who must file,” <https://www.irs.gov/charities-non-profits/annual-electronic-filing-requirement-for-small-exempt-organizations-form-990-n-e-postcard>. We note that the IRS data does not provide information on whether a small exempt organization is independently owned and operated or dominant in its field.

<sup>22</sup> See Exempt Organizations Business Master File Extract (EO BMF), “CSV Files by Region,” <https://www.irs.gov/charities-non-profits/exempt-organizations-business-master-file-extract-eo-bmf>. The IRS Exempt Organization Business Master File (EO BMF) Extract provides information on all registered tax-exempt/non-profit organizations. The data utilized for purposes of this description was extracted from the IRS EO BMF data for businesses for the tax year 2022 with revenue less than or equal to \$50,000 for Region 1-Northeast Area (71,897), Region 2-Mid-Atlantic and Great Lakes Areas (197,296), and Region 3-Gulf Coast and Pacific Coast Areas (260,447) that includes the continental U.S., Alaska, and Hawaii. This data includes information for Puerto Rico (469).

<sup>23</sup> 5 U.S.C. § 601(5).

<sup>24</sup> 13 U.S.C. § 161. The Census of Governments survey is conducted every five (5) years compiling data for years ending with “2” and “7”. See also Census of Governments, <https://www.census.gov/programs-surveys/economic-census/year/2022/about.html>.

<sup>25</sup> See U.S. Census Bureau, 2022 Census of Governments – Organization Table 2. Local Governments by Type and State: 2022 [CG2200ORG02], <https://www.census.gov/data/tables/2022/econ/gus/2022-governments.html>. Local governmental jurisdictions are made up of general purpose governments (county, municipal and town or township) and special purpose governments (special districts and independent school districts). See also tbl.2. CG2200ORG02 Table Notes\_Local Governments by Type and State\_2022.

<sup>26</sup> See *id.* at tbl.5. County Governments by Population-Size Group and State: 2022 [CG2200ORG05], <https://www.census.gov/data/tables/2022/econ/gus/2022-governments.html>. There were 2,097 county governments with populations less than 50,000. This category does not include subcounty (municipal and township) governments.

less than 50,000 and 11,879 special purpose governments (independent school districts<sup>28</sup>) with enrollment populations of less than 50,000.<sup>29</sup> Accordingly, based on the 2022 U.S. Census of Governments data, we estimate that at least 48,724 entities fall into the category of “small governmental jurisdictions.”<sup>30</sup>

15. *Wireless Telecommunications Carriers (except Satellite)*. This industry comprises establishments engaged in operating and maintaining switching and transmission facilities to provide communications via the airwaves.<sup>31</sup> Establishments in this industry have spectrum licenses and provide services using that spectrum, such as cellular services, paging services, wireless Internet access, and wireless video services.<sup>32</sup> The SBA size standard for this industry classifies a business as small if it has 1,500 or fewer employees.<sup>33</sup> U.S. Census Bureau data for 2017 show that there were 2,893 firms in this industry that operated for the entire year.<sup>34</sup> Of that number, 2,837 firms employed fewer than 250 employees.<sup>35</sup> Additionally, based on Commission data in the 2022 Universal Service Monitoring Report, as of December 31, 2021, there were 594 providers that reported they were engaged in the provision of wireless services.<sup>36</sup> Of these providers, the Commission estimates that 511 providers have 1,500 or fewer employees.<sup>37</sup> Consequently, using the SBA’s small business size standard, most of these providers can be considered small entities.

16. *All Other Telecommunications*. This industry is comprised of establishments primarily engaged in providing specialized telecommunications services, such as satellite tracking, communications

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<sup>27</sup> See *id.* at tbl.6. Subcounty General-Purpose Governments by Population-Size Group and State: 2022 [CG2200ORG06], <https://www.census.gov/data/tables/2022/econ/gus/2022-governments.html>. There were 18,693 municipal and 16,055 town and township governments with populations less than 50,000.

<sup>28</sup> See *id.* at tbl.10. Elementary and Secondary School Systems by Enrollment-Size Group and State: 2022 [CG2200ORG10], <https://www.census.gov/data/tables/2022/econ/gus/2022-governments.html>. There were 11,879 independent school districts with enrollment populations less than 50,000. See also tbl.4. Special-Purpose Local Governments by State Census Years 1942 to 2022 [CG2200ORG04], CG2200ORG04 Table Notes\_Special Purpose Local Governments by State\_Census Years 1942 to 2022.

