6712-01

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Parts 0, 2, 90

[WP Docket No. 07-100; FCC 18-33]

4.9 GHz Band

AGENCY: Federal Communications Commission.

ACTION: Proposed rule.

SUMMARY: In 2002, the Commission allocated the 4940–4990 MHz (4.9 GHz) band for fixed and mobile use and designated the band for public safety broadband communications. Since then, the band has experienced relatively light usage compared to the heavy use of other public safety bands. In this document, the Commission proposes several rule changes and seeks comment on alternatives with the goal of promoting increased public safety use of the band while opening up the spectrum to additional uses that will encourage a more robust market for equipment and greater innovation. The Commission proposes rules on channel aggregation, aeronautical mobile use, frequency coordination, site-based licensing, regional planning, and technical rule changes with the goal of promoting increased use of the band. The Commission seeks comment on alternatives such as expanding eligibility, spectrum leasing, sharing, and redesignating the band for commercial use.

DATES: Submit comments on or before **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**. Submit reply comments **[INSERT DATE 90 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER]**.

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

- Federal Communications Commission's Web Site: http://apps.fcc.gov/ecfs/. Follow the instructions for submitting comments.
- Mail: U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554. 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.
- Hand or Messenger Delivery: 445 12th St., SW, Room TW-A325, Washington, DC 20554.
- People with Disabilities: Contact the FCC to request reasonable accommodations (accessible format documents, sign language interpreters, CART, etc.) by e-mail: FCC504@fcc.gov or phone: 202-418-0530 or TTY: 202-418-0432.

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

FOR FURTHER INFORMATION CONTACT: Thomas Eng, Policy and Licensing Division, Public Safety and Homeland Security Bureau, Federal Communications Commission, 445 12th Street, SW., Washington, DC 20554, at (202) 418-0019, TTY (202) 418-7233, or via e-mail at Thomas.Eng@fcc.gov.

SUPPLEMENTARY INFORMATION: This is a summary of the Commission's Sixth Further Notice of Proposed Rulemaking (Sixth FNPRM) in WP Docket No. 07-100, adopted on March 22, 2018 and released as FCC 18-33 on March 23, 2018. The complete text of this document is available for inspection and copying during normal business hours in the FCC Reference Information Center, Portals II, 445 12th Street, SW, Room CY-A257, Washington, DC 20554. Alternative formats (computer diskette, large print, audio cassette, and Braille) are available to persons with disabilities or by sending an e-mail to FCC504@fcc.gov or calling the

Consumer and Governmental Affairs Bureau at (202) 418-0530, TTY (202) 418-0432. This document is also available on the Commission's Web site at http://www.fcc.gov.

Comments

Pursuant to §§ 1.415 and 1.419 of the Commission's rules, 47 CFR 1.415, 1.419, interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS). See Electronic Filing of Documents in Rulemaking Proceedings, 63 FR 24121, May 1 (1998).

- Electronic Filers: Comments may be filed electronically using the Internet by accessing the ECFS: http://apps.fcc.gov/ecfs/.
- Paper Filers: Parties who choose to file by paper must file an original and one copy of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number.

  Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

  - All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th St., SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes and boxes must be disposed of before entering the building.

- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9050 Junction Drive, Annapolis Junction, MD 20701.
- U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554.

Introduction

The Commission has allocated and designated 50 megahertz of spectrum in the 4.9 GHz band (4940–4990 MHz) to public safety. Although nearly 90,000 public safety entities are eligible under our rules to obtain licenses in the band, there were only 2,442 licenses in use in 2012 and only 3,174 licenses in use nearly six years later in 2018. With no more than 3.5% of potential licensees using the band, we remain concerned that, as the Commission stated in 2012, the band has "fallen short of its potential."

Public safety entities have offered several reasons why the band has seen less use than expected. One reason cited is the difficulty of acquiring equipment and the cost of deployment. According to the Association of Public-Safety Communications Officials International's (APCO) 4.9 GHz Task Force Report (APCO Report), "the public safety user community remains small relative to the greater consumer marketplace," which "has historically resulted in a limited vendor ecosystem, specialized devices, and higher costs." We also believe that a lack of available equipment for mobile applications has impeded widespread use of the band by public safety. The National Public Safety Telecommunications Council (NPSTC) has argued that interference concerns have also suppressed use of the 4.9 GHz band. In its 4.9 GHz NPSTC Plan Recommendations Final Report (NPSTC Plan), NPSTC notes that because the Commission's current rules "allow geographically based licensing with little documentation on system design

and transmitter location," public safety "contemplating new service in this band cannot determine if other agencies in their area might cause harmful interference today or in the future."

In this Sixth FNPRM, we seek comment on several alternatives to stimulate expanded use of and investment in the 4.9 GHz band, drawing on comments in the record as well as the NPSTC Plan submitted in 2013 and the APCO Report submitted in 2015. Our goal is to ensure that public safety continues to have priority in the band while opening up the band to additional uses that will facilitate increased usage, including more prominent mobile use, and encourage a more robust market for equipment and greater innovation, while protecting primary users from harmful interference. We believe that with an appropriate sharing mechanism in place, which we discuss in further detail below, our proposed approach will promote more opportunistic use of the 4.9 GHz band without compromising the integrity and security of public safety operations.

Background

In June 2012, the Commission released the Fifth Further Notice of Proposed Rulemaking (Fifth FNPRM) in which it sought comment on rule changes intended to establish frequency coordination procedures for 4.9 GHz operations and to encourage spectrum efficiency and greater use of the 4.9 GHz band. It sought comment on how 4.9 GHz licensees currently use this spectrum, what applications and uses are best suited for the band, and what are the most cost-effective ways to improve accessibility to the band while minimizing adverse impact on incumbent operations. The Commission sought views on alternative frequency coordination proposals for 4.9 GHz licensees. The Commission also sought comment on specific proposals regarding expanded eligibility for critical infrastructure industry (CII) entities, for commercial entities on a secondary basis, subject to a shutdown feature, and for the First Responder Network Authority (FirstNet). The Commission also sought comment about the impact of the Middle Class Tax Relief and Job Creation Act of 2012 (Spectrum Act) on broadband uses of the 4.9

GHz band by public safety entities. Finally, the Commission sought comment on whether to allow aeronautical mobile use in the 4.9 GHz band.

The responsive comments to the Fifth FNPRM illustrate the wide variety of existing systems operating in the 4.9 GHz band and underscore the importance of developing rules that promote flexible use and maximize spectrum efficiency. Since the Fifth FNPRM the Commission has continued to build the record on the 4.9 GHz band. In October 2013, NPSTC submitted detailed recommendations in the NPSTC Plan, and the Public Safety and Homeland Security Bureau (Bureau) released a Public Notice seeking comment on the proposals in the NPSTC Plan. In September 2015, the APCO Report provided additional recommendations on how to increase public safety use of the band, reduce equipment costs, and drive investment in up-to-date technology in the band.

Sixth Further Notice of Proposed Rulemaking

Taking into consideration the record in response to the Fifth FNPRM, comments on the NPSTC Plan, the APCO Report, and more recent ex parte filings, we now propose a limited set of rules for the 4.9 GHz band to promote more flexible and intensive use of this spectrum while preventing interference. We also seek comment on current usage and what types of services are being provided. Our goals are (a) to support the needs of public safety while opening the band to other compatible uses, (b) to maximize spectral efficiency and usage, (c) to promote a common equipment ecosystem that will drive down equipment costs and stimulate investment through economies of scale, (d) to encourage innovation, and (e) to ensure that secondary users do not cause interference to primary users.

In this Sixth FNPRM, we review the major issues previously identified in the Fifth FNPRM; in the NPSTC Plan and the APCO Report and in comments on both of these evaluations; and in subsequent ex parte proposals. We then propose and seek comment on

specific rules and policies intended to address each issue, and seek comment on and solicit alternative proposals.

Band Plan

In the Fifth FNPRM, the Commission sought comment on the current 4.9 GHz band plan, which divides the band into ten one-megahertz channels (Channels 1–5 and 14–18) and eight five-megahertz channels (Channels 6–13), and limits channel aggregation bandwidth to 20 megahertz. The NPSTC Plan proposes to keep this channelization, but recommends aggregating Channels 1–5 into a single 5 megahertz channel designated for air-to-ground communications and robotic use and proposes to reduce the current channel aggregation limit from 20 to 10 megahertz. The APCO Report proposes no band plan changes but calls for relaxing the 20 megahertz channel aggregation limit, arguing that this would enable the band to accommodate 40 megahertz products that are currently available only outside the U.S., which relaxation could "create a better business case for manufacturers," and would "provide more options for rural deployments."

Discussion. Most commenters express support for the NPSTC band plan proposal. Based in part on the NPSTC band plan, we propose to retain the existing channelization plan for the band, but we seek comment below on more flexible aggregation limits, and in the Aeronautical Mobile and Robotic Use section, we propose to modify the 4.9 GHz band plan by aggregating Channels 1–5 to form a five-megahertz bandwidth channel for aeronautical mobile and robotic use. Although current geographic licenses authorize use of the entire 50 megahertz by all qualified services, we envision that under our revised rules we would grant licenses for specific uses that would authorize specific channels. We are concerned that the current geographic licensing model does not provide sufficient information on specific channel usage to facilitate effective frequency coordination, which we propose below for the 4.9 GHz band. For

example, we seek comment on licensing base stations and hot spots site-by-site rather than blanket geographic licensing, and licensing these stations and mobiles for a specific channel or channels instead of the entire band, to the extent that channel use is static. Does 4.9 GHz equipment dynamically change channels as needed throughout the band to avoid interference? We seek comment on these proposals.

We further propose to expand the existing channel aggregation bandwidth limit to 40 megahertz and seek comment on that proposal, which could provide more options of the type advocated in the APCO Report, such as new rural deployments, and may enable public-safety access to 5G technologies. We seek comment on this proposal. We are concerned that narrowing the limit to 10 megahertz as proposed in the NPSTC Plan would constrain flexibility and discourage use of innovative broadband technologies. We nonetheless propose to allow Regional Planning Committees (RPCs) to submit plans to limit aggregations to 20 megahertz. We solicit alternative band plan suggestions or modifications to the above. For example, should we permanently aggregate Channels 6–9 and 10–13 to form two 20-megahertz channels? We seek comment about the relative costs and benefits of wider channels. Are wider channels needed to drive innovation of equipment in the band, or are the current aggregation limits sufficient?

