transportation conformity requirements for this area in accordance with the MOA for rural areas. DAQ worked with NC DOT and other applicable transportation and air quality partners for the area to develop and execute an updated MOA to address the consultation and other applicable transportation conformity SIP requirements such as 40 CFR 93.122(a)(4)(ii) and 40 CFR 93.125(c). This MOA is provided in the docket for this proposed rulemaking.

North Carolina's September 24, 2021, SIP revisions for the Rural Area MOA make many of the same changes as the bi-State Charlotte MOAs and the Great Smoky Mountain Area MOA. With respect to ''Duties of the Parties'' section, the Interagency Consultation Conformity Determination Meeting timing clarification, a typographical error in clause 6.3.1.5, the removal of the ''Termination of Agreement'' section, and the Modifications of Agreement section, the Rural Area MOA makes the same changes as those made in the bi-state Charlotte MOAs. With respect to the definitions for ''Transportation Improvement Program (TIP)'' and ''Statewide Transportation Improvement Program (STIP)'', the Rural Area MOA makes the same changes as the Great Smoky Mountain National Park Area MOA. EPA finds these changes acceptable of the same reasons outlined in Sections II.A and II.B. Further minor, non-substantive changes throughout the document include basic word preference changes, grammatical changes, and the necessary renumbering of sections to incorporate the addition of a clause.

EPA has reviewed the procedures and updates provided in the MOA and has preliminarily determined that it is consistent with the CAA and the applicable transportation conformity requirements at 40 CFR 51.390 and 40 CFR part 93. Therefore, EPA is proposing to approve the inclusion of the updated MOA for the Rural Area into the North Carolina SIP.

III. Proposed Actions

For the reasons discussed above, EPA is proposing to approve North Carolina's September 24, 2021, SIP revisions. Specifically, EPA is proposing to approve the replacement of Transportation Conformity MOAs for the Burlington-Graham MPO, Cabarrus-Rowan MPO, Charlotte Regional Transportation Planning Organization, Durham-Chapel Hill-Carrboro MPO, Gaston-Cleveland-Lincoln MPO, Greater Hickory MPO, Greensboro Urban Area MPO, High Point Urban Area MPO, North Carolina Capital Area MPO, Rocky Mount Urban Area MPO, the Great Smoky Mountains National Park (NPS), and Rural Area (NC DOT). EPA is proposing to find that these actions are consistent with section 110 and 176 of the CAA and will not interfere with any applicable requirement concerning attainment and reasonable further progress or any other applicable requirement of the CAA.

IV. Statutory and Executive Order Reviews

Under the CAA, the Administrator is required to approve a SIP submission that complies with the provisions of the Act and applicable Federal regulations. See 42 U.S.C. 7410(k); 40 CFR 52.02(a). Thus, in reviewing SIP submissions, EPA's role is to approve state choices, provided they meet the criteria of the CAA. These actions merely propose to approve state law as meeting Federal requirements and do not impose additional requirements beyond those imposed by state law. For that reason, these proposed actions:

- Are not significant regulatory actions subject to review by the Office of Management and Budget under Executive Orders 12866 (58 FR 51735, October 4, 1993) and 13563 (76 FR 3821, January 21, 2011);
- Do not impose an information collection burden under the provisions of the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*);
- Are certified as not having significant economic impacts on a substantial number of small entities under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*);
- Do not contain any unfunded mandate or significantly or uniquely affect small governments, as described in the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4);
- Do not have Federalism implications as specified in Executive Order 13132 (64 FR 43255, August 10, 1999);
- Are not economically significant regulatory actions based on health or safety risks subject to Executive Order 13045 (62 FR 19885, April 23, 1997);
- Are not significant regulatory actions subject to Executive Order 13211 (66 FR 28355, May 22, 2001);
- Are not subject to requirements of Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note) because application of those requirements would be inconsistent with the CAA; and
- Do not provide EPA with the discretionary authority to address, as appropriate, disproportionate human health or environmental effects, using practicable and legally permissible methods, under Executive Order 12898 (59 FR 7629, February 16, 1994).

The SIP revisions are not approved to apply on any Indian reservation land or in any other area where EPA or an Indian tribe has demonstrated that a tribe has jurisdiction. In those areas of Indian country, the proposed rules do not have tribal implications as specified by Executive Order 13175 (65 FR 67249, November 9, 2000), nor will they impose substantial direct costs on tribal governments or preempt tribal law.

List of Subjects in 40 CFR Part 52

Environmental protection, Air pollution control, Incorporation by reference, Carbon monoxide, Intergovernmental relations, Lead, Nitrogen dioxide, Ozone, Particulate matter, Reporting and recordkeeping requirements, Sulfur oxides, Volatile organic compounds.

Authority: 42 U.S.C. 7401 *et seq.*

Dated: January 31, 2023.

Daniel Blackman,

Regional Administrator, Region 4.

[FR Doc. 2023–02488 Filed 2–6–23; 8:45 am]

BILLING CODE 6560–50–P

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Parts 1, 87, and 88

[WT Docket No. 22–323; FCC 22–101; FR ID 122915]

Spectrum Rules and Policies for the Operation of Unmanned Aircraft Systems

AGENCY: Federal Communications Commission.

ACTION: Proposed rule.

SUMMARY: In this document, the Federal Communications Commission (''FCC'' or ''Commission'') seeks comment on rules to promote access by unmanned aircraft system (UAS) operators to licensed spectrum to support UAS operations. First, this document seeks comment on service rules for the 5030–5091 MHz band that will provide UAS operators with access to licensed spectrum with the reliability necessary to support safety-critical UAS command-and-control communications links. Second, due to the increasing interest in operating UAS using existing terrestrial flexible-use spectrum networks, this document seeks comment on whether the Commission's current rules are adequate to ensure co-existence of terrestrial mobile operations and UAS use or whether changes to these rules are necessary.

Third, to further promote the safe integration of unmanned aircraft operations in controlled airspace and facilitate flight coordination, this document proposes a process for UAS operators to obtain a license in the aeronautical very high frequency (VHF) band to communicate with air traffic control and other aircraft. Together, these measures will help to promote the growth and safety of UAS operations.

DATES: Comments are due on or before March 9, 2023. Reply comments are due on or before April 10, 2023.

ADDRESSES: You may submit comments, identified by WT Docket No. 22–323, by any of the following methods:

- *Electronic Filers:* Comments may be filed electronically using the internet by accessing the ECFS: *https://apps.fcc.gov/ecfs.*
- *Paper Filers:* Parties who choose to file by paper must file an original and one copy of each filing. Filings can be sent by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.
- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9050 Junction Drive, Annapolis Junction, MD 20701.
- U.S. Postal Service first-class, Express, and Priority mail must be addressed to 45 L Street NE, Washington, DC 20554.
- Effective March 19, 2020, and until further notice, the Commission no longer accepts any hand or messenger delivered filings. This is a temporary measure taken to help protect the health and safety of individuals, and to mitigate the transmission of COVID–19. See FCC Announces Closure of FCC Headquarters Open Window and Change in Hand-Delivery Policy, Public Notice, DA 20–304 (March 19, 2020), *https://www.fcc.gov/document/fcc-closes-headquarters-open-window-and-changes-hand-delivery-policy.*

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

FOR FURTHER INFORMATION CONTACT: Peter Trachtenberg, Mobility Division, Wireless Telecommunications Bureau, (202) 418–7369, or by email to *Peter.Trachtenberg@fcc.gov.* For additional information concerning the proposed Paperwork Reduction Act information collection requirements contained in this document, contact Cathy Williams, Office of Managing Director, at (202) 418–2918 or *Cathy.Williams@fcc.gov.*

SUPPLEMENTARY INFORMATION: This is a summary of the Commission's Notice of Proposed Rulemaking (*NPRM*) in WT Docket No. 22–323, FCC 22–101, adopted on December 23, 2022, and released on January 4, 2023. The full text of this document, including all Appendices, is available for inspection and viewing via the Commission's website at *https://docs.fcc.gov/public/attachments/FCC-22-101A1.docx* or ECFS by entering the docket number, WT Docket No. 22–323. Alternative formats are available for people with disabilities (Braille, large print, electronic files, audio format), by sending an email to *FCC504@fcc.gov* or calling the Consumer and Governmental Affairs Bureau at (202) 418–0530 (voice), (202) 418–0432 (TTY).

Synopsis

I. Discussion

A. UAS Communications in the 5030–5091 MHz Band

1. We propose to adopt a band plan and service rules in the 5030–5091 MHz band to enable UAS operators to use interference-protected control-and-non-payload-communications (CNPC) links. We seek comment on our proposal and on options to make the band available for this purpose. We further seek comment on the costs and benefits of any such options, including the costs and benefits of the specific band plan and service rules options discussed below. We seek comment on measures that will facilitate UAS use and promote equity for these underserved populations.

2. Through this proceeding, we seek to provide UAS operators with access to an additional spectrum resource that may complement other spectrum resources that are currently available or in development. We tentatively conclude that, while other spectrum bands are available for UAS communications, licensing the 5030–5091 MHz band specifically for UAS CNPC will have important public interest benefits. We seek comment on this tentative conclusion and the extent to which the 5030–5091 MHz band may offer unique advantages over other bands in supporting UAS CNPC.

1. Band Plan

3. For the purpose of this band and its service rules, and consistent with the Federal Aviation Administration (FAA) definitions of the terms, we propose to define UAS as an unmanned aircraft (UA) and its associated elements (including communication links and the components that control the UA) that are required for the safe and efficient operation of the UA in the airspace of the United States, and to define a UA as an aircraft operated without the possibility of direct human intervention from within or on the aircraft. We seek comment on these proposed definitions and on any alternatives. We further identify two broad UAS use cases for purposes of determining the appropriate band plan and service rules—non-networked operations, generally occurring within radio-line-of-sight (hereinafter line-of-sight or LOS) of the UAS operator, and network-supported operations, which rely on network infrastructure to go beyond radio-line-of-sight of the operator. Non-networked operations involve flights within a sufficiently localized area that can rely on direct wireless links between the UAS operator's controller and the UA and therefore do not require any supporting network infrastructure. In contrast, network-supported operations rely on deployed network infrastructure, such as cell towers and sites, to relay information between the operator and the UA and may therefore extend far beyond the range of direct wireless links between operator and UA. We seek comment on whether any other UAS use cases should be considered in determining the appropriate band plan and service rules.

4. Hereinafter, we use the term Non-Networked Access (NNA) to indicate spectrum or licenses (*e.g.,* NNA blocks) that would be governed by service rules appropriate to support non-networked communications. Likewise, we use the term Network-Supported Service (NSS) in connection with spectrum or licenses to indicate that the relevant spectrum or licenses would be governed by service rules appropriate to support the provision of network-based services. Further, we propose to use NNA and NSS in the rules to designate the spectrum allocated for non-networked and network-supported use cases, respectively.

5. The Aerospace Industries Association (AIA) suggests that RTCA's terminology for these two use cases should be used. RTCA uses the term ''point-to-point'' for non-networked communications links and the term ''Command-and-Control Communications Service Providers'' to describe network-supported services. We tentatively find that our proposed terminology is more descriptive of the use cases we seek to support, and that the use of the term point-to-point,

which has been long used in Commission rules and orders to reference systems providing a data communication link between two fixed stations, may itself contribute to confusion in this context. We seek comment on the proposed terminology, and on alternatives.

6. To accommodate both NNA and NSS in the 5030–5091 MHz band, we propose to partition the band, to dedicate different segments of spectrum in the band for each use case, and to license each of these segments in a manner that is appropriate to support the relevant use cases. We seek comment broadly on the placement of NNA and NSS spectrum to ensure efficient, reliable, and safe use of the band. We seek comment on whether to make spectrum available for multi-purpose uses, *e.g.,* expansion bands for temporary NNA or NSS use. We seek comment on our proposals and on alternatives.

7. We specifically propose to dedicate at least 10 megahertz of spectrum for NNA operations, and seek comment on this proposal. AIA argues that 10 megahertz will be sufficient to promote deployment while preserving the opportunity for an incremental approach to licensing the band that will better accommodate developing industry standards. We seek comment on AIA's argument. We seek comment on the placement of the NNA spectrum within the band and whether, consistent with AIA's proposal, we should place 5 megahertz blocks at the bottom (5030–5035 MHz) and top (5086–5091 MHz) of the band for NNA use. Alternatively, should we locate the dedicated NNA blocks somewhere internal in the band rather than at the band edges? If so, should we designate the spectrum at the edges of the band for NSS?

8. An analysis by RTCA based in part on the use of an ''online filter-design tool'' finds that filters that sufficiently protect services in the adjacent bands ''would necessitate guardbands unusable by terrestrial CNPC at both ends of the 5030–5091 MHz bands, reducing the 61 MHz of usable passband width to 42–52 MHz depending on the case.'' It further states, however, that ''[c]ustom filter designs could probably provide larger usable passbands than those obtained using the online tool, possibly at the cost of increased size and weight.'' We seek comment on this analysis, and whether fixed guard bands at one or both ends of the band are warranted to protect services in the spectrum adjacent to the 5030–5091 MHz band, including (1) radionavigation-satellite service (RNSS) downlinks in the 5010–5030 MHz band, (2) aeronautical mobile telemetry (AMT) downlinks to support flight testing in the 5091–5150 MHz band, and (3) the Aeronautical Mobile Airport Communications System (AeroMACS) in the 5000–5030 MHz and 5091–5150 MHz bands. Alternatively, does the need to protect adjacent band services argue for dedicating the edge spectrum to something other than NNA assignments, such as satellite?

9. We further seek comment on whether, instead of designating separate upper and lower NNA blocks, we should place all dedicated NNA spectrum together in one contiguous block. Is placement of the NNA spectrum into two or more separate blocks useful for technical or other reasons? Conversely, would providing the spectrum in a single contiguous block reduce interference challenges (*e.g.,* by potentially reducing the adjacency of NNA and NSS blocks) or better support certain channelizations of the band or important use cases that may require channel bandwidths of more than 5 megahertz? Further, with regard to any technical standards that commenters may recommend applying to services or equipment in the 5030–5091 MHz band, we seek comment on whether these standards require the use of contiguous spectrum.

10. With regard to the remaining spectrum in the band, we seek comment on how to structure it consistent with the goal of dedicating a segment of spectrum for exclusive use NSS licenses. We seek comment on how much of the spectrum to dedicate for NSS operations, and how we should license any remaining spectrum. For the spectrum that we dedicate to NSS operations, we seek comment on the placement of the NSS blocks and on the appropriate block size for NSS licenses to promote investment and competition and support the current and evolving bandwidth needs of NSS services. In the current record, AIA proposes 5 to 10 megahertz blocks, and Wisk supports 10 megahertz blocks. We seek comment on these options and on any other appropriate block sizes. What size spectrum blocks would be necessary to support CNPC services? What block size would be appropriate if we permit NSS licensees to support non-CNPC communications? Would the flexibility of larger block sizes (such as 10 or 20 megahertz) better facilitate mixed CNPC and non-CNPC use?

11. While we anticipate that a significant portion of this remaining spectrum would be designated for NSS, we seek comment on whether we should use a portion of the spectrum for opportunistic use by both NNA or NSS licensees (multi-purpose use). Should we instead use a portion of the spectrum to increase the amount of spectrum dedicated to NNA operations? To the extent we dedicate spectrum for NSS licenses, we also seek comment on making that spectrum available for NNA operations on an interim, opportunistic basis. Under this approach, NNA users, in addition to having access to dedicated NNA spectrum, could use frequencies in a dedicated NSS block in geographic areas where the NSS licensee has not yet deployed an operating network. Once a network is deployed and operational in a particular area, NNA users would no longer have opportunistic access to the spectrum in that area. This approach would enable the NSS spectrum in an area to be used productively prior to the issuance of NSS licenses and deployment of networks, while providing NSS licensees with complete exclusivity once their systems are deployed. We seek comment on the costs and benefits of this approach, including its technical and economic feasibility, and on alternative approaches to NNA opportunistic access or alternative methods of ensuring productive usage of dedicated NSS spectrum prior to network deployment.

12. With these issues and questions in mind, we seek comment broadly on an appropriate band plan for the 5030–5091 MHz band. As one possible option for structuring the band overall, we invite comment on:

- Dedicating 10 megahertz of spectrum for NNA operations, with 5 megahertz blocks at the bottom (5030–5035 MHz) and top (5086–5091 MHz) of the band.
- Dedicating 40 megahertz of spectrum for NSS operations, divided into 4 licensed blocks of 10 megahertz each, with NNA opportunistic access as described above.
- Making the remaining 11 megahertz available for temporary, opportunistic use by either NNA users or NSS licensees (multi-purpose use).

We also seek comment on alternatives to this band plan, including plans that designate the edge spectrum for some purpose other than NNA operations (such as for NSS operations) or that provide different amounts of spectrum for NNA, NSS, and/or multi-purpose use than those presented in the example discussed above.

13. We further invite comment on alternative approaches to allocating the 5030–5091 MHz band for the support of UAS. For example, AIA proposes that we allocate and license the 51 megahertz between 5035 MHz and 5086 MHz on a geographic area basis in a

phased, incremental manner over a period of years—*e.g.,* allocating and licensing only 5 megahertz in the first year, and then licensing additional spectrum over the following years with blocks and geographic areas sized according to user demand and service provider applications. AIA suggests that such an incremental approach would help the Commission to accommodate different UAS markets defined by different UAS missions that are expected to emerge over time. We seek comment on this possible approach, and more generally on whether we should allocate only a portion of the band at this time and defer allocation of the remainder of the band. We further seek comment on whether we should preserve part of the band at this time for experimental use, or for potential future satellite-based CNPC that relies on the aeronautical mobile-satellite route (R) service (AMS(R)S) allocation in the band.

14. As another alternative, Qualcomm recommends that the Commission allocate 20 megahertz for direct UA-to-UA communications, including communications between the aircraft to facilitate detect and avoid (DAA) operations, and communications to broadcast Remote ID information. Qualcomm proposes that the remaining 41 megahertz of spectrum be licensed in two 20.5 megahertz blocks or four 10.25 megahertz blocks to network providers for the provision of NSS CNPC services and for payload transmissions to the extent that capacity is not needed for CNPC. We seek comment on this option and on Qualcomm's assertion that supporting the functionalities of DAA and Remote ID broadcasts will require 20 megahertz of 5030–5091 MHz band spectrum. We also seek comment on the compatibility of UA-to-UA transmissions and UA broadcast with CNPC links between a ground control station and a UA. If they are not compatible, should a portion of the band be designated exclusively for UA-to-UA or UA broadcast transmissions, and if so, how much spectrum should be designated for this purpose?