<sup>29</sup> While the special purpose governments category also includes local special district governments, the 2022 Census of Governments data does not provide data aggregated based on population size for the special purpose governments category. Therefore, only data from independent school districts is included in the special purpose governments category.

<sup>30</sup> This total is derived from the sum of the number of general purpose governments (county, municipal and town or township) with populations of less than 50,000 (36,845) and the number of special purpose governments - independent school districts with enrollment populations of less than 50,000 (11,879), from the 2022 Census of Governments - Organizations tbls. 5, 6 & 10.

<sup>31</sup> See U.S. Census Bureau, *2017 NAICS Definition*, “517312 Wireless Telecommunications Carriers (except Satellite),” <https://www.census.gov/naics/?input=517312&year=2017&details=517312>.

<sup>32</sup> *Id.*

<sup>33</sup> See 13 CFR § 121.201, NAICS Code 517312 (as of 10/1/22, NAICS Code 517112).

<sup>34</sup> See U.S. Census Bureau, *2017 Economic Census of the United States, Employment Size of Firms for the U.S.:* 2017, Table ID: EC1700SIZEEMPFIEM, NAICS Code 517312, <https://data.census.gov/cedsci/table?y=2017&n=517312&tid=ECNSIZE2017.EC1700SIZEEMPFIEM&hidePreview=false>. At this time, the 2022 Economic Census data is not available.

<sup>35</sup> *Id.* The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

<sup>36</sup> Federal-State Joint Board on Universal Service, Universal Service Monitoring Report at 26, Table 1.12 (2022), <https://docs.fcc.gov/public/attachments/DOC-391070A1.pdf>.

<sup>37</sup> *Id.*

telemetry, and radar station operation.<sup>38</sup> This industry also includes establishments primarily engaged in providing satellite terminal stations and associated facilities connected with one or more terrestrial systems and capable of transmitting telecommunications to, and receiving telecommunications from, satellite systems.<sup>39</sup> Providers of Internet services (e.g. dial-up ISPs) or Voice over Internet Protocol (VoIP) services, via client-supplied telecommunications connections are also included in this industry.<sup>40</sup> The SBA small business size standard for this industry classifies firms with annual receipts of \$40 million or less as small.<sup>41</sup> U.S. Census Bureau data for 2017 show that there were 1,079 firms in this industry that operated for the entire year.<sup>42</sup> Of those firms, 1,039 had revenue of less than \$25 million.<sup>43</sup> Based on this data, the Commission estimates that the majority of “All Other Telecommunications” firms can be considered small.

17. *Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing.* This industry comprises establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment.<sup>44</sup> Examples of products made by these establishments are: transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment.<sup>45</sup> The SBA small business size standard for this industry classifies businesses having 1,250 employees or less as small.<sup>46</sup> U.S. Census Bureau data for 2017 show that there were 656 firms in this industry that operated for the entire year.<sup>47</sup> Of this number, 624 firms had fewer than 250 employees.<sup>48</sup> Thus, under the SBA size standard, the majority of firms in this industry can be considered small.

18. *Uncrewed Aircraft Radio Equipment Manufacturers.* Neither the SBA nor the Commission have developed a small business size standard specifically applicable to uncrewed aircraft radio equipment manufacturers. Radio and Television Broadcasting and Wireless Communications

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<sup>38</sup> See U.S. Census Bureau, *2017 NAICS Definition*, “517919 All Other Telecommunications,” <https://www.census.gov/naics/?input=517919&year=2017&details=517919>.

<sup>39</sup> *Id.*

<sup>40</sup> *Id.*

<sup>41</sup> See 13 CFR § 121.201, NAICS Code 517919 (as of 10/1/22, NAICS Code 517810).

<sup>42</sup> See U.S. Census Bureau, *2017 Economic Census of the United States, Selected Sectors: Sales, Value of Shipments, or Revenue Size of Firms for the U.S.: 2017*, Table ID: EC1700SIZEREVFIRM, NAICS Code 517919, <https://data.census.gov/cedsci/table?y=2017&n=517919&tid=ECNSIZE2017.EC1700SIZEREVFIRM&hidePreview=false>. At this time, the 2022 Economic Census data is not available.

