



FEDERAL COMMUNICATIONS COMMISSION

47 CFR Parts 1 and 90

[WP Docket No. 07-100; FCC 21-106; FR ID 54623]

4.9 GHz Band

AGENCY: Federal Communications Commission.

ACTION: Proposed rule.

SUMMARY: In this Eighth Further Notice of Proposed Rulemaking (Eighth Further Notice), the Federal Communications Commission (Commission or FCC) seeks comment on the structure of the 4940-4990 MHz (4.9 GHz) band in an effort to maximize public safety use while exploring options that could spur innovation, improve coordination, and drive down costs in the band.

DATES: Interested parties may file comments on or before **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**; and reply comments on or before **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: You may submit comments, identified by WP Docket No. 07-100, by any of the following methods:

- **Electronic Filers:** Comments may be filed electronically using the Internet by accessing the ECFS: <http://apps.fcc.gov/ecfs/>.
- **Paper Filers:** Parties who choose to file by paper must file an original and one copy of each filing.
- 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 e-mail to fcc504@fcc.gov or call the Consumer & Governmental Affairs Bureau at 202-418-0530 (voice), 202-418-0432 (TTY).

FOR FURTHER INFORMATION CONTACT: For additional information on this proceeding, contact Jonathan Markman of the Wireless Telecommunications Bureau, Mobility Division, at (202) 418-7090 or Jonathan.Markman@fcc.gov, or Thomas Eng of the Public Safety and Homeland Security Bureau, Policy and Licensing Division, at (202) 418-0019 or Thomas.Eng@fcc.gov.

SUPPLEMENTARY INFORMATION: This is a summary of Commission's Eighth Further Notice of Proposed Rulemaking, in WP Docket No. 07-100; FCC 21-106, adopted on September 30, 2021 and released on October 1, 2021. The full text of the Eighth Further Notice of Proposed Rulemaking, including all appendices, is available for inspection and copying during normal business hours in the FCC Reference Information Center, 45 L Street NE, Washington, DC 20554, or by downloading the text from the Commission's website at <https://docs.fcc.gov/public/attachments/FCC-21-106A1.pdf>. 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. EIGHTH FURTHER NOTICE OF PROPOSED RULEMAKING

A. Overview

1. In this Eighth Further Notice, we propose to revisit the structure of the 4.9 GHz band to maximize public safety use while exploring options that could spur innovation, improve coordination, and drive down costs in the band. Specifically, we seek to establish a nationwide framework for coordinating access to the band. We believe that a comprehensive and integrated approach that emphasizes public safety needs represents a superior path to unlocking the potential of the 4.9 GHz band rather than pursuing a state-centered approach that could lead to a patchwork of incompatible uses. Similarly, we believe a nationwide approach will promote a robust equipment market, drive down prices and costs, spur innovation, and increase the likelihood of interoperable communications and consistent interference protection. We also explore potentially allowing non-public safety use of the band to encourage a more robust and innovative equipment market, provided that non-public safety use can occur without causing harmful interference to public safety operations in the band. As part of this vision, we seek comment on how best to meet the needs of public safety in this band and on establishing a database that would contain consistent and reliable information about what spectrum is available and where and how it is being used. Our goal is to provide greater certainty and predictability to stakeholders seeking to plan and invest in 4.9 GHz deployments and enable spectrum users to coordinate shared use of the band to avoid conflicts. In addition, we seek comment on a range of technical issues, eligibility issues, and other measures intended to increase use of the band.

2. We note that this proceeding has an extensive record, which we intend to draw upon as needed to develop a cohesive set of nationwide rules to maximize use of the band,

including protection for public safety operations. We encourage commenting parties to assist us by providing input on the new ideas proposed herein and by submitting additional new proposals or by modifying previous proposals. To the extent that commenters wish to reiterate any proposals that have been previously introduced into the record, commenters should demonstrate that the proposals align with our approach and priorities for the band as described in this Eighth Further Notice. We preserve our flexibility to consider and adopt proposals from prior stages of this proceeding that the Commission has not specifically rejected.

B. Ensuring Public Safety Use of the Band

3. As noted above, the band is currently home to 3,541 licensees. We recognize that these licenses represent a significant investment of scarce public safety resources, so as we explore ways to enhance the usage of the band, we are cognizant that we must protect these investments.

1. Protection for Public Safety Licensees

4. We seek comment in this Eighth Further Notice on how to ensure public safety licensees have efficient and interference-free access to the band. Numerous commenters have addressed this issue, and several have expressed support for various approaches to protecting public safety licensees from interference. For instance, the National Public Safety Telecommunications Council (NPSTC) argues that interference protection, whether “done manually or through some potential future automated frequency coordination approach,” must be incorporated into the management of the band to protect incumbents “against interference and signal degradation.” We agree, and we tentatively conclude that incumbent public safety licensees as well as future public safety users should be protected from harmful interference, both in the near term and on a forward-looking basis, subject to other requirements and conditions that we may adopt in this proceeding.

5. NPSTC recommends “use of the threshold degradation approach in the ANSI/TIA-10 [American National Standards Institute/Telecommunications Industry

Association] standard to minimize interference to incumbent fixed operations,” which NPSTC notes “encompass many of the public safety operations” in the band. We seek comment on the feasibility of NPSTC’s proposal to use the TIA-10 standard to minimize interference to incumbents that deploy fixed facilities. Are there alternatives to the TIA-10 standard which could be used to guard against interference between licensees deploying fixed point-to-point (P-P) links and point-to-multipoint (P-MP) hubs? Under Part 90, contour overlap analysis is often the basis for determining if an applicant’s proposed facilities would likely cause interference to an incumbent operator. Would contour overlap analysis requirements be useful for certain 4.9 GHz band deployments, and if so, what service and interference contour values would be appropriate? We also seek comment on what standards would be appropriate for incumbents deploying non-fixed, geographic-area operations or ad-hoc temporary operations. Commenters are encouraged to address how their proposals would support our tentative conclusion to protect both existing and future public safety licensees in the band as well as interact with potential new non-public safety operations in the band, with specific attention to the licensing and sharing models addressed below.

2. Licensing Database

6. In the *Sixth Further Notice of Proposed Rulemaking (Sixth Further Notice)* (83 FR 20011), the Commission stated that it believed many concerns public safety users have about the 4.9 GHz band could be addressed if more complete technical information were available to all affected parties. We therefore seek comment on collecting more granular data on 4.9 GHz operations in our licensing database and combining that with a formal coordination structure to improve interference mitigation efforts and bolster public safety confidence in the band. Today, licensees in the 4.9 GHz band only provide our Universal Licensing Service (ULS) database with control points and geographic area of operations. More robust information on public safety operations in the band could help improve predictability for public safety operations and facilitate robust, non-interfering access to the band for non-public safety entities. Therefore, we

tentatively conclude that additional information is required, and we seek comment on whether to continue using ULS or to transition to a third-party licensing database to accommodate the additional information. For instance, in the *Sixth Further Notice*, the Commission proposed to maintain ULS as the comprehensive licensing database for the 4.9 GHz band and proposed to modify ULS as necessary to accept the necessary licensing data. Since ULS can readily accommodate additional information, we seek comment on these proposals. We seek comment on requiring incumbents and future applicants to supply complete microwave path data for links, and to license base stations (currently authorized under the geographic license scheme) on a site-by-site basis.

7. In the *Sixth Further Notice*, the Commission proposed “to require incumbent licensees and new applicants to provide technical information that will enhance frequency coordination and help mitigate the possibility of interference, while permitting more new users.” We seek comment on this proposal to require incumbents and future applicants in the 4.9 GHz band to submit more information in ULS. Would collecting this data improve the level of interference protection licensees receive in the band? We seek comment on whether collecting this data would create a more predictable and transparent spectrum environment for any current and future users of the band, including potential non-public safety users. To what extent does not having this data currently listed in ULS lead to additional interference or uncertainty in the band? In particular, should licensees specify channels they are using for their operations? In the *Sixth Further Notice*, the Commission also proposed to add the 4.9 GHz band to the ULS microwave schedule for P-P, P-MP, and proposed to “uncouple base and mobile stations from geographic licenses and instead require that base and mobile technical parameters be entered on the existing location and technical data schedules.” We seek comment on these ULS schedule proposals and ask commenters to address whether ULS’s existing schedules are sufficient for collecting the additional data.