15. We seek comment on whether we should establish any internal guard bands, such as between the NNA and NSS blocks, or whether we can rely on appropriate technical rules to ensure that UAS operations in one block do not cause harmful interference to UAS operations in adjacent spectrum blocks. We request that parties proposing guard bands provide detailed technical justification and specify the width and placement of the proposed guard bands. We further seek comment on whether fixed guard bands at one or both ends of the band are warranted to protect services in the spectrum adjacent to the 5030–5091 MHz band, including (1) radionavigation-satellite service (RNSS) downlinks in the 5010–5030 MHz band, (2) aeronautical mobile telemetry (AMT) downlinks to support flight testing in the 5091–5150 MHz band, and (3) the Aeronautical Mobile Airport Communications System (AeroMACS) in the 5000–5030 MHz and 5091–5150 MHz bands.

2. Dynamic Frequency Management System

16. To address the complexities involved in coordinating shared interference-protected access to the 5030–5091 MHz band, we propose that access to the band be managed by one or more dynamic frequency management systems (DFMS). We use the term DFMS to describe a frequency coordination system that, in response to requests from UAS operators for frequency assignments in NNA spectrum, would determine and assign to the requesting operator, through an automated (non-manual) process, temporary use of certain frequencies for a particular geographic area and time period tailored to the operator's submitted flight plan. For the duration of the assignment, the operator would have exclusive and protected use of the assigned frequencies within the assigned area and timeframe, after which the frequencies would be available in that area for assignment to another operator. We contemplate that each DFMS would be administered by a private third party, which we refer to as a DFMS administrator. We further contemplate that each system would be capable of coordination-related activities across the entire 5030–5091 MHz band. While we contemplate that NSS licensees would be responsible for the use and coordination of frequencies within the scope of their licenses, requiring a DFMS to be capable of coordination across the entire band would enable a DFMS to provide dynamic access to any portions of the 5030–5091 MHz band that are, in the initial order or subsequently, assigned for NNA use, as well as to implement opportunistic access to portions of the band that are assigned for NSS use as appropriate. We tentatively conclude that these systems could (1) facilitate the efficient and intensive use of a limited spectrum resource for interference-protected CNPC; (2) give UAS operators access to reliable CNPC for operations where those communications links are safety-critical; (3) enable UAS operators to gain spectrum access in a timely, efficient, and cost-effective manner; (4) enforce compliance with frequency assignments through access controls, checking existing frequency assignments, providing updates in authorized databases, and other mechanisms; (5) protect critical communications inside the band and in adjacent spectrum; (6) support opportunistic use in unused portions of spectrum sub-bands designated for exclusive use licenses; and (7) promote rapid evolution of the use of the band in response to technological, market, or regulatory changes, such as if the Commission deploys spectrum in the band incrementally or, in the future, finds that modifying the access rules in a particular sub-band is in the public interest to better meet market demand. We seek comment on our proposal and its costs and benefits.

17. The support in the current record for the use of a DFMS, along with the success of the 3.5 GHz band Spectrum Access System (SAS) and the potential to build on the SAS experience and technology, lead us to tentatively conclude that a DFMS solution can feasibly be implemented to enable near-term use of the band with the benefits discussed above. We seek comment on our tentative conclusion, and the extent of interest in providing such DFMS services in the 5030–5091 MHz band. In addition to the specific questions below, what other aspects of the 3.5 GHz band SAS approach would be appropriate here, and what aspects should be changed? How should the Commission supervise the operations of the DFMS?

18. We propose to permit more than one DFMS to operate in the band, each providing access to frequencies nationwide, and to require coordination and communication between them to ensure that the assignments of one DFMS are consistent with the assignments of the others. We seek comment on this proposal.

19. *DFMS requirements and responsibilities.* We seek comment on the appropriate regulatory framework to establish for a DFMS, including its requirements and responsibilities and the requirements and responsibilities of a DFMS administrator. We seek comment on whether and to what extent we can draw on the requirements and responsibilities governing the SAS and SAS administrators in the 3.5 GHz band. For example, we seek comment on whether to follow our policy for the 3.5 GHz SASs and establish only the minimum high-level requirements necessary to ensure the effective development and operation of fully functional DFMSs, leaving other requirements to be addressed by the

DFMS administrators and multi-stakeholder groups. If we follow this policy, what high-level requirements should we establish?

20. One of the most important responsibilities of the DFMS would be to ensure that UAS operators receiving 5030–5091 MHz assignments and operating consistent with their assignments are protected from harmful interference and that they do not cause harmful interference to other protected operations in the band and adjacent bands, including protected Federal operations. We seek comment on whether the Commission should simply establish an appropriate high-level requirement on the DFMS, such as a requirement to provide protected access to spectrum appropriate to cover a submitted and valid request, to the extent such spectrum is available, and defer to the DFMS administrators, or potentially a multi-stakeholder group, to determine the appropriate means of doing so. To the extent the Commission should codify more detailed requirements, we seek comment on all measures the Commission should adopt to facilitate the ability of the DFMS to provide reliable, interference-protected assignments, including any necessary specifications, requirements, responsibilities, authority, processes, or remedies. We further seek comment on the interference mitigation techniques that can be employed by UAs, such as geo-fencing.

21. At a minimum, we propose to require that a DFMS administrator adopt procedures to immediately respond to requests from Commission staff for information they store or maintain and to comply with any Commission enforcement instructions they receive, as well as to securely transfer all the information in the DFMS to another approved entity in the event it does not continue as the DFMS Administrator at the end of its term. We seek comment on these proposals. In addition, what requirements should we impose on the DFMS or DFMS administrator with regard to retention of records and information, including registration and assignment records? Should we require retention of all such information for at least five years? What requirements should we adopt to ensure data security in DFMS operations, including the security of end-to-end communications between operators and a DFMS and the security of information stored by a DFMS?

22. What requirements, if any, should be imposed on NNA operators in the band to help ensure the DFMS's ability to provide interference-protected access or to promote more robust or efficient use of the spectrum? Should these requirements be high-level, with additional development through a DFMS administrator or multi-stakeholder group, or should they be more detailed? What information should we require operators to provide to the DFMS regarding ground stations and unmanned aircraft stations? Should that information be provided prior to any requests, with an assignment request, or on an ongoing or periodic basis during an operation? For example, should we require operators to provide ground station geographic location, effective isotropically radiated power (EIRP), and/or antenna patterns? Assuming a DFMS has the necessary information about the ground station, is information about the location or transmitter characteristics of the UA unnecessary to prevent harmful interference? Should we require an active UAS relying on an NNA assignment in the band to provide a DFMS with the UA information that must be broadcast under the Remote ID rule or some subset or variation of that information? Should an operator be required to provide the DFMS specific information about the UA, including its manufacturer, model, or other technical or identifying information? Should an operator be required to affirmatively communicate to the DFMS, in real time or within a certain period of time of the relevant event, the initiation and termination of the flight or, alternatively, the initiation and termination of the operator's use of the assigned frequencies? Are there other circumstances or information (aside from the request) that the operator should be required by rule to communicate to the DFMS? Should any requirements be imposed on UAS operators relying on NSS networks to facilitate the DFMS's ability to provide interference-protected NNA assignments?

23. We further seek comment on whether to mandate that a UAS operator register with a DFMS as a precondition to requesting NNA frequency assignments, and if so, what requirements we should impose with respect to such registration. Should the Commission simply require registration and leave the details to be developed by, for example, the DFMS administrators or a multi-stakeholder group? To the extent the Commission should codify further details, what information should be included with registration? Should UAS operators be required to register ground and UA stations? Should we impose requirements with regard to if and when registration should be updated and, if so, what is the appropriate duration of the initial registration term and the renewal term? Under what circumstances should the Commission or the relevant DFMS administrator revoke a UA operator's registration? While we envision that any registration requirements would apply only to operators seeking NNA assignments, we seek comment on whether to require operators relying on a network service in NSS spectrum to register with a DFMS.

24. We also seek comment on what requirements, if any, we should impose with respect to the submission of UAS operator requests for NNA assignments, and conversely what, if any, details of the request process should be left to be developed by a multi-stakeholder group. For example, should we impose specifications of what information should be included in a request, and if so, what data should we require? Should requests include the relevant ground and unmanned aircraft stations that will be used in the operation, and if so, how should these be identified? To the extent we permit mobile ground stations, should requests provide a specification of the route of the mobile ground station over time and the times at which the station will reach specific locations in order to enable frequency assignment to consider the range coverage of the station as a function of time? Should we require submission of a flight plan, and if so, what information should the flight plan include, and in what format? For example, should it specify time of use, and flight positions and flight altitude over the course of the flight plan, as suggested by AIA? Should an operator be required to submit requests no more than a certain specified time period in advance of a flight?

25. As a general matter, should a DFMS grant a frequency assignment for the duration and other parameters requested, provided the unassigned spectrum is available to meet the request? Alternatively, should limits or restrictions be placed on what can be granted?

26. As several parties have noted, operators may need to revise their assignments after a flight has commenced (*e.g.,* where the flight needs to deviate from its anticipated flight path and UAS CNPC transmissions for the revised flight would not be covered by the original assignment, or where a flight takes longer than provided under the assignment). We seek comment on any rules we should adopt to enable or facilitate the filing and timely processing of such requests for revised assignments or to otherwise address an operator's mid-flight need for revised

assignment. Do we need to adopt any rule to address cases where the revised request cannot be granted consistent with other previously granted assignments?

27. In the 3.5 GHz band, SASs may require fixed stations to implement reassignment to new frequencies, reduction of the permitted transmitting power level, or cessation of operations, as necessary to avoid or eliminate harmful interference and implement spectrum access priorities. Is an active management approach feasible and appropriate, and if so, what regulatory requirements should be adopted to enable or implement such an approach? If not feasible, what approaches or mechanisms will be available to the DFMS to ensure the reliability of communications? In particular, given that the proposed assignments would be limited in both frequency, time, and geography, what requirements, procedures, penalties, or other measures should be in place to prevent or address (1) flights that use unauthorized frequencies; (2) flights that occur outside an authorized time period, such as a flight that exceeds its authorized duration; or (3) flights that occur outside an authorized area. If a DFMS's role is merely to reserve appropriate spectrum for UAS flights, and a DFMS takes no other active measures to ensure or enforce compliance with the assignments or the protection of operations, will spectrum access be sufficiently reliable for mission critical purposes?

28. *Fees.* Under the 3.5 GHz rules, an SAS administrator is authorized to charge users ''a reasonable fee'' for the provision of its services, and the Commission ''can require changes to those fees if they are found to be unreasonable.'' We propose to adopt a similar provision authorizing the administrator of a DFMS to charge reasonable fees for its provision of services, including registration and channel assignment services, and to permit parties to petition the Commission to review fees and require changes if they are found to be excessive. To encourage efficient use of the limited spectrum resource and discourage any attempt at warehousing, we seek comment on specifically authorizing reasonable usage-based fees, and on standards and approaches for establishing the amounts of such fees.

29. *Selection process.* We seek comment on the process for selecting the DFMS administrators, and whether the 3.5 GHz SAS approval process could serve as a model. Under the approach for SAS approval, the Commission delegated authority to the Wireless Telecommunications Bureau (WTB) and the Office of Engineering and Technology (OET) to administer the process and provided that (1) the Bureaus would issue a Public Notice requesting proposals from entities desiring to administer a SAS; (2) applicants would be required, at a minimum, to demonstrate how they plan to meet the Commission's rules governing SAS operations, demonstrate their technical qualifications to operate a SAS, and provide any additional information requested by WTB and OET; (3) based on these applications, WTB and OET would determine whether to conditionally approve any of the applicants; and (4) any applicants that received conditional approval would be required to demonstrate that their SASs meet all the requirements in the rules and any other conditions the Bureaus deemed necessary, and at a minimum, to allow their systems to be tested and analyzed by Commission staff. We seek comment on adopting this approach. In particular, we seek comment on facilitating the potential selection of multiple DFMSs through an application and certification process by which any entity found to meet the requirements can be the administrator of such a system, and we seek comment on what eligibility requirements should be set and whether (or to what extent) they should be codified or established through a separate process. We also seek comment on whether we should provide a testing or trial phase for DFMS technology prior to the submission of applications, to facilitate or inform the requirements of the application process. Following the SAS model, we propose to delegate jointly to WTB and OET the authority to administer the selection process and make the selection. We seek comment on what role the FAA and National Telecommunications and Information Administration (NTIA) should have in setting up the process, reviewing applications, and making the selection.

30. *Coordination with flight authorization.* In addition to spectrum access, *i.e.,* authorization to transmit, UAS operators also need approved or otherwise authorized access from the FAA to conduct flights in the airspace of the United States. We seek comment on whether and how frequency assignments should be coordinated with airspace authorization for low altitude, high altitude, and terminal (departure/arrival) operations. For example, should a DFMS be required to determine that a requesting party has any necessary flight authority as a condition of granting a spectrum assignment request? If so, we seek comment as to whether and how a DFMS would interact with air traffic control or the relevant UAS Traffic Management (UTM) systems (such as the Low Altitude Authorization and Notification Capability (LAANC) system), or otherwise obtain information regarding airspace approvals, authorizations, or availability.

31. *Alternative approaches to dynamic spectrum access.* We seek comment on other options to enable dynamic spectrum access to the 5030–5091 MHz band. Some parties suggest that we adopt some form of cognitive radio solution, in which UAS radios would directly detect and identify available spectrum channels. They argue that a centralized system like the DFMS will be complex and labor intensive to use, will be inefficient in spectrum assignments and vulnerable to spectrum warehousing, and will have difficulty ensuring link protection and responding quickly to developments such as changes in flight plans while a UA is already in flight. We seek comment on these concerns and whether they can be addressed by a DFMS, and we seek comment on the feasibility, costs, and benefits of alternative options as compared to the DFMS discussed above, and whether such alternatives would be sufficiently reliable to support even the most safety-critical uses such as flights in controlled airspace. We further seek comment on whether there are existing technologies that could be applied or adapted to implement these alternative approaches, and on any standards work or other studies regarding the safety and reliability of links under such systems.

32. We seek comment on whether a similar system to the 6 GHz database or the white space database established in the TV bands could be adopted for NNA operations in the 5030–5091 MHz band, under which 5030–5091 MHz radios would be required to directly and periodically query a central database for available channels. Given that the 6 GHz and white space systems are implemented to enable unlicensed devices to access spectrum without interference protection, we seek comment on whether this type of system could be suitable to implement interference protection for UAS NNA operations. If the Commission adopts rules providing for the establishment of such a system, should we require that the system database be updated in real time with relevant parameters of the NNA systems currently in operation? We further seek comment on whether any such system and any tool used to perform the interference analysis should be certified and approved for use by the

Commission and/or other appropriate authorities prior to operation.

33. In the event that we adopt rules providing for the establishment and operation of a DFMS or some other coordination system or process, there may be a significant period of time before such coordination system is operational in the band and some operators may want protected access to the band during this interim period. Accordingly, we seek comment on whether to establish some method by which operators can get temporary protected access to frequencies in the 5030–5091 MHz band, or a portion of the band, during this interim period.

3. Multi-Stakeholder Group

34. We seek comment on a possible role for a multi-stakeholder group to help develop the requirements and processes applicable to the DFMSs, as well as to study standards and interference issues associated with UAS operations in the band. We seek comment on whether, consistent with the successful approach in the 3.5 GHz band, we should encourage a multi-stakeholder group to address implementation issues in the 5030–5091 MHz band, but without the Commission formally designating such a group or imposing a formal process for how the group reaches its determinations or recommendations. If such a multi-stakeholder group were to be formed by third parties, what selection procedures might be desirable to ensure that the group appropriately reflects the diversity of UAS stakeholders? What role might Federal agency stakeholders have in this process? We seek comment on these and any additional procedures or approaches that a multi-stakeholder group might implement, particularly in light of the positive experience with the 3.5 GHz band stakeholder group.

35. Assuming there is a role for a multi-stakeholder group, we seek comment on the appropriate extent of that role and the responsibilities it might most usefully undertake. We seek comment on the matters a multi-stakeholder group should address with consensus standards or other determinations, or with the development of recommendations to one or more of the stakeholder agencies. We further seek comment on the matters that the Commission should address independently of any multi-stakeholder group and the rules it should adopt to establish a basic regulatory framework to govern the 5030–5091 MHz band and the DFMSs.

4. Scope of Permissible Services

36. As discussed above, the Commission added an AM(R)S allocation in the 5030–5091 MHz band to support UAS communications. AM(R)S is reserved exclusively for communications relating to the safety and regularity of flight, primarily along national or international civil air routes. Consistent with the scope of the allocation and the expressed purpose for its incorporation, we propose to permit only CNPC and to define CNPC as any UAS transmission that is sent to or from the UA component of the UAS and that supports the safety or regularity of the UA's flight. We seek comment on these proposals and on alternatives that would be consistent with the allocation and its purpose. Should we alternatively define CNPC to cover any communications to or from a UA other than payload communications, and to define payload as information sent to achieve mission objectives? RTCA DO–362A, which provides Minimum Operational Performance Standards (MOPS) for UAS CNPC in the 5030–5091 MHz band, states that ''payload communications,'' for purposes of the standard, ''specifically include communications associated with the UA mission payloads, which do not contain safety-of-flight information,'' and clarifies that ''[s]afety-of-flight information is any information/data sent to or received from the UA that is necessary to ensure the UAS is operated/operating in a manner that protects people and/or property from harm due to unintentional events.'' We seek comment on whether to adopt these or similar terms to define the scope of permissible CNPC. NTIA proposes that we limit the band to a subset of CNPC, specifically communications for the control of the UA and other ''safety-critical functions,'' in order to limit UAS use to ''essential services.'' RTCA DO–362A similarly provides that CNPC includes ''[d]ata and information sent to/from the Pilot Station and the UA for the control of the UA and other safety-critical functions.'' We seek comment on this option, on the costs and benefits of limiting the band to only the ''safety-critical'' communications, on what types of communications would be considered ''safety-critical,'' and what, if any, types of non-payload but safety-related communications would not be considered ''safety-critical.'' More generally, should we restrict communications to a subset of CNPC? We seek comment on whether dual-purpose communications should be permissible if one of the purposes falls within the permissible scope.