<sup>43</sup> *Id.* The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard. We also note that according to the U.S. Census Bureau glossary, the terms receipts and revenues are used interchangeably, see [https://www.census.gov/glossary/#term\\_ReceiptsRevenueServices](https://www.census.gov/glossary/#term_ReceiptsRevenueServices).

<sup>44</sup> See U.S. Census Bureau, *2017 NAICS Definition*, “334220 Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing,” <https://www.census.gov/naics/?input=334220&year=2017&details=334220>.

<sup>45</sup> *Id.*

<sup>46</sup> See 13 CFR § 121.201, NAICS Code 334220.

<sup>47</sup> See U.S. Census Bureau, *2017 Economic Census of the United States, Employment Size of Firms for the U.S.: 2017*, Table ID: EC1700SIZEEMPFIRM, NAICS Code 334220, <https://data.census.gov/cedsci/table?y=2017&n=334220&tid=ECNSIZE2017.EC1700SIZEEMPFIRM&hidePreview=false>. At this time, the 2022 Economic Census data is not available.

<sup>48</sup> *Id.* The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

Equipment Manufacturing is the closest industry with a SBA small business size standard.<sup>49</sup> The SBA small business size standard for this industry classifies businesses having 1,250 employees or less as small.<sup>50</sup> U.S. Census Bureau data for 2017 show that there were 656 firms in this industry that operated for the entire year.<sup>51</sup> Of this number, 624 firms had fewer than 250 employees.<sup>52</sup> In addition, the SBA provides a size standard for the Aircraft Manufacturing industry which includes the manufacture of uncrewed and robotic aircraft.<sup>53</sup> The SBA small business size standard for this industry classifies businesses having 1,500 employees or less as small.<sup>54</sup> U.S. Census Bureau data for 2017 show that there were 254 firms in this industry that operated for the entire year.<sup>55</sup> Of this number, 227 firms had fewer than 250 employees.<sup>56</sup> Based on this data, we conclude that a majority of manufacturers in this industry are small.

19. *Uncrewed Aircraft System Operators.* Neither the Commission nor the SBA have developed a small business size standard specifically applicable to UAS operators. The Commission lacks data on the number of operators in the United States that could be subject to the rules, therefore it is not possible to determine the number of affected small entity operators at this time. We find, however, that the Regulatory Flexibility Analysis of the Federal Aviation Administration (FAA) Remote ID rule is helpful. In this analysis, the FAA assessed the impact of the rule on small entity non-recreational UAS operators based on an analysis that the Association for Uncrewed Vehicle Systems International (AUVSI) performed relating to part 107 waivers.<sup>57</sup> In the analysis, the AUVSI determined that 92 percent of the waivers were issued to entities with fewer than 100 employees. Based on this data, the FAA determined that a majority of entities operating uncrewed aircraft for other than recreational purposes are small.<sup>58</sup> Accordingly, based on the FAA's determination we conclude that a majority of uncrewed UAS operators are small entities.

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<sup>49</sup> See U.S. Census Bureau, *2017 NAICS Definition*, "334220 Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing," <https://www.census.gov/naics/?input=334220&year=2017&details=334220>.

<sup>50</sup> See 13 CFR § 121.201, NAICS Code 334220.

<sup>51</sup> See U.S. Census Bureau, *2017 Economic Census of the United States, Employment Size of Firms for the U.S.: 2017*, Table ID: EC1700SIZEEMPfirm, NAICS Code 334220, <https://data.census.gov/cedsci/table?y=2017&n=334220&tid=ECNSIZE2017.EC1700SIZEEMPfirm&hidePreview=false>. At this time, the 2022 Economic Census data is not available.

<sup>52</sup> *Id.* The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

<sup>53</sup> See U.S. Census Bureau, *2017 NAICS Definition*, "336411 Aircraft Manufacturing," <https://www.census.gov/naics/?input=336411&year=2017&details=336411>.

<sup>54</sup> See 13 CFR § 121.201, NAICS Code 336411.