We agree with commenters that any reconfiguration or repurposing of the 4.9 GHz band should not force incumbent licensees to modify, abandon, or replace existing 4.9 GHz facilities, which would impose technical, operational, and financial burdens on those incumbents. Therefore, we propose to grandfather all incumbent users as of the date any final rules become effective. As we discuss below in the Database and Existing Licensees section, we further propose that those incumbent licensees whose authorizations currently encompass the entire 4.9 GHz band must certify the channels they actually use when they input their transmitter and

receiver parameters into the Commission's Universal Licensing System (ULS) database. Only those channels for which operating parameters have been supplied would receive protection. We seek comment on this approach, under which all new primary and secondary users of the band will be required to coordinate around and protect incumbent users. We also seek comment on whether a temporary licensing freeze before the release date of a report and order in this proceeding and lasting until the effective date of the final rules would be necessary to prevent the filing of applications for systems that are incompatible with the modified band plan.

Aeronautical Mobile and Robotic Use

In the Fifth FNPRM, the Commission sought comment on whether to lift the general prohibition on aeronautical mobile operations in the 4.9 GHz band. The Commission proposed to revise § 90.1205(c) to permit aeronautical mobile operation in the band on a secondary, non-interference basis to 4.9 GHz terrestrial services and subject to demonstrating interference protection to radio astronomy (RAS) operations. The Commission sought comment on whether to impose restrictions or conditions on aeronautical mobile use, such as an altitude limit of 1500 feet above ground.

Eight parties filed comments to the Fifth FNPRM in support of allowing aeronautical mobile operations under such conditions. The National Academy of Sciences Committee on Radio Frequencies (CORF), an organization representing RAS observatories, requests the following conditions: (1) make the aeronautical use secondary to terrestrial services, including RAS; (2) limit the altitude of use of this band to 1500 feet above the altitude of the observatory and limit operation to greater than 50 miles from observatories; (3) require aeronautical mobile applicants within 50 miles of protected observatories to demonstrate that the former will protect the latter from interference; and (4) require applicants within 50 miles of protected observatories to certify that they have served a copy of their application on such observatories. AASHTO

recommends that air-to-ground operations that employ omnidirectional antennas should be limited to low power, while operations using steerable directional antennas that minimize interference to terrestrial users could employ higher power. FCCA/IAFC/IMSA recommend a maximum altitude of "500 feet above ground for direct, non-directional air-to-ground video feeds," a maximum bandwidth of five megahertz for a video feed, and a requirement that "aircraft providing video feeds to fixed remote receive sites must use steerable antennas and be limited to 1500 feet above ground level."

The NPSTC Plan recommends aggregating Channels 1–5 into a five-megahertz channel to be used for air-to-ground communications and robotic communications. The NPSTC Plan would permit transmissions at altitudes up to 400 feet above ground level, and at higher altitudes if the licensee has a waiver. The proposal would require aeronautical mobile operations with an area of operation less than 80.5 km from listed RAS sites to obtain concurrence from the affected RAS site. NPSTC proposes licensing robotic operations on Channels 1–5 on a shared basis with air-to-ground operations, not allowing Channels 1–5 to be used for point-to-point (P-P) communications, and migrating existing users to other channels. APCO also supports these proposals, noting that "modification of the existing rules, using the guidelines proposed in the NPSTC recommendations, would allow use of the 4.9 GHz band for air to ground communications, would add to the available public safety portfolio, and would assist with increasing public safety use of the spectrum." APCO also supports "following the proposal contained in the NPSTC report with regard to robotic operations to allow for use of 4.9 GHz spectrum on a controlled and limited basis for robotic applications."

Discussion. We propose to designate Channels 1–5 as aeronautical mobile channels in the 4.9 GHz band. The proposed channel selection provides spectral separation from RAS operations in the 4950-4990 MHz band. As NPSTC notes, the 4.9 GHz band is an ideal short

range band with the bandwidth required to transmit video from air to ground. Moreover, many law enforcement agencies operate helicopters and planes using video cameras and so could benefit from this rule change.

We also propose to designate Channels 1–5 for robotic use. Although law enforcement has been using robots for several years, these devices currently operate on an unlicensed basis and are unprotected from interference. Modifying our rules to allow robotic operations could thus improve public safety. We seek comment on the relative costs and benefits of adding robotic use to this band. Is interference likely to be a problem for public safety robots? We propose to limit aerial transmitted information to video payload and to prohibit use of the 4.9 GHz band for aircraft (including unmanned aircraft systems) command and control. We seek comment on these proposals and also request commenting parties to address whether similar restrictions on payload and command and control frequencies should be imposed on robotic uses.

One of the potential cost of these rules would be that, for other than grandfathered licensees, the public safety use of Channels 1–5 would be limited to aeronautical mobile and robotic operations. We seek comment on the extent to which limiting the flexibility of spectrum use in this manner imposes costs by, e.g., creating cumbersome regulatory obstacles to repurposing the spectrum for alternative public safety needs that may become more pressing as circumstances change. Are there any countervailing benefits in establishing these proposed use restrictions? We also seek comment on the potential benefits of the proposed rule apart from such restrictions. Such benefits, which may be significant, would include that aeronautical mobile functionality would provide to first responders, who could use Channels 1–5 to transmit airborne video of emergency scenes such as wildfires, vehicle pursuits, and other events to assist in response and recovery efforts. A benefit of using these channels for robotic operations would be to enhance first responder safety by allowing users to send remote controlled, camera-

equipped mobile devices into potentially dangerous situations. We seek comment on the magnitude of these and any other relative costs and benefits.

Because we decline to propose mandatory relocation of incumbent terrestrial users on Channels 1–5, we therefore propose to require aeronautical mobile and robotic operations to be frequency coordinated around incumbent terrestrial users of Channels 1–5, consistent with the frequency coordination procedures proposed in the Coordination section below, including RPC review. We seek comment on the relative costs and benefits of this coordination requirement. Once aeronautical mobile and robotic operations are licensed, we propose to grant them co-primary status on Channels 1–5. Therefore, during an incident or emergency requiring such use, they would be able to operate on an equal basis with terrestrial users, around which they have already been coordinated, presenting a minimal risk of interference. To prevent future terrestrial licensing in the 4940–4945 MHz segment, we propose to revise § 90.1207 so terrestrial-based licenses are only available in the 4945–4990 MHz segment rather than the entire band. We seek comment on the relative costs and benefits of these proposals and alternative approaches.

While we propose to allow manned aeronautical use of Channels 1–5, we believe it would be premature at this time to permit unmanned aerial systems (UAS) to transmit in the 4.9 GHz band. The Federal Aviation Administration's (FAA) part 107 rules limit small UAS operations to 400 feet altitude above ground, require visual line of sight aircraft operation, prohibit operations over people, and prohibit operation in certain airspace, among other restrictions. The FAA's UAS altitude limit is well below our proposal of 1500 feet above ground, and the other restrictions may present impediments to effective public safety use of UAS. Moreover, the Commission has not yet issued service rules for UAS operations in any specific spectrum band. Nevertheless, we seek comment on the potential for the 4.9 GHz band to support possible future UAS payload operations.

We propose to establish a maximum altitude limit of 1500 feet (457 meters) above ground level (AGL) for manned airborne operations on Channels 1–5. We believe this limit allows greater flexibility than NPSTC's proposal of 400 feet and is consistent with the altitude limit adopted for air-to-ground communications in the 700 MHz narrowband spectrum. However, because FAA rules require fixed-wing aircraft to maintain certain clearances around structures, we propose to allow fixed-wing aircraft to transmit at altitudes exceeding 1500 feet AGL, but only to avoid obstructions, and then only in the immediate area of the obstruction. We seek comment on the terrestrial interference potential and coverage of fixed-wing aircraft compared to the interference potential and coverage of helicopters, and whether any restrictions or prohibitions should apply to either group of aircraft.

We propose to allow air-to-ground and robotic transmissions only from low power devices as defined in § 90.1215 of our rules, which limits maximum conducted output power to 14 dBm per 5 megahertz bandwidth and use of a directional antenna to confine radiation to the direction of the associated receiving antenna. We seek comment on this proposed power limit, as well as on other techniques to minimize interference. For example, AASHTO and LA County propose to allow use of higher powered steerable directional antennas for air-to-ground communications, while Vislink contends that some air-ground communications will require omnidirectional antennas. We seek comment on the current state of aerial steerable directional antenna technology and the associated cost of such equipment.

To minimize the impact of 4.9 GHz aeronautical and robotic operations on the important work being done by RAS observatories, we propose that aeronautical mobile and robotic operations, as with all other 4.9 GHz band operations, make every effort to protect the RAS observatories listed in our rules. We propose that aeronautical mobile use shall generally be prohibited within 80.5 kilometers from a listed RAS site. Public safety entities seeking

authorization for aeronautical mobile operations fewer than 80.5 kilometers from a listed RAS site would be required to submit a waiver request and notify and obtain concurrence from the affected observatory. Next, we propose to apply the L emission mask to aeronautical mobile devices on Channels 1–5, which will provide attenuation of 40 dB at 4950 MHz and above to minimize emissions into RAS. We do not propose to require robotic operations to maintain 80.5 km spacing to RAS sites. Robotic operations are transient and, because of their lower antenna elevations relative to airborne operations, do not pose an equivalent interference issue. Moreover, RAS sites are typically located in remote areas where robotic operations are unlikely to take place. We seek comment on our conclusion concerning the interference potential of robotic operations to RAS operations and on any burdens that these proposed RAS protection rules would impose, including the burden placed on small entities.