37. We seek comment on whether, instead of a general definition of scope or, potentially, as a clarifying and non-exclusive supplement to a general definition, we should specify certain categories of communications that are covered, such as (1) telecommands to the UA; (2) telemetry from the UA that is relied upon for flight guidance or other flight safety-related purposes, such as geo-fencing to protect sensitive areas, *i.e.,* Microwave Landing System sites, radio astronomy sites, adjacent licensees, etc.; (3) DAA-related transmissions; (4) video transmissions from the UA relied upon for flight guidance or other flight safety-related purposes; (5) Air Traffic Control communications relayed via the UA; and (6) remote identification transmissions. We seek comment on whether permissible communications should be restricted to communications between the control station and the UA station, *i.e.,* excluding broadcast from the UA or UA-to-UA communications. We further seek comment on whether we should establish priorities among different categories of CNPC, or leave the rules flexible on this matter, with such prioritization potentially to be considered and developed through appropriate standards development by multi-stakeholder groups.

38. We note that the regulatory definition of AM(R)S limits the allocation to communications ''relating to safety and regularity of flight, *primarily along national or international civil air routes.*'' As the allocation does not require that communications be exclusively for flights along such air routes, we propose not to restrict the scope of permissible CNPC services to such communications. We seek comment on this proposal and the extent to which operations outside civil air routes will need access to the 5030–5091 MHz band for CNPC (as opposed to being able to rely on other spectrum solutions that may or may not provide the same level of reliability or air safety assurance). Assuming some measure is necessary or appropriate to reflect the focus on flights primarily along national or international civil air routes, we seek comment on whether it would be sufficient to ensure that the applicable rules and technical standards provide the necessary reliability and safety to support the use of the band for such flights.

39. We also seek comment on whether we should restrict NNA to CNPC but permit NSS licensees a broader scope such as a scope permitting UAS payload communications or permitting both

UAS and non-UAS communications, provided that licensees ensure the safety and reliability of CNPC and ensure that communications associated with the safety of flight always have both priority and preemption over other communications. We seek comment on whether such an expansion of scope would be permissible under section 303(y) of the Communications Act, which places certain limits on the Commission's authority to ''allocate electromagnetic spectrum so as to provide flexibility of use.''

40. If we conclude that NSS licensees should be permitted a broader scope of permissible communications on an ancillary basis, we seek comment on adding an appropriate allocation if necessary, on what type of allocation should be adopted to support the broader scope, on whether to subject the allocation to secondary status under the AM(R)S allocation and to the limitations applicable to the AM(R)S allocation, and on any measures we should adopt to ensure that the primary use of the spectrum is for CNPC. Should we rely on appropriate multi-stakeholder groups to develop the details of requirements to implement prioritization and preemption? Should any mechanisms for implementing preemption and prioritization be subject to specific review and approval by the Commission, the FAA, and/or an appropriate third-party group?

5. Eligibility Restrictions

41. We propose that any entity be eligible to obtain a 5030–5091 MHz NSS license other than those precluded by section 310 of the Communications Act and those that are barred under 47 U.S.C. 1404 from participating in auctions. We seek comment on this proposal and whether eligibility should be more restricted. We further seek comment on how, in this context, we should interpret section 310(b), which imposes restrictions on who can hold or be granted a ''broadcast or common carrier or aeronautical en route or aeronautical fixed radio station license.'' Under the various authorization proposals discussed herein, would a licensee be considered as holding a ''common carrier[,] aeronautical en route or aeronautical fixed radio station license''? If so, how should we evaluate any foreign-ownership holdings?

42. We also seek comment on whether to provide that any entity is eligible to operate NNA stations using assignments from a DFMS other than those precluded by section 310 from holding station licenses. Given our proposal elsewhere to license NNA stations by rule, we seek comment on whether section 310 ownership restrictions, which apply to ''station licenses,'' apply to operators of stations licensed by rule. We further seek comment, if section 310 does not apply to operators of licensed-by-rule stations, on whether NNA station operators, or the parties receiving assignments from a DFMS for such operation, should be subject to eligibility restrictions comparable to those imposed by section 310 on station licensees.

43. NTIA recommends that, to be eligible for a license for 5030–5091 MHz UAS operations, an applicant be required to certify that it has the requisite FAA remote pilot certification or, in the case of an organization, to certify that it will only utilize individuals with this qualification for its UAS operations in the band. Compliance by 5030–5091 MHz operators with applicable FAA remote pilot regulations will be critical to the safe operation of UAS in the 5030–5091 MHz band, and we seek comment on the best approach to achieve this goal, and on NTIA's proposal as one option. To the extent that we adopt a licensed-by-rule model for NNA as proposed, however, UAS operators will not be required to submit individual license applications, and accordingly, there will be no individual license applications in which UAS operators could make the proposed certifications. Further, provision of network-based NSS would likely involve a network provider's provision of CNPC services to other entities, and thus, it is likely the relevant UAS operator will be neither a licensee nor an employee of a licensee. Accordingly, we seek comment on whether requiring license applicants to certify that they have the requisite FAA remote pilot certification or will utilize operators with such qualifications is a practical option in either the NNA or NSS context.

44. We further seek comment on the costs and benefits of conditioning either NNA or NSS eligibility on a certification that the party has the necessary FAA remote pilot certification or compliance with other FAA requirements. We seek comment on whether it provides a significant regulatory benefit to specifically limit eligibility in this manner, given that UAS operators using 5030–5091 MHz spectrum will in any case be subject directly to FAA rules and enforcement and would not be able to lawfully operate unless they comply with all applicable FAA requirements. We also seek comment on any administrative concerns from having the Commission potentially be required to interpret and enforce the regulatory regime of another agency.

45. To the extent that there should be some mechanism in addition to the FAA's enforcement authority to adequately ensure that use of the 5030–5091 MHz band will be consistent with FAA requirements, we seek comment on whether we can instead rely on the DFMS and NSS licensees to ensure that UAS operators have the necessary FAA approvals. For example, to address NNA users, users registering with a DFMS could be required to make the requisite certification as a condition of registration. Alternatively, we might impose a more general requirement on a DFMS to adopt measures that reasonably ensure that operators have the requisite FAA remote pilot authority, and defer to the DFMS administrator (or a multi-stakeholder group) on specific mechanisms to implement this requirement. We seek comment on these and other alternatives.

6. Non-Networked Access (NNA) Service Rules

46. *Licensing rules.* We seek comment on the licensing regime or mechanism we should adopt to enable authorization of NNA operations in the 5030–5091 MHz band and the costs and benefits of any proposed approach. We propose to reduce the administrative burdens on operators and the Commission by adopting a licensing approach that would not require individual licensing of these numerous operators and/or stations. Specifically, we propose to implement a licensed-by-rule authorization for aircraft and ground stations in the band, as recommended by AIA and others. Under this framework, operators would not be required to apply for individual spectrum licenses for themselves or their mobile or ground stations in order to conduct NNA operations in the band. Instead, parties using rule-compliant stations and operating in compliance with the rules would only need to obtain the requisite temporary frequency assignment from the DFMS in order to transmit in the band in the requested location, frequency, and timeframe. We further propose to permit the stations used by the operator on the ground to send and receive signals to the UA to be either fixed stations or mobile stations (such as hand-held controllers). As used in this document, the term ''mobile station'' refers to a station ''intended to be used while in motion or during halts at unspecified points.'' We seek comment, however, on whether to require all NNA ground stations in the band to be fixed stations, and on the costs and benefits of permitting the use of mobile ground

stations. To what extent would prohibiting such stations facilitate coordination in the NNA portion of the band, or reduce the likelihood of harmful interference, failures to comply with assignments, or challenges with administering or policing the system? If we do not permit mobile ground stations, should we differentiate ''portable'' stations, *i.e.,* stations that can be moved but are not intended to be used while in motion?

47. Section 307(e) of the Act authorizes the Commission to adopt a licensed-by-rule approach for certain specific categories of services, including the ''citizens band radio service,'' and also expressly delegates to the Commission the discretion to define the scope of the term ''citizens band radio service.'' In the Commission's rules, the citizens band radio service is defined as ''any radio service or other specific classification of radio stations used primarily for wireless telecommunications for which the FCC has determined that it serves the public interest, convenience and necessity to authorize by rule the operation of radio stations in that service or class, without individual licenses, pursuant to 47 U.S.C. 307(e)(1).'' We tentatively find that licensing by rule of NNA stations would serve the public interest, convenience, and necessity, and accordingly, we propose to implement licensing by rule by including NNA within the scope of the citizens band radio service. We seek comment on our tentative conclusion and proposal, on the scope of our authority under section 307(e) to adopt a licensed-by-rule approach to UAS operations, and on alternative licensing approaches we might adopt that would not require individual licensing of operators or stations in the band.

48. Section 307(e)(1) also expressly authorizes licensing by rule in ''the aviation radio service *for aircraft stations*'' but does not provide an equivalent grant of authority to adopt licensing by rule for aviation service ground stations. We seek comment on whether we nevertheless have authority in this case to adopt licensing by rule for both aircraft and ground stations in the aviation service.

49. *Technical requirements.* We seek comment on appropriate technical requirements to govern 5030–5091 MHz NNA equipment and operations. In the current record, NTIA, AIA, and many other parties support adoption of the technical requirements in the RTCA DO–362A standard for this purpose. RTCA DO–362A contains MOPS for terrestrial-based (*i.e.,* non-satellite) CNPC point-to-point or point-to-multipoint links in the 5030–5091 MHz band, including power limits, emission limits, and frequency accuracy requirements. We propose to adopt the RTCA DO–362A standard or technical requirements based on that standard to govern NNA equipment and operations and seek comment on this proposal. We seek comment on the adequacy of the RTCA DO–362A specified equipment and operational performance requirements, including both transmitter power and receiver input power, and required minimum coupling loss (separation distance) between ground and airborne CNPC radios and emissions from other licensed radio services.

50. We seek comment on an appropriate measure of CNPC link reliability to assess RTCA DO–362A and other standards, on the specific anticipated level of CNPC link reliability through radios compliant with the RTCA DO–362A standard, and on any available data that confirms that reliability. We seek comment on any current or past operation of equipment compliant with RTCA DO–362 or RTCA DO–362A, on the results of any such operations, and on the extent to which they support or raise issues or concerns about incorporation of the standard as the governing technical framework for the 5030–5091 MHz band. We also seek comment on whether parties have deployed experimental UAS equipment in the 5030–5091 MHz band in reliance on any other technical standard. Is there any benefit to requiring formal experimental trials or testing for 5030–5091 MHz band equipment?

51. We also seek comment on any costs or disadvantages in imposing the RTCA DO–362A standard. For example, we seek comment on whether and to what extent imposition of this standard may limit the scope of UAS operations that can make use of links in the band. We also seek comment on whether any such limitations are a result of hard constraints codified in the standard on the scope of UAS operations that may occur consistent with the standard specifications, or instead are a consequence of practical constraints, such as if the standard requires the development and installation of radio equipment that may be too heavy for some UA to carry.

52. Canada states that some technical incompatibilities have been identified between RTCA DO–362A and a proposed standard by the European Organization for Civil Aviation Equipment (EUROCAE) for satellite-based CNPC in the same band, designated draft ED–265, and asserts that adoption of the RTCA DO–362A standard without addressing the incompatibilities may create difficulties in managing the operation of CNPC links in support of international UAS operations. We seek comment on these concerns, the nature of the incompatibilities, and what, if any, measures, requirements, or restrictions are necessary to address them. We note that RTCA has been considering the ''ED–265/DO–362 interference issue.'' We seek comment on any determinations that have been made regarding these incompatibilities and whether the issue is adequately addressed in the current RTCA DO–362A version of the standard or will be addressed in a future version. If revisions to RTCA DO–362A are necessary or appropriate to address these issues, we seek comment on whether the next version of the standard is anticipated to be backwardly compatible with RTCA DO–362A, and if not, whether adoption of final rules should be deferred until these issues are resolved in a new version of the standard. We seek comment on whether any coordination or other requirements are necessary to ensure adequate protection of foreign satellite-based CNPC services in the band, particularly insofar as they may operate near United States jurisdictional boundaries. We also note that footnote 5.443C of the Table of Frequency Allocations limits the use of the 5030–5091 MHz band to ''internationally standardized aeronautical systems.'' We seek comment on whether this provision requires the Commission to adopt a standard that is compatible with the EUROCAE standard, and whether RTCA DO–362A would meet our obligations under footnote 5.443C.

53. If we incorporate the RTCA DO–362A standard into our rules, we seek comment on whether to do so through adoption of a general requirement that, to be certified for use under or operated under the NNA rules, all radio equipment must comply with the requirements of RTCA DO–362A, rather than to separately incorporate the various technical requirements of RTCA DO–362A (*e.g.,* power, frequency stability, and emission limitations) into the service rules. If we adopt a general requirement to comply with RTCA DO–362A, we propose to also separately codify requirements for power and emission bandwidth based on the RTCA DO–362A standard, to provide clarity and ease of reference in the rules. If, alternatively, we do not have a requirement of general compliance with RTCA DO–362A, but require compliance with only selected

provisions of the standard, which provisions or requirements from RTCA DO–362A should we impose? Which specific provisions of RTCA DO–362A are necessary for compatible use of the 5030–5091 MHz band? Should the Commission's technical framework require compliance more broadly with section 2, the Equipment Performance Requirements and Test Procedures applicable to the link system radios, or both sections 2 and 3, the latter of which includes performance standards for the link system when installed in a UA and ground location? Alternatively, is it sufficient, for purposes of establishing the baseline technical framework, to require compliance with the specific frequency capture range (which includes a frequency accuracy standard), power limits, and emission limits stipulated by the standard?

54. RTCA states that emission limit requirements should also require equipment compliance with the 50 ms Time Division Duplex (TDD) requirements specified under section 2.2.1.3 of the standard. It asserts that use of non-TDD systems or TDD systems with different time length frames operating in the 5030–5091 MHz band within the same radio horizon as RTCA DO–362A compliant equipment will cause unacceptable levels of interference. We seek comment on RTCA's assertion and recommendation, and whether adoption of the standard for NNA will necessarily require all equipment in the band, including equipment in neighboring NSS blocks, to use RTCA DO–362A compliant TDD equipment to avoid harmful interference to NNA operations.

55. We seek comment on whether any of the general technical requirements in subpart D of part 87 should apply to NNA equipment. NTIA proposes, for example, that in addition to meeting the out-of-band emissions limits in RTCA DO–362A, we should also require equipment to meet the out-of-band emissions limit specified in § 87.139(c). RTCA argues, however, that the current requirements of § 87.139(c) are less stringent than those in RTCA DO–362A, and that the Commission should just require compliance with the latter. L3Harris Technologies (L3Harris) asserts that it is not clear whether § 87.139 is applicable, as it applies only to communications using certain specific Emissions Designators and the RTCA DO–362A mandatory modulation makes no reference to these designators. We seek comment on NTIA's proposal, on whether § 87.139(c) may, under its existing terms, apply to UAS communications anticipated in the 5030–5091 MHz band, and whether such application is in the public interest. We further seek comment on whether we need to specify authorized emission classes and designators for this service, such as has been done with aviation services. If so, we seek comment on what classes and designators are appropriate, and whether we should use one of the types of assignable emissions already defined in, for example, § 87.137 of the rules. We propose emission designators of G8D for data and G8F for video and seek comment on their appropriateness for operations subject to RTCA DO–362A.

56. We seek comment on any other requirements we should impose on NNA equipment. For example, what requirements should we adopt to facilitate a DFMS's ability to communicate with or otherwise control such equipment in the execution of the DFMS's responsibilities? Should equipment be required to enable the DFMS to make direct (machine-to-machine) frequency assignments to the UAS equipment, in order to ensure that assignments are accurately programmed? Should this capability be available at all times, or only pre-flight? To the extent DFMS communications or control signals are intended to affect operating parameters of the UA, should such communications or control signals be required to occur exclusively through communications between the DFMS and the relevant ground control station or stations, rather than through direct communications with a UA station? In the 3.5 GHz band, fixed stations must respond automatically to SAS directions to modify certain operational parameters such as frequency or power limit. Should requirements be adopted for NNA equipment to provide the DFMS with similar control? We further seek comment on whether to impose requirements to ensure interoperability between NNA and NSS network services. Potentially, UA flights that initially rely on a network service may extend into areas where no network has been deployed. What requirements, if any, should we adopt to facilitate operations that can seamlessly switch between network service for CNPC and NNA assignments for that purpose?

57. We note that RTCA has also adopted another standard applicable to CNPC in the 5030–5091 MHz band, designated RTCA DO–377A, Minimum Aviation System Performance Standards for C2 Link Systems Supporting Operations of Unmanned Aircraft Systems in U.S. Airspace (RTCA DO–377A). Whereas RTCA DO–362A describes minimum performance standards for the ground and airborne radios used for a direct link, focusing on certain design characteristics of these radios such as power and emissions limits, RTCA DO–377A describes the minimum performance of an overall ''C2 Link System,'' defined as a system used to send information exchanges between a control station and an unmanned aircraft and to manage the connection between them, and which can be comprised of one or many Air/Ground links and Ground/Ground links. To the extent that RTCA DO–377A applies to NNA operations, we seek comment on whether we should adopt rules requiring compliance with the standard. Alternatively, should we limit our requirements, as AIA recommends, to technical requirements based on RTCA DO–362A and leave system performance, safety, and security requirements, such as those in RTCA DO–377A, to be considered by a multi-stakeholder group or addressed by the FAA?

Incorporation by reference. As discussed above, we propose to adopt the technical standard RTCA DO–362A in whole or in part; RTCA DO–362A provides technical requirements for NNA operations in the 5030–5091 MHz band. To accomplish this, we propose to incorporate the standard by reference into our rules under 1 CFR part 51. The material is available from RTCA, 1150 18th Street NW, Suite 910, Washington, DC 20036, via email: *info@rtca.org* or *http://RTCA.org.*

58. *Application of Part 87 Aviation Service Rules and Part 1 Wireless Radio Service Rules.* We seek comment on where to locate the new NNA services rules within the organization of the Commission's rules. Some parties argue that the new service should be located in part 87, which ''states the conditions under which radio stations may be licensed and used in the aviation services.'' We seek comment on this option. We seek comment on whether, alternatively, we should locate the new UAS rules in a new rule part rather than in part 87, as reflected in the amendments at the end of this document. We further seek comment on alternative options for the appropriate home for the new rules.