<sup>55</sup> See U.S. Census Bureau, *2017 Economic Census of the United States, Employment Size of Firms for the U.S.: 2017*, Table ID: EC1700SIZEEMPfirm, NAICS Code 336411, <https://data.census.gov/cedsci/table?y=2017&n=336411&tid=ECNSIZE2017.EC1700SIZEEMPfirm&hidePreview=false>. At this time, the 2022 Economic Census data is not available.

<sup>56</sup> *Id.* The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

<sup>57</sup> See Federal Aviation Administration, Department of Transportation, Remote Identification of Unmanned Aircraft, 86 Fed. Reg. 4390, 4494 (Jan. 15, 2021) (*Remote ID Rule*).

<sup>58</sup> See *id.*

#### D. Description of Projected Reporting, Recordkeeping, or Other Compliance Requirements

20. The proposed changes to the Commission's service rules in the *NPRM*, if adopted, could impose new reporting, recordkeeping, or other compliance requirements on some small entities. At this time, however, the record does not include sufficient cost/benefit analyses to allow the Commission to quantify the costs of compliance for small entities including whether it will be necessary for small entities to hire professionals to comply with the proposed rules if adopted. The *NPRM* nevertheless seeks comment, particularly from small entities, on the costs and burdens of the proposed rules and whether there are any actions the Commission should take to minimize concerns by small entities regarding their compliance requirements. Below is an overview of the potential compliance obligations small entities may face due to the proposed rule changes for the three distinct bands of spectrum discussed in the *NPRM*.

21. ***Air-Ground Communications in the 450 MHz Band.*** As discussed above, the potential rule changes proposed in the *NPRM*, if adopted, could impose new reporting, recordkeeping, or other compliance requirements on some small entities. In addition to the proposed rule changes associated with the amended allocation in the 450 MHz band, there could also be new service rule compliance obligations. For the new operations allowed and the new licensing framework in the band, the *NPRM* seeks comment on various service rules that should apply, including performance, construction, and technical operating requirements. Additionally, the *NPRM* seeks comment on the costs and benefit of the proposed approaches and any associated rule changes or requirements.

22. ***Application Freeze.*** In order to maintain the existing licensing landscape in the band, and to permit the incumbent licensee to submit necessary filings, while this rulemaking proceeding is pending, the Wireless Telecommunications Bureau suspended acceptance and processing of new applications to conduct part 22 general aviation air-ground service operations in the 450 MHz band.<sup>59</sup>

23. ***Voluntary Transition to a Nationwide License.*** The *NPRM* proposes to voluntarily transition the band to a geographic licensing structure with a single nationwide license, thereby creating a less burdensome environment for small entity compliance. It tentatively concludes that the licensing regime is in the public interest because of the public safety need for UAS CNPC across the country. Further, the *NPRM* proposes certain eligibility restrictions an entity must meet in order to qualify for the geographic license with nationwide coverage. Specifically, it proposes to define "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<sup>60</sup> 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. The covered incumbent eligibility criteria intends to ensure expanded operations are expeditiously deployed in the band, putting the spectrum to its highest and most efficient use.

24. In addition, the *NPRM* proposes to transition to a geographic license framework by converting a single incumbent's site-based licenses into a nationwide license. Under the proposed approach, a covered incumbent seeking the 450 MHz Air-Ground Service nationwide license would 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 would be completely voluntary.

25. ***Certification.*** The *NPRM* proposes 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

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<sup>59</sup> See *Wireless Telecommunications Bureau Announces Temporary Filing Freeze on Applications in the 450 MHz Band*, WT Docket No. 24-629, Public Notice, DA 25-39 (WTB Jan. 17, 2025).

<sup>60</sup> 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).

eligibility criteria (Eligibility Certification). The proposed criteria for a covered incumbent are: (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. The *NPRM* further proposes that, in order to meet the first prong of covered incumbent criteria, 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. The *NPRM* proposes that the covered incumbent can meet the second prong of the covered incumbent criteria by providing 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. Lastly, the *NPRM* proposes to require the covered incumbent to submit the Eligibility Certification and coverage map in ULS.