Next, we propose to amend § 2.106 of the Commission's rules to remove the prohibition on aeronautical mobile service use from the 4940–4950 MHz band in the non-Federal Table of Frequency Allocations, i.e., we propose to reallocate the lower 10 megahertz segment of the 4940–4990 MHz band from the "mobile except aeronautical mobile" service to the "mobile" service. This action would parallel the International Table and provide the Commission with additional flexibility with regard to the future use of the mobile service. We request comment on this proposal.

Finally, we remind commenters that the United States has border agreements with Canada and Mexico for the 4.9 GHz band that limit potential air-ground operations in border areas. In the Canada Agreement, the Commission agrees not to authorize aeronautical mobile stations within 160 kilometers of the border area without the written consent of Innovation, Science and Economic Development Canada (ISED). In the Mexico Agreement, for stations operated in aircraft, power flux density shall not exceed -114 dBW/m2 in any 1 MHz bandwidth

at or beyond the common border. Thus, any rules we may adopt authorizing aeronautical use will be subject to these restrictions in border areas. However, we retain the option of seeking future revision of these cross-border agreements through appropriate international channels. The limits arising from these international agreements would continue to apply to all licensees in the 4.9 GHz band, including aeronautical and robotic uses.

Coordination

Our rules currently require 4.9 GHz licensees to "cooperate in the selection and use of channels in order to reduce interference and make the most effective use of the authorized facilities," but do not require prior frequency coordination. We note that current 4.9 GHz band licenses authorize use of the entire band and are geographic rather than site-based. Thus, they allow licensees to deploy base stations, mobile units, and temporary fixed stations anywhere within the licensee's jurisdiction using any part of the spectrum band by informally coordinating with other uses, and without having to obtain prior clearance from the Commission. In the 2009 FNPRM in this proceeding, the Commission expressed concern that informal self-coordination "may not ensure that applicants for primary permanent fixed stations offer sufficient protection to other primary permanent fixed stations and other co-primary users." Accordingly, the Commission proposed a notice-and-response coordination procedure conducted among applicants and licensees similar to the procedure used for point-to-point (P-P) microwave applications under part 101 of the Commission's rules. However, in the Fifth FNPRM, the Commission acknowledged the views of the majority of commenters that notice-and-response coordination "may not be appropriate for this band because [it] would add a level of uncertainty and complexity to the coordination process," and sought comment on requiring 4.9 GHz applications to be submitted to a third party such as a certified public safety frequency coordinator or an RPC. Most commenters to the Fifth FNPRM supported certified frequency

coordination for the 4.9 GHz band, although a few commenters argued that the status quo of self-coordination is working.

NPSTC's Plan proposes that 4.9 GHz applications be coordinated by a certified public safety frequency coordinator. APCO supports NPSTC's recommendation because "many public safety users and manufacturers choose not to invest in the 4.9 GHz band because it is not coordinated." Specifically, APCO reports that "the current jurisdictional licensing model is viewed within the public safety community as too similar to an unlicensed structure to provide the degree of confidence needed for mission critical communications, including sensitive transmissions." APCO asserts that "new frequency coordination procedures designed to improve usage, performance, and interference protection would encourage public safety entities that have been reluctant in the past to begin utilizing the 4.9 GHz Band."

Discussion. We propose to require certified frequency coordination for licensing in the 4.9 GHz band. Given that our goal is to encourage a wide variety of uses of the 4.9 GHz band, we agree with NPSTC, APCO, and the majority of commenters 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. We seek comment on this view. We do not propose to require incumbent 4.9 GHz licensees to submit to frequency coordination for their existing operations. Rather, as noted above, we propose to grandfather incumbent operations provided that they file certain technical information on P-P, point-to-multipoint (P-MP), base, and mobile operations in our licensing database as discussed infra in the Database and Existing Licensees section.

We propose that, subject to qualification criteria, Public Safety Pool frequency coordinators which the Commission has certified to coordinate in other part 90 spectrum bands should be eligible to coordinate applications in the 4.9 GHz band. We seek comment on whether

to limit 4.9 GHz band coordination to public safety coordinators or whether to allow coordination by non-public safety coordinators as well. To ensure that coordinators are qualified to address band-specific coordination issues, we propose to require all frequency coordinators seeking to coordinate in the 4.9 GHz band to submit a qualification showing, which would include a coordination plan and a showing of expertise specifically for the 4.9 GHz band. We further propose to direct the Public Safety and Homeland Security Bureau to certify coordinators for the band. We seek comment on these proposals, including whether a qualification showing would place a burden on small entities. Current public safety frequency coordinator fees for frequency pair/site combinations range from $60 to $315 depending on the frequency band. We seek comment on the relative costs and benefits of frequency coordination.

The NPSTC Plan proposed that frequency coordinators would send each application to the applicant's home RPC for a five-business day review. We believe this particular proposal is burdensome on RPCs and redundant with the frequency coordinator's function and invite comment on this tentative conclusion. However, NPSTC also proposed that any application where the power flux density (PFD) into an adjacent region border exceeds -109 dBW/m2 would be flagged to be sent to the adjacent RPC to review. We believe this proposal may help prevent interference between regions, so we propose to adopt it. We seek comment on whether this PFD is an appropriate threshold, how PFD should be calculated and predicted, and how a PFD dispute would be resolved. We seek comment on what reference bandwidth should apply to this proposed PFD limit, e.g., is a 5 megahertz bandwidth appropriate?

Finally, we seek comment on whether waiving frequency coordination for certain technology could serve as incentive for manufacturers and licensees to use such technology in the 4.9 GHz band without creating harmful interference. Should we exempt certain short term uses from frequency coordination, such as public safety robotic uses or ad hoc mobile networks?

If so, how could such users minimize interference potential to existing operations in the same areas?

Database and Existing Licensees

In the Fifth FNPRM, the Commission noted that ULS does not contain information specifying receiver location for 4.9 GHz band P-P or P-MP links, geographically licensed base station coordinates, antenna gain, output power, and antenna height. Because a frequency coordinator lacking this information would have difficulty protecting incumbent primary fixed links and base stations from interference from new operations, the Fifth FNPRM proposed to require all current 4.9 GHz licensees to register the technical parameters of their permanent fixed P-P, P-MP, and base-to-mobile stations, including permanent fixed receivers when applicable, into a coordination database to ensure that primary operations receive proper interference protection. The Commission "tentatively concluded that the most cost-effective option is for the Commission to create and maintain a 4.9 GHz registration database that is modeled after an existing database," such as the millimeter wave band registration database in ULS. The Commission also sought comment on whether to use a third party database such as the Computer-Assisted Pre-Coordination Resource and Database (CAPRAD) or a dynamic database similar to the Television White Space (WS) database.

Commenters generally agree that the 4.9 GHz band is hampered by lack of a reliable database that provides technical information about current licensee deployments. The APCO Report concludes that wider use of the 4.9 GHz band is inhibited by "blanket geographical licensing for fixed and mobile operations on any channel across the band," and therefore proposes that "all fixed locations be identified and licensed for a specific channel or channels." The NPSTC Plan proposes that incumbent licensees be required to "relicense using the proposed frequency coordination process and appropriate ULS schedules" within one year from when ULS

is ready to accept applications using the new process. It also proposes that incumbent licensees that do not conform to the new band plan (including any region-specific variations) must modify their licenses within five years of the adoption of new rules.

The NPSTC Plan recommends using ULS to compile the information needed for coordination because "ULS is already funded" and "data required for coordination is already collected by ULS in the application process." NPSTC opposes using a private database that would "require the applicants to fund the entire cost of capturing, storing, and making data available to coordinators." However, other commenters suggest establishing a geo-location database similar to the WS database, so that commercial and unlicensed users could use the 4.9 GHz band on a secondary basis.

Discussion. Our rules specify that 4.9 GHz licensees encountering or causing harmful interference are expected to cooperate and resolve the problem by mutually satisfactory arrangements. Based on the record in this proceeding, we believe that concerns from public safety users of this band regarding resolution of interference issues in the 4.9 GHz band would be addressed if more complete technical information is available to all affected parties. Therefore, we propose 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, thereby promoting more efficient use of spectrum that has long been underutilized. We solicit alternative suggestions that would achieve these goals.

We believe ULS provides the most efficient and cost-effective means to facilitate certified frequency coordination in the 4.9 GHz band because it is both flexible and easily accessible to frequency coordinators, incumbent licensees, applicants, and other interested parties. While the Commission relies on private databases in other select spectrum bands, ULS

is already set up for licensing in the 4.9 GHz band, and the Commission can use existing form schedules to capture P-P, P-MP, fixed receiver, base station, and mobile station data. Accordingly, we propose to add the 4.9 GHz band to the microwave schedule for P-P, P-MP, and fixed receiver stations. We also propose 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.. Thus, we propose to maintain ULS as the comprehensive licensing database for the 4.9 GHz band, which frequency coordinators will use to base their coordination. This proposal would not affect or restrict frequency coordinators' use of their own internal databases, which draw licensing data from ULS on a regular basis. We propose to modify ULS as necessary to accept the necessary licensing data, prepare application instructions, and release a public notice to announce when ULS is ready to accept such applications. Regarding the burdens associated with the Commission's application for radio service authorization, the Commission has estimated that "each response to this collection of information will take on average 1.25 hours." The estimate "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." We seek comment on whether these time and cost burdens are accurate, and on the number of entities (incumbents and new entrants) likely to be subject to this requirement. We also seek comment on how best to measure the benefits emanating from this filing requirement in order to determine whether its benefits exceed its relative costs. For example, what is the cost of resolving current and potential interference problems in the absence of such a filing requirement? We seek comment on this proposal, and on the feasibility of alternative database solutions.

We propose to set a one-year timetable, starting on the release date of the ULS public notice described above, for incumbent licensees to provide data, as recommended in the NPSTC

Plan. We propose one year because we believe this gives licensees sufficient time to gather technical information about their site-based facilities and file applications, while providing a reasonable date certain that ULS will be sufficiently populated with site-based data to enable accurate frequency coordination. We propose to establish an application process for existing licensees with geographic licenses to identify P-P, P-MP, fixed receivers, base stations, and mobiles that are not licensed site-by-site. Under this process, incumbent licensees would file one or more applications, and update or delete the existing licenses as necessary to eliminate redundancy following a Public Notice announcing that ULS is ready to accept such applications. There would be no fee for the application process since only public safety eligible entities are currently authorized in the band, and the Commission does not charge application fees for public safety entities. We seek comment on this proposal.