59. Whether we locate the rules for the 5030–5091 MHz band in part 87, a new rule part, or elsewhere, we seek comment on whether and to what extent the generally applicable rules in subparts B through F of part 87 should apply to or be incorporated into the new NNA service, either in their current form or with modifications.

60. As an example, § 87.89 requires that, with certain exceptions, operators of licensed aviation service stations ''must hold a commercial radio operator

license or permit.'' The operator license requirement is distinct from and wholly independent of the requirement that each station be licensed and requires individuals seeking an operator license to demonstrate, by passing a formal examination, sufficient knowledge of the relevant radio technologies. The operator license requirement stems from section 318 of the Act, which requires operators of transmitting equipment of licensed stations to hold an operator's license, except where the Commission finds that the public interest, convenience, or necessity will be served by waiving such requirement. We seek comment on whether, in addition to the station license (which, as discussed, we propose to provide through licensing by rule), we should require UAS operators using a NNA assignment in the 5030–5091 MHz band to have an individual operator license. Conversely, would it be in the public interest to forgo any such operator licensing or permitting requirements as unnecessary or inappropriate in light of FAA regulation of and authority over UAS remote pilot qualifications, or for other reasons?

61. We also seek comment on whether the new service should be subject to rules under part 1, subpart F, governing ''Wireless Radio Service'' applications and proceedings. We seek comment on whether NNA services, even if licensed by rule, should be included in and subject to the subpart F rules for Wireless Radio Services to the same extent as other licensed-by-rule services.

62. *Streamlined procedures to update incorporated standards.* We anticipate that any technical standard developed by a standards organization that we incorporate by reference into our rules will be subject to ongoing revisions as parties gain more experience and the UAS industry continues to rapidly evolve. To help ensure that the rules for 5030–5091 MHz UAS operations continue to reflect the most current version of any incorporated standard for 5030–5091 MHz UAS operations, we invite comment on whether we should adopt a comparable delegation of rulemaking authority in this case. Specifically, we seek comment on whether to delegate joint rulemaking authority to WTB and OET to incorporate into the Commission's rules, after consultation with the FAA and NTIA, and notice and an opportunity for public comment, any updated version of a previously incorporated technical standard applicable to UAS operations in the 5030–5091 MHz band. Similar to limitations the Commission has placed in some earlier delegations of rulemaking authority to update standards, should we limit this delegated authority to the incorporation of standard updates that do not raise major compliance issues?

7. Network Supported Service (NSS) Service Rules

63. We seek comment on the license terms and service rules we should adopt for NSS licenses. We seek comment in particular on issuing exclusive use, geographic area defined licenses for a specific term of years, with rights of renewal, subject to specific performance (network coverage) obligations. We seek comment on appropriate technical and operational requirements and on the assignment process rules.

64. *Geographic area licenses.* Consistent with our approach in several other bands that has promoted the deployment of wide area networks for a variety of fixed and mobile services, we propose to license NSS spectrum blocks in the 5030–5091 MHz band for exclusive use on a geographic area basis. We seek comment on this approach, on its costs and benefits, and on alternative licensing approaches. If a party opposes using geographic licensing, it should explain its position, describe the licensing scheme it supports, and identify the costs and benefits associated with its alternative licensing proposal.

65. We further seek comment on the appropriate geographic license area or areas for NSS licenses to support NSS UAS operations and facilitate investment, including investment by small entities, and robust spectrum use. We seek comment on whether we should adopt larger license areas such as Regional Economic Area Groupings (REAG) or nationwide markets to facilitate NSS uses that may often involve flight over long distances, adopt a more granular scheme such as Partial Economic Areas (PEA), which would provide more flexibility to serve a smaller area but still permit parties to achieve a larger area through aggregation, or adopt a mix of large and small license areas for different spectrum blocks. While NTIA supports licensing by REAG, AIA argues in its comments to the *Refresh Public Notice (PN),* 86 FR 50715 (Sept. 10, 2021), that license areas corresponding to the Air Route Traffic Control Center (ARTCC) areas or other areas ''that make sense in an aviation system context'' would be appropriate, and Wisk similarly recommends use of the ARTCC areas to provide ''alignment with a general air traffic density basis.'' We seek comment on whether to adopt license areas based on a geographic area division of the country that has been developed specifically for aviation purposes, such as the ARTCC areas.

66. *License term.* We propose to issue NSS licenses for an initial 15-year term. AIA and Wisk both support a license term ''longer than 10 years,'' and we believe that circumstances in the band, including the need to set up a DFMS in the band and integrate its functions with operations in NSS spectrum, as well as the nascent stage of standards development and other technical work regarding NSS networks generally, favor the use of a longer initial license term. We propose to limit subsequent terms to 10 years. We seek comment on these proposals.

67. *Performance (network build-out or coverage) requirements.* We seek comment on performance requirements (*i.e.,* build-out or coverage requirements) that are appropriate for NSS licensees and UAS operation. We seek comment in particular on whether to adopt a population-based performance metric, such as a requirement to cover at least 80 percent of the population in the license area within 12 years of the grant of the license, as the Commission recently adopted for geographic licenses in other bands. We also seek comment on whether to adopt an appropriate interim performance requirement, such as a requirement to cover at least 45 percent of the population in the license area within six years of license grant.

68. AIA argues that aircraft uses require reliable control links for all geographic areas of flight regardless of proximity to population centers, and suggests that a build-out requirement based on ''user demand, special diversity and signal strength'' would better meet the needs of beyond-radio-line-of-sight UAS operations. We seek comment on AIA's arguments, and on whether we should either require licensees to meet some criteria other than population, such as geographic area coverage of 25% of the license area at year six and 50% of the license area at year 12. Alternatively, should we provide licensees with the option of meeting either a population-based requirement or some alternative? To the extent commenters recommend alternative build-out requirements, we ask them to propose either specific numerical benchmarks or other specific and objectively verifiable buildout criteria.

69. We seek comment on appropriate rules for compliance demonstration and enforcement. As for compliance demonstration, we propose to adopt a process similar to compliance rules applicable to part 27 licensees, requiring a demonstration of compliance with the

performance requirements by filing a construction notification with the Commission within 15 days of the expiration of the applicable benchmark, including electronic coverage maps accurately depicting the boundaries of the licensed area and the boundaries of the actual areas to which the licensee provides service. If a coverage map is used to demonstrate compliance, we seek comment on the appropriate standardized parameters for the propagation model. For example, should there be standardized values for inputs such as cell edge probability, cell loading, and clutter? As for enforcement, we propose that if a licensee fails to meet the final performance requirement, the license authorization will terminate automatically without specific Commission action. If we adopt an interim requirement, we propose that failure to meet the requirement would result in the reduction by two years of both the due date for the final performance requirement and the license term (resulting in a final performance requirement at year 10 and a license term of 13 years).

70. *License Renewal.* We seek comment on the appropriate standard for license renewal. In the *WRS Second R&O,* 82 FR 41530 (Sept. 1, 2017), the Commission adopted a unified regulatory framework for the Wireless Radio Services (WRS) that replaced the existing patchwork of service-specific rules regarding renewal with a single unified standard, and safe harbors for meeting that standard for different service categories, including a safe harbor for geographic licensees providing commercial service. We seek comment on whether the regulatory renewal framework for WRS commercial geographic licensees is appropriate for NSS licensees. If we apply this framework, are there any special factors we need to account for or incorporate in the context of networks for support of UAS operations?

71. *Competitive bidding or other assignment procedures.* In the event that mutually exclusive license applications are received, we propose to assign these exclusive-use licenses through a system of competitive bidding. Consistent with the competitive bidding procedures the Commission has used in previous auctions, we propose to conduct any auction for geographic area licenses for spectrum in the band in conformity with the part 1, subpart Q, general competitive bidding rules, subject to any modification of the part 1 rules that the Commission may adopt in the future. We seek comment on whether any of these rules would be inappropriate or should be modified for an auction of licenses in this band. Consistent with the statutory requirement and our longstanding approach, we propose to use a public notice process to solicit public input on certain details of auction design and the auction procedures. Our proposal to assign these licenses through competitive bidding assumes that Congress amends section 309(j)(1) of the Communications Act to extend the Commission's authority to award licenses by competitive bidding. We seek comment on alternate assignment procedures in the event that the Commission's statutory authority to auction licenses is not extended.

72. If we provide for the assignment of these licenses through a system of competitive bidding, we also propose to make bidding credits for designated entities available for this band and seek comment on this proposal. If we decide to offer small business bidding credits, we seek comment on how to define a small business. In recent years, for other flexible-use licenses, we have adopted bidding credits for the two larger designated entity business sizes provided in the Commission's part 1 standardized schedule of bidding credits. We propose to use the same definitions here.

73. The standardized schedule of bidding credits provided in § 1.2110(f)(2)(i) of the rules defines small businesses based on average gross revenues for the preceding three years. In December 2018, Congress revised the standard set out in the Small Business Act for categorizing a business concern as a ''small business concern,'' by changing the annual average gross receipts benchmark from a three-year period to a five-year period. Thus, as a general matter, a Federal agency cannot propose to categorize a business concern as a ''small business concern'' for Small Business Act purposes unless the size of the concern is based on its annual average gross receipts ''over a period of not less than 5 years.'' For consistency with the statutory requirements, we therefore propose to adopt the Small Business Act's revised five-year average gross receipts benchmark for purposes of determining which entities qualify for small business bidding credits.

74. Accordingly, we propose to define a small business as an entity with average gross revenues for the preceding five years not exceeding $55 million, and a very small business as an entity with average gross revenues for the preceding five years not exceeding $20 million. A qualifying ''small business'' would be eligible for a bidding credit of 15 percent and a qualifying ''very small business'' would be eligible for a bidding credit of 25 percent. We also seek comment on whether the aviation-safety purpose of the band, the characteristics of these frequencies, or any other factor suggest that we should not make available one or either of these designated entity bidding credits, or that we should adopt different small business size standards and associated bidding credits than we have in the past. Finally, we seek comment on whether we should offer rural service providers a designated entity bidding credit for licenses in this band. Commenters addressing these proposals or advocating for any alternatives should consider what specific details of the licenses or operations in the band may affect whether designated entities will apply for them and whether designated entities should be supported by bidding credits.

75. AIA proposes that the Commission directly select NSS licensees from the submitted license applications based on criteria to be established by the FAA or by a multi-stakeholder group to ensure that applicants meet aviation performance levels and minimum performance standards established in RTCA DO–377A. We seek comment on AIA's proposal or alternative approaches for selecting the NSS licensees and whether such approaches would be consistent with our statutory obligation under section 309(j) of the Act to use competitive bidding to resolve mutually exclusive applications, and with our general responsibility for licensing of spectrum uses under Title III of the Communications Act.

76. Regardless of the assignment mechanism, we seek comment on whether NSS licensees should be subject to a particular limit on the amount of NSS spectrum they can aggregate in the 5030–5091 MHz band, such as a limit of 20 megahertz. To the extent that NSS spectrum is assigned on geographic market basis, are limits on 5030–5091 MHz spectrum aggregation necessary to ensure competition for network-based CNPC services?

77. *Technical requirements.* We seek comment on appropriate technical requirements and parameters for NSS licenses. As an initial matter, the appropriate technical requirements may depend in part on the types of operations likely to be carried out in the band and the network architectures necessary to support such operations. Accordingly, we seek comment on what operations commenters anticipate the NSS licensees will be used to support. Will they include Advanced Air Mobility, package delivery services, or

infrastructure inspection? Are they likely to be predominantly operations above, or below, a certain altitude, or to involve predominantly large or predominantly small UA? Will they involve autonomous operations, and if so, to what extent and for what purposes will such autonomous operations likely require network-based CNPC? For those anticipated operations, we seek comment on what type of network architectures will likely be needed in the band to support such uses. Will they necessarily be like the terrestrial cellular networks, or will there be other architectures, and if so, of what nature? To the extent that parties have already developed or plan to deploy network infrastructure to support UAS NSS operations, we seek comment on what type of network architectures they have developed or plan to deploy for this purpose.

78. We seek to adopt technical rules that will promote efficient use of spectrum and provide licensees as much flexibility as possible in terms of the services they wish to provide, while also providing adequate protection of licensees in the band or adjacent bands. We seek comment on requirements that will achieve these goals in the context of spectrum intended to support network-based UAS CNPC with the level of reliability needed for safety-critical aviation purposes. In particular, we seek comment on whether the RTCA DO–362A standard or equivalent technical parameters, which we propose above for NNA operations, should also apply to NSS licenses. Would adopting similar requirements for NSS help to ensure compatibility between NNA and NSS operations? We ask that commenters discuss the adequacy of the RTCA DO–362A specified equipment and operational performance requirements for NSS operations, including both transmitter power and receiver input power, and required minimum coupling loss (separation distance) between ground and airborne CNPC radios and emissions from other licensed radio services. We also seek comment on whether to require NSS licensees to comply with RTCA DO–377A, which addresses the minimum performance, safety, and security standards for a CNPC link system overall, whether that system relies on a network or a direct link. As noted above, AIA recommends that we require UAS equipment to comply with RTCA DO–362A, but leave the requirements in RTCA DO–377A to be considered by the FAA or an appropriate group of stakeholders. We seek comment on whether to take this approach for NSS licensees. To the extent that NSS licensees are permitted to support communications other than CNPC, we seek comment on whether those services should be subject to the same technical requirements as apply to CNPC.

79. Because the RTCA DO–362A standard is focused on point-to-point or point-to-multipoint (*i.e.,* non-networked) link performance rather than network services, and RTCA DO–377A on establishing the minimum performance, security, and safety standards of a system rather than mitigating interference impacts on other systems, we seek comment on whether application of either of these standards sufficiently address the impact of wide area network operations, including cellular networks, on other services in-band or in adjacent bands. We further seek comment on whether applying these standards, or specific parameters drawn from these standards, to network-based services in the band may unnecessarily restrict the range of services or operations in the band. We seek comment on whether there are any additional or alternative technical requirements that we should consider for NSS licenses and on the extent to which communications under these technical requirements would have sufficient reliability for safety-critical aviation purposes. To the extent that parties argue for alternative technical requirements, we ask that they be specific as to what requirements they propose be adopted in the rules.

80. We note that work is ongoing to develop technical standards for reliable UAS communications over mobile networks. We seek comment on these efforts, on the scope, status, and anticipated completion date of any other current or planned studies or standards development work regarding the reliability of UAS communications over Long-Term Evolution (LTE) or other mobile network technologies, and on whether these studies or standards will address or apply to UAS network-based communications in the 5030–5091 MHz band. If not, we seek comment on whether the development of these studies or standards may nevertheless be helpful in determining the appropriate requirements for networks in the 5030–5091 MHz band. We further seek comment on the extent to which any of these studies or standards are being or will be coordinated with the aviation community or the FAA to ensure that they provide sufficient reliability for all UAS use cases, including aviation flights where communications is safety-critical. We also seek comment on the extent to which mobile networks using LTE or other mobile network technologies can be implemented in the 5030–5091 MHz band consistent with the RTCA DO–362A standard.

81. As an alternative to requiring NSS compliance with the RTCA DO–362A standard generally, are there certain specific requirements of RTCA DO–362A that we should minimally impose, to ensure compatibility with NNA operations or for other purposes? For example, as we noted earlier, RTCA asserts that all equipment in the band must comply with the 50 ms Time Division Duplex (TDD) requirements specified under section 2.2.1.3 of the RTCA DO–362A standard to ensure that UAS operations in the band are compatible with each other. We seek comment on whether, even if we do not require general compliance with RTCA DO–362A, we should mandate compliance with the TDD requirements under section 2.2.1.3. Further, we seek comment on whether we should, at a minimum, require NSS equipment to comply with the power limits and out-of-band emission limits established in the standard to ensure that such equipment is compatible with AeroMACS.

82. We seek comment on any other technical issues that need to be addressed to enable the deployment of NSS networks. For example, in order to prevent harmful interference between geographic area licensees, such licensees are typically subject to market boundary power strength limitations. Because the networks deployed by geographic area licensees are terrestrial in nature, these limitations were developed using certain technical assumptions—*i.e.,* that natural and manmade terrestrial obstacles attenuate signals, reducing the potential of harmful interference between users in adjacent license service areas. Obstacles such as hills, trees, buildings, and other natural and manmade structures attenuate emissions, lessening the interference impact between licensees. UAS operations typically fly above many of these obstacles and, depending on the UA altitude and its distance to the service area boundary border, a UA may be in direct line-of-sight with adjacent license areas and users, greatly increasing the potential for harmful interference. As we anticipate adopting geographic area-based licenses for NSS spectrum, we request comment on an appropriate field strength limit to protect NSS licensees given this increased potential for harmful interference. We seek comment on other necessary technical specifications, such as out-of-band emission limits, and ask

that any proposals include technical justifications and analysis, such as UA altitude assumptions, power levels, antenna assumptions, the increasing interference effects resulting from the increasing number of transmitting UA (aggregate effects), and the victim receiver characteristics such as receiver sensitivity, and adjacent and non-adjacent channel rejection.

83. *Application of requirements from aviation service and wireless radio service rules.* As with NNA service rules above, we seek comment on whether and to what extent the NSS service rules should incorporate or be subject to the rules generally applicable to aviation services under subparts B through F of part 87 of the Commission's rules, either in their current form or with modifications. We also seek comment on whether the NSS service should be subject to rules under part 1, subpart F, governing Wireless Radio Service applications and proceedings. In particular, we seek comment on whether to allow partitioning and disaggregation of NSS licenses in secondary market transactions as well as spectrum leasing, including whether we should consider any competitive impacts associated with such transactions.

84. We anticipate that NSS licenses will be used to provide mobile network services to UAS operators on a commercial basis. Accordingly, we also seek comment on whether and to what extent we should incorporate regulations that regulate commercial mobile networks in other bands, such as the requirements generally applicable to part 27 flexible-use licensees. For example, should we incorporate or apply the requirements of § 27.52 (RF safety), § 27.56 (antenna structure height for the protection of air safety), or § 27.64 (protection from interference)?