8. What is the burden on incumbents and applicants who would need to submit

detailed site-based information, and does the benefit of having additional technical data listed in ULS outweigh that burden? For instance, the Commission estimates the average burden for each applicant completing FCC Form 601 and associated schedules to be 1.25 hours, which includes “the time to read the instructions, look through existing records, gather and maintain required data, and actually complete and review the form or response.” Is this estimate accurate for incumbents or new applicants who would need to submit the additional technical information described above with their Form 601 application? What is the interplay of these potential new data collection requirements with potential sharing mechanisms, discussed below, that would facilitate shared public safety and non-public safety use of the band?

9. Are there alternatives to collecting additional technical data in ULS for the 4.9 GHz band? For instance, would a database managed by a third party offer advantages over requiring incumbents and new applicants to submit additional information via ULS? If so, what are those advantages and what would be the cost of having a third party administrator manage a database to collect the information needed to increase interference protection in the 4.9 GHz band? How would the transition from ULS to a third-party database be implemented? Who would pay that cost and how would those costs impact public safety given that public safety entities are subject to no filing fees in ULS? In other words, would a third-party managed database increase costs on public safety licensees in the band and would those costs outweigh any derived benefits? Commenters that support the use of a third party band manager are encouraged to consider how such a system could work with the various methods of introducing non-public safety operations to the band described below. If we were to pursue this option, who would be suitable to manage the database? How should we select the administrator?

10. Regardless of whether ULS or a third-party database is used to collect technical detail on 4.9 GHz deployments, incumbent licensees with geographic licenses would need time to submit the requisite information. In the *Sixth Further Notice*, the Commission proposed giving incumbent geographic licensees one year to identify in ULS P-P links, P-MP hubs, fixed

receivers, base stations, and mobiles that are not currently licensed site-by-site. The Commission sought comment on whether the status of a license should become secondary if the incumbent licensee does not meet the one-year deadline. Most parties commenting on this issue concurred with this time period. We seek comment on whether a one-year timetable is still appropriate for incumbent geographic licensees to submit technical data on their deployments into a database, and whether any deterrent, such as the risk of forfeiting primary status, is needed to ensure compliance. On the other hand, given that the purpose of collecting additional technical data is to provide increased interference protection to incumbent licensees, does this benefit provide sufficient incentive for licensees to comply with a timetable requirement?

3. Interoperability

11. The record generated in response to the *Sixth Further Notice* demonstrates that the public safety community employs this band for a wide variety of uses. As we strive to develop a national framework for this band, we seek to encourage uses that enable collaboration and mutual aid between multiple licensees, for instance, in response to larger incidents and emergencies. To that end, we seek comment on whether to adopt any technical standards for the 4.9 GHz band that would promote interoperability in the band. In other private land mobile radio (PLMR) frequency bands used by public safety, the Commission designates certain channels for interoperability communications, and in some instances, it also specifies technical requirements for equipment designed to transmit on those channels. The goal is to ensure that public safety officials from different agencies can communicate on designated interoperability channels regardless of the make or model of their radio equipment.

12. We seek comment on whether any interoperability requirements are needed for the 4.9 GHz band. For example, should we designate a band segment or certain channels in the band for interoperable communications? If so, how much spectrum would sufficiently address public safety needs and how should interoperable spectrum be administered to optimize those resources for their primary purpose? For example, should state interoperability coordinators,

regional planning committees, or individual agencies administer the use of interoperable 4.9 GHz spectrum? In addition, if we were to set aside spectrum for public safety interoperability purposes, should we also specify technical standards for equipment intended to operate on those channels? Would such a requirement invigorate or stifle innovation and equipment options? Parties discussing interoperability for the 4.9 GHz band should explain if and how the benefits of any such requirements outweigh associated costs. How should interoperability requirements apply to non-public safety entities if we expand eligibility for the band beyond public safety (as discussed below)? What technical and licensing conditions should apply to non-public safety licensees to ensure interoperable and interference-free operations? How could the introduction of non-public safety operations into the band help foster a broader interoperable device marketplace? Should we allow the marketplace to adopt voluntary interoperability standards in lieu of requirements specified in the Commission's rules? If so, how could a voluntary industry standard promote interoperability between all eligible users of the band?

4. Public Safety Priority and Preemption

13. An important element of public safety spectrum use, particularly where spectrum is shared with non-public safety users, is ensuring that public safety will have immediate and reliable access to spectrum whenever and wherever it is required for mission-critical operations. We therefore seek comment on affording public safety licensees priority access to the 4.9 GHz band, including the ability to preempt any non-public safety operations that may be authorized in the band.

14. The Association of Public-Safety Communications Officials-International, Inc. (APCO) states in its 2015 report that ,while it supports an approach to the band which fosters development in the commercial sector of “more cost effective equipment,” any such solution must afford “priority and preemption for public safety users in a shared environment.” We note that there are other instances where public safety users are afforded priority network access and the ability to preempt the operations of other users in emergency circumstances. If we open the

4.9 GHz band to non-public safety users, as discussed below, we seek comment on whether public safety priority and preemption should be elements of any sharing model we ultimately adopt. We seek comment on this approach and how best to accomplish that goal in the 4.9 GHz band.

15. For instance, we seek comment below on whether excess capacity leasing or a dynamic spectrum sharing system could effectively enable sharing between public safety and non-public safety. If so, to what extent and by what method could these sharing models ensure priority and preemption for public safety operations? Are priority and preemption sufficient tools to ensure public safety mission-critical operations access to the band under an excess capacity or dynamic spectrum sharing scheme? How would priority and preemption work under other spectrum sharing models?

16. If we adopt rules for public safety priority and preemption, we seek comment on the types of mission-critical public safety operations that should have priority over other public safety as well as non-public safety operations. Given the wide range of possible deployments in the 4.9 GHz band, both geographically and in terms of type of use, how should public safety licensees with overlapping operating areas determine priority and preemption rights and whether certain deployments or types of communications should have priority? For instance, should emergency mobile deployments at an incident scene be able to preempt fixed P-P links that may be operating on a primary basis? Does the primary status of a license or deployment have any bearing on priority and preemption? How do two overlapping licensees that both have primary status determine priority if they seek to use the same channel at the same time? We seek comment on how to ensure that mission-critical communications maintain consistent priority, no matter what deployment form they may take.

17. Finally, we seek comment on the technical feasibility of building priority and preemption algorithms into 4.9 GHz networks and equipment to enable authorized public safety users to obtain priority and preempt use of the spectrum if necessary. In contrast to instances

where public safety and non-public safety operate on a single shared network, 4.9 GHz licensees operate on disparate networks. How does this affect the availability of priority and preemption solutions? Is there a demand in the equipment marketplace for priority and preemption tools, and if not, should we require 4.9 GHz band equipment to include such tools? What equipment security requirements could we impose to avoid unauthorized signaling of priority? What would be the cost of incorporating priority and preemption algorithms into equipment?

C. Fostering Greater Public Safety Use of the Band

18. Regardless of what eligibility rules or sharing model we may ultimately adopt, we anticipate that the future of this band includes a robust public safety presence. We tentatively conclude that a nationwide, coordinated approach to the management of the spectrum will not only increase the utility of this band for public safety, but will also promote greater public safety use of the band by providing greater certainty with regards to the availability of the spectrum and interference protection. In this section, we explore ways to make the spectrum environment more attractive to existing and future public safety users.

1. Frequency Coordination

19. We seek comment on requiring formal frequency coordination in the 4.9 GHz band to support interference protection and increase public safety confidence in using the band. As noted above, our rules currently allow licensees in the 4.9 GHz band to deploy base stations, mobile units, and temporary fixed stations anywhere within the licensee's jurisdiction without formal frequency coordination. Rather, our rules direct licensees to informally coordinate with other users in the band by cooperating in "the selection and use of channels in order to reduce interference and make the most effective use of the authorized facilities."