AASHTO suggests that incumbent licensees should be required to submit to frequency coordination either when their licenses are set for renewal or within one calendar year of the Commission's adoption of coordination requirements. We disagree because the purpose of the application process is to collect missing incumbent data so that fixed operations would be visible in the database. Although a richer database will better aid future coordinations, coordination of incumbents is not necessary to accomplish this goal and would impose unnecessary cost. Accordingly, for this incumbent application process, we propose to grant NYCTA's request to waive frequency coordination requirements for one year following the effective date of those rules. However, we propose that after the one-year deadline, an application from an incumbent licensee to supply the required database information would be treated as any other application for a new license or modification, i.e., it would require frequency coordination. We seek comment about whether the status of a license should become secondary if the incumbent licensee does not meet the one-year deadline.

Finally, we decline to propose that incumbent licensees modify their licenses to conform to the new proposed rules and band plan. We agree with commenters such as Region 8 and King County/Seattle that such action would be unduly burdensome and inequitable to incumbent licensees, which already use the band for mission critical public safety operations. Instead, we propose to grandfather existing licensees from having to make any technical modifications to conform to the new rules and band plan, other than providing more sufficient data as we discussed above, as of the effective date of new rules adopted in this proceeding. However, applications from incumbent licensees submitted more than one year after the new rules are in effect would be subject to the new proposed rules and band plan.

Regional Planning

Section 90.1211(a) of the Commission's rules provides that each RPC region may submit a plan with guidelines to be used for sharing spectrum in the 4.9 GHz band. The rules list elements to be included in regional plans and provide instructions for the plan's modification. Although the Commission originally set a deadline for all RPCs to submit 4.9 GHz regional plans, it subsequently decided to make plan submission voluntary and stayed the deadline. To date, only 10 out of 55 RPC regions have submitted 4.9 GHz regional plans. In the Fifth FNPRM, the Commission sought comment on whether it should lift the stay and amend § 90.1211 to require Regional Plans to cover permanent fixed links and base stations, as well as mobile and temporary fixed links.

NPSTC's Plan states 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. NPSTC proposes to allow RPCs to file amended regional plans specific to 4.9 GHz to reflect regional considerations, including a required showing of need, within 120 days

after the Commission adopts new rules for the band. Several commenters support RPC involvement in the 4.9 GHz band.

Discussion. We believe that RPCs should play an integral role in shaping use of the 4.9 GHz band through regional planning. In this connection, we propose to afford RPCs the flexibility to file new and amended regional plans for Commission review and approval to reflect their region-specific needs or considerations as supported by a showing of need. Alternately, RPCs would have the option to default to the national rules without regional variation by taking no action. We seek comment on this proposal, and on how to implement regional variations.

NPSTC recommends that RPCs be able to make region-specific changes in the following four areas: (i) enabling additional channel aggregation; (ii) incorporating an additional channel designated for specialized use; (iii) placing limits on the use of P-P links in urban areas or imposing more stringent antenna requirements or other technical parameters to allow greater channel reuse; and (iv) in rural areas, allowing higher radiated power for longer path lengths and non-line of sight paths. We tentatively disagree with the NPSTC Plan's proposals for item (i) because we propose to allow 40 megahertz channel aggregation, and for item (iv) because we believe that the upper equivalent isotropically radiated power (EIRP) limits should be codified in our rules rather than left to the discretion of the RPCs. We propose to allow regional plans to be submitted for Commission approval that include variations for items (ii) and (iii) as well as for polarization. In lieu of item (i), we propose to allow RPCs to limit aggregations to 20 megahertz as discussed above. We also propose to limit the ability of RPCs to restrict non-public safety licensing eligibility to a greater degree than is provided in the Commission's rules. In general, we believe that providing these areas in which a regional plan can deviate from the national plan, combined with the overall flexibility of the band plan we propose, will enable regions to meet most needs of their users without threatening investments in existing deployments. Because we

cannot foresee all areas in which RPCs may need flexibility, we propose to allow RPCs to request changes outside these areas pursuant to a waiver request. We are mindful that regional variations add a challenge to frequency coordination, but we believe that frequency coordinators have the tools to keep track of these variations. We seek comment on relative costs and benefits arising from this approach, which would not change the status of regional plans as optional.

We seek comment on when RPCs should be required to submit regional plans. Comments on this issue were mixed, with suggested deadlines of 180 days, 240 days, and 12 months after final rules are effective. Considering the resource constraints on RPCs, we propose a deadline of six months after the effective date of final rules for each RPC to notify the Commission either that it intends to file a regional plan or that the region will default to the general rules, and a deadline of one year after rules adopted in this proceeding become effective for the filing of regional plans. Prior to Commission acceptance of any regional plan, we propose to allow new applications for 4.9 GHz licenses to be filed consistent with updated general rules. These licenses would be grandfathered for the duration of the license period. We would lift the current stay on § 90.1211(a) once the proposed rule modification becomes effective. We propose to continue to accept regional plans and amendments after the one-year deadline for the benefit of those RPCs that lack the resources to file timely regional plans or are not yet formed, but the purpose of the deadline is to provide a goal to commence licensing based on regional plan considerations. The Public Safety and Homeland Security Bureau would place any submitted regional plans on public notice for comment. With regard to Plan Amendments, we seek comment on establishing a streamlined process for staff review of such modifications, including defining "major" and "minor" plan modifications as defined by § 90.527(b) of the rules. We seek comment on these proposals and solicit alternative suggestions, especially from

the individual RPCs. We seek comment on any burdens that the regional plan filing deadline may place on small entities.

Finally, we decline the NPSTC Plan's recommendation to permanently waive the existing requirement to obtain concurrence from adjacent regions for plan amendments. The NPSTC Plan makes no mention of the existing adjacent region coordination requirement for initial regional plans, and we do not see why regional plan amendments should not also be subject to adjacent region review. This adjacent region review process for plan amendments has worked in the 700 MHz and 800 MHz bands, and we do not believe the process which is currently in place is unduly burdensome on RPCs for the 4.9 GHz band. We seek comment on whether adjacent region review requirements would place undue burdens on small entities.

Technical Standards

In the Fifth FNPRM, the Commission sought comment on whether to adopt technical standards for 4.9 GHz band equipment. While acknowledging that the Commission previously had declined to mandate such a technical standard, the Commission sought comment on using IEEE 802.11 as a potential standard solution, given the standard's worldwide availability and flexibility in supporting various applications. Some commenters to the Fifth FNPRM assert that mandatory technical standards would inhibit technological development in the band, restrict local flexibility and control, and render existing equipment obsolete. Other commenters contend that standards would promote national interoperability and lend certainty to the marketplace for 4.9 GHz equipment. A number of these commenters express specific support for an 802.11-based standard.

Discussion. Since the Commission adopted service rules for the 4.9 GHz band in 2003, the 4.9 GHz band has not fostered a market for diverse technology or inexpensive equipment, which in turn has led to underutilization and a slow influx of users. In general, the Commission

has favored technology-neutral rules and has avoided adoption of mandatory standards, a model that has worked in many spectrum bands. However, the record in this proceeding suggests that some public safety users may desire greater certainty regarding technical standards to stimulate investment in the band. While we tentatively conclude that we should not adopt mandatory technical standards for the 4.9 GHz band and seek comment on this view, we seek comment on how to encourage voluntary implementation of technical standards for equipment in the band that can provide certainty for public safety users while also providing appropriate incentives for manufacturers to develop innovative and cost-effective equipment that will encourage interoperability, discourage fragmentation, and reduce equipment costs through higher economies of scale. Would a voluntary industry standard/framework that would not be promulgated in our rules be appropriate and preferable to incorporating such a standard (or any other) in our rules? Are there industry standards available in the 4.9 GHz band, and if not, what is the likelihood that applicable standards could be extended to the 4.9 GHz band? What would be the relative cost and benefit of different voluntary standards for high-power and low-power systems?

Point-to-Point and Point-to-Multipoint

Until 2009, permanent fixed P-P and P-MP stations in the 4.9 GHz band were secondary to base, mobile, and temporary fixed operations. In 2009, the Commission permitted licensing of permanent fixed P-P and P-MP stations that deliver broadband services on a primary basis, while those stations that deliver narrowband traffic remain secondary to other operations in the 4.9 GHz band. In the Fifth FNPRM, the Commission sought comment on whether to license all permanent fixed P-P stations on a primary basis, regardless of whether they support broadband or narrowband traffic, or whether permanent fixed P-MP stations not delivering broadband service should remain secondary.

Discussion. Secondary status requires the user to accept the risk of interference and to cease operation if it causes interference to a primary licensee. The supporting commenters persuade us that primary status for P-P and P-MP links that carry or support narrowband traffic would resolve this risk and increase usage of the 4.9 GHz band because it would give potential users confidence to invest in the band. Given the divided comment record on primary status for narrowband P-P and P-MP links, we propose to allow licensees to use individual 1-MHz bandwidth Channels 14-18 for permanent fixed P-P and P-MP operations on a primary basis, while existing permanent fixed P-P and P-MP operations on individual 1-MHz bandwidth Channels 1-5 would remain secondary, with no such further licensing allowed on those channels due to the proposed aeronautical mobile and robotic designation. We seek comment on this proposal, including its relative costs and benefits. Under the status quo, any competing public safety organization in dense urban areas could obtain secondary licenses for P-P and P-MP links on channels 14-18 with no obligation to protect each other from interference. Accordingly, one potential cost of a proposal to license these links on a primary basis is that it could increase the difficulty of competing public safety organizations in dense urban areas to obtain primary licenses for base, mobile, and temporary fixed operations in channels 14-18 because primary users are entitled to interference protection and cannot be licensed with overlapping channel assignments and areas of operation as secondary use may allow. How likely is this to occur, and what would be the cost of a work-around?