85. *Other requirements.* We seek comment on any other service rules we should adopt for NSS licensees. For example, to ensure that UA flights are supported in the event they need to cross license area boundaries, should we adopt a roaming requirement? If anything more than market forces is necessary to address this issue, should the current roaming requirements under § 20.12(e) of the Commission's rules, requiring commercial mobile data service providers to offer roaming arrangements to other such providers on commercially reasonable terms and conditions, be extended to NSS licensees for this purpose? If these requirements are sufficient, how and where should we integrate them in the context of NSS service rules? If they are insufficient, what additional rules are needed to ensure that UAS operate continually and safely across licensing areas? We also seek comment on whether to adopt an interoperability requirement, for example, requiring NSS equipment to be capable of operating over any part of the 5030–5091 MHz band dedicated to NSS operations, or requiring support for the entire band. We further seek comment on whether to impose requirements to enable seamless switching between NNA and NSS services to support flights that may need to rely on both modes of spectrum access. Should we require NSS licensees to provide any other information, including the manufacturer, model, or other details regarding the UAs that will be flown? We seek comment on any requirements or other measures that would promote intensive use of the band. For example, we seek comment on how we might facilitate use of NSS for both low and high altitude uses, and whether we should require NSS licensees to support both low and high altitude uses or should take other steps to ensure that both low and high uses are supported.

86. *Satellite-based networks.* We seek comment on whether to authorize NSS licensees, at their discretion, to provide network-supported service for UAS CNPC through either a satellite or terrestrial network, or alternatively, whether the Commission should provide that certain NSS licenses are dedicated exclusively to satellite-based service. We seek comment on whether and to what extent there is interest in the United States in providing a satellite service for CNPC in the 5030–5091 MHz band, on the costs and benefits of permitting NSS licensees to deploy satellite services for network-supported CNPC, and on the advantages and disadvantages of a satellite option over terrestrial networks in this context.

87. Assuming we permit NSS licensees to deploy satellite-based service, we seek comment on how to permit and integrate the provision of such services and on the appropriate service rules. We seek comment on the application of the Commission's part 25 rules, which govern satellite communications, to such services, and the extent to which the rules applicable to terrestrial NSS networks should also apply to satellite-based NSS networks. We further seek comment on how the DFMS and other proposals discussed above would work for satellite communications. For example, how would a DFMS implement opportunistic access to spectrum in which satellite operations might be deployed? We also seek comment on how to ensure that any such satellite services are compatible with both terrestrial NSS and NNA operations in the band and other in-band and adjacent-band services, and on the circumstances, requirements, coordination processes, and/or restrictions necessary to ensure compatibility and to provide the reliability intended for CNPC in this band. For example, should we permit an NSS licensee to deploy a satellite service only if the NSS license is nationwide or the licensee in question has aggregated all geographic area licenses in a particular block throughout the nation? Are guard bands necessary between blocks with satellite deployments and blocks used for terrestrial networks or operations? Footnote 5.443D of the Table of Frequency Allocations provides that services under the satellite allocation in the 5030–5091 MHz band are subject to coordination under ITU Radio Regulations (R.R.) No. 9.11A, and that the use of this frequency band by the AMS(R)S is limited to internationally standardized aeronautical systems. We seek comment on what rules, if any, we should adopt to implement the requirements under footnote 5.443D.

88. *High-Altitude Platform Stations.* We seek comment on whether to permit NSS licensees to deploy High-altitude Platform Stations (HAPS). The Commission's rules define a ''High Altitude Platform Station'' as ''[a] station located on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth.'' Potentially, these stations could be used by NSS licensees as a long-range relay of CNPC between two or more stations, and RTCA DO–362A includes extensive analysis of such an option, which it refers to as a ''High-altitude Relay System.'' We seek comment on whether and to what extent there is current interest in deploying HAPS as all or part of a network solution for CNPC, on the technical feasibility and commercial viability of the use of HAPS to provide all or part of a network service in the 5030–5091 MHz band, and on the costs and benefits of permitting HAPS for this purpose. To the extent it is feasible and economic, are there limitations on the circumstances or uses to which it can be applied? For example, would it be available only to provide relay between two or more UA, or could it also provide relay between UA and stations on the ground? We also seek comment on what technical or other requirements or restrictions are needed either to ensure that NSS use of HAPS to provide network service would be compatible with other operations and services or for

other reasons. For example, we seek comment on whether, consistent with the definition of HAPS in the Commission's rules, we should specify an altitude floor and/or ceiling on the use of such stations. Given the potential footprint of a HAPS-based service, should we permit an NSS licensee to deploy HAPS only if the NSS licensee holds a nationwide market or holds all geographic area licenses on a particular block nationwide? We further seek comment on whether permitting such systems warrants any revisions to the proposals or options for the NSS rules. In addition, because the HAPS acting as network relays for UA communications would also themselves be UA, we seek comment on whether an NSS licensee's operation of such stations may require CNPC (during ascent, descent, or otherwise), whether and to what extent such stations should be permitted to use NNA assignments for CNPC, and if so, what changes to our NNA proposals or other rules are needed. We note that No. 4.23 of the ITU Radio Regulations provides that ''[t]ransmissions to or from high altitude platform stations shall be limited to bands specifically identified in Article 5 (WRC–12).'' At present, Article 5 does not specifically identify the 5030–5091 MHz band for this purpose. We seek comment on whether, if we restricted such stations to deployments below the 20 km floor for HAPS as defined in the ITU Radio Regulations, permitting HAPS in the band could nonetheless be consistent with No. 4.23 or if, to permit such use, we would need to seek a revision to the bands in which HAPS is permitted under ITU R.R., Article V. We seek comment on whether there is any other legal constraint or consideration to address in permitting such use.

8. Equipment Authorization

89. To ensure that equipment in the new band has the level of reliability and safety required of aviation equipment, we propose to impose equipment authorization requirements similar to those under §§ 87.145 and 87.147 of the Commission's rules to all equipment intended for use in the 5030–5091 MHz band. Section 87.145 requires that each transmitter must be certificated for use in the relevant service, and § 87.147 establishes a specific equipment authorization process for part 87 equipment, which, for the frequencies in the 5030–5091 MHz band among others, requires coordination with the FAA. We seek comment on our proposals.

9. Protection of Other Services

a. Microwave Landing Systems

90. We seek comment on what measures we should adopt to protect Federal Microwave Landing System (MLS) services from harmful interference by UAS communications in the 5030–5091 MHz band. Should we establish exclusion zones around the Air Force bases with MLS deployments, with a process to add or eliminate exclusion zones to the extent Federal MLS stations are deployed or deactivated? AIA proposes that the Commission codify the locations at which MLS operations are conducted and establish a coordination mechanism to enable UAS CNPC operations near those MLS stations. We seek comment on this option, the specifics of any such coordination mechanism, and how this or any option would address the deployment of new Federal MLS stations, particularly in the case of NSS licensees that may have already deployed networks in the area of the new deployment.

91. Because we find no current licensed non-Federal MLS systems in operation, and given that the FAA does not anticipate the future use of these systems at airports, we seek comment on whether any measures are necessary to protect non-Federal MLS. We also seek comment on whether to provide that no future non-Federal MLS licenses (including MLS radionavigation land test licenses at 5031 MHz) will be granted in the 5030–5091 MHz band by amending §§ 87.173(b) and 87.475 of our part 87 rules to remove the 5030–5091 MHz band as a band that can be used for non-Federal MLS. We seek comment on the costs and benefits of this option. Would eliminating the potential for future non-Federal MLS in the 5030–5091 MHz band help to ensure a stable spectral environment that may facilitate the use of the band for UAS CNPC? Would it facilitate the use of the band for other communications, to the extent such communications may be permitted? Given the development and widespread adoption of alternative solutions for instrument-based landing and the apparent abandonment of MLS, is there any need to preserve the option in our rules for licensing of non-Federal MLS in this band?

b. Out-of-Band Services

92. *Radioastronomy.* To address the potential impact on radio astronomy observations from UAS transmissions in the 5030–5091 MHz band, NTIA requests that Footnote US211 continue to apply to any services authorized in the 5030–5091 MHz band. NTIA also recommends that the Commission require coordination of UAS operations within the National Radio Quiet Zone (NRQZ). NTIA further recommends that ''additional criteria'' be developed to minimize UAS impact to particular radio astronomy sites, particularly from low-altitude operations, but does not elaborate or propose particular criteria. As a further measure, NTIA recommends that the requirements for licensees in the band include passing a test or similar effort to promote awareness of radio astronomy sites.

93. We seek comment on whether additional measures are necessary to protect radio astronomy and on NTIA's recommendations in this regard. We propose, consistent with NTIA's recommendations, to continue to apply the requirements of Footnote US211 in the 5030–5091 MHz band, to prohibit UAS operations within the NRQZ without prior coordination with the NRQZ administrator and, in the case of NNA operations relying on DFMS assignments, to require the submission of a concurrence from the NRQZ administrator with any request to a DFMS for frequency assignment within the NRQZ. We seek comment on these proposals. We note that § 1.924(a) of the Commission's rules establishes required procedures for licensees and applicants that seek to construct or operate new or modified fixed stations to coordinate their deployments in the NRQZ. Should we apply these licensee/applicant procedures for the NRQZ to all UAS operations relying on the 5030–5091 MHz band in the NRQZ? To the extent we require NRQZ administrator concurrence for licensed-by-rule operations, we seek comment on the appropriate procedures to apply. To the extent measures beyond coordination and concurrence requirements for UAS operations are warranted, we seek comment on what other measures are practicable.

94. *AeroMACS.* AeroMACS is a broadband aeronautical mobile (route) service system that will enable communications for surface operations at airports between aircraft and other vehicles and between other critical fixed assets. The Commission has allocated both the 5000–5030 MHz and 5091–5150 MHz bands for such use but has not yet established service rules in either band.

95. We seek comment on whether any special measures are necessary to ensure compatibility between UAS operations in the 5030–5091 MHz band and AeroMACS. AIA indicates that RTCA is currently working on a revision to the AeroMACS technical standard, RTCA DO–346, that will ensure that future

AeroMACS deployments will be compatible with CNPC links that are in compliance with RTCA DO–362A, and that no other special limitations on 5030–5091 MHz operations beyond compliance with RTCA DO–362A are necessary. More recently, RTCA's Program Management Committee (PMC) held its June 2022 meeting approving RTCA DO–346A with these revisions. We seek comment on whether the revised AeroMACS standard and compliance with the power and out-of-band emission limits of RTCA DO–362A are adequate measures to protect AeroMACS operations from harmful interference from 5030–5091 MHz UAS operations, and whether the revisions to the AeroMACS standard require specific service rules for the 5030–5091 MHz band. Should we adopt exclusion zones around airports with AeroMACS deployments, or prohibit use of a certain amount of spectrum at the edge of the 5030–5091 MHz band in the vicinity of such airports?

96. *Radionavigation-satellite service.* The 5010–5030 MHz band also includes an allocation for the radionavigation-satellite service (RNSS) (space-to-Earth) for potential future use. Footnote 5.443C of the Table of Frequency Allocations addresses requirements in the 5030–5091 MHz band for the protection of RNSS downlinks. Specifically, it provides that ''[u]nwanted emissions from the aeronautical mobile (R) service in the frequency band 5030–5091 MHz shall be limited to protect RNSS system downlinks in the adjacent 5010–5030 MHz band'' and that ''[u]ntil such time that an appropriate value is established in a relevant ITU–R Recommendation, the e.i.r.p. density limit of –75 dBW/MHz in the frequency band 5010–5030 MHz for any AM(R)S station unwanted emission should be used.'' As CNPC services would be part of the AM(R)S allocation, this requirement applies to such services in the 5030–5091 MHz band. We propose to require 5030–5091 MHz operations to comply with the specific EIRP spectral density limit specified in Footnote 5.443C and seek comment on that proposal. Footnote 5.443C further limits AM(R)S use of the 5030–5091 MHz band to ''internationally standardized aeronautical systems.'' We seek comment on codifying this requirement as a service rule and on whether any other measure is necessary to implement the restriction. We further seek comment on whether any other special measures applicable to the 5030–5091 MHz band, such as a guard band at the bottom edge of the 5030–5091 MHz band, should be adopted to protect RNSS system downlinks.

97. *Flight testing.* The 5091–5150 MHz band is also allocated for aeronautical mobile telemetry communications from aircraft stations, subject to the technical parameters in ITU Resolution 418 (WRC–12) intended to ensure compatibility with other services. According to NTIA, Federal agencies currently use this allocation in the 5091–5150 MHz band to support flight testing. We seek comment on whether measures beyond generally applicable out-of-band emissions limits are necessary to ensure that 5030–5091 MHz operations are compatible with such services.

c. Canadian and Mexican Coordination

98. In the event of any adjustments made to the agreements with Mexico or Canada regarding use of the 5030–5091 MHz band, we note that our proposed rules, and any rules that may ultimately become effective pursuant to this proceeding, may need to be modified to comply with those agreements. We seek comment on whether we should adopt an interim measure to address UAS communications in the 5030–5091 MHz band that may cause harmful interference to operations in Mexico or Canada during the period prior to any adjustments made to the agreements between the United States, Mexico, and/or Canada regarding use of the band. If so, what should this interim measure provide?

B. Airborne Use of Flexible-Use Spectrum

99. While the Commission remains committed to allowing flexibility in the use of existing spectrum and networks, we are uncertain about the potential interference impacts of UAS use. Therefore, we seek comment on the adequacy of current rules to ensure co-existence of existing terrestrial wireless networks and UAS and on the regulatory solutions that may be necessary to facilitate and encourage such use.

1. Applicable Spectrum Bands

100. The flexible-use spectrum landscape for potential UAS use is varied, consisting of bands that prohibit airborne use (in the Table of Frequency Allocations or by rule) and bands that are silent on airborne operation. For example, parts 22 and 96 explicitly prohibit the airborne use of Cellular Radiotelephone Service and Citizens Broadband Radio Service (CBRS) spectrum. Likewise, the Table of Frequency Allocations precludes aeronautical mobile use for several other spectrum bands, including all or portions of the 1670–1675 MHz, 1.4 GHz, 2.3 GHz (Wireless Communications Service), and 3.7 GHz bands. Other flexible-use bands, however, are silent regarding airborne operations. We seek comment on the spectrum bands that might be utilized for UAS, as well as the spectrum bands that would not be suitable for such operation (*e.g.,* frequency bands with co-channel or adjacent channel services that require protection).

101. To inform our review, commenters should indicate the flexible-use bands in which they are currently operating or testing UAS. In addition, we ask commenters to detail the flexible-use band(s) that they may be interested in using for UAS in the future, including bands with and without explicit rules or allocations prohibiting airborne use. We also ask commenters to identify the type of communication contemplated, *e.g.,* command and control, telemetry, or payload (video, etc.) for the desired band, as well as the type of technology or infrastructure needed to support such use.

2. Sufficiency of Existing Rules

102. Certain entities maintain that our existing service and technical rules for the various flexible-use bands are sufficient to address the potential for harmful interference from UAS operations. While our existing rules promote optimal flexibility for licensees, these rules are largely focused on terrestrial operations and were not designed with airborne operations in mind. Although studies are underway to develop techniques to manage and mitigate the increased risk of harmful interference posed by UAS, at this time it is unclear whether these mitigation techniques and standards enhancements would be sufficient to protect existing wireless users and adjacent service area/band licensees from harmful interference caused by UAS use. Further, the functionality exhibited by UAs may necessitate revising our rules to enable UAS operation on existing flexible-use networks. In light of these interference concerns, we seek comment on whether modifications to our rules to protect existing terrestrial and other airborne operations are warranted.

103. *Interference mitigation.* Use of flexible-use spectrum by UAS can raise interference problems for co-channel and potentially adjacent-channel operations—particularly the high-density use that is expected to occur in the future. The impact of UAs on mobile networks is different than conventional mobile devices due to the high altitude

and high mobility of UAs. The higher altitude of UAs means that they (1) can see and be seen by more base stations than a conventional mobile device; and (2) have more favorable propagation conditions than propagation experienced by terrestrial operations. In addition, this high mobility, coupled with moving velocities up to 100 miles per hour under current FAA restrictions, can result in base station handoff issues and other network issues as described in detail below. These factors underlie two scenarios in which harmful interference can occur in the presence of UAS operating on flexible-use spectrum—downlink interference and uplink interference.

104. In the downlink—communications from the base station to UAs—the UAs may operate at an altitude that is within line of sight of multiple base stations and, as a result, the UAs can receive downlink interference from those base stations. Accordingly, UAs may experience more downlink interference than terrestrial user equipment because the enhanced propagation conditions and greater line-of-sight cause downlink interference resulting from the multiple base stations visible to, and attempting to connect to, the UA. The increased downlink interference leads to increased resource utilization levels in the network and eventually degrades the downlink performance of both airborne and terrestrial equipment.

105. At the same time, in the uplink—communications from the UA to the base station—the same UA can also cause interference to these multiple line-of-sight base stations. Uplink interference could increase as more UAs are introduced into the network. This interference may also increase depending on the UA's intended uses. For example, UAs may generate more uplink traffic than is typical of conventional mobile devices due to the use of data rate-intensive applications, such as video streaming and data streaming; such applications increase spectrum demand and present an increased risk of uplink interference. The increased uplink interference from UAs affects the throughput performance of terrestrial user equipment: as the number of UAs operating in a network increases, uplink resource utilization in the network also increases and at a greater rate than terrestrial-only operation. Eventually, the uplink performance of both UA and terrestrial equipment in the network is degraded.

106. To support use of UAS in terrestrial mobile networks, in 2017, 3rd Generation Partnership Project (3GPP) published a technical report (TR36.777) investigating the ability for UAs to be served using terrestrial LTE networks. The report's findings—which were based on the analysis of field trials performed by various companies analyzing LTE commercial network performance with the introduction of UAs—validated that downlink and uplink interference may result from UAS operation. The report proposed various network and UA enhancements to minimize LTE throughput degradation and interference to the network and to UAs and terrestrial devices.

107. TR36.777 confirmed the effect that UAS operations may have on downlink operations. The report observed that UAs uniformly distributed between 1.5 meters and 300 meters above ground level experienced downlink interference as a direct result of the UAs operating in the direct line-of-sight of more cells than terrestrial user equipment. This causes the UAs to receive downlink intercell interference from multiple cells. The resulting increase in resource utilization to provide for the introduction of UAs further decreases the spectral efficiency in the network and degrades downlink throughput performance of both UAs and terrestrial user equipment.

108. The report similarly validated impacts on uplink interference. To this end, it also was observed that since the UAs experience line-of-sight propagation conditions to more cells than terrestrial devices, the UAs would cause interference to more cells in the uplink than a typical terrestrial device. The uplink interference caused by UAs degrades the throughput performance of terrestrial devices. The increase in resource utilization level further increases interference in the network, which in turn degrades the uplink throughput performance of both UAs and terrestrial user equipment.