20. The Commission previously contemplated frequency coordination as a means to encourage increased public safety use of the band. In 2009, the Commission noted that, "[w]ithout a specific coordination procedure in place, interference issues may arise between co-primary permanent fixed stations or other co-primary users of the band." In the *Sixth Further*

Notice, the Commission stated that “neither self-coordination nor a notice-and-response coordination procedure is likely to be sufficient to ensure interference protection to primary users in a mixed use environment.” APCO argues in its 2015 report that “new frequency coordination procedures designed to improve usage, performance, and interference protection” would increase interest in the band by the public safety community and “provide incentives for equipment vendors to direct investment into this market.”

21. Therefore, in this Eighth Further Notice, we tentatively conclude that some form of formal frequency coordination, whether through a coordination method discussed in this subsection and/or a dynamic spectrum sharing model as discussed further below, is necessary to support interference protection and increase public safety confidence in using the band. We seek comment on this tentative conclusion. Would mandatory frequency coordination provide certainty and incentives for public safety to increase its use of the band? Would it encourage equipment manufacturers to invest in developing new and low cost equipment for the band? If we adopt frequency coordination requirements, should they also apply to applications for non-public safety uses, insofar as such uses are permitted? If so, what criteria should coordinators apply to ensure that proposed non-public safety uses will not interfere with public safety operations?

22. If we adopt formal frequency coordination for the 4.9 GHz band, what type of frequency coordination would most effectively promote innovative use of the band while protecting against interference? In certain spectrum bands under Part 90, applicants seeking to license a new frequency or modify existing facilities must demonstrate that their application was coordinated by a Commission-certified frequency coordinator. The certified frequency coordinator recommends the most appropriate frequency for the proposed operation. Another type of frequency coordination that does not rely on certified frequency coordinators is used for applicants in the fixed microwave service. Part 101 requires that an applicant coordinate proposed facilities with existing licensees and other applicants whose facilities could be affected

by the new proposal, i.e., “notice-and-comment” type frequency coordination. We seek comment on whether Part 90 type frequency coordination, Part 101 type frequency coordination, or a combination of the two would be best suited for the 4.9 GHz band. Should Part 101 type coordination apply only to P-P or P-MP deployments in the 4.9 GHz band since those deployments are similar to deployments licensed under Part 101 of the Commission’s rules, or could it apply to additional deployments? What are the costs associated with Part 101 type coordination, including the time and effort to identify all incumbent licensees who must be notified, and how do those costs compare to Part 90-type frequency coordination? Do the benefits of frequency coordination outweigh any associated costs? Furthermore, below we seek comment on a Spectrum Access System (SAS) managed shared access model to facilitate non-public safety use of the band. Therefore, we seek comment on whether a SAS model could be used either in lieu of, or in parallel with, frequency coordination methods discussed above.

23. Next, we seek comment on how formal frequency coordination would apply to temporary or ad hoc deployments in the 4.9 GHz band. In particular, we seek comment on how to balance the need for public safety agencies to deploy temporary or ad hoc operations while protecting licensees with permanent deployments from interference. We also seek comment on what interference standard(s) should be the basis for any frequency coordination method adopted for the 4.9 GHz band. We seek comment on whether to incorporate the technical standard for frequency coordination into our rules, or rely on either an industry-agreed standard or frequency coordinator consensus. What should be the process for permitting Commission review of any disputes arising from the frequency coordinator’s actions, and how should Commission staff resolve such disputes?

24. If we adopt a coordination approach for the 4.9 GHz band that requires use of certified frequency coordinators, what criteria should the Commission use to certify coordinators? Should eligibility be limited to coordinators already approved to coordinate Public Safety Pool frequencies, or should it be open to other parties? Should prospective coordinators

be required to demonstrate a specific level of technical expertise with respect to 4.9 GHz operations in order to be certified?

2. Nationwide Band Manager

25. We seek comment on the concept of designating a single entity to serve as a nationwide band manager or licensee for the 4.9 GHz band. Assigning spectrum management responsibility to a single nationwide entity might simplify the task of developing a national framework for the band, and has been supported by some commenters. However, this approach would also represent a marked departure from the approach that we have applied to the band up to this point, and it raises a variety of significant policy, legal, and operational questions.

26. We seek comment on the concept of designating a single nationwide band manager that would be responsible for developing a nationwide framework for the band. For example, the Commission has adopted band manager rules for the 700 MHz Guard Bands, and the Wireless Telecommunications Bureau has permitted certain entities to engage in band manager activities via waiver request for the 220 MHz band. What entities would be appropriate for such a role in the 4.9 GHz band? How would the Commission differentiate between competing proposals to become the single nationwide band manager? If we were to pursue a nationwide band manager approach, we seek comment on appropriate rules or guidelines to define how the band manager would be authorized to select and manage users of the band. Would a band manager's duties be limited to merely developing a nationwide framework, or would a band manager take a more active role in evaluating applications? Would a band manager decide who can use the spectrum? Should we impose reporting requirements on a 4.9 GHz band manager, and, if so, what should those reports address and how often should they be filed with the Commission? What would be an appropriate level of compensation for the band manager? If the Commission moves forward with dynamic spectrum sharing, could one or more dynamic spectrum sharing system administrators assume the role of band manager, and would such designation be appropriate?

27. We also seek comment on establishing a national license for the 4.9 GHz band. If we were to adopt this approach, what rights and responsibilities over the band should be associated with the national license, and what rights should be reserved for state, local, tribal, or regional public safety licensees? As proposed above, we envision that incumbent licensees in the band would retain spectrum rights and would be entitled to protection of their facilities. Would all other spectrum rights be invested in the national licensee? If yes, what obligation should the national licensee have to ensure access to the band by sub-national public safety entities? If we were to allow public safety and non-public safety sharing of the band as discussed further below, would the national licensee be responsible for management or oversight of the sharing process? Finally, if we were to establish a national license, what process should we establish for accepting applications and selecting a licensee? What qualifications or attributes should be required to be eligible to apply for the license? If more than one entity applied to be the national licensee, how would the Commission adjudicate between competing applications?

3. Regional Planning Committees

28. Our current 4.9 GHz licensing regime is loosely based on a voluntary regional planning framework. Section 90.1211(a) of the Commission's rules provides that each Regional Planning Committee (RPC) may submit a plan with guidelines to be used for sharing 4.9 GHz spectrum within the RPC region. The rules list elements to be included in regional plans and provide instructions for plan modifications. Although the Commission originally set a deadline for all RPCs to submit 4.9 GHz regional plans, it subsequently stayed the deadline and made plan submission voluntary. To date, only 10 out of 55 RPC regions have submitted 4.9 GHz regional plans.

29. In the *Sixth Further Notice*, the Commission stated its belief that RPCs should play an integral role in shaping use of the 4.9 GHz band through regional planning. The Commission proposed to allow RPCs to submit 4.9 GHz band regional plans, which could

include region-specific technical guidelines. APCO noted that the *Sixth Report and Order* (85 FR 76469) abandoned these proposals, and in the latest round of comments, NPSTC and the American Association of State Highway and Transportation Officials (AASHTO) suggest that active RPCs could serve a valuable role in helping to manage the 4.9 GHz band in their regions.

30. As we endeavor to establish a nationwide spectrum management framework for the 4.9 GHz band, we seek comment on whether RPCs should play a continued or expanded role. Should we continue to make the filing of regional plans optional, or should we require RPCs to file regional plans? In light of the fact that only 10 of 55 RPCs have filed voluntary plans, what resources would RPCs need to ensure that plans were filed for all regions? If we were to adopt frequency coordination requirements for the band as discussed above, would RPCs have the technical expertise and resources to serve as coordinators? To what degree is regional planning consistent with our goal of establishing a national framework for management of the band that would encourage development of standardized equipment and promote interoperability? Should we develop a standardized template to ensure that all regional plans are consistent and support a nationwide approach? Should we allow RPCs to file alternative regional plans that vary from a standardized approach? In the proposal that it filed in 2013, NPSTC stated that “a single national plan for 4.9 GHz will meet most regions’ needs,” but “some regions will need some different parameters to better meet needs of users in their regions.” Is this a viable approach in today’s environment?