The NPSTC Plan recommends that applications for P-P licenses include a showing as to the need for the bandwidth requested, to address the potential of P-P links to cause interference. At this time, we do not propose to impose such a requirement, which no other commenter has suggested, because the record does not contain objective benchmarks for correlating various uses with bandwidth needs. We have found that no evidence of P-P interference in the record, and we

invite commenters to submit any such evidence. Further, we believe that technical rule changes we propose below in the Power Limits section may reduce interference potential by producing more directional P-P links. We seek comment on our view and on these concerns.

Next, in order to limit "temporary" links to truly temporary uses, we propose to adopt the NPSTC Plan's recommendation that temporary P-P links may only be operated for thirty days maximum over a given path in a one-year period. Any application for longer operation would require a showing why longer duration is needed and how the link is supporting public safety protection of life and property. We seek comment on whether the number of days should be reduced or increased and the reasons therefor. We seek comment on the relative costs and benefits of the limitation proposed here, as well as any alternate proposals. We solicit alternative suggestions and solicit comment on burdens that a timeframe limitation on temporary P-P links would place on small entities.

Finally, we decline to consider a request from the comment record that the band be used only for fixed uses. The band supports substantial mobile use, and it would be contrary to the public interest to force such operations to relocate from the 4.9 GHz band or cease operation. We believe that with the regional planning process combined with frequency coordination, the goal of increased density of fixed link deployment can occur with rule changes regardless of mobile presence. We seek comment on this tentative conclusion.

Power Limits

The 4.9 GHz rules contain power output limits that depend on the channel bandwidth for both low power and high power transmitters. High power P-P and P-MP links may use directional antennas with gains greater than 9 dBi and up to 26 dBi with no reduction in conducted output power, but if antennas with a gain of more than 26 dBi are used, the maximum conducted output power and peak power spectral density must be reduced by the amount in

decibels that the directional gain exceeds 26 dBi. The Commission imposed the antenna gain rule "in order to avoid interference from fixed operations to mobile operations."

In the Fifth FNPRM, the Commission sought recommendations for an effective radiated power (ERP) limit for high power, permanent and temporary fixed transmitters, and whether to impose a maximum ERP limit on point-to-point links. Going forward, we will discuss radiated power levels in the 4.9 GHz band in terms of EIRP, rather than ERP, because antenna gains in the 4.9 GHz band rules are conventionally specified in terms of gain relative to an isotropic reference (dBi). To make point-to-point use in the band more efficient, the Commission also sought comment on whether it should establish a different minimum gain for P-P transmitting antennas and, if so, what value of gain would be appropriate and what power reduction, if any, should be required.

The NPSTC Plan does not address ERP limits, but it notes that § 101.143 of the Commission's rules specifies a formula for reducing the maximum EIRP for short path lengths and proposes "that the frequency coordinators use a similar reduction in maximum EIRP for short path lengths with formulas developed based on transmit powers allowed in this band." The NPSTC Plan further recommends that for P-P links an antenna with a minimum gain of 26 dBi, a maximum of 5.5 degree beamwidth and a minimum 25 dB front-to-back ratio be required. The NPSTC Plan also recommends that frequency coordinators be allowed to impose tighter specifications for the antenna if that allows assignment of a channel that otherwise would cause interference. NPSTC states that equipment using "multiple modulation rates and /or MIMO [multiple-input and multiple-output] antenna technologies" is inefficient and proposes that "they normally not be allowed in the band." NPSTC recommends that requests for higher EIRP levels only be granted under waiver and receive full coordination so that both frequency coordinators and RPCs can comment.

The APCO Report argues for "increasing the size of the antennas supporting 4.9 GHz operations." APCO states that "larger directional antennas (i.e. 4' diameter and above) have more discriminatory "off-path" antenna patterns and FB (Front-to-Back) ratios which allow the coordinator to assign frequencies closer together and permit more systems to co-exist, interference-free, within a given frequency band." APCO also contends that "there are cases where a larger antenna may allow the coordinator to assign a frequency to a system where a smaller antenna may not have an efficient enough antenna pattern."

Discussion. We propose to allow P-P transmitting antennas to operate with a minimum directional gain of 26 dBi, maximum 5.5 degree beamwidth and minimum 25 dB front-to-back ratio. Antenna physical size, or area, is related to antenna gain. Although the rules do not contain restrictions on physical antenna size, we believe this proposal will enable users to deploy larger directional antennas, as recommended in the APCO Report, and to produce narrower beam widths and more directional P-P links, which should enable co-channel users in congested areas to place links closer together and achieve greater frequency reuse. Moreover, the higher gain would increase the EIRP so that P-P links can cover longer distances, which could save users the expense of deploying multiple, low EIRP links. Further, the record indicates that several low cost antennas that meet these requirements are already available. We seek comment on the relative costs and benefits of this proposal. We invite commenters to provide additional information about these antennas and associated costs in the record and we seek comment on the levels of directional antenna gains that licensees are using today. We also seek comment about burdens that a change to the antenna gain rules would place on small entities, notwithstanding that we propose to grandfather existing P-P and P-MP installations from having to replace antennas.

We seek comment on whether the rules should contain a maximum EIRP limit for directional links. Although the NPSTC Plan proposes no maximum EIRP, three commenters suggest power levels equivalent to maximum EIRP levels of 65.15 dBm for P-P and 55.15 dBm for P-MP to "promote the use of the band for longer range communications …, particularly in rural areas." Accordingly, we seek comment on these EIRP limits. Since we noted above that the upper power limits need to be codified in the rules, we seek comment on whether these proposed power limits are adequate to meet the needs of regions whose users would deploy links with long path lengths in rural areas. We also seek comment on whether such an increase in maximum power levels for directional links creates any additional interference concerns and how it might affect the ability to coordinate additional links. Similarly, what effect might such an increase have on the ability for continued mobile operations in the band? We seek comment on whether emission mask M is sufficient, or whether a tighter emission mask should be imposed for these higher power operations. We seek further comment on other power suggestions in the record and how they would fit with the above proposals.

Finally, we decline to propose restrictions on multiple modulation rates and MIMO antenna technologies as proposed by the NPSTC Plan. We agree with the City of New York that "Multiple Input Multiple Output (MIMO) technology is a key element of both the 802.11n standard and LTE standards. Rather than being less spectrally efficient, it is more so as it provides for increased throughput and range." Similarly, multiple modulation rates are more spectrally efficient and offer licenses additional flexibility in the planning and operation of their systems.

Polarization

The Fifth FNPRM sought comment on requiring P-P links to use a specific polarization, e.g., horizontal or vertical, to reduce potential interference to other links or to portable or mobile

devices. The Commission sought comment on the costs of changing an antenna's polarization and whether polarization diversity would increase throughput.

Discussion. Given the mixed comment record, we decline to propose any polarization requirements in our rules. However, we still believe that polarization can be a tool to increase density of P-P links in a given area and to address cases of actual interference between two or more P-P links. We note that side-by-side co-channel P-P links with orthogonal (opposite) polarizations could operate with minimized interference because each receive antenna would reject signals of the opposite polarization. We are also encouraged that dual polarization together with polarization multiplexing can increase capacity in a P-P link, as Cambium suggests. As discussed above, we propose to allow regional plans submitted for Commission review pursuant to § 90.1211 to propose any polarization schemes for new applications within their regions as necessary to maximize frequency reuse, manage interference, and increase throughput. As part of the application frequency coordination process, frequency coordinators would be able to recommend a particular polarization for a proposed P-P link in those regions. We seek comment on this proposal.

Deployment Reports, Construction Deadlines

The Fifth FNPRM sought comment on whether to require 4.9 GHz licensees to file periodic deployment reports to better inform the Commission about usage of the band. The Commission indicated that reports could include information such as status of equipment development and purchase, including number of devices and users; site development, including use of existing towers; deployments and upgrades (commencement and completion), including site information and location; and applications in development or in use. The Commission also sought comment on reporting frequency.

Discussion. Although a deployment report requirement had some support in the record, we agree with the opposing comments regarding burdens on licensees and decline to propose requiring deployment reports. In addition to imposing a burden, such reports would be superfluous given our database proposal discussed above, in which existing licensees would file certain additional information on their operating parameters.

However, we propose to establish a one-year construction deadline for all 4.9 GHz licensees, with a corresponding construction reporting requirement. The current rules impose an 18-month construction deadline only on fixed P-P stations that are licensed on a site-by-site basis, and no construction deadline for base and temporary fixed stations. We believe that shortening the construction period to one year for all 4.9 GHz licenses will lead to more timely use of the spectrum and reduce the possibility of spectrum warehousing. Accordingly, we propose to 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 and file a standard construction notification with the Commission. We also propose to reduce the construction period for fixed point-to-point stations from 18 months to 12 months. These proposed rule changes will also harmonize the construction deadlines for the 4.9 GHz band with the deadlines of § 90.155, which is the analogous rule for the majority of part 90 radio services. We note that we have received no objections to this construction deadline change. We seek comment on these proposals, on their relative costs and benefits, on the burdens that the proposed construction deadline would place on small entities, and on alternative solutions that would achieve the same goal.

Eligibility, Shared Use, and Other Alternatives

Currently, only entities providing public safety services are eligible for licenses in the 4.9 GHz band. Non-public safety entities—including CII entities—may use the 4.9 GHz spectrum by entering into sharing agreements with eligible public safety licensees, but only for "operations

in support of public safety." In light of the limited use of the band to date by public safety, the Fifth FNPRM sought comment on whether expanding eligibility to non-public safety users might lead to increased use and reduction in equipment costs that would benefit public safety. Specifically, the Commission sought comment on whether CII entities should be eligible to hold primary 4.9 GHz licenses, thus removing the requirement for a sharing agreement, and also whether the band should be opened to commercial users on a secondary or non-interfering basis subject to a shutdown mechanism to enable priority access by public safety entities. In response to the Fifth FNPRM, the NPSTC Plan proposed to extend primary 4.9 GHz eligibility to CII. More recently, other ex parte filers have recommended various secondary spectrum sharing approaches combined with maintaining priority status for public safety in the 4.9 GHz band.