109. The report suggested several potential solutions to mitigate both uplink and downlink interference. Many of the solutions can be implemented by network providers independently and do not require an update to the 3GPP standard. To mitigate downlink interference, the report proposed the following solutions:

- *Full-Dimensional MIMO (FD–MIMO)*—This solution would use multiple antennas at the eNodeB (base station) transmitter to mitigate the interference in the downlink to UAs. FD–MIMO can also limit the mean terrestrial user equipment (UE) packet throughput loss.
- *Directional Antenna at UAs*—Interference in the downlink can be mitigated by equipping UAs with a directional antenna instead of an omnidirectional antenna. A directional antenna can be used to mitigate the interference in the downlink to UAs by decreasing the interference power coming from a broad range of angles.
- *Receive Beamforming at UAs*—The UAs are assumed to be equipped with more than two receive antennas to mitigate the interference in the downlink to UAs. Downlink interference mitigation can be achieved in this case by using receive beamforming at UAs. In this solution, multiple cells belonging to the same site are coordinated and data is jointly transmitted to the UAs.
- *Intra-Site Joint Transmission Coordinated Multi-Point Operation (JT CoMP)*—In this solution, multiple cells are coordinated and data is jointly transmitted to the UAs.
- *Coverage Extension*—In this solution, coverage extension techniques via downlink shared channels, physical broadcast channels, and physical downlink shared channels are used to enhance synchronization and initial access for UAs. Because the UA is synchronized with the network, downlink interference is mitigated.
- *Coordinated Data and Control Transmission*—In this solution, multiple cells belonging to the same or different sites are coordinated. Data, common signal/channels (*e.g.,* synchronization signal and Physical Broadcast Channel (PBCH)), and control channels can be jointly transmitted to the UAs. The coordinated cells could construct a larger cell for UAs, and terrestrial user equipment is served by physical cells without coordination, simultaneously. A dedicated downlink resource within the Physical Downlink Shared Channel (PDSCH) region of the coordinated cells can be reserved for these coordinated transmissions.

110. The report proposed the following techniques to mitigate uplink interference:

- *User Equipment Specific Fractional Pathloss Compensation Factor*—In this solution, an enhancement to the existing open loop power control mechanism is considered where a device-specific fractional pathloss compensation factor is introduced.
- *User Equipment Specific Power Output Parameter*—Configuring a lower power output for UAs compared to terrestrial devices improves terrestrial uplink user equipment throughput performance. Such a configuration, however, reduces UA uplink throughput.
- *Closed Loop Power Control*—In this solution, the target received powers for the UAs are adjusted. By applying

closed loop power control, mean terrestrial user equipment uplink throughput improvement can be improved.

• *Full-Dimensional MIMO (FD–MIMO)*—By using FD–MIMO with multiple antennas at the eNB receiver interference in the uplink can be mitigated. In addition, FD–MIMO can limit the mean terrestrial user equipment packet throughput loss.

111. In addition to TR 36.777, 3GPP made changes to Technical Standard TS36.331 to help address UA interference to the base station. In LTE networks, measurement reports are messages sent from a UA to a base station that help the base station make network decisions. The changes to TS36.331 included measurement report triggers for two reporting events: H1 (above) and H2 (below) UA height thresholds sent from the UA to the base station to help the base station see the UA and to deal with potential interference. 3GPP is also making additional enhancements to integrate UAS into LTE networks that do not relate to interference.

112. While the 3GPP TR 36.777 report concluded that it is feasible to use existing LTE networks to provide UA connectivity, the report and its findings have their limitations. The 3GPP quantitative analyses for Release 15 evaluated only the self-network performance impact of various potential solutions to interference detection and mitigation. Moreover, the technical solutions identified do not eliminate the interference from UAs, they merely reduce the levels of interference. The report also noted that interference challenges become more visible when the density of UAs increases. Beyond these limitations, the report did not evaluate the interference potential and impact on neighboring wireless networks or other radio services in the vicinity of UAS operation, nor did it evaluate the costs associated with the proposed technical solutions. As a result, there are open questions about the level of interference that licensees may experience and deem acceptable from neighboring licensees deploying UAS, the mitigation measures that may be necessary, and the costs licensees are willing to absorb to protect themselves from interference. Thus, the current 3GPP studies, while a valuable start, point to the need to address additional UAS interference issues.

113. Given that it appears that UAS operations within a single terrestrial mobile network will likely result in an increased level of intra-network interference and decreased network efficiency, it is also likely that adjacent markets and networks will be affected by UAS operations. While we seek to provide licensees with as much flexibility as possible to deploy a wide range of services and applications, including UAS, the increased risk of harmful interference from such operations is a concern. Neighboring licensees, whether they deploy or decide not to deploy UAS/airborne technologies, will be impacted and may be required to implement protections for their own networks. A difficult situation may arise for all parties when adjacent licensees—both of which are operating within the Commission's rules—reach an impasse regarding interference, and the failure to reach a resolution may detrimentally affect operations for one or both licensees.

114. We seek comment on how licensees deploying UAS technologies could protect licensees in neighboring markets and neighboring spectrum bands from interference. Some flexible-use licensees planning to deploy airborne technology (*e.g.,* UAS) may believe that such use is not problematic from an interference standpoint because they may assume that (1) all licensees will deploy the same technology, (2) all terrestrial networks are equally prepared to protect themselves, and (3) other potentially incompatible airborne technologies will not also be deployed. While this best-case scenario may turn out to be true as the market for airborne services develops, our rules must be expansive enough to account for the increased potential for harmful interference. Our rules should, at a minimum, set out a framework for UAS operations that is broad enough to account for varying interference scenarios. For these reasons, we seek comment on whether our rules can accommodate UAS operations while also protecting co-channel and adjacent band operations, including satellite operations, where permitted. In addition, we seek comment on changes to our rules that may be necessary to accommodate these scenarios.

115. For example, the power limitations for mobile devices vary depending on the service. For the personal communications services (PCS) band, the limit is 2 Watts EIRP. Hand-held stations operating in the 698–757 MHz, 776–788 MHz, 805–806 MHz, and 600 MHz uplink band are limited to 3 Watts Effective Radiated Power (ERP). Are these and other power limitations for mobile devices in the flexible-use bands appropriate for UAS operation? Considering the increased interference potential of UAS, should the power limitations for UAs be lower than for terrestrial devices?

116. Additionally, for many services, a licensee's predicted or measured median field strength limit must be calculated and may not be exceeded at any given point along its service area boundary. These limits were developed considering only terrestrial devices. With the introduction of UAS, how will licensees ensure these boundary limits are not exceeded? Are the current limits sufficient to protect the boundary of a neighboring licensee on the same or adjacent channel block? Can a UAS report and store power control and location metrics to ensure boundary limits are not exceeded?

117. As noted, the higher the altitude at which UAs are operating, the greater the number of line of sight paths between a UA and surrounding base stations, and thus the greater the potential impact on adjacent networks. We seek comment on the altitudes that are being considered for UA operations involving flexible-use spectrum. Will operations on these bands likely be limited to low altitudes such as 400 feet above ground level (AGL), or is it anticipated that UAS use on flexible-use bands will include operations at higher altitudes such as 10,000 feet AGL or greater? Given the increased potential for interference at high altitudes, should the Commission impose altitude restrictions on UAS operations using flexible-use spectrum?

118. Further, it is not clear whether existing out-of-band emissions rules adequately account for the favorable line-of-sight propagation conditions associated with UAS. Should such rules be modified to account for UAS operations in flexible-use spectrum, and if so, how? We seek comment on these and other technical rules that should be evaluated and perhaps revised to facilitate the use of flexible-use bands for UAS.

119. To inform our analysis regarding whether rule revisions may be necessary, we seek technical studies and analyses regarding the potential for UAS operations to cause interference to adjacent channel, adjacent band, or adjacent market operations. Among other issues, these studies and analyses should address how licensees deploying UAS technologies plan to protect terrestrial or satellite licensees in neighboring markets or spectrum bands from harmful interference. We request comment on the challenges and issues that carriers have experienced when testing or deploying UAS operations relative to the carrier's own terrestrial wireless network. What solutions have carriers developed or are carriers developing to address those challenges, specifically, the hardware, software,

processes required, as well as the costs entailed in deploying such solutions? What UAS altitude and UA density assumptions have been used to analyze deployment challenges and protection of neighbors? Are these solutions to be implemented applicable to the UA, or are they network-based? For licensees employing LTE, can the solutions identified in the 3GPP TR36.777 Report be applied to resolve interference issues within the network and to adjacent networks? Given that flexible-use spectrum licensees may deploy networks other than LTE, what additional interference issues may be encountered and what are the technical solutions that could be applied, given that there may be varying levels of compatibility with airborne technologies? We note that some areas, such as Quiet Zones require the application of more stringent measures to reduce the potential for interference; how will licensees continue to protect such areas when operating at higher altitudes? Are there network-based solutions being developed that could prevent individual UAs from approaching or entering such noise-sensitive locations or other restricted areas that would mitigate the potential for UAs to cause interference or endanger safety of life and property in such areas? We also seek comment on any other regulatory matters that may be affected by UAS operations. For example, will UAS/airborne technologies affect other regulatory requirements like 911 location accuracy?

120. *Different Use Cases.* Our regulatory approach with respect to flexible-use bands is to provide licensees with sufficient flexibility to choose the services that they wish to provide. Licensees could offer a wide range of services and applications, ranging from ''conventional'' command and control (C2) and payload offerings to UTM management services. This ability of licensees to engage in a wide range of use cases creates additional technical uncertainty when deploying UAS operations. We seek comment on the airborne use cases that commenters are considering for flexible-use spectrum. Is there a need for specific rules to permit different applications? Further, should licensees that incorporate UAS operations be required to meet different limitations than what currently exist?

121. One application being explored is the use of UAs as airborne base stations. HAPS systems can potentially be used to provide both fixed broadband connectivity for end users and transmission links between the mobile and core networks for backhauling traffic. As noted, the Commission's rules—as well as ITU Radio Regulations—define HAPS as radio stations located on an object at an altitude of 12–31 miles (20–50 kilometers) and at a specified, nominal, fixed point relative to the Earth.

122. We note that the Commission is currently considering whether HAPS or other stratospheric-based services could be used in any portion of the 71–76 GHz, 81–86 GHz, 92–94 GHz, and 94.1–95 GHz (70/80/90 GHz) bands to provide or support broadband internet access. Are there flexible-use bands that could potentially accommodate such use? Would such use be compatible with ''conventional'' UAS and terrestrial, flexible-use operations given the potential impact that such high altitude use could have on other operations in the band? If so, what rule changes or regulatory considerations would be necessary to permit such uses?

123. Other examples of airborne base station platforms include the use of tethered UAS, which typically are UAs physically connected to the ground via cables that provide power and data links to the UAs. We are aware that there has been research and development in the use of tethered UAS as temporary base stations, particularly as part of disaster recovery efforts. What issues are raised by the use of tethered UAS temporary base stations? If the station is essentially functioning as a conventional base station, should the existing rules applicable to the particular band be applied? Or is it necessary to apply other service and technical parameters, *e.g.,* antenna height and power output? What additional concerns are raised where tethered UAS base stations as well as HAPS are deployed? Further, what would be the impact of a mobile airborne base station on airborne user equipment (*i.e.,* UAS)? What changes or additions to our rules are necessary to address such concerns?

124. *Elimination of Rules Which Impede UAS.* In its Final Report, the Beyond Visual Line of Sight Aviation Rulemaking Committee (BVLOS ARC) recommended that the Commission reconsider the restrictions on airborne use that apply to certain spectrum bands. The *BVLOS ARC Final Report* noted that beyond-visual-line-of-sight operations require that spectrum bands with appropriate characteristics are sufficiently available to meet the needs of numerous users operating in a variety of operating environments. Similarly, the Technological Advisory Council (TAC) has noted that the Commission should reassess the technical basis for prohibiting use of certain terrestrial mobile bands above ground level. To the extent that measures can be identified that resolve or mitigate the impact of UAS use on adjacent operations, we seek comment on whether current prohibitions on airborne operations should be removed. For example, the Cellular Radiotelephone Service airborne use prohibition in § 22.925 was put in place specifically because of the heightened risk of interference by airborne mobiles to cellular networks. Can such operations be protected in the presence of UAS use? If solutions are developed that effectively mitigate the increased potential for harmful interference posed by UAS use, should UAS operations be permitted in Cellular Radiotelephone Service or other bands? Are there certain noise-restricted bands that must retain the prohibition regardless of any UAS interference mitigation measures? If a commenter seeks to eliminate or modify an existing prohibition, the commenter should specifically explain why the airborne use would not cause harmful interference to a co-channel or adjacent channel licensee's operations.

125. *Canadian and Mexican Coordination.* The use of UAS will likely have an impact in areas beyond United States borders. There are several agreements that address use of the flexible-use bands in the border regions between the United States, Canada, and Mexico. These agreements do not contemplate UAS use. Because UAS operation in these bands would increase the interference potential in the border regions, commenters should be aware that UAS use may not be permitted in border areas until such time as the agreements are updated to accommodate such use, or agreements on such use are reached with both countries. We seek comment on how to address issues arising from UAS use in the border regions pending any changes to existing agreements.

3. UAS Impact on Spectrum Rights

126. The Commission's rules largely presume that wireless networks are terrestrial in nature, which raises questions regarding the extent of spectrum rights granted as part of existing commercial authorizations. Pursuant to the Communications Act and the Commission's rules, the Commission grants licensees the right to operate radio systems on a particular radio frequency. In some services, such as those with allocations prohibiting aeronautical mobile use, it can be presumed that a licensee only has rights with respect to ground-based operations. Likewise, other services have technical rules which suggest that

only terrestrial networks were contemplated for those services. By contrast, rules for geographic market-based licenses define market areas according to geographic boundaries, but they are silent as to the vertical scope of such markets. The Commission has never explicitly stated what it believes to be the vertical limit of a licensee's spectrum rights, leaving a question as to the ''ceiling'' of license areas and the attendant protections associated with these geographic markets. As the interference discussion above highlights, however, market boundaries become crucial at higher altitudes.

127. The ability of a licensee to exercise or protect its spectrum rights with respect to adjacent licensees becomes relevant in the context of UAS use, given that the operation of UAs well within the boundaries of one license area can affect and be affected by base stations located inside the boundaries of another license area—more so than for conventional mobile operation. UAs will have line-of-sight connectivity to base stations both within the geographic market area where the UA is flying, as well as base stations in other adjacent geographic areas. The potential for a UA to establish a network connection with a base station in an adjacent market causes a tension between Commission policies: (1) a licensee's authorization generally provides the licensee exclusive use of the spectrum within its licensed market area; and (2) historically, our rules consider mobile devices to be operating under the authority of the licensee whose transmitter is providing service. UA operation creates a tension between these two policies because a UA can be served by a transmitter that is well outside of the licensee's market boundary. The greater line-of-sight of UAs could extend the reach of a transmitter further into an adjacent market, thus muddling the concept of license exclusivity.

128. This aspect of UAS use raises questions regarding how and under what circumstances a licensee is able to enforce rights under its license. For example, it may be difficult to determine UAS operation as a cause of interference to a network because such operation is intermittent and because the effect may vary depending on the position and movement of the UA. Moreover, even if UAS operation is determined to be a cause of interference, the offending licensee is likely to be operating within the Commission's rules regarding conventional mobile operations. This poses questions regarding the circumstances under which the ''victim'' licensee, *i.e.,* the licensee experiencing harmful interference, may seek relief from the Commission where both entities are compliant with service rules.

129. Accordingly, we seek comment on whether the Commission should identify a vertical limit at which flexible-use licenses may be used to support UAS on an exclusive or primary basis. Use beyond this limit would be on a non-primary basis. ''Non-primary'' in this context would mean that a licensee would be required to cure harmful interference to an adjacent licensee caused by its UAS operation even if it is operating within the rules. First, is it appropriate to establish a vertical limit for primary UAS operations in our rules? If we adopt a limit, what should that limit be? What factors should the Commission consider regarding a vertical limit for licensed UAS operations?

130. Second, we seek comment on how to determine whether a licensee should be required to cure harmful interference caused by its non-primary operations to adjacent licensees even if it is operating within the service rules for the license. How should we determine whether an entity should be obligated to take corrective measures, as there may be scenarios in which it could be difficult to determine fault? We request comment on how licensees should be able to enforce their license rights. What interference resolution mechanism would be appropriate?

B. Licensing UAS Operators for VHF Communications

131. The aeronautical VHF band (117.975 MHz–137 MHz) is used by aviation for air traffic control and advisory communications among other aviation-safety purposes. In some instances, to ensure the safety of the National Airspace System, the FAA requires operators of UAS to communicate with air traffic control (ATC) facilities when operating on or in the vicinity of an airport or operating in controlled airspace over the VHF traffic control and advisory frequencies. To meet this requirement, operators may use a VHF station integrated into the UA itself whereby the UAS operator's control station connects with the UA using a non-VHF channel and the UA completes the connection to ATC over the normal VHF channels. This approach is commonly referred to as ATC relay. Implementation of ATC relay in UA technology is still nascent and UAS operators have, therefore, continued to rely on ground-based VHF stations. The part 87 aviation service rules governing the use of the aeronautical VHF band do not, however, provide a licensing mechanism for the operator of a UAS to obtain a ground-based station license. Accordingly, UAS operator requests for such authorization are currently handled by special temporary authority on a case-by-case basis. We propose to establish a mechanism by which UAS operators may apply for a regular license for this purpose, with appropriate requirements, restrictions, and conditions to maintain the integrity of the band and service legitimate needs for flight coordination.

132. Although aeronautical VHF stations are generally licensed by rule under part 87 if the aircraft does not make international flights or communications, we do not propose to authorize ground-based VHF stations under a licensed-by-rule approach. Rather, under our proposal, we would require operators to file a license application with the Commission for an individual license covering their VHF station. Given the potential number of UAS operators, we have concerns that a licensed-by-rule approach applied to these operators' stations in the VHF band could endanger this critical and limited amount of aeronautical spectrum and the safety of the National Airspace System.

133. In addition, given the wide availability of inexpensive, off-the-shelf VHF hand-held radios that can be easily operated without training, we are concerned about the greater potential for parties to obtain and use ground stations on a licensed-by-rule basis to contact ATC, because they may not have adequate training for such communications. We are further concerned that licensed-by-rule operators would be difficult to identify during communications with ATC or afterwards in the event of problems. We tentatively conclude that ground stations for VHF communications should not be licensed by rule, and seek comment on our analysis and tentative conclusion.