4. Incentivizing Use of Latest Commercially Available Technologies

31. We seek comment on ways to incentivize public safety use of the latest commercially available technologies, particularly 5G. As a general matter not limited to any particular spectrum band, what is the path for public safety to use 5G? Would public safety agencies be able to deploy custom 5G networks themselves, with the aid of consultants and contractors as necessary? What commercial 5G offerings are available to public safety, and what are the priority and preemption capabilities of such solutions? We also seek comment on the

value, utility, and potential of the commercially available technologies, such as 5G, to public safety. For instance, the Public Safety Spectrum Alliance (PSSA) asserts that 5G functionality is expected to be the future of public safety cellular communications because it will support new high-speed applications that leverage rich media, such as augmented and virtual reality, and video streaming, while also offering extremely low latency, allowing true real-time data streaming and transfer necessary for use of autonomous vehicles, bomb and hazardous material detection and remediation, and mobile video surveillance capabilities. Nokia states that “[n]ew technologies enabled by 5G can also allow for network slicing that can provide greater certainty for enhanced security and other quality of service metrics that may be required for public safety incumbent use cases as well as certain potential ... [commercial] use cases.” We seek comment on PSSA’s and Nokia’s views. What capabilities and applications could 5G and other advanced technologies enable for public safety? We seek comment on any public safety use cases supported by 5G and other advanced technologies.

32. In the *Sixth Report and Order*, the Commission noted that some countries have considered, or are considering, allocating the 4.9 GHz band for 5G, and noted that successful international harmonization efforts could provide further advantages in the availability and price of equipment, thus potentially increasing its utility for flexible use. The *Seventh Further Notice of Proposed Rulemaking (Seventh Further Notice)* (85 FR 76505) specifically sought comment on whether 5G wireless operators, among others, could put the 4.9 GHz spectrum to use. Some commenters support further exploration of potential 5G deployments in the 4.9 GHz band. PSSA states that “as spectrum falling within the mid-band, 4.9 GHz is significantly better suited [than the 700 MHz band public safety broadband spectrum] to offer 5G capabilities.” We seek comment on the potential for the 4.9 GHz band to support applications enabled by 5G technology, including but not limited to the examples suggested by PSSA and Nokia. Is development of 5G in the band technically feasible, and what are the potential benefits and costs of such development? Could the technical capabilities of 5G technology promote more intense

use of the 4.9 GHz band by public safety entities? In the context of our objectives to establish a national framework that ensures public safety priority, how can we create conditions in the 4.9 GHz band that will encourage deployment of 5G and subsequent innovative technologies? As in other spectrum bands, our strong preference is to adhere to a technology-neutral policy for the band and strive for operational flexibility. Do any of the existing 4.9 GHz rules in part 90 (i.e., subpart Y) impede or discourage 5G deployments?

33. We also seek comment on commercial interest in the 4.9 GHz band for 5G, whether for public safety offerings, for non-public safety, or a sharing combination. Could commercial 5G providers and operators put 4.9 GHz spectrum to use? Could 5G technology also enhance opportunities for shared public safety and non-public safety use of the band? If so, how?

5. Other Technical Options

34. Although we seek comment above on certain prominent proposals from the *Sixth Further Notice*, the Commission proposed several other technical rule changes to increase utilization of the 4.9 GHz band. We incorporate these proposals by reference. In particular, the Commission proposed to (1) expand the channel aggregation bandwidth limit from 20 to 40 megahertz; (2) accord primary status for all P-P and P-MP links on Channels 14-18 of the band plan; (3) limit temporary P-P operation to thirty days maximum over a given path over a one-year period; (4) raise the minimum antenna gain for P-P antennas to 26 dBi; (5) require all 4.9 GHz geographic licensees to place at least one base or temporary fixed station in operation within 12 months of license grant; (6) reduce the construction period for fixed P-P stations from 18 months to 12 months; and (7) allow manned aeronautical mobile, not including unmanned aeronautical systems (UAS), and robotic use in the lowest five megahertz of the band with altitude and other technical limitations. The Commission also sought comment on how to encourage voluntary implementation of technical standards for the band and on power limits and emission masks. We seek comment on these proposals and open issues, and seek comment on

whether we should include any of them going forward as part of our proposed national framework.

D. Facilitating Non-Public Safety Access to the Band

35. While we emphasize the importance of public safety operations in the 4.9 GHz band, we also recognize that introducing non-public safety operations in the band may help to foster innovation and drive down equipment costs, thereby making more intensive public safety use of the spectrum a possibility. To that end, we seek comment on expanding use of the band to non-public safety entities, subject to appropriate safeguards to protect public safety operations. We also seek comment on ensuring a cohesive and predictable shared spectrum landscape that would also allow for planning and investing in the band by public safety and non-public safety users alike.

36. In this Eighth Further Notice, we seek comment on whether and how to allow non-public safety entities access to the 4.9 GHz band for non-public safety operations, with particular emphasis on expanding use of the band under a nationwide framework. We seek comment on whether it is in the public interest to open the band to non-public safety uses, and under what terms. We seek comment on whether such a policy has the potential to not only promote efficient use of valuable mid-band spectrum, something which we have recognized repeatedly is in the public interest, but also to reduce equipment costs and spur innovation, which will benefit public safety users as well. We also seek comment on any costs public safety may incur if the band is shared with other users, such as in the need to replace equipment or modify usage. Would use of the band by non-public safety entities make it less reliable for public safety agencies that use the band for critical safety of life communications? If so, how can we address these concerns?

37. If we decide to allow non-public safety use of the 4.9 GHz band, we seek comment on how best to do so. Given that all public safety licenses issued for the 4.9 GHz band to date allow full access to its entire 50 megahertz and the public safety operations that it hosts

are of critical importance, we recognize that any sharing regime will be complex. During earlier stages of this proceeding, several stakeholders put forth proposals to permit non-public safety use of the band, some of which have received qualified support from public safety stakeholders.

38. As part of these different potential non-public safety use frameworks, we seek comment on the types of non-public safety operations which should be permitted, and the types of entities that should be eligible for access. Should we allow all types of commercial use, but limit the types of users? For example, the Commission has previously recognized that railroad, power, and petroleum entities use radio communications “as a critical tool for responding to emergencies that could impact hundreds or even thousands of people.” Therefore, we seek comment on whether critical infrastructure (CII) eligible entities should be permitted access to the band in a way distinct from other classes of non-public safety users. We also seek comment on whether shared CII access to the band will sufficiently increase use of the band nationwide to encourage innovation and impact equipment costs.

39. We seek comment on these possible alternatives, in particular on the interplay of different elements of the possible approaches to improve access to the band and facilitate non-public safety use. In other words, these components should not be viewed as mutually exclusive and, indeed, any comprehensive framework that we may adopt will likely include elements of multiple access models and licensing approaches discussed below. Commenters that support opening the band for non-public safety applications are encouraged to submit detailed proposals—including cost-benefit analyses—on these issues, incorporating elements of different options discussed below and explaining why they are preferable to alternatives.

1. Shared Access Models

40. We seek comment below on possible sharing mechanisms, non-public safety licensing approaches, and leasing regimes that could be used to provide shared access to the band for non-public safety users while protecting—and, potentially, improving—critical public safety operations. These options are not exclusive of one another (e.g., excess capacity leasing could

be combined with a dynamic sharing mechanism) and commenters are encouraged to submit detailed proposals addressing how a comprehensive sharing regime could be implemented.

a. Excess Capacity Leasing

41. One potential means of sharing the band between public safety and non-public safety users involves leasing of excess capacity on public safety networks to non-public safety users. For example, a public safety licensee which has constructed a network of fixed sites for its operations, but only uses that network in emergencies, could lease the use of that network when no such emergency is occurring. Alternatively, a public safety licensee could work with a commercial wireless operator to construct a dual-use system pursuant to its license. Are such excess capacity leasing arrangements feasible for this band and, if so, could they provide potential benefits to public safety licensees? Could such leasing arrangements facilitate more robust deployment of 4.9 GHz public safety networks? What types of non-public safety entities would be interested in leasing excess capacity from public safety licensees? Commenters that support excess capacity leasing should address the specific costs and benefits of such a regime, giving particular consideration to the non-exclusive nature of the public safety licenses in this band, the current and potential future coordination mechanisms discussed herein, and the wide range of different uses this band hosts.