In this Sixth FNPRM, we seek to further discuss these alternative eligibility and spectrum sharing approaches and other alternatives for the band. We seek comment on four specific alternatives outlined below, and on whether the four alternatives or elements thereof could be combined. We also solicit comment on any other sharing approaches that would meet the Commission's goals for the band.

Extending Eligibility to CII

The NPSTC Plan proposes to expand eligibility to afford CII co-primary status with public safety in the 4.9 GHz band and allow CII entities immediate access to two five-megahertz channels (Channels 6 and 7). On the remaining channels in the band, NPSTC proposes to preserve public safety's licensing priority for three years, but would allow CII to seek access on a notice basis. Under the proposed notice procedure, a CII entity's application to use unoccupied channels would be put on public notice, and any public safety entity in the same geographic area as the CII entity's planned system would have 30 days to file an application for the same channels, in which case the public safety applicant would prevail. This notice process would

expire after three years after the Commission's rules become effective, at which point public safety and CII would have equal access to all channels in the band with no required notice.

The majority of commenters responding to both the Fifth FNPRM and the NPSTC Plan support expanding 4.9 GHz band eligibility to CII entities. APCO and FCCA/IAFC/IMSA assert that CII eligibility would enhance interoperability between utilities and public safety agencies during and immediately following major emergencies, although APCO cautions that CII use should be "carefully monitored to ensure that public safety needs are considered in every potential conflicting filing." The Utilities Telecom Council (UTC) states that CII primary eligibility "could provide capacity and coverage for smart grid and other applications … [and] would promote investment in and more effective use of the spectrum."

Some public safety commenters oppose direct licensing of CII entities and advocate retaining the requirement that CII entities may only use the 4.9 GHz band pursuant to sharing agreements with public safety licensees. In response, Southern Company contends that "the current eligibility rules for the 4.9 GHz band do not correlate with marketplace or political realities," because CII entities are "understandably reluctant to enter agreements whereby their investment in infrastructure, and their use of a vital communications resource, could be rendered worthless at any time, including when that resource is needed most."

Some commenters advocate expanding CII eligibility to include additional categories of potential users. The Enterprise Wireless Alliance (EWA) proposes extending 4.9 GHz band eligibility to "all private internal systems" that "have defined areas of operation not necessarily focused on population centers, often conducted in a campus-type environment that can be coordinated with public safety usage." The Alarm Industry Communications Committee (AICC) argues that alarm companies should have primary access to the 4.9 GHz band in order to allow

them "to more efficiently and rapidly gather and forward to PSAPs information about emergencies."

Discussion. We seek comment on whether offering CII co-primary status with public safety is likely to create incentives for increased investment in the 4.9 GHz band. The Commission has 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." Extending eligibility to CII could encourage collaborative investment by public safety and CII users of the 4.9 GHz band to improve response to emergencies that affect both public safety and critical infrastructure. We seek comment on this approach, including its potential relative costs and benefits.

We also seek comment on whether eligibility for CII entities should be conditioned on using the band to provide "public safety services" as that term is defined in Section 337(f)(1)(A) of the Communications Act of 1934, as amended. For example, API requests that CII entities be permitted to use the band for any purpose, not just in support of public safety. Would eliminating the requirement that the band be used for "public safety services" by CII users increase use of the band, lowering equipment costs and facilitating the other benefits of CII access to the band? Or would it unduly increase congestion? Considering the public safety focus of the 4.9 GHz band, should we limit CII use of the 4.9 GHz band to communications related to the protection of life, safety, and property, as opposed to general business purposes? If we maintain the requirement, how should the Commission ensure compliance by CII users (and what are the costs of doing so)? Given public safety's relatively modest use of 4.9 GHz spectrum to date, we think there is sufficient remaining spectrum in the band to accommodate both expanded use by public safety and CII co-primary use. Stated otherwise, we think the benefits of co-primary use of the band by both CII and public safety can be realized at slight or

no cost to public safety. We seek comment on this characterization. Is there reason to elevate public safety communications in the band over other uses? If so, would preferential algorithms built into equipment ensure priority of public safety communications? How would that priority be achieved? Would such priority be sufficient to ensure that public safety traffic would not be interfered with? We seek comment on affording public safety priority over other users and how priority would be achieved.

If we grant co-primary eligibility to CII entities without the need for a sharing agreement with a public safety entity, we seek comment on NPSTC's proposal to provide CII immediate, co-primary access to Channels 6 and 7 during the first three years, to establish a notice procedure for CII access to the remainder of the band during the three-year period, and to open up the entire band to CII thereafter. Should we consider alternative access arrangements, such as providing CII immediate access to Channels 12 and 13, which could be coupled with access to narrowband Channels 14–18 to create 15 megahertz of contiguous spectrum for CII to access on a co-primary basis? Should we exclude Channels 1–5 from CII eligibility in light of our proposal to dedicate this segment to public safety aeronautical mobile and robotic use? We seek comment on these options and solicit any alternative suggestions.

We in turn seek comment on extending 4.9 GHz band co-primary eligibility to all private internal systems, as EWA requests. Would doing so be consistent with our core goal of supporting critical public safety needs? Similarly, we seek comment on extending primary eligibility to alarm companies as advocated by AICC. Does the fact that the Commission's recent review of ULS in another proceeding suggesting that certain frequencies designated for central alarm operations may be underutilized affect how we should approach this request? Finally, we note that the Commission's general approach to making spectrum available in recent years has leaned toward flexible use rather than allocations to specific industries. We seek

comment on how granting CII entities eligibility for co-primary status is consistent with this approach. We also ask how CII entities' need for co-primary use of this band can be differentiated from the needs of other critical and safety-related industries that may seek access to this band in the future.

Leasing

In the 2003 4.9 GHz Third Report and Order, the Commission allowed non-public safety entities engaged in providing public safety-related services to be licensed in the 4.9 GHz band to support public safety operations. In 2004, the Commission permitted public safety licensees with "exclusive spectrum rights" to lease their spectrum to other public safety entities eligible for such a license authorization and to entities providing communications in support of public safety operations. Based on the record at that time, the Commission declined to permit public safety licensees to lease 4.9 GHz spectrum for commercial or non-public safety operations. Specifically, the Commission noted that commenters expressed concern that such leasing could face statutory barriers or result in abuse without the implementation of regulatory safeguards. In the Secondary Markets Order, the Commission also noted that allowing such leasing could be premature given the then-nascent state of "interruptible use" technology that would enable public safety licenses to immediately reclaim the use of any leased spectrum for public safety emergencies.

Discussion. In this Sixth FNPRM, we seek to establish new licensing and service rules for the 4.9 GHz band that will spur investment and innovation while furthering public safety use of the band. We seek comment on whether these objectives could be facilitated by expanding the leasing alternatives available to public safety in the band. In particular, should we remove the current limitation and allow public safety licensees that have obtained exclusive spectrum rights in the 4.9 GHz band to lease spectrum capacity to CII or to commercial entities generally?

Would such expanded leasing flexibility stimulate investment in equipment and networks that would benefit public safety and further our objectives for increased use of the band? Would such leasing opportunities present public safety entities with new potential revenue streams that could be used to increase investment in NG911 operations or to purchase new 4.9 GHz equipment? What rule changes, if any, would best facilitate bringing the economies of scope and scale that come with commercial use of a band to this public safety spectrum? How would a leasing alternative lead to increased use of the band compared to the current environment, where non-public safety entities can to enter into sharing agreements with public safety licensees? What are the relative costs and benefits of expanding leasing alternatives?

We also seek comment on how best to ensure that public safety would retain priority access to 4.9 GHz spectrum in any commercial leasing framework. As noted above, the Commission cited a dearth of technology in 2004 that would support "interruptible" spectrum leasing. In light of the significant technological advances that have occurred since then, does technology now exist that would enable public safety to interrupt other spectrum users and reclaim leased spectrum capacity in emergencies? Should non-public safety entities that lease spectrum capacity have primary status because they entered agreements with specific public safety licensees? If so, how would public safety priority function?

As noted above, in the Secondary Markets Order the Commission cited to comments expressing concern that the Communication Act might be a barrier to allowing public safety entities to lease spectrum that had been designated for public safety for non-public safety operations. Those comments suggested that because Section 337 of the Communications Act of 1934 defines "public safety services" as services that "are not made commercially available to the public by the provider," the Commission could be limited in its ability to allow non-public safety services on bands designated for public safety services. However, Section 337's

proscription on commercial operations is expressly limited to 24 megahertz of spectrum in the 700 MHz band, and there is no equivalent statutory limitation on the 4.9 GHz band. Section 90.1203 of our rules, which governs eligibility for 4.9 GHz licenses, incorporates the requirements and conditions set forth in § 90.523 of our rules, which in turn implements Section 337 of the Act, and provides that applications in this band are limited to operations in support of public safety. The Commission tentatively concludes that it has authority to modify § 90.1203 to allow public safety licensees to enter into leases for non-public safety or commercial uses in the 4.9 GHz band. We seek comment on this tentative conclusion. Are there any other potential jurisdictional barriers to adopting the rules proposed here?

If we authorize expanded leasing by public safety in the 4.9 GHz band, should there be conditions or limitations on use of leased spectrum or expenditure of leasing revenues to safeguard against potential abuse? For example, should use of leased spectrum be limited to communications in support of public safety or should all communications be allowed regardless of whether they have a public safety nexus? Can or should we require public safety licensees that receive leasing revenues to invest such revenues solely for public safety purposes, e.g., for procurement of public safety equipment or maintenance and operational costs of the network? Would such a requirement be consistent with the Miscellaneous Receipts Act? Are there provisions of state or local law relating to use of funds by local public safety entities that the Commission should take into consideration here? How would compliance with such a requirement be audited and enforced?

We seek comment on the relative costs and benefits of a commercial-leasing options vis-à-vis the CII co-primary option discussed above. Which option would bring the greatest innovation to the 4.9 GHz band? Which option would best facilitate the introduction of new, lower cost equipment? Which option would best empower public safety users—the case-by-case

leasing to commercial entities where public safety users must sign off on each use or the ability of CII users to gain co-primary access to the spectrum without further public safety input? In short, which of these options would best serve our goals in increasing shared use of this band at the lowest cost? As noted above, given public safety's relatively modest use of 4.9 GHz spectrum to date, we think that allowing leasing would not impose any cost on public safety. Stated otherwise, we think the benefits of allowing more efficient spectrum use through leasing can be realized at no cost to public safety. We note that there are potential revenue streams from leasing, further supporting our judgement that allowing leasing would be produce benefits that exceed relative costs. We seek comment on this characterization.