134. While we typically do not individually license aircraft stations operating on VHF for domestic flights and communications, we seek comment on licensing ATC relay operations. ATC relay implementation is currently in its nascent stage, however we expect relay operations to increase with a corresponding increase in UA operations near airports and in controlled airspace. Given that ATC relay and ground-based VHF stations will both be used to communicate with ATC, are there inherent differences between ground radio operators and relay operators for the purpose of the communications? Is there a reason to expect operators using ATC relay

stations are better trained for such communications? Are there other licensing related issues that we should consider that make relay systems unique?

135. We seek to adopt a licensing mechanism that addresses these concerns and maintains the integrity of the band while also meeting the legitimate needs of certain UAS operators for communications in the VHF band. To achieve these goals, we propose several measures below. We seek comment on these measures, and on any alternative approaches that would provide a regular licensing mechanism that meets the Commission's goals.

136. First, we propose to individually license ground stations for UAS operator communication with control towers and other aircraft pilots under a new category of licensed station, an *Unmanned Aircraft Operator VHF Ground Station,* and to define the new station as ''a station on the ground providing unmanned aircraft pilot radio communication relating to safety and regularity of flight on air traffic control, flight service station, unicom, or multicom frequencies.'' Individual licensing will enable the Commission to identify authorized operators, identify unauthorized users, and aid in resolving instances of harmful interference. Accordingly, under this proposal, parties will be required to submit individual license applications. We propose that parties use the FCC Form 605, which is used generally for, *inter alia,* authorizations for stations in the ''aircraft service,'' and we seek comment on whether any modifications to the form are necessary or helpful to facilitate its use for this purpose.

137. Second, we propose to provide that these stations may operate over all air traffic control, flight service station, aeronautical advisory station (unicom), and aeronautical multicom station (multicom) channels authorized for use by aircraft. We seek comment on which specific channels to cover for this purpose.

138. Third, we propose to permit mobile stations (stations intended to be used while in motion or during halts at unspecified points), and we further seek comment on whether to permit non-mobile stations as well. To the extent parties support the inclusion of non-mobile stations, we seek comment on whether coverage of such stations for communications between two non-mobile sites (*i.e.,* the operator's fixed VHF station and air traffic control) is consistent with the aeronautical mobile and aeronautical mobile (route) allocations applicable to the air traffic control frequencies.

139. Fourth, we propose to require that license applications include an endorsement from the FAA. An endorsement must be included in a written document issued by the FAA, such as a Certificate of Approval (COA). We propose to provide that a license will not be issued without an FAA endorsement. We further propose that the approved license will be subject to any restrictions or conditions specified on the FAA endorsement. While licenses under part 87 are normally issued for 10 years, we seek comment on whether to provide that license terms for these stations will be the lesser of 10 years or the duration of the FAA endorsement, if any is specified. We further seek comment on whether a party seeking license renewal should be required to submit a new FAA written endorsement.

140. Finally, we propose to adopt a clarification of § 87.18 that will make clear that licensing by rule continues to apply to UAS aircraft stations, such as the VHF stations used for ATC relay. As discussed above, while we seek comment on whether the concerns that underlie our proposal that a UAS operator's ground-based VHF stations should be individually licensed warrant the same approach for UAS aircraft stations, we are not proposing at this time to require individual licensing for those UAS aircraft stations used for VHF communications. To avoid any confusion as to the continued application of licensing by rule to such stations that might result from our proposal to license a UAS operator's ground-based VHF station individually, we propose to clarify in § 87.18(b) that licensing by rule applies to aircraft stations, whether ''manned or unmanned.''

141. We believe these steps will help to promote the safe integration of UAS into the National Airspace System, while maintaining the integrity of the aeronautical VHF band. We request comment on these proposals and alternatives. We seek comment on whether a provision enabling UAS operators to license ground-based stations to communicate over the aeronautical VHF band is necessary or if instead we should continue to address requests for authorization for ground-based stations on a case-by-case basis. If providing a mechanism for licensing of ground-based VHF stations is warranted, we seek comment on whether the proposed rules adequately address this need or unduly restrict the ability of UAS operators to communicate with ATC or with manned aircraft. Conversely, we seek comment on whether the proposal is too broad, and whether we should further restrict the circumstances under which UAS operators may obtain licensed ground stations to use the aeronautical VHF band. We also request comment on whether the FAA's planned integration of the Next Gen Data Communications system into the 136–137 MHz band or other innovations have any current or future effect on this need, including whether they may alter the frequencies that a future UAS operator needs to use to communicate with ATC or otherwise warrant modifications to our proposal.

142. We further seek comment on the appropriate technical and operational requirements for the new category of station, and whether we should generally require such stations to comply with the technical and operational requirements applicable to aircraft stations licensed in the same frequency, or if any additional or alternate requirements should be adopted. In particular, we note that, under § 87.89 of the Commission's rules, operators of aviation service stations are generally required to hold a commercial radio operator license or permit, and that the operator license or permit requires passing a requisite knowledge test. The rule also specifies, however, that no operator license is required to ''[o]perate a VHF telephony transmitter providing domestic service or used on domestic flights.'' We seek comment on whether a UAS operator's VHF communications with ATC would constitute the operation of a VHF telephony transmitter providing domestic service or used on domestic flights, and if so, whether we should create an exception to this provision and provide that UAS operators that operate a licensed Unmanned Aircraft Operator Ground VHF Station must have a commercial radio operator license. Should we specify an alternative permit or training requirement for such operators?

143. *Digital Equity and Inclusion.* Finally, the Commission, as part of its continuing effort to advance digital equity for all, including people of color, persons with disabilities, persons who live in rural or Tribal areas, and others who are or have been historically underserved, marginalized, or adversely affected by persistent poverty or inequality, invites comment on any equity-related considerations and benefits (if any) that may be associated with the proposals and issues discussed herein. Specifically, we seek comment on how our proposals in this document may promote or inhibit advances in diversity, equity, inclusion, and

accessibility, as well the scope of the Commission's relevant legal authority.

II. Procedural Matters

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

145. *Regulatory Flexibility Act.* The Regulatory Flexibility Act of 1980, as amended (RFA), 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.'' Accordingly, the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) concerning the possible impact the rule and policy changes addressed in this document.

146. *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.

III. Initial Regulatory Flexibility Act Analysis

147. As required by the Regulatory Flexibility Act of 1980, as amended (RFA), the Commission has prepared this present Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on a substantial number of small entities by the policies and rules proposed in the *NPRM.* Written public comments are requested on this IRFA, including comments on any alternatives. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments provided in the *NPRM.*

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

148. The *NPRM* proposes and seeks comment on several rule amendments to address the growing need of the operators of UAS for access to licensed spectrum. Together, the proposals and the measures upon which the *NPRM* seeks comment will help further the development and promote the growth and safety of UAS operations.

149. First, the *NPRM* seeks comment on service rules for the 5030–5091 MHz band that will provide UAS operators with access to licensed spectrum with the reliability necessary to support safety-critical UAS communications links. The Commission's objective in this proceeding is to provide UAS operators with access to an additional spectrum resource that may complement other spectrum resources that are currently available or in development.

150. Second, due to the increasing interest in operating UAS using existing terrestrial flexible-use spectrum networks, the *NPRM* seeks comment on whether the Commission's rules are adequate to ensure co-existence of terrestrial mobile operations and UAS use or whether changes to our rules are necessary. To this end, it seeks comment on the sufficiency of the current flexible-use rules to prevent interference to and from UAS operations, and on whether the Commission can eliminate the current prohibitions on airborne operations applicable to certain of these flexible-use bands.

151. Third, to further promote the safe integration of unmanned aircraft operations in controlled airspace and facilitate flight coordination, the *NPRM* proposes a process for UAS operators to obtain a VHF license to communicate with air traffic control and other aircraft.

B. Legal Basis

152. 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

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

- *Wireless Telecommunications Carriers.*
- *Satellite Telecommunications Providers.*
- *Other Telecommunications Providers.*
- *Radio and Television Broadcasting and Wireless Communications Equipment Manufacturers.*
- *Unmanned Aircraft Radio Equipment Manufacturers.*
- *Unmanned Aircraft System Operators.*

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

154. The *NPRM* proposes to adopt a band plan and service rules for the 5030–5091 MHz band to enable small and other UAS operators, to access interference-protected spectrum for control-and-non-payload communications (CNPC) links, and seeks comment on various options. We expect the proposals and service rules upon which we seek comment in the *NPRM* will impose new or additional reporting or recordkeeping and/or other compliance obligations on small and other UA operators for access and use of the 5030–5091 MHz band spectrum. At this time however, the Commission cannot quantify the cost of compliance and cannot determine whether small entities will have to hire professionals to comply with the rule changes that may be adopted in this proceeding. Below we discuss proposals in the *NPRM* and their potential compliance requirements for small and other entities to operate in the 5030–5091 MHz band.

155. *The Band Plan.* The *NPRM* proposes to partition the 5030–5091 MHz band to accommodate both non-networked radio-line-of-sight—or Non-Networked Access (NNA)—use cases, which can rely on direct communication links between an operator's controller and the unmanned aircraft (UA), and beyond-radio-line-of-sight—or Network-Supported Service (NSS)—use cases, which typically depend on network infrastructure to support communications between the operator and the UA. The *NPRM* proposes to dedicate a minimum of 10 megahertz of spectrum for NNA operations, and seeks comment on various options for the remaining 51 megahertz of spectrum, including dedicating 40 megahertz of spectrum for network-based NSS operations by dividing the spectrum into 4 licensed blocks of 10 megahertz each, and providing 11 megahertz for temporary additional spectrum available to either NNA-based operators or NSS licensees. The *NPRM* further proposes to permit only CNPC in the band, to define CNPC as any UAS transmission that is sent to or from the UA component of the UAS and that supports the safety or regularity of the UA's flight. It further proposes to provide that any entity, other than those precluded by section 310 of the Communications Act, will be eligible to obtain a 5030–5091 MHz NNA station or obtain a 5030–5091 MHz NSS license, and seeks comment on similarly restricting the eligibility of entities to operate NNA stations using assignments from a DFMS.

156. *Dynamic Frequency Management System.* The *NPRM* proposes that access to the band be managed by one or more dynamic frequency management systems (DFMSs). A DFMS would be a frequency coordination system that, in response to requests from registered NNA users, would determine and assign to the requesting user, through an automated (non-manual) process, temporary use of certain frequencies for a particular geographic area and time period tailored to the user's submitted flight plan. The *NPRM* seeks comment on the appropriate regulatory framework to establish for a DFMS, including what requirements should be imposed on UAS operators in the band to help ensure a DFMS's ability to provide interference-free access. Among other possible requirements, the *NPRM* seeks comment on what information the operator should be required to provide regarding ground stations and unmanned aircraft stations, including whether an active UAS in the band should be required to submit information required by FAA's Remote ID rule, or some subset or variation of the information, and whether a UAS should be required to communicate to the DFMS, in real time or within a certain period of time of the relevant event, the initiation and termination of the flight or, alternatively, the initiation and termination of the operator's use of the assigned frequencies. Both of these potential rules would likely have reporting implications for small and other UAS operators, if adopted. The *NPRM* also seeks comment on whether to require UAS operators to register with a DFMS as a pre-condition of receiving NNA assignments and to provide certain information with such registration, which could also impact recordkeeping and reporting obligations. The *NPRM* proposes to authorize the administrator of a DFMS to charge UAS operators reasonable fees for its provision of services, including registration and channel assignment services, and to permit parties to petition the Commission to review fees and require changes if they are found to be excessive.

157. *NNA Service Rules.* The *NPRM* proposes to adopt service rules for NNA operations, including rules for licensing and technical requirements, and seeks comment broadly on the licensing regime or mechanism to enable authorization of NNA operations in the 5030–5091 MHz band and the costs and benefits of any proposed approach. For the licensing of stations in NNA spectrum, the *NPRM* proposes to adopt a licensed-by-rule authorization for aircraft and ground stations in the band. For technical requirements, the *NPRM* proposes to adopt the technical standard RTCA DO–362A or technical requirements based on this standard, which contains Minimum Operational Performance Standards for terrestrial-based (*i.e.,* non-satellite) CNPC point-to-point or point-to-multipoint links in the 5030–5091 MHz band, including power limits, emission limits, and frequency accuracy requirements. In both the licensing eligibility and technical standards requirement discussions, we inquire whether to impose certification requirements that would likely be filed with the Commission, thereby impacting reporting requirements for users of the 5030–5091 MHz band.

158. The *NPRM* also seeks comment on whether any of the general technical requirements in subpart D of part 87 of the Commission's rules should apply to NNA equipment, and whether to adopt any other requirements on NNA equipment to facilitate a DFMS's ability to communicate with or otherwise control such equipment in the execution of the DFMS's responsibilities. In addition, the *NPRM* seeks comment on the potential application of the generally applicable rules in subparts B through F of part 87, including whether to require each UAS operator using an NNA assignment in the 5030–5091 MHz band to have an operator license or permit. It further seeks comment on whether the new service should be subject to rules under part 1, subpart F, governing ''Wireless Radio Service'' applications and proceedings. The application and/or incorporation of existing rules under part 87 or any other part of the Commission's rules would subject NNA users of the 5030–5091 MHz band to any applicable reporting and recordkeeping requirements under those rules unless explicitly excluded in the final rules.

159. *NSS Service Rules.* The *NPRM* also seeks comment on service rules for NSS licenses, including rules addressing, in particular, whether to issue geographic area defined licenses for a specific term of years, with rights of renewal. More specifically, the *NPRM* seeks comment on rules addressing (1) the geographic area scheme for licenses, (2) the appropriate initial and subsequent license terms, (3) performance requirements, (4) license renewal framework, and (5) technical and operational requirements.

160. For the geographic area of licenses, the *NPRM* seeks comment on whether to adopt larger licenses areas such as Regional Economic Area Groupings, a more granular scheme

such as Partial Economic Areas, or a geographic division of the country developed specifically for aviation purposes. The *NPRM* proposes to issue NSS licenses for an initial 15-year term, and to limit subsequent terms to 10 years. The *NPRM* seeks comment on the appropriate standard for license renewal, and on whether the regulatory renewal framework for commercial geographic licensees of wireless radio services under part 1 of the Commission's rules is appropriate for NSS licensees. The *NPRM* also seeks comment on performance requirements, such as a requirement to cover 80 percent of the population within 12 years of license grant, and 45 percent coverage of the population within six years of license grant. For compliance demonstration, the *NPRM* proposes to adopt a process similar to compliance rules applicable to part 27 licensees, requiring licensees to file a construction notification with the Commission within 15 days of the expiration of the applicable benchmark, including submission of electronic coverage maps accurately depicting the boundaries of the licensed area and the boundaries of the actual areas to which the licensee provides service. For enforcement, the *NPRM* proposes that if a licensee fails to meet the final performance requirement, the license authorization will terminate automatically without specific Commission action, and that failure to meet the interim requirement would result in the reduction by two years of both the due date for the final performance requirement and the license term.

161. In the event that the Commission receives mutually exclusive license applications for NSS licenses, the *NPRM* proposes to assign these exclusive use licenses through a system of competitive bidding. Consistent with the competitive bidding procedures the Commission has used in previous auctions, the *NPRM* proposes to conduct any auction for geographic area licenses for spectrum in the band in conformity with the part 1, subpart Q general competitive bidding rules, subject to any modification of the part 1 rules that the Commission may adopt in the future. For small entities, the *NPRM* seeks comment on whether to make bidding credits available for eligible small businesses and rural service providers.

162. The *NPRM* also seeks comment on appropriate technical requirements for NSS licenses, and whether the technical standard RTCA DO–362A or equivalent technical parameters should also apply to NSS licenses. As an alternative to requiring NSS licensee compliance with the RTCA DO–362A standard generally, the *NPRM* also seeks comment on whether there are certain specific requirements of RTCA DO–362A that the Commission should minimally impose on NSS licensees to ensure compatibility with NNA operations, or for other purposes, such as the Time Division Duplex requirements of the RTCA DO–362A standard. In addition, the *NPRM* seeks comment on adoption of a field strength limit to prevent interference between adjacent geographic area licensees.

163. As with NNA service rules, the *NPRM* seeks comment on whether and to what extent the NSS service rules should incorporate or be subject to the requirements generally applicable to aviation services under subparts B through F of part 87 of the Commission's rules, either in their current form or with modifications, and whether the NSS service should be subject to rules under part 1, subpart F, governing wireless radio service applications and proceedings. In particular, the *NPRM* seeks comment on whether to allow partitioning and disaggregation of NSS licenses as well as spectrum leasing. Likewise as mentioned earlier in the NNA service rules discussion, NSS users would be subject to any applicable reporting and recordkeeping requirements under existing Commission's rules incorporated into the requirements for the 5030–5091 MHz band. The *NPRM* also seeks comment on whether to authorize NSS licensees, at their discretion, to provide network-supported service for UAS CNPC through either a satellite or terrestrial network, or alternatively, whether the Commission should provide that certain NSS licenses are dedicated exclusively to satellite-based service. It further seeks comment on whether to permit NSS licensees to deploy High-altitude Platform Stations (HAPS).

164. *Equipment Authorization.* To ensure that equipment in the new band has the level of reliability and safety required of aviation equipment, the *NPRM* proposes to impose equipment authorization requirements similar to those under §§ 87.145 and 87.147 of the Commission's rules to all equipment intended for use in the 5030–5091 MHz band. Section 87.145 requires that each transmitter must be certificated for use in the relevant service, and § 87.147 establishes a specific equipment authorization process. Section 87.147 specifically requires an applicant for certification of equipment to notify the FAA of the filing of the application, and provides that the Commission will not act on the application until it receives the FAA's determination regarding whether it objects to the application for equipment authorization.