42. If we choose to implement an excess capacity leasing regime, we seek comment on how that regime should be implemented and how the rights of public safety and non-public safety entities should be managed. Given the importance of public safety operations in the band, should we ensure priority and preemption for such operations vis-à-vis non-public safety lessees? If so, how can we best do so? What specific rule-based mechanisms should we implement to ensure a consistent and publicly accountable leasing system? How should we address the overlapping rights of different public safety licensees in the band to ensure a stable and predictable spectrum environment for public safety operations? If we designate a single nationwide band manager, as discussed above, could that entity have a role in facilitating leased

access to excess capacity on public safety networks? Alternatively, could these issues be addressed by utilizing a SAS, as discussed below? Specifically, could a SAS be used to manage leases and coordinate access for lessors and lessees? How would such a system work within the Commission's existing leasing rules?

b. Spectrum Access System (SAS) Managed Shared Access

43. In the *Seventh Further Notice*, the Commission sought comment on whether a dynamic spectrum access system could be used to facilitate non-public safety use of the band alongside public safety access. The Commission noted that such opportunistic use of spectrum is permitted in several other spectrum bands using a variety of different automatic sharing systems that rely on databases to ensure protection of other users. We expand on the Commission's earlier inquiry and seek comment on whether a dynamic frequency coordinator—such as the SAS used to coordinate access to the Citizens Broadband Radio Service in the 3.55-3.7 GHz band (3.5 GHz band)—could be used to facilitate sharing between public safety and non-public safety users.

44. In the 3.5 GHz band, SASs currently are used to protect several types of incumbent operations—including critical Department of Defense radar systems, fixed satellite service earth stations, and incumbent terrestrial wireless licensees—as well as two tiers of users in the Citizens Broadband Radio Service. A similar system could be used to protect public safety operations in the 4.9 GHz band. Would a SAS be the most appropriate system to coordinate dynamic spectrum sharing in this band? Or would another model, like the Automatic Frequency Coordination system in the 6 GHz band, be more appropriate? For either system, what, if any, modifications would be necessary to address the unique needs of public safety users in the 4.9 GHz band? What would be the costs associated with such a system, both its setup and its implementation going forward, and how would those costs compare to the cost of traditional Part 90 frequency coordination? Who would be responsible for those costs? Should the Commission maintain the system, or should it contract the responsibility to a third-party?

45. If we implement a SAS-based authorization model in the band, we seek comment on how best to use the unique capabilities of the SASs to protect public safety users, authorize non-public safety operations, and mitigate potential interference between and among various tiers of users in the band. Most importantly, could a SAS protect public safety operations—including possible operations over potential nationwide interoperability spectrum—while providing meaningful access to the band for non-public safety users? We also seek comment on how implementing dynamic spectrum sharing in this band would impact public safety confidence in the band, particularly given the efforts discussed above to increase the visibility of public safety deployments in the band in order to enable protection and clear access rights.

46. We also seek comment on how public safety licensees could best be incorporated into a SAS-driven dynamic spectrum sharing regime while protecting the rights of public safety users and ensuring an interference-free operating environment. Specifically, should public safety licensees be required to inform the SAS of their operations, with the system protecting these operations by only permitting non-public safety use of other frequencies in the band? Or should the SAS also be responsible for assigning frequencies to public safety operations based on their needs? If the latter, to what extent and by what method should the SAS ensure priority and preemption for public safety operations? Should the SAS treat future public safety deployments differently than pre-existing deployments? Is a SAS managed model consistent with our earlier tentative conclusion that frequency coordination is in the public interest for this band? What, if any, requirements should we put in place to protect non-public safety operations from one another?

47. We note that the feasibility of dynamic sharing could depend on factors such as how intensely incumbents are currently using the spectrum, the types of existing services these incumbents are using (e.g., mobile vs. fixed), and the ability of dynamic sharing systems to register, detect, and coordinate existing systems. We seek comment on these and other characteristics in the 4.9 GHz band that would affect dynamic sharing, whether a dynamic

spectrum sharing model is appropriate for this band, and, if so, what type of dynamic sharing is most appropriate. Commenters should also discuss the impacts of the different possible changes to the band that the Commission is considering as part of its efforts to standardize public safety operations and ensure greater visibility into deployments in order to provide greater protections for those operations, such as coordination requirements and a licensing database. How could a dynamic spectrum access system take advantage of those efforts?

48. Finally, we seek comment on whether to segment the 4.9 GHz band to enable non-public safety uses while also protecting public safety operations. Would combining such a segmentation of the band with a dynamic spectrum sharing system enable reliable spectrum access both for public safety operators and for non-public safety users, while also ensuring efficient use of spectrum that public safety is not actively using? For example, could we reserve some portion of the band for public safety use on a primary basis, and only permit non-public safety use of this portion via a dynamic spectrum sharing system, while making the remainder of the band available for non-public safety access? Could we grant public safety licensees some form of preemption rights, which would allow public safety access to the entire 4.9 GHz band in the case of an emergency, but limit public safety access to only a portion of the band at other times? If we do segment the band, should we require devices to be operable across the entire 4.9 GHz band, as we did in the 3.5 GHz band? Would segmenting the band—coupled with a band wide operability requirement—help to spur innovations in the equipment marketplace in the band to the benefit of public safety users?

c. Manual and Technical Sharing

49. Given the non-exclusive nature of 4.9 GHz band licenses, we seek comment on whether alternative methods of sharing are preferable to dynamic sharing. Would implementing licensing and technical rules be sufficient to enable non-public safety use without causing harmful interference to those public safety operations that would remain in the band? For example, we could require sensing capabilities for non-public safety equipment, or limit

emissions to levels below that which could cause harmful interference to public safety operations. What would be the necessary requirements to allow for purely technical protection measures? Would such limitations prevent the other benefits of opening this band to non-public safety use, such as fostering innovation and lowering equipment costs, from being realized? Such rules could be different for urban or rural areas, in recognition of the different uses of the band in those locations, as discussed above.

50. We seek comment on whether a frequency coordination requirement imposed on public safety operations, as discussed above, would enable similar requirements to be placed on non-public safety operations and thereby enable shared access. What requirements would we need to impose on non-public safety operations to enable full protection for public safety users, and what information would coordinators need from non-public safety operations to ensure such protection? Would we require non-public safety operators to modify their systems based on new public safety deployments, or only to protect incumbents at the time they deploy? What, if any, requirements should we put in place to protect non-public safety operations from one another?

2. Licensing Non-Public Safety Operations

51. In the event we determine that allowing non-public safety operations in the 4.9 GHz band is in the public interest, we will have to decide on the appropriate framework under which to authorize such operations. Below, we seek comment on a number of different licensing regimes which could be combined with one another and with the sharing regimes discussed above to create a comprehensive, nationwide framework for non-public safety operations in the band.

a. Non-Exclusive Licensed Access

52. We seek comment on allowing non-public safety users to access the band on a licensed, non-exclusive basis. Methods that have been used in other bands include: (1) traditional site-based Part 90 secondary licensing, such as in the PLMR bands; (2) the “license light” licensing model used in the 3650-3700 MHz Service prior to its incorporation into the

Citizens Broadband Radio Service; and (3) the licensed-by-rule General Authorized Access (GAA) tier of the Citizens Broadband Radio Service. Such approaches have been successfully used to make spectrum available to a wide variety of operators with relatively low barriers to entry vis-à-vis exclusive licensing models. Would a non-exclusive licensing approach be well-suited to the 4.9 GHz band? Could such an approach facilitate significant non-public safety use in the band while protecting important public safety operations? How should the system treat future public safety deployments, as opposed to incumbents? Could a non-exclusive licensing approach help to promote technological innovation in the band, including the equipment marketplace, to the benefit of public safety and non-public safety users? Commenters that support implementing a non-exclusive licensing model for non-public safety users in the band are encouraged to provide detailed proposals, including details on any sharing or authorization mechanism needed to facilitate such an approach.

b. Granting Exclusive Use Licenses

53. While exclusive use licenses are often the preferred method of allocating spectrum to commercial use, given the non-exclusive nature of existing public safety licenses, the ongoing importance of public safety operations in the band, and the fact that nearly all of the U.S. is covered by at least one public safety license, assigning such licenses in the 4.9 GHz band may prove to be a challenge. But exclusive use licenses offer several important benefits, and, as such we seek comment on a variety of ways that exclusive use licenses could be utilized to facilitate non-public safety use in this band.