Two-Tiered Sharing on a Secondary Basis

In the Fifth FNPRM, the Commission sought comment on whether to open 4.9 GHz band eligibility to commercial users on a secondary or non-interfering basis, while ensuring priority access for public safety entities by means of a sharing mechanism, such as dynamic access control based on a database similar to that used for TV white spaces devices. In response, some commenters support extending eligibility to commercial entities on a secondary basis. Carlson, AICC, Spectrum Bridge, SSC, and WISPA suggest that adopting an intelligent, dynamic database system as the sharing mechanism could allow non-public safety to use the 4.9 GHz band on a secondary basis. The APCO Report recommends that the Commission consider "build[ing] upon the 'white space' model and apply[ing] it to the 4.9 GHz arena to spur development by increasing the potential customer base, including within the CII segment." APCO recommends that the Commission study "[a]n innovative approach that incorporates essential features such as frequency coordination, with newer spectrum management tools that could expand the user base while preserving reliable access for public safety."

However, many public safety commenters oppose opening the band to commercial users, even on a secondary basis. These commenters express concern that because public safety generally requires greater lead time than commercial entities to secure funding to construct communications systems, commercial operations could foreclose public safety use and increase the risk of interference and congestion. Commenters also express skepticism about the feasibility of a using a dynamic database as a sharing mechanism. FCCA/IMSA/IAFC argue that "white space-style databases are not appropriate for the 4.9 GHz band" because they rely on equipment that employs geo-location or similar technologies, and "requiring 4.9 GHz devices to incorporate geo-location or similar capabilities will unnecessarily impede the development of equipment for the band." Southern similarly "does not believe the database paradigm used for TV White Spaces … devices would be appropriate for the 4.9 GHz band," citing the risk to public safety that could be caused by "loss of critical communications service due to database errors, malfunctions of the coordination system, or loss of connectivity with the database."

Discussion. As a third option, we seek comment on the feasibility of a two-tiered sharing approach, in which Tier 1 would consist of primary licensees in the band (including all incumbent users), while Tier 2 would allow other non-public safety users to access the band on a secondary basis, with safeguards to ensure priority and interference protection for Tier 1 operations. We seek comment on potential mechanisms that could facilitate two-tiered sharing in the 4.9 GHz band while protecting primary users.

For example, could we implement Tier 2 secondary access to the 4.9 GHz band using frequency coordination and licensing procedures similar to those we are proposing for primary licensing? The public safety community has long relied on frequency coordination in other spectrum bands to protect mission-critical communications from interference. While this system has worked well in other bands, frequency coordination in the 4.9 GHz band would typically

take place before deployment and does not take into account the dynamically changing environment of real-time spectrum usage. We seek comment on whether a frequency coordination approach to Tier 2 secondary use would provide sufficient flexibility to support dynamic spectrum use while protecting Tier 1 users. Would real-time coordination be feasible if we required Tier 2 users to provide digital identification and/or geo-location so that Tier 1 users could readily identify potential sources of interference to their systems? We seek comment on relative costs and benefits that a digital ID and/or geolocation requirement on Tier 2 users would have, especially for Tier 2 small businesses.

We also seek comment on the feasibility of developing an automated database system to enable dynamic Tier 2 secondary use of the 4.9 GHz band while protecting Tier 1 operations. We acknowledge the concerns raised by commenters that "white-spaces" databases previously developed for commercial bands might not provide sufficient assurance of real-time protection for mission-critical public safety operations. We seek comment on what capabilities an automated system would need to support the public safety requirements of the 4.9 GHz band. Should the database be centralized or distributed? What would it cost to design, build, and operate such a system, and who should be responsible for such costs? What information would Tier 1 and Tier 2 users need to enter and update in the database to facilitate dynamic spectrum sharing? What would be the cost and burden of providing such information? How would an automated system communicate with users' devices to help minimize interference and facilitate registration, coordination, and dynamic access? What capabilities would be required to identify potentially interfering Tier 2 users in real time and to direct them to move to a non-interfering channel or to shut down? We seek comment on these issues and on alternative models for spectrum sharing that would achieve these goals. Beyond the upfront cost of designing, building and operating the automated database system, and recurring database maintenance costs—both

necessary to enable dynamic Tier 2 secondary use—such dynamic spectrum sharing would appear to impose few costs on public safety because it would retain primary access to the spectrum as needed. These costs would be the costs of entering and updating information to the automated database. We seek comment on whether the benefits to secondary users would outweigh the upfront, recurring, and database entry relative costs, and any other appreciable costs that we may not have taken into account.

Redesignation of the Band

As this spectrum has been underutilized, we request comment on redesignating the 4.9 GHz band, wholly or partially, to support commercial wireless use. Are the bases for the Commission's decision in 2002 to allocate the entire band for public safety purposes still valid, or does the public interest now call for a change? For example, would the public interest be best served if this spectrum could be used for commercial applications, such as 5G, or would it be better to strike a balance between public safety and commercial uses? What are the relative costs and benefits of a commercial use of this spectrum as weighed against the band plan we propose above or the sharing use alternatives on which we seek comment? If only a portion of the band were to be redesignated, how should the band be divided between public safety and commercial use? If any or all of the spectrum is redesignated for commercial wireless purposes, should the Commission consider auctioning the redesignated spectrum, making licenses available on some other basis, or authorizing the spectrum for unlicensed use under part 15 of the Rules? We seek comment on any other alternatives to support commercial wireless use of the 4.9 GHz band. If the band were made available for licensed or unlicensed use, we seek comment on what the technical rules would be appropriate. Specifically, if the band were made available for licensed use, should we apply the power levels, emissions limits, and other technical requirements that are in the existing 4.9 GHz band technical rules, the Citizen's Broadband Radio Service (CBRS) as

reflected in part 96 subpart E, or the technical rules for the AWS-3 spectrum as reflected in part 27 for the 1710–1780 MHz and 2110–2170 MHz bands? The CBRS rules assume time division duplex operation while the AWS-3 rules assume frequency division duplex operation, with each set of rules specifying separate technical requirements for base stations and mobile devices. If the band were made available for unlicensed use, we specifically invite comment on whether we should apply the same technical rules that exist for the U-NII band at 5150–5250 MHz under part 15 subpart E. If the Commission allows commercial use in all or part of the 4.9 GHz band, should it allow both mobile and fixed use? When considering whether to designate all or part of the band for commercial users, should the Commission consider designating the entire band in markets where there are no existing public safety 4.9 GHz facilities? In markets where there are public safety incumbents, should public safety use be limited to those incumbents or should a specified amount of the 4.9 GHz band be reserved for public safety use? If the Commission divides the band into commercial and public safety segments, would it need to establish guard bands or would in-band and out-of-band emission limits suffice to guard against harmful interference? Commenters should address how the loss of opportunities for public safety spectrum use in the 4.9 GHz band might affect congestion in other bands currently allocated for public safety use.

In the event that the Commission redesignates any of the spectrum in the 4.9 GHz band, how should the Commission treat existing public safety systems operating in the band? Should public safety systems simply be grandfathered on their current frequencies? If so, should it be based on the frequencies licensed or those actually deployed and used? If the band is divided into public safety and commercial segments, should public safety licensees be required to relocate their facilities into the public safety segment? In the event the Commission elects to designate the entire band for commercial use, is there alternative spectrum to which existing

public safety 4.9 GHz licensees can be relocated? If so, who should pay the relocation cost, e.g., if the Commission decides to auction the redesignated spectrum? Should auction proceeds be used to pay public safety's cost to relocate its systems? We seek comment on the relative costs and benefits of all of these options.

PROCEDURAL MATTERS

Ex Parte Presentations

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

.ppt, searchable .pdf). Participants in this proceeding should familiarize themselves with the Commission's ex parte rules.

Regulatory Flexibility Analysis

As required by the Regulatory Flexibility Act of 1980, see 5 U.S.C. 603, the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on small entities of the policies and rules addressed in this document. IRFA is set forth in Appendix C of the Sixth FNPRM. Written public comments are requested on the IRFA. These comments must be filed in accordance with the same filing deadlines as comments filed in response to this Sixth FNPRM as set forth herein, and they should have a separate and distinct heading designating them as responses to the IRFA. The Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, will send a copy of the Sixth FNPRM, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA).

Initial Paperwork Reduction Act Analysis

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

ORDERING CLAUSES

Accordingly, IT IS ORDERED, 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, that this Sixth Further Notice of Proposed Rulemaking is HEREBY ADOPTED.

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

List of Subjects in 47 CFR Parts 0, 2, and 90

Organization and functions (Government agencies); Communications equipment; Radio; Reporting and recordkeeping requirements

FEDERAL COMMUNICATIONS COMMISSION

Marlene Dortch,
Secretary,
Office of the Secretary.

Proposed Rules

For the reasons discussed in the preamble, the Federal Communications Commission proposes to amend 47 CFR parts 0, 2 and 90 as follows:

PART 0 – COMMISSION ORGANIZATION

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

AUTHORITY: Sec. 5, 48 Stat. 1068, as amended; 47 U.S.C. 155, 225, unless otherwise noted.

2. Section 0.392 is amended by adding paragraph (k) to read as follows:

§ 0.392 Authority Delegated.

* * * * *

(k) Certifies frequency coordinators; considers petitions seeking review of coordinator actions; and engages in oversight of coordinator actions and practices.

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

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

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

4. Section 2.106, the Table of Frequency Allocations, is amended by revising page 41 to read as follows:

§ 2.106 Table of Frequency Allocations.