165. *Protection of Other Services.* The *NPRM* seeks comment on any measures the Commission should adopt to protect Federal Microwave Landing System (MLS) deployments in the 5030–5091 MHz band, and on whether to provide that no future non-Federal MLS licenses (including MLS radionavigation land test licenses at 5031 MHz) will be granted in the 5030–5091 MHz band. To protect radio astronomy operations, the *NPRM* proposes, consistent with NTIA's recommendations, to continue to apply to the 5030–5091 MHz band the requirements of Footnote US211 of the Table of Frequency Allocations, and to prohibit UAS operations within the National Radio Quiet Zone (NRQZ) without prior coordination with the NRQZ administrator and submission of a concurrence from the NRQZ administrator with any request to a DFMS for frequency assignment within the NRQZ. The *NPRM* also seeks comment on applying to all UAS operations relying on the 5030–5091 MHz band in the NRQZ the licensee/applicant procedures for the NRQZ under § 1.924(a) of the Commission's rules, which include written notification filing requirements. The *NPRM* further seeks comment on any special measures necessary to ensure compatibility between UAS operations in the 5030–5091 MHz band and AeroMACS and flight testing in adjacent bands. To protect radionavigation-satellite service in the 5010–5030 MHz band, the *NPRM* proposes to require 5030–5091 MHz operations to comply with the specific effective isotropically radiated power (EIRP) spectral density limit specified in Footnote 5.443C of the Table of Frequency Allocations. With regard to Canadian and Mexican coordination, the *NPRM* proposes to provide that all operations in the band are subject to international agreements with Mexico and Canada.

166. *Airborne Use of Flexible-Use Spectrum.* Regarding UAS operations in flexible-use spectrum, the Commission did not make specific proposals and seeks comment on the adequacy of its current rules to ensure co-existence of existing terrestrial wireless networks and UAS, and on the regulatory solutions that may be necessary to facilitate and encourage such use. Thus, at this time the Commission is not in a position to determine what rule changes could result from the questions raised in the *NPRM,* and which of those changes, if any, will result in reporting and/or recordkeeping obligations for small entities.

167. *VHF Licenses for UAS Pilots.* The *NPRM* proposes that the Commission individually license stations for UA pilot communication with control towers and other aircraft pilots under a new category of licensed station, an Unmanned Aircraft Operator Ground VHF Station, and to define the new station as ''a station on the ground providing unmanned aircraft pilot radio communication relating to safety and regularity of flight on air traffic control, flight service station, unicom, or multicom frequencies.'' The *NPRM* further proposes to provide that these stations may operate over all air traffic control, flight service station, aeronautical advisory station (unicom) and aeronautical multicom channels authorized for use by aircraft. In addition, the *NPRM* proposes to permit mobile stations (stations intended to be used while in motion or during halts at unspecified points), and seeks comment on whether to permit non-mobile stations as well. Under this proposal, UAS operators would be required to file a license application with the Commission for an individual license covering their VHF station.

E. Federal Rules That May Duplicate, Overlap, or Conflict With the Proposed Rules

168. Proposed UAS service rules for the 5030–5091 MHz band would, in part, overlap with and, depending on the UAS equipment requirements established in this proceeding, may be inconsistent with the FAA's Technical Standard Order (TSO) C213a, which establishes minimum performance standards for UAS radios in the 5030–5091 MHz MHz band.

IV. Ordering Clauses

169. 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 the Notice of Proposed Rulemaking *is hereby adopted.*

170. *It is further ordered* that the Petition for Rulemaking filed by the Aerospace Industries Association in the Commission's rulemaking proceeding RM–11798 *is granted* to the extent specified herein, that RM–11798 is incorporated into this proceeding, WT Docket No. 22–323, and that RM–11798 is *terminated.*

171. *It is further ordered* that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, *shall send* a copy of the Notice of Proposed Rulemaking, including the Initial Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

List of Subjects

47 CFR Part 1

Administrative practice and procedure, Communications, Communications common carriers, Communications equipment, Radio, Reporting and recordkeeping requirements, Telecommunications.

47 CFR Part 87

Radio.

47 CFR Part 88

Communications, Communications equipment, Incorporation by reference, Reporting and recordkeeping requirements, Unmanned aircraft control services.

Federal Communications Commission.

Marlene Dortch,

Secretary.

Proposed Rules

For the reasons discussed in the preamble, the Federal Communications Commission proposes to amend 47 CFR chapter I 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, unless otherwise noted.

■ 2. Section 1.901 is revised to read as follows:

§ 1.901 Basis and purpose.

The rules in this subpart are issued pursuant to the Communications Act of 1934, as amended, 47 U.S.C. 151 *et seq.* The purpose of the rules in this subpart is to establish the requirements and conditions under which entities may be licensed in the Wireless Radio Services as described in this part and in parts 13, 20, 22, 24, 27, 30, 74, 80, 87, 88, 90, 95, 96, 97, and 101 of this chapter.

■ 3. Section 1.907 is amended by revising the definitions of ''Private Wireless Services'' and ''Wireless Radio Services'' to read as follows:

§ 1.907 Definitions.

* * * * *

Private Wireless Services. Wireless Radio Services authorized by parts 80, 87, 88, 90, 95, 96, 97, and 101 of this chapter that are not Wireless Telecommunications Services, as defined in this part.

* * * * *

Wireless Radio Services. All radio services authorized in parts 13, 20, 22, 24, 26, 27, 30, 74, 80, 87, 88, 90, 95, 96, 97 and 101 of this chapter, whether commercial or private in nature.

* * * * *

PART 87—AVIATION SERVICES

■ 4. The authority citation for part 87 continues to read as follows:

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

■ 5. Section 87.3 is amended by adding paragraph (g) to read as follows:

§ 87.3 Other applicable rule parts.

* * * * *

(g) Part 88 contains rules governing the use of the 5030–5091 MHz band by unmanned aircraft systems.

■ 6. Section 87.5 is amended by adding in alphabetical order a definition of ''Unmanned Aircraft Operator VHF Ground Station'' to read as follows:

§ 87.5 Definitions.

* * * * *

Unmanned Aircraft Operator VHF Ground Station. A station on the ground providing unmanned aircraft pilot radio communication relating to safety and regularity of flight on air traffic control, flight service station, unicom, or multicom frequencies.

* * * * *

■ 7. Section 87.18 is amended as follows:

■ a. By adding the words ''(manned or unmanned)'' after ''An aircraft station'' in the first sentence of paragraph (b); and

■ b. By adding paragraph (c).

The addition reads as follows:

§ 87.18 Station license required.

* * * * *

(c) Notwithstanding paragraph (a) of this section, Unmanned Aircraft Operator VHF Ground Stations are not licensed by rule and must be licensed by the FCC either individually or by fleet for communications on air traffic control, flight service station, unicom, or multicom frequencies in accordance with § 87.49.

■ 8. Section 87.49 is added to read as follows:

§ 87.49 Application for an Unmanned Aircraft Operator VHF Ground Station license.

A person may apply for an Unmanned Aircraft Operator VHF Ground Station license to communicate on air traffic control, flight service station, unicom, or multicom frequencies if written approval is first obtained from the Federal Aviation Administration (FAA). The applicant must provide, with the license application, a copy of the

written approval from the FAA, such as a Certificate of Waiver or Authorization (COA), approving the applicant's use of the specific frequencies requested in connection with unmanned aircraft activity. License grant will be subject to any conditions, coordination, or restrictions imposed by the FAA in its written approval.

■ 9. Part 88 is added to read as follows:

PART 88—UNMANNED AIRCRAFT CONTROL SERVICES

Subpart A—General Rules

Subpart B—Non-Networked Access

Subpart C—[Reserved]

Subpart D—Technical Requirements

Subpart E—Dynamic Frequency Management Systems

Authority: 47 U.S.C. 154(i), 303, 307.

Subpart A—General Rules

§ 88.1 Scope.

This part sets forth the regulations governing the use of the 5030–5091 MHz band by unmanned aircraft systems. The regulations in this part do not govern unmanned aircraft systems communications services in any bands other than the 5030–5091 MHz band.

§ 88.3 Application of other rule parts.

(a) Except as expressly provided under this part, part 87 of this chapter shall not apply to unmanned aircraft systems communications in the 5030–5091 MHz band.

(b) Non-Networked Access (NNA) devices, as defined in this part, are considered part of the Citizens Band Radio Service, as defined in § 95.303 of this chapter. Except for § 95.303, the rules of part 95 of this chapter shall not apply to such devices.

§ 88.5 Definitions.

The following terms and definitions apply only to the rules in this part.

Control and Non-payload Communications (CNPC). Any unmanned aircraft system (UAS) transmission that is sent to or from the unmanned aircraft (UA) component of the UAS and that supports the safety or regularity of the UA's flight.

DFMS Administrator. An entity authorized by the Federal Communications Commission (Commission or FCC) to operate a DFMS in accordance with the rules and procedures set forth in subpart E of this part.

Dynamic Frequency Management System (DFMS). An automated frequency coordination system operating in the 5030–5091 MHz band that, in response to frequency assignment requests from UAS operators, assigns to the requesting operator, through an automated (non-manual) process, temporary use of certain frequencies for a particular geographic area and time period tailored to the operator's submitted flight plan.

Ground station. A land or mobile station not on board a UA that is part of a UAS and for communication with an unmanned aircraft station.

NNA device. A ground station or unmanned aircraft station authorized under this part and designed to communicate using NNA assignments consistent with subparts B and D of this part.

NNA user. An authorized user of spectrum in the 5030–5091 MHz band operating on an NNA basis, as set forth in subpart B of this part.

Non-Networked Access (NNA). Temporary, interference-protected access to the 5030–5091 MHz band pursuant to a frequency assignment from a DFMS and consistent with subpart B of this part.

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

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

Unmanned aircraft system (UAS). A UA and its associated elements (including an unmanned 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.

Subpart B—Non-Networked Access

§ 88.25 Scope.

Transmissions over an NNA assignment may include any form of CNPC.

§ 88.27 Authorization.

(a) Any entity, other than those precluded by section 310 of the Communications Act of 1934, as amended, 47 U.S.C. 310, and otherwise meets the technical, financial, character, and citizenship qualifications that the Commission may require in accordance with such Act is eligible to be an NNA user and operate NNA devices under this part.

(b) NNA devices, including ground stations and unmanned aircraft stations, are licensed by the rules in this part and do not need an individual license issued by the Commission. Even though an individual license is not required, an NNA device licensed by the rules in this part must comply with all applicable operating requirements, procedures, and technical requirements found in this part.

(c) NNA users must register with a DFMS and comply with its instructions and the rules in this part.

(d) NNA users may transmit in the 5030–5091 MHz band only using NNA devices compliant with the rules of this part, and only pursuant to and consistent with the terms of a frequency assignment from a Commission-approved DFMS.

§ 88.29 Frequencies.

The 5030–5035 MHz and 5086–5091 MHz bands are allocated for CNPC use to NNA users.

§ 88.31 Non-Networked Access use.

(a) NNA users registered with a DFMS may submit a request for temporary assignment of frequencies for CNPC limited to the duration and geographic coverage necessary to support a single submitted UAS flight plan. Requests may also be made either prior to or during the relevant operation to modify an assignment. Such requests must be made to the same DFMS responsible for the original assignment.

(b) If frequencies meeting the request are available, the DFMS shall assign them on an exclusive but temporary basis. The scope of the assignment shall be tailored in both duration and geographic coverage to ensure interference-free communications for the entire submitted UAS flight plan.

(c) When registering with or using the services of a DFMS, an NNA user shall comply with all instructions of the DFMS Administrator, including those

regarding registration, requests and other submissions to the DFMS, and operational use of NNA assignments.

(d) An NNA user operating under a DFMS assignment must provide indication to the DFMS, within 5 minutes of the event, when a flight has commenced and when it has terminated.

(e) NNA users are prohibited from engaging in UAS operations using NNA assignments within the National Radio Quiet Zone (NRQZ) without prior coordination with the NRQZ administrator. Any request to a DFMS for frequency assignment within the NRQZ must include submission of a Letter of Concurrence from the NRQZ administrator, and NNA users submitting such a request shall comply with all conditions enumerated in the Letter of Concurrence. NNA users are urged to take all practicable steps to protect radio astronomy observations in the 5000–5250 MHz band.

Subpart C—[Reserved]

Subpart D—Technical Requirements

§ 88.101 Transmitter power.

The power of the transmitter is defined as the average envelope measured during the duration of the burst transmission bounded by the first preamble symbol to the last midamble symbol, measured at the transmitter's radio frequency (RF) output port with a 50 ohm load attached. The power must be determined by direct measurement at the transmitter output terminals. The maximum power of a transmitter must not exceed the values listed in paragraphs (a) and (b) of this section.

(a) For an Airborne Radio Transmitter:

(1) High Power Mode: 10 watts.

(2) Low Power Mode: 100 mW.

(b) For a Ground Radio Transmitter: 10 watts.

§ 88.103 Bandwidth of emission.

The authorized bandwidth is the maximum occupied bandwidth authorized to be used by a station. Equipment must be tunable in 2.5 kHz steps within the range 5030–5091 excluding center frequencies 5030 MHz and 5091 MHz. The authorized bandwidth is limited to multiples of 5 kHz according to the following:

(a) One In-flight Emergency Video Channel having a width of 500 kHz.

(b) Two takeoff and Landing Video Channels of 250 kHz width per channel.

(c) Non-Video Channels may operate on up to 250 kHz-wide channels in multiples of 5 kHz.

§ 88.105 Types of emission.

The assignable emission designators in multiples of 5 kHz up to 500 kHz are as follows:

(a) G8D—for data.

(b) G8F—for video.

§ 88.107 Acceptability of transmitters for licensing.

Each transmitter utilized for operation under this part and each transmitter marketed as set forth in § 2.803 of this chapter must be certificated by the Commission following the procedures set forth in part 2, subpart J, of this chapter.

§ 88.109 Authorization of equipment.

An applicant for certification of equipment must notify the Federal Aviation Administration (FAA) of the filing of a certification application. The letter of notification must be mailed to: FAA, Office of Spectrum Policy and Management, ASR–1, 800 Independence Ave. SW, Washington, DC 20591 prior to the filing of the application with the Commission.

(a) The notification letter must describe the equipment, and give the manufacturer's identification, antenna characteristics, rated output power, emission type and characteristics, the frequency or frequencies of operation, and essential receiver characteristics if protection is required.

(b) The certification application must include a copy of the notification letter to the FAA. The Commission will not act until it receives the FAA's determination regarding whether it objects to the application for equipment authorization. The FAA should mail its determination to: Office of Engineering and Technology Laboratory, Authorization and Evaluation Division, 7435 Oakland Mills Rd., Columbia, MD 21046. The Commission will consider the FAA determination before taking final action on the application.

§ 88.111 Performance standards.

Transmitters operating in the 5030–5091 MHz band must comply with and operate in accordance with technical standard *RTCA–DO–362A* (incorporated by reference, see § 88.115).

§ 88.113 RF safety.

Licensees and manufacturers are subject to the radio frequency radiation exposure requirements specified in §§ 1.1307(b), 1.1310, 2.1091, and 2.1093 of this chapter, as appropriate. Applications for equipment authorization of mobile devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions and technical information showing the basis for this statement must be submitted to the Commission upon request.

§ 88.115 Incorporation by reference.

Certain material is incorporated by reference into this part with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. All approved incorporation by reference (IBR) material is available for inspection at the Federal Communications Commission (FCC) and at the National Archives and Records Administration (NARA). Contact FCC at: 45 L Street NE, Reference Information Center, Room 1.150, Washington, DC 20554, (202) 418–0270, For information on the availability of this material at NARA, visit *www.archives.gov/federal-register/cfr/ibr-locations.html* or email *fedreg.legal@nara.gov.* The material may be obtained from the following source:

(a) RTCA, 1150 18th Street NW, Suite 910, Washington, DC 20036, email: *info@rtca.org* or *http://RTCA.org.*

(1) RTCA–DO–362A, Command and Control (C2) Data Link Minimum Operational Performance Standards (MOPS) (Terrestrial), dated December 17, 2020 (*RTCA–DO–362A*), IBR approved for § 88.111.

(2) [Reserved]

(b) [Reserved]

Subpart E—Dynamic Frequency Management Systems

§ 88.135 DFMS requirements.

(a) DFMS must provide a process for NNA users to register with the system for the purpose of submitting frequency assignment requests and obtaining frequency assignments.

(b) A DFMS must be capable of processing frequency assignment requests nationwide and across the entire 5030–5091 MHz band. However, a DFMS may only grant assignments for spectrum within those frequencies specified under § 88.29.

(c) In response to frequency assignment requests from a registered NNA user, a DFMS shall determine and provide, through an automated (non-manual) process, an assignment of frequencies for a particular geographic area and time period tailored to the NNA user's submitted flight plan, to the extent that frequencies are available to meet the request and grant of the assignment is otherwise consistent with this part. Assignments must provide protected access to frequencies over a duration and geographic area sufficient to cover the entire submitted flight plan.

(d) Assignments for operations in the National Radio Quiet Zone (NRQZ) must be accompanied by a Letter of Concurrence from the NRQZ Administrator and may only be granted within the terms and conditions, if any, specified in the Letter of Concurrence.

(e) Assignments must account for the need to protect other authorized operations.

§ 88.137 DFMS Administrators.

The Commission will approve one or more DFMS Administrators to manage access to the 5030–5091 MHz band on a nationwide basis as specified under § 88.135. Each DFMS Administrator is responsible for the functioning of a DFMS and providing services to operators in the Unmanned Aircraft Control Service. Each DFMS Administrator approved by the Commission must:

(a) Operate a DFMS consistent with the rules of this part.

(b) Establish and follow protocols and procedures to ensure compliance with the rules set forth in this part.

(c) Provide service for a ten-year term. This term may be renewed at the Commission's discretion.

(d) Securely transfer all the information in the DFMS to another approved entity in the event it does not continue as the DFMS Administrator at the end of its term. It may charge a reasonable price for such conveyance.

(e) Cooperate to develop a standardized process for coordinating operations with other approved DFMSs, avoiding any conflicting assignments, and maximizing shared use of available frequencies.

(f) Coordinate with other DFMS Administrators including, to the extent possible, sharing assignment and other information, facilitating non-interference to and from operations relying on assignments from other DFMSs, and other functions necessary to ensure that use of available spectrum is safe and efficient and consistent with this part.

(g) Ensure that the DFMS shall be available at all times to immediately respond to requests from authorized Commission personnel for any and all information stored or retained by the DFMS.

(h) Establish and follow protocols to comply with enforcement instructions from the Commission.

§ 88.139 DFMS Administrator fees.

(a) A DFMS Administrator may charge users a reasonable fee for provision of its services, including usage-based fees for frequency assignments.

(b) The Commission, upon request, will review the fees and can require changes in those fees if they are found to be excessive.

[FR Doc. 2023–00961 Filed 2–6–23; 8:45 am]

BILLING CODE 6712–01–P