26. *License and Operating Rules.* The *NPRM* proposes to adopt additional service rules that would provide UAS operators with the ability to conduct control and non-payload operations in the band. In addition, the *NPRM* proposes specific eligibility criteria for the covered incumbent to modify one of its site-based licenses into a nationwide license and proposes to maintain the existing part 22 general eligibility standard for licenses in the 450 MHz band. It also proposes to license the 450 MHz band on an exclusive, nationwide license basis. Lastly, the *NPRM* tentatively concludes that the license term for the nationwide license should be 15 years.

27. *Performance Benchmarks.* The *NPRM* proposes two options to meet the performance requirements and proposes to have an interim and final performance requirement in each option. In the proposed Option 1, to meet the interim performance benchmark, the licensee must continue to provide service at 25,000 feet over CONUS, Alaska, and Hawaii and service at 400 feet covering 17.5 percent or more of each REAG geographic area. To meet the final performance requirement under proposed Option 1, the licensee must provide service in CONUS, Alaska, and Hawaii at 25,000 feet and service at 400 feet covering 35 percent or more of each individual license area REAG geographic area. Under the proposed Option 2, to meet the interim performance benchmark, the licensee must provide service at 400 feet covering 35 percent or more of each individual REAG geographic area. To meet the final performance requirement under this option, the licensee must provide service covering 70 percent or more of each individual license area REAG geographic area. The *NPRM* proposes that the licensee may choose to fulfill its performance requirement either by a combination of high and low altitude services under Option 1 or significant service at low altitude under Option 2. The *NPRM* further proposes 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 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 *NPRM* proposes 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.

28. *Compliance Procedures.* The *NPRM* proposes a rule requiring 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. The *NPRM* proposes that the covered incumbent must notify the Commission by filing FCC Form 601 when it meets its construction obligations within the construction period. It proposes that the notification must be filed within 15 days of the expiration of the applicable construction period. Additionally, the *NPRM* seeks comment on this proposal and any alternatives. The *NPRM* also seeks comment on whether a covered incumbent has any special or unique issues such that they would require additional time to comply.

29. *General Applicability of Other Part 22 and Part 1 Rules.* The *NPRM* proposes 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<sup>61</sup> and permanent discontinuance of

<sup>61</sup> 47 U.S.C. § 310; 47 CFR § 22.5.

operations.<sup>62</sup> The *NPRM* also proposes 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.<sup>63</sup> FAA rules presently regulate remote identification of UAS, so the *NPRM* proposes not to adopt duplicative rules.<sup>64</sup>

30. *Technical Rules.* The *NPRM* seeks comment on the appropriate power levels in the 450 MHz band and proposes to eliminate the 20 kilohertz channel requirement. The *NPRM* further proposes to apply 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 also proposes to eliminate the channel siting requirement in the Commission's rules for the 450 MHz band. The *NPRM* proposes to retain the transmitter location rules for the 450 MHz Air-Ground Service. The *NPRM* 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). It proposes to apply these general part 22 rules to the 450 MHz Air-Ground Service. Further, the *NPRM* proposes to apply these rules to licensees that acquire their licenses through partitioning or disaggregation (to the extent the service rules permit such licenses). Finally, the *NPRM* seeks comment on incorporating RTCA standards into our rules for the 450 MHz band.

31. *UAS Detection in the 24.45–24.65 GHz Band.* The *NPRM* proposes and seeks comment on changes to 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 would primarily impose existing part 90 technical, licensing, and operating compliance requirements on new radiolocation operations in the band. The *NPRM* also proposes to establish a frequency stability standard on radiolocation operations in the 24.45–24.65 GHz band, and it would require that the devices used to conduct such operations receive authorization to do so under the Commission's part 90 rules.

32. *Radiolocation Allocation in the 24.45–24.65 GHz Band.* The *NPRM* proposes to add to the U.S. Table a federal and a non-federal secondary allocation for radiolocation operations in the 24.45–24.65 GHz band. The band is currently allocated only to radionavigation and inter-satellite services. The *NPRM* seeks comment on this approach, especially with regard to any potential for harmful interference between radiolocation operations and existing co-channel and adjacent-channel operations.

33. *Part 90 Licensing and Operating Rules for Radiolocation Operations.* The *NPRM* proposes to add 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 to apply the existing part 90 rules related to license applications, term, performance requirements, and license renewal to such operations. The *NPRM* further proposes to apply 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.