* * * * *

1International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
(See previous page)	3500-3700 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile Radiolocation 5.433	3500-3600 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 5.433A Radiolocation 5.433	3500-3550 RADIOLOCATION G59 AERONAUTICAL RADIONAVIGATION (ground-based) G110	3500-3550 Radiolocation	Private Land Mobile (90)
			3550-3650 RADIOLOCATION G59 AERONAUTICAL RADIONAVIGATION (ground-based) G110	3550-3600 FIXED MOBILE except aeronautical mobile US105 US433	Citizens Broadband (96)
3600-4200 FIXED FIXED-SATELLITE (space-to-Earth) Mobile		3600-3700 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile Radiolocation 5.433	US105 US107 US245 US433	3600-3650 FIXED FIXED-SATELLITE (space-to-Earth) US107 US245 MOBILE except aeronautical mobile US105 US433	Satellite Communications (25) Citizens Broadband (96)
		5.435	3650-3700 US109 US349	3650-3700 FIXED FIXED-SATELLITE (space-to-Earth) NG169 NG185 MOBILE except aeronautical mobile US109 US349	

	3700-4200 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile	3700-4200	3700-4200 FIXED FIXED-SATELLITE (space-to-Earth) NG180	Satellite Communications (25) Fixed Microwave (101)
4200-4400 AERONAUTICAL RADIONAVIGATION 5.438 5.439 5.440		4200-4400 AERONAUTICAL RADIONAVIGATION 5.440 US261		Aviation (87)
4400-4500 FIXED MOBILE 5.440A		4400-4940 FIXED MOBILE	4400-4500	
4500-4800 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 MOBILE 5.440A			4500-4800 FIXED-SATELLITE (space-to-Earth) 5.441 US245	
4800-4990 FIXED MOBILE 5.440A 5.442		US113 US245 US342	4800-4940 US113 US342	
Radio astronomy 5.149 5.339 5.443		4940-4990	4940-4950 FIXED MOBILE	Public Safety Land Mobile (90Y)
			4950-4990 FIXED MOBILE except aeronautical mobile 5.339 US342 US385	

	5.339 US342 US385 G122		
4990-5000 FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY Space research (passive) 5.149	4990-5000 RADIO ASTRONOMY US74 Space research (passive) US246		

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PART 90 – PRIVATE LAND MOBILE RADIO SERVICES

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

AUTHORITY: Sections 4(i), 11, 303(g), 303(r), and 332(c)(7) of the Communications Act of 1934, as amended, 47 U.S.C. 154(i), 161, 303(g), 303(r), and 332(c)(7), and Title VI of the Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. 112-96, 126 Stat. 156.

6. Section 90.175 is amended by removing paragraph (j)(22) and adding paragraph (k) to read as follows:

§ 90.175 Frequency coordinator requirements.

* * * * *

(k) *For frequencies in the 4940-4990 MHz band:* See § 90.1209 of this chapter for further information.

7. Section 90.1205 is amended by revising paragraph (c) to read as follows:

§ 90.1205 Permissible operations.

* * * * *

(c) Aeronautical mobile and robotic station operations are permitted subject to § 90.1219.

8. Section 90.1207 is revised to read as follows:

§ 90.1207 Licensing.

(a) A 4945–4990 MHz band geographic license gives the licensee authority to operate temporary (1 year or less) fixed stations on any authorized channel in this band within its licensed area of operation. See § 90.1213. A 4945–4990 MHz band license will be issued for the geographic area encompassing the legal jurisdiction of the licensee or, in case of a

nongovernmental organization, the legal jurisdiction of the state or local governmental entity supporting the nongovernmental organization.

(1) A temporary fixed station is required to be individually licensed if:

(i) International agreements require coordination;

(ii) Submission of an environmental assessment is required under § 1.1307 of this chapter; or

(iii) The station would affect areas identified in §1.924 of this chapter.

(2) Any antenna structure that requires notification to the Federal Aviation Administration (FAA) must be registered with the Commission prior to construction under §17.4 of this chapter.

(b) Subject to §90.1209, base stations and mobile units (including portable and handheld units) in the 4945–4990 MHz band are required to be licensed on a site-by-site basis. All existing licensees that operate such stations shall seek licenses for such stations in the Commission's Universal Licensing System database by filing new or modification applications within one year after the Public Safety and Homeland Security Bureau and the Wireless Telecommunications Bureau announce by public notice that the database is ready to accept such applications. Any antenna structure that requires notification to the Federal Aviation Administration (FAA) must be registered with the Commission prior to construction under §17.4 of this chapter.

(c) Permanent fixed point-to-point transmitters and receivers, permanent fixed point-to-multipoint transmitters and fixed receivers in the 4945–4990 MHz band must be licensed individually on a site-by-site basis. All existing licensees that operate such stations shall seek individual licenses for such stations in the Commission's Universal Licensing System database

by filing new applications within one year after the Public Safety and Homeland Security Bureau and the Wireless Telecommunications Bureau announce by public notice that the database is ready to accept such applications. Primary permanent fixed point-to-point and point-to-multipoint transmitters must use directional antennas with gains equal to or greater than 26 dBi. All such stations in the 4945–4990 MHz band are accorded primary status.

(d) A 4940–4945 MHz license gives the licensee authority to operate aeronautical mobile or robotic stations subject to § 90.1219 on any authorized channel in this band within its licensed area of operation. *See* § 90.1213. Geographic area licenses and individually licensed stations issued before the effective date of this rule that use spectrum overlapping or within the 4940-4945 MHz band segment are grandfathered.

(e) Existing 4940–4990 MHz band licenses as of the effective date of this rule are grandfathered from revisions to § 90.1215(a)(2).

9. Section 90.1209 is amended by revising paragraphs (b) through (d), and adding paragraph (e) to read as follows:

§ 90.1209 Policies governing the use of the 4940–4990 MHz band.

* * * * *

(b) Each application for a new frequency assignment or for a change in existing facilities must include a showing of frequency coordination. A database of licenses is available at http://wireless.fcc.gov/uls. Frequency coordinators and potential applicants should examine this database before seeking station authorization, and make every effort to ensure that their fixed and base stations operate at a location, and with technical parameters, that will minimize the potential to cause and receive interference. Licensees of stations suffering or causing harmful interference are expected to cooperate and resolve this problem by mutually satisfactory

arrangements. If licensees are unable to do so, frequency coordinators may adjudicate such matters and recommend solutions to the Commission. The Commission may impose restrictions including specifying the transmitter power, antenna height, or area or hours of operation of the stations concerned. Within one day of making a frequency recommendation, the lead frequency coordinator must send a copy of the application to other certified frequency coordinators. Concurrently, the lead frequency coordinator must send a copy of the application to the adjacent 700 MHz Regional Planning Committee where the signal at the region border exceeds -109 dBW/m2/5 MHz.

(c) Licensees will make every practical effort to protect radio astronomy operations as specified in § 2.106, footnote US385 of this chapter.

(d) Licensees of base or temporary fixed stations must place at least one such station in operation within twelve (12) months of the license grant date, or the license cancels automatically as of the expiration of such twelve-month period, without specific Commission action. Fixed point-to-point and point-to-multipoint stations which are licensed on a site-by-site basis must be placed in operation within twelve (12) months of the grant date or the authorization for that station cancels automatically as of the expiration of such twelve-month period, without specific Commission action.

(e) Temporary fixed point-to-point stations may only be operated for thirty days maximum over a given path over a one-year time frame.

10. Section 90.1211 is amended by revising paragraph (a), (b)(4), and (c) and adding paragraph (d) to read as follows:

§ 90.1211 Regional plan.

(a) To facilitate the shared use of the 4.9 GHz band, each region may submit a plan on guidelines to be used for sharing the spectrum within the region.

(b) * * *

(4) A description of the coordination procedures for permanent fixed point-to-point and point-to-multipoint stations, base stations, temporary fixed stations, and mobile operations. The procedures shall include, but are not limited to, mechanisms for incident management protocols, interference avoidance, and interoperability.

(c) Regional plans may vary from the band plan in the following areas:

(1) Limit channel aggregation to 20 megahertz bandwidth.

(2) Designate one or more channels for specialized use.

(3) Place limits on the use of point-to-point links in urban areas or impose more stringent limits on antenna gain, maximum conducted output power, power spectral density, or other technical parameters of point-to-point systems relative to the limits of § 90.1215.

(4) Require polarization for point-to-point links.

(d) Regional plans may be modified by submitting a written request, signed by the regional planning committee, to the Chief, Public Safety and Homeland Security Bureau. The request must contain the full text of the modification, and a certification that all eligible entities had a chance to participate in discussions concerning the modification and that any changes have been coordinated with adjacent regions.

11. Section 90.1213 is revised to read as follows:

§ 90.1213 Band plan.

(a) Upon the effective date of this rule, Channel numbers 1 through 5 are aggregated for a channel bandwidth of 5 MHz and may be subsequently licensed for use only in accordance

with § 90.1219 of this chapter; any existing operations on these channels prior to the effective date of this rule are grandfathered. Channel numbers 6 through 13 are 5 MHz bandwidth channels and Channel numbers 14 through 18 are 1 MHz bandwidth channels. The following channel center frequencies are permitted to be aggregated for channel bandwidths of 5, 10, 15 or 20 MHz as described in paragraph (b) of this section. Channel numbers 14 through 18 should be used for narrow bandwidth operations and should be used in aggregations only if all other 5 MHz channels are blocked.

Center Frequency (MHz)	**Bandwidth (MHz)**	**Channel Nos.**
4942.5	**5**	**1–5**
4947.5	**5**	**6**
4952.5	**5**	**7**
4957.5	**5**	**8**
4962.5	**5**	**9**
4967.5	**5**	**10**
4972.5	**5**	**11**
4977.5	**5**	**12**
4982.5	**5**	**13**
4985.5	**1**	**14**
4986.5	**1**	**15**
4987.5	**1**	**16**
4988.5	**1**	**17**

4989.5	**1**	**18**

(b) The following tables list center frequencies to be licensed for aggregated channels only. A license may contain any combination of bandwidths from aggregated channels provided that the bandwidths do not overlap. The bandwidth edges (lower and upper frequencies) are provided to aid in planning.

(1) 5 MHz bandwidth aggregation:

Center Frequency (