54. Would exclusive use licenses potentially increase current and future licensees' willingness to invest heavily in the band? Exclusive use licenses may be subject to mutually exclusive applications, which would be resolved by competitive bidding. Would this increase the likelihood that new licensees will be those entities that are most highly motivated to invest in the band? The Commission's competitive bidding systems generally facilitate the aggregation of licenses when it is economically efficient to do so. Would this make it more likely that licensees

aggregating licenses in competitive bidding will invest in developing and deploying networks in this band? Given these potential benefits, we seek comment on whether this band is well-suited to exclusive use licensing and, if so, how to achieve it.

55. *Overlay Licensing.* Overlay licenses would grant new non-public safety entrants the right to use the band in ways that would not cause harmful interference to public safety users at any given time, but would be exclusive as to other non-public safety users. Such a licensing framework could be combined with different access models—including spectrum manager models, competitive bidding, and dynamic database-driven sharing models—and could be coupled with relocation or re-banding of some existing operations to increase the amount of spectrum available to the overlay licensee. This approach could provide the flexibility to allow new non-public safety operations in the band while safeguarding public safety users.

56. We seek comment on whether we should utilize overlay licenses to facilitate non-public safety use of the 4.9 GHz band. We also seek comment on how to assign such licenses and how to structure the rules governing them. How would an overlay license work in concert with potential new technical, interoperability, and coordination rules for public safety licensees that we seek comment on here? What technical or coordination rules would be required for non-public safety operations, as distinct from those required of public safety licensees? How would overlay licenses work with potential future public safety operations, as opposed to incumbents?

57. We also seek comment on the impact of this approach on use of the band. Would other users of the band spur innovation and expand the type, and lower the price, of 4.9 GHz equipment available to public safety entities? What types of entities should be eligible for overlay licenses? Would overlay licenses provide new licensees with sufficient spectrum access to justify investment in equipment and broadband and mobile applications? If more spectrum access than is currently available is needed to motivate investment, can overlay licensees reasonably expect to obtain sufficient spectrum access by negotiation with incumbents? What conditions would be necessary for such negotiations to be successful? Is it possible that such

access negotiations would both provide new overlay licensees with sufficient and reliable bandwidth while maintaining current incumbent operations? We seek comment on any other considerations regarding the use of overlay licensing for the 4.9 GHz band.

58. *Exclusive Use Licenses for Specified Frequencies.* We seek comment on whether licenses providing exclusive use of specified frequencies, e.g., designated channels, would be more beneficial for the 4.9 GHz band than overlay licenses. Depending on the use of the band by underlying incumbent licensees, overlay licenses may not enable the use of uniform frequencies across geographic areas by new licensees. However, enabling the exclusive use of uniform frequencies likely would require any incumbent public safety operations using the frequencies to cease. We seek comment on possible mechanisms for relocation or repacking of such operations. We seek comment below on the use of an incentive auction model to enable this effort. But we similarly seek comment on any alternatives to relocate or repack public safety incumbents as needed.

59. What are the benefits and costs to this approach and how could it be implemented? How would licensing specified frequencies for exclusive use work in concert with other proposals to increase use of the band, such as the new technical and coordination rules for public safety operations or dynamic spectrum sharing, and which would it rule out?

c. Unlicensed Access

60. Unlicensed access allows a wide range of different users the ability to access spectrum, especially in rural or underserved areas and often at lower price points than through licensed services. This framework permits users to support innovative use cases and applications that can be tailored for each area, especially through Wi-Fi, Bluetooth, and other widely used technologies. Because the Commission permits unlicensed operations on a variety of spectrum bands, users are able to both match available capacity to their spectrum needs and choose the band(s) that are best suited to their particular coverage requirements. The Commission previously sought comment on unlicensed operations in this band. We recognize that both the

demand for unlicensed spectrum and the unlicensed spectrum landscape have continued to evolve. We seek updated information on the potential use of the 4.9 GHz band for unlicensed access. To what extent is the band desirable for such use, given the presence of public safety incumbents and amount of spectrum available? What use cases could the 4.9 GHz band host? Is this band suitable to provide the types of applications users are demanding in terms of capacity and coverage requirements? Are there particular unlicensed applications and protocols that are well-suited for the 4.9 GHz band? We seek comment below on possible sharing mechanisms, which could operate in concert with unlicensed use, but what technical or licensing rules would be required in order to enable such use, regardless of sharing mechanism?

3. Other Considerations

61. *Technical Flexibility.* In the context of establishing a nationwide approach, we also seek comment on the feasibility of implementing different technical rules (e.g., maximum power levels) for the band to account for different public safety and non-public safety needs in different scenarios. We note that the record in this proceeding indicates that there may be varying use cases and opportunities for use in a nationwide framework. For example, public safety usage of the band is greater in urban areas than rural ones. At the same time, there may be differences in non-public safety use of this band in rural areas, particularly to accommodate wireless broadband. Would it be in the public interest to adopt flexibility in the technical rules for the 4.9 GHz band to accommodate these different needs, consistent with our decision to pursue an integrated, nationwide approach to the band? For example, in other proceedings we have adopted different power levels for urban and rural deployments. Should we take a similar approach here as part of a nationwide framework? Would this approach help foster efficient use, encourage innovation, and improve the equipment marketplace for the band? How would we define the different areas within our nationwide framework, and how would we ensure these definitions remain up-to-date as use of the band evolves?

62. *Incentive Auction.* In addition to its standard authority to conduct competitive

bidding to assign licenses, the Commission has statutory authority to conduct incentive auctions, in which it offers incumbent licensees a share of the proceeds from the auction of new licenses made available by the incumbents relinquishing their spectrum usage rights. Should the Commission consider an incentive auction to encourage public safety licensees to relocate their operations (or modify them in some way to reduce the amount of spectrum they require) in order to enable greater non-public safety use of the band? How would we structure an incentive auction within the Commission's existing statutory authority that would result in enough clear spectrum to attract new licensees and serve the public interest? What alternate options are available to public safety licensees which accept incentive auction payments? Would the current 4.9 GHz licensees, many of which are governmental entities, be legally or practically equipped to participate in the reverse phase of an incentive auction? Would their incentives align with the public interest? How would we have to modify our incentive auction structure here, given the non-exclusive rights of the current licensees? Should any incumbent public safety licensees choosing not to participate in the incentive auction be required to be repacked into a portion of the band or otherwise modify their operations to enable coexistence with new non-public safety licensees? What is the likelihood that enough existing licensees would be willing to relinquish their spectrum usage rights so that the Commission then could offer enough new licenses to stimulate investment in the band?

63. *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 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

Paperwork Reduction Act

64. This Eighth Further Notice of Proposed Rulemaking may contain new or modified information collection(s) subject to the Paperwork Reduction Act of 1995. If the Commission adopts any new or modified information collection requirements, they will be submitted to the Office of Management and Budget (OMB) for review under section 3507(d) of the PRA. OMB, the general public, and other federal agencies will be invited to comment on the new or modified information collection requirements contained in this proceeding. In addition, pursuant to the Small Business Paperwork Relief Act of 2002, we seek specific comment on how we might “further reduce the information collection burden for small business concerns with fewer than 25 employees.”

Regulatory Flexibility Act

65. 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 potential rule and policy changes contained in the Eighth Further Notice of Proposed Rulemaking. The IRFA is contained in Appendix C in the Eighth Further Notice of Proposed Rulemaking.

Ex Parte Rules

66. 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.

67. 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 § 1.1206(b) of the Commission's rules. In proceedings governed by § 1.49(f) of the rules 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.