34. *Part 90 Technical Rules for Radiolocation Operations.* The *NPRM* proposes to preserve and apply, 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 *NPRM* proposes to impose power limits on a case-by-case basis, as described in section 90.205, consistent with comparable part 90 licenses. The *NPRM* similarly proposes, per section 90.207, to determine emissions-type limitations on a case-by-case basis, and to establish them upon a satisfactory showing of need. The *NPRM* also proposes to apply section 90.210's Emission Mask B to radiolocation operations in the 24.45–24.65 GHz band. Finally, the *NPRM* proposes to continue to review and authorize on a case-by-case basis bandwidth limits

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<sup>62</sup> 47 CFR § 1.953.

<sup>63</sup> *Id.* § 22.313(a); *see also* Appendix A.

<sup>64</sup> *See* 14 CFR §§ 89.105, 89.110, 89.115, 89.305, 89.315.

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.

35. *Equipment Authorization for Radiolocation Operations.* The *NPRM* proposes to require transmitters used to conduct radiolocation operations in the 24.45–24.65 GHz band to receive authorization to operate under part 90 of the Commission’s rules. The requirements for such authorization are set forth in section 90.203.

36. *Commercial Aviation Air-Ground Systems.* The Commission proposes 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 propose to 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 propose any new reporting or recordkeeping requirements for this band, we do propose compliance requirements for licensees.

37. *Power Measurement.* The Commission proposes to regulate 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 restricts peak ERP for airborne mobile transmitters to 12 watts ERP and ground station transmitters to 500 watts ERP in the 849–851 MHz and 894–896 MHz. We do not yet specify particular limits for these airborne mobile and ground station transmitters, but, if this rule is adopted, we would require licensees to regulate by average power not to exceed a certain level.

38. *Peak-to-Average Ratio.* The Commission proposes to implement 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 would allow for emissions higher than permitted under the current peak power basis, we tentatively conclude that it serves the public interest to adopt a PAR limit to mitigate the potential for undesirable interference that could result otherwise. In the event the Commission adopts a PAR, the Commission would restrict licensees to a PAR limit of 13 dB.

39. *Power Spectral Density Model.* In the *NPRM*, the Commission proposes to adopt a PSD model for the Commercial Aviation Air-Ground Systems band. 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. We have previously implemented a PSD model for similar bands, such as the 800 MHz Cellular Radiotelephone Service, to promote technology neutrality for entities utilizing broadband technologies in these bands. While existing Commission rules do not yet specify a certain PSD limit for this band, if a PSD model is adopted and a limit is specified, we would allow entities employing wideband technologies to utilize a PSD model.

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

40. The RFA requires an agency to describe any significant, specifically small business, alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): “(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities; (3) the use of performance, rather than design standards; and (4) an exemption from coverage of the rule, or any part thereof, for such small entities.”<sup>65</sup>

41. *Air-Ground Communications in the 450 MHz Band.* The proposals contained in the *NPRM* are designed to facilitate more intensive use of 650 kilohertz of low-band spectrum for air-ground

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<sup>65</sup> See 5 U.S.C. § 603(c)(1)(4).

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 that could occur if some of the rule changes or approaches proposed in the *NPRM* are adopted. Specifically, in the *NPRM*, the Commission seeks 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 seeks 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 seek to obtain any information, through comments or otherwise, specific to the interests of small entities, which should provide 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.

42. The proposed transition to a geographic licensing regime would be completely voluntary, which may minimize impact of the rules on small entities. Further, the *NPRM* considers and seeks comment on allowing the covered incumbent to choose between two performance requirement options. The *NPRM* proposes a license term of 15 years. The certainty of a longer license term would provide a licensee that is a small entity sufficient incentive to make the long-term investments necessary for compliance. Additionally, certain applicable technical rules would be eliminated or remained unchanged, which would either reduce or, at least maintain, the existing economic obligations of small entities.

43. 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. Thus, to identify additional approaches that could further minimize the economic impact on small entities the Commission seeks comment on alternative obligations, timing for implementation, scope of subject licenses, and other measures that could accommodate the needs and resources of small entities. Prior to adopting final rules in this proceeding, the Commission will evaluate comments filed in response to the *NPRM*, and carefully consider the matters and the impact of all rule changes on small entities.

44. *UAS Detection in the 24.45–24.65 GHz Band.* The *NPRM* proposes and seeks comment on modest rule changes to enable radiolocation operations in the 24.45–24.65 GHz band. We believe that very few changes to our part 90 rules will be required in order to facilitate this expanded utility of a band of spectrum that is presently underused. We therefore propose to retain and apply relevant, familiar, and generally applicable part 90 licensing, operation, and technical rules wherever possible. This approach is tailored to minimize any new burden on small entity and all other applicants. We nevertheless seek comment on the costs and benefits of our various proposals, including the application of existing rules, as well as our proposals to add a federal and a non-federal, secondary radiolocation allocation to the U.S. Table, and to require new part 90 equipment authorization for transmitters that will conduct radiolocation operations in the 24.45–24.65 GHz band.

45. *Commercial Aviation Air-Ground Systems.* The *NPRM* proposes and seeks comment on the adoption of average power regulation, a PAR limit, and a PSD model for Commercial Aviation Air-Ground Systems, as well as considers 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 *NPRM* invites interested parties to comment on these proposals as well as consider the costs and benefits of each proposal. The Commission believes that, if adopted, these rules would 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 onboard. For example, small businesses would be able to utilize this connectivity while on a commercial flight.

46. Additionally, these proposals would 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 proposals 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.

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

47. None.

**STATEMENT OF  
CHAIRWOMAN JESSICA ROSENWORCEL**

Re: *Facilitating Opportunities for Advanced Air Mobility*, WT Docket No. 24-269, Notice of Proposed Rulemaking (January 16, 2025)

Today, the Federal Communications Commission explores how our spectrum polices can support the continued growth of drone technology and the emergence of Advanced Air Mobility, a new sector of the aviation industry that leverages new propulsion and flight control technologies to make passenger and cargo transportation more accessible, convenient and efficient. These technologies rely on spectrum for critical communications and navigation, so we are modernizing our rules to foster this innovation by opening up the 450 MHz band for aeronautical command and control communications, expanding radiolocation operations in the 24.45–24.65 GHz band, and updating rules for in-flight connectivity for commercial aviation air-ground systems.

This is the right time to do this. There are heartbreaking fires across Los Angeles. Last year, I saw the unthinkable damage that a hurricane wrought in Asheville. At the FCC we send boots on the ground to these crises because we know that thoughtful spectrum policy can help with restoration and recovery. If you want an object lesson in why this is true, consider our first-of-its-kind framework for Supplemental Coverage from Space that allows satellite operators to partner with wireless carriers so smartphones can stay connected through satellites when there is no signal available on the ground. During these disasters, when fires or floods knock out cell towers, people have been able to reach emergency help through this back-up in our skies.

The new drone and air mobility technologies that our actions today enable can also help in crisis. They will mean the ability to deliver personnel and supplies to hard-to-reach areas, inspect and maintain critical infrastructure before and after disaster strikes, and assist first responders with search-and-rescue operations. I am eager to see the incredible public safety possibilities that these forward-looking policies for connectivity will foster in the future.

**STATEMENT OF  
COMMISSIONER GEOFFREY STARKS**

Re: *Facilitating Opportunities for Advanced Air Mobility*, WT Docket No. 24-269, Notice of Proposed Rulemaking (January 16, 2025)

We are in the middle of a revolution in the development and deployment of Uncrewed Aircraft Systems (UAS). This technology holds the potential to boost agricultural sustainability, speed up recovery from natural disasters, and support more efficient delivery of medicine, consumer goods, and more. During my time at the Commission, I've worked hard to ensure we're providing UAS innovators with the spectrum and regulatory environment they need to maintain U.S. leadership, most recently in the 5GHz band.

However, we must also be clear-eyed about the threat that unauthorized UAS operations pose to public safety. Over several days in December, unsanctioned UAS operations over New York and New Jersey have caused significant confusion, threatened public safety, and even forced the closure of a major airport. As this episode demonstrates, while we continue to advance UAS technology, it's imperative that we also support the growth of UAS detection and countersurveillance systems. I'm glad to see this NPRM support not just UAS operations but also technology to detect UAS systems when they're being used to commit crimes or threaten public safety. Taken together, the policies in this NPRM will advance a more stable, innovative, and safe UAS ecosystem.

Thank you to the Commission staff who worked on this item. It has my full support.