III. INITIAL REGULATORY FLEXIBILITY ANALYSIS

68. As required by the Regulatory Flexibility Act of 1980, as amended (RFA), the Commission has prepared this 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 Eighth Further Notice of Proposed Rulemaking (Eighth Further Notice). Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments as specified in the Eighth Further Notice. The Commission will send a copy of the Eighth Further Notice, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA). In addition, the Eighth Further Notice and IRFA (or summaries thereof) will be published in the Federal Register.

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

69. In the Eighth Further Notice, we seek comment on a nationwide framework to encourage greater use and improved spectrum efficiency of the 4940-4990 MHz (4.9 GHz) band. We seek comment to implement changes to our policies and regulations that promote optimal use, innovation, and investment. The *Fifth Further Notice of Proposed Rulemaking* (77 FR 45558) and *Sixth Further Notice of Proposed Rulemaking* in this proceeding enabled the Commission to develop a record on several issues, including 4.9 GHz coordination, eligibility, licensing, band plan, power and antenna gain, aeronautical mobile use, and standards. The *Sixth Report and Order and Seventh Further Notice of Proposed Rulemaking*, however, sought to establish a new framework to expand access to the band by providing states the opportunity to lease 4.9 GHz band spectrum to commercial entities, critical infrastructure industry, including electric utilities, and other stakeholders. In addition, the *Seventh Further Notice* sought comment on new state-based licensing regime for public safety operations in the 4.9 GHz band, including a centralized structure of state oversight and coordination of public safety operations in the band.

70. In the Eighth Further Notice, we revisit the structure of the 4.9 GHz band to promote public safety use and encourage a robust market for equipment. Specifically, we focus on establishing a nationwide framework that will avoid breaking up the 4.9 GHz band into a patchwork of state leases. We believe that a nationwide approach will promote robust equipment market, lower costs, and increase the likelihood of interoperable communications and consistent interference protection. To achieve this vision, we seek comment on establishing a database with consistent and reliable information about what spectrum is available where or how it is being used—providing certainty and predictability to plan and invest in 4.9 GHz deployments. Further, we seek comment on certain prominent proposals from the *Sixth Further Notice*, such as Universal Licensing System (ULS) information submissions, non-public safety access, dynamic spectrum sharing, and frequency coordination in the 4.9 GHz band, as well as on several other Commission proposals involving technical rule changes to increase utilization of the 4.9 GHz

band and we incorporate these proposals by reference into the Eighth Further Notice. We believe that by implementing a nationwide framework that reflects public safety input, we can ensure that public safety continues to be prioritized in the band while opening up the band to additional uses that will facilitate increased usage and encourage a more robust market for equipment and greater innovation, and at the same time protect against harmful interference.

B. Legal Basis

71. The proposed action is authorized pursuant to Sections 1, 4(i), 4(j), 4(o), 301, 303(b), 303(g), 303(r), 316, 332, and 403 of the Communications Act of 1934, as amended, 47 U.S.C. 151, 154(i), 154(j), 154(o), 301, 303(b), 303(g), 303(r), 316, 332, and 403.

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

72. 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 and policies, 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 SBA.

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

States which translates to 30.7 million businesses.

74. Next, the type of small entity described as a “small organization” is generally “any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.” The Internal Revenue Service (IRS) uses a revenue benchmark of \$50,000 or less to delineate its annual electronic filing requirements *for* small exempt organizations. Nationwide, for tax year 2018, there were approximately 571,709 small exempt organizations in the U.S. reporting revenues of \$50,000 or less according to the registration and tax data for exempt organizations available from the IRS.

75. Finally, the small entity described as a “small governmental jurisdiction” is defined generally as “governments of cities, counties, towns, townships, villages, school districts, or special districts, with a population of less than fifty thousand.” U.S. Census Bureau data from the 2017 Census of Governments indicate that there were 90,075 local governmental jurisdictions consisting of general purpose governments and special purpose governments in the United States. Of this number there were 36,931 general purpose governments (county, municipal and town or township) with populations of less than 50,000 and 12,040 special purpose governments - independent school districts with enrollment populations of less than 50,000. Accordingly, based on the 2017 U.S. Census of Governments data, we estimate that at least 48,971 entities fall into the category of “small governmental jurisdictions.”

76. *Private Land Mobile Radio Licensees.* Private land mobile radio (PLMR) systems serve an essential role in a vast range of industrial, business, land transportation, and public safety activities. Companies of all sizes operating in all U.S. business categories use these radios. Because of the vast array of PLMR users, the Commission has not developed a small business size standard specifically applicable to PLMR users. The closest applicable SBA category is Wireless Telecommunications Carriers (except Satellite) which encompasses business entities engaged *in radiotelephone communications*. The appropriate size standard for this category under SBA rules is that such a business is small if it has 1,500 or fewer employees.

For this industry, U.S. Census Bureau data for 2012 shows that there were 967 firms that operated for the entire year. Of this total, 955 firms had employment of 999 or fewer employees and 12 had employment of 1000 employees or more. Thus under this category and the associated size standard, the Commission estimates that the majority of PLMR licensees are small entities.

77. According to the Commission's records, a total of approximately 393,490 licenses comprise PLMR users. Of this number there are a total of 3,541 PLMR licenses in the 4.9 GHz band. The Commission does not require PLMR licensees to disclose information about number of employees, and does not have information that could be used to determine how many PLMR licensees constitute small entities under this definition. The Commission however believes that a substantial number of PLMR licensees may be small entities despite the lack of specific information.

78. *Frequency Coordinators.* Neither the Commission nor the SBA has developed a small business size standard specifically applicable to spectrum frequency coordinators. The closest applicable SBA category is Business Associations which comprises establishments primarily engaged in promoting the business interests of their members. The SBA has developed a small business size standard for "Business Associations," which consists of all such firms with gross annual receipts of \$7.5 million or less. For this category, U.S. Census Bureau data for 2012 shows that there were 14,996 firms that operated for the entire year. Of these firms, a total of 14,229 had gross annual receipts of less than \$5 million and 396 firms had gross annual receipts of \$5 million to \$9,999,999.

79. There are 13 entities certified to perform frequency coordination functions under Part 90 of the Commission's rules. According to U. S. Census Bureau data approximately 95% of business associations have gross annual receipts of \$7.5 million or less and would be classified as small entities. The Business Associations category is very broad however, and does not include specific figures for firms that are engaged in frequency coordination. Thus, the

Commission is unable to ascertain exactly how many of the frequency coordinators are classified as small entities under the SBA size standard. Therefore, for purposes of this IRFA under the associated SBA size standard, the Commission estimates that a majority of the 13 FCC-certified frequency coordinators are small.

80. *Regional Planning Committees.* Neither the Commission nor the SBA has developed a small business size standard specifically applicable to Regional Planning Committees (RPCs) and the National Regional Planning Council (NRPC). As described by the NRPC, “[NRPC] is an advocacy body formed in 2007 that supports public safety communications spectrum management by [the RPCs] in the 700 MHz and 800 MHz NPSPEC public safety spectrum as required by the Federal Communications Commission.” The NRPC states that RPCs “consist of public safety volunteer spectrum planners and members that dedicate their time, in addition to the time spent in their regular positions, to coordinate spectrum efficiently and effectively for the purpose of making it available to public safety agency applicants in their respective region.” According to Commission data, there are 55 RPCs. The Commission has not developed a small business size standard specifically applicable to RPCs and the NRPC. The closest applicable industry with a SBA small business size standard is Wireless Telecommunications Carriers (except Satellite) which encompasses business entities engaged in radiotelephone communications. Under the SBA small business size standard, a business employing no more than 1,500 persons is considered small. For this industry, U.S. Census Bureau data for 2012 shows that there were 967 firms that operated for the entire year. Of this total, 955 firms had employment of 999 or fewer employees and 12 had employment of 1000 employees or more. Thus using the SBA size standard, we estimate that all of the RPCs and the NRPC can be considered small.

81. *Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing.* This industry comprises establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment. Examples of products

made by these establishments are: transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment. The SBA has established a small business size standard for this industry of 1,250 employees or less. U.S. Census Bureau data for 2012 show that 841 establishments operated in this industry in that year. Of that number, 828 establishments operated with fewer than 1,000 employees, 7 establishments operated with between 1,000 and 2,499 employees and 6 establishments operated with 2,500 or more employees. Based on this data, we conclude that a majority of manufacturers in this industry are small.

82. *Wireless Telecommunications Carriers (except Satellite)*. This industry comprises establishments engaged in operating and maintaining switching and transmission facilities to provide communications via the airwaves. Establishments in this industry have spectrum licenses and provide services using that spectrum, such as cellular services, paging services, wireless internet access, and wireless video services. The appropriate size standard under SBA rules is that such a business is small if it has 1,500 or fewer employees. For this industry, U.S. Census Bureau data for 2012 show that there were 967 firms that operated for the entire year. Of this total, 955 firms employed fewer than 1,000 employees and 12 firms employed 1,000 employees or more. Thus under this category and the associated size standard, the Commission estimates that the majority of Wireless Telecommunications Carriers (except Satellite) are small entities.

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

83. The nationwide framework described in the Eighth Further Notice may impose new or additional reporting or recordkeeping and/or other compliance obligations on small entities, if adopted. The reporting or recordkeeping and/or other compliance obligations generally fall into two categories: technical requirements and eligibility/governance criteria.

Potential information collections and compliance requirements that are technical in nature may include costs associated with compensating engineering or technical staff or consultants or attorneys which the Commission is unable to quantify at this time. The purpose of the information collections is to ensure that future operations protect incumbent operations from interference, and to make it feasible to identify the source of any actual interference that may occur, as well as maximize use of the 4.9 GHz band. We discuss these potential requirements below.

84. *Licensing Database and Frequency Coordination.* The Eighth Further Notice seeks comment on requiring base and mobile stations, permanent fixed P-P transmitters and receivers, and permanent fixed P-MP transmitters and receivers in the 4940-4990 MHz band to be licensed individually on a site-by-site basis for interference protection and frequency coordination purposes which would impose a one-time information collection requirement on existing 4.9 GHz band licensees. The information collected would include technical parameters such as transmitter and receiver antenna coordinates, azimuth (direction), polarization, beamwidth, physical dimensions, gain, and height above ground, as well as transmit details such as power, channel, emission, and would be collected on Form 601 in the Commission's Universal Licensing System database. We expect that there will not be any application fees associated with this information collection for public safety entities because they are exempt from application fees pursuant to 47 CFR 1.1116(b). To the extent non-public safety access is permitted in the band however, non-public safety entities would incur application fee costs.

85. The Eighth Further Notice also seeks comment on requiring formal frequency coordination in the 4.9 GHz band to support interference protection and increase public safety confidence to use the band. If formal frequency coordination is adopted, we have requested comment on the criteria and type of certification the Commission should use to certify coordinators which may impose reporting and recordkeeping obligations. The selected frequency coordinators could be subject reporting recordkeeping obligations associated with

coordination for the 4.9 GHz band. Additionally, licensees could be subject to requirements to submit information to frequency coordinators and subject to compliance costs associated frequency coordination.

86. *Facilitating Non-Public Safety Access to the Band.* The Eighth Further Notice seeks comment various methods of enabling non-public safety access to the 4.9 GHz band alongside public safety access, including tiered licensing, a dynamic spectrum access system, and overlay licenses. For any of these methods, either the Commission or a third party would collect information from non-public safety users that wish to access the 4.9 GHz band. Such users may be classified as small businesses, small organizations, small governmental jurisdictions; PLMR licensees; and wireless telecommunications carriers (except satellite). The information collected would likely be equivalent to information collected on Form 601 of the Commission's Universal Licensing System database. For the dynamic spectrum access system method, a third party database would collect certain licensing and operational information from incumbent public safety 4.9 GHz band PLMR licensees. The amount of information collected, the means, and the frequency of such collection depends on whether the dynamic spectrum access system database would draw existing sources of such information, such as information contained in the Commission's Universal Licensing System. The Eighth Further Notice also seeks comment on the potential use of an incentive auction as part of the discussion on granting exclusive access rights which would have recordkeeping and data submission obligations.

87. *Nationwide Licensee or Band Manager.* The Eighth Further Notice seeks comment on designating a nationwide band manager that would be responsible for developing a nationwide framework for the 4.9 GHz band. If adopted, a one-time information collection may take the form of a band manager application and a proposed nationwide framework describing how different types of entities may operate within the 4.9 GHz band.

88. *Regional Planning Committees.* The Eighth Further Notice seeks comment on a requiring regional planning committees (RPCs) to file regional plans, which could impact

reporting and recordkeeping obligations for RPCs. Under the Commission's existing rules in the 4.9 GHz licensing regime, the filing of regional plans by RPCs is voluntary. Sections 90.1211(b) and (c) of the Commission's rules detail certain information that must be submitted in regional plans and provide instructions for plan modifications. In the Eighth Further Notice, we inquire whether to develop a standardized template to ensure that the information submitted in all regional plans is consistent and supports a nationwide approach, and whether to allow RPCs to file alternative regional plans that vary from a standardized approach.

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

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

90. The Commission's reliance on technical and eligibility requirements utilized in other public safety and PLMR spectrum bands as the basis of inquiries in Eighth Further Notice potentially provides regulatory policies and frameworks that small entities are operationally familiar with and may therefore minimize any substantial economic impact if similar requirements are adopted in this proceeding. To assist in the Commission's evaluation of the economic impact on small entities as a result of the actions that have been proposed in this proceeding, and the options and alternatives for such entities, the Commission has raised questions and sought comment on these matters in the Eighth Further Notice. As part of the inquiry, the Commission has specifically requested that commenters include costs and benefit

analysis data in their comments. Additionally, we are seeking comment on proposals in the *Sixth Further Notice*, which include inquiries and requests for information on the impacts for small entities and courses of action that might be considered to accommodate the resources small entities. For example, as part of the proposed information collection requirement to make information available to frequency coordinators to ensure that these operations are protected from interference, the *Sixth Further Notice* proposed a one-year deadline for licensees to complete this information collection after final rules in this proceeding become effective. Before the deadline, the Commission would waive frequency coordination requirements. After one year, the information collection would be subject to frequency coordination requirements, including frequency coordination fees. The Commission also sought comment on whether the status of a license should become secondary if the incumbent licensee does not meet the one-year deadline. The *Sixth Further Notice* sought comment on whether small entities should have a lengthier deadline, and what showing the Commission should require from licensees to attest that they qualify as small entities. The *Sixth Further Notice* also asked whether the Commission should require small entities to file attestations by the one-year deadline or accept attestations after the deadline at the time they eventually complete the information collection.

91. The Commission is hopeful that the comments it receives will specifically address matters impacting small entities and include data and analyses relating to these matters. Further, while the Commission believes the rules that are eventually adopted in this proceeding should benefit small entities, whether public safety or non-public safety, by giving them more options for gaining access to valuable spectrum, the Commission expects to more fully consider the economic impact and alternatives for small entities following the review of comments filed in response to the Eighth Further Notice. The Commission's evaluation of this information will shape the final alternatives it considers, the final conclusions it reaches, and any final actions it ultimately takes in this proceeding to minimize any significant economic impact that may occur on small entities.

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

None.

IV. ORDERING CLAUSES

92. Accordingly, IT IS ORDERED, pursuant to the authority found in sections 4(i), 4(j), 302, 303(b), 303(f), 303(g), 303(r), 309(j) and 405 of the Communications Act of 1934, as amended, 47 U.S.C. 154(i), 154(j), 302a, 303(b), 303(f), 303(g), 303(r), 309(j), and 405, that this Eighth Further Notice of Proposed Rulemaking IS HEREBY ADOPTED.

93. IT IS FURTHER ORDERED that, pursuant to applicable procedures set forth in §§ 1.415 and 1.419 of the Commission's Rules, 47 CFR 1.415, 1.419, interested parties may file comments on the Eighth Further Notice of Proposed Rulemaking on or before 30 days after publication in the *Federal Register*, and reply comments on or before 60 days after publication in the *Federal Register*.

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

FEDERAL COMMUNICATIONS COMMISSION.

Katura Jackson,

Federal Register Liaison Officer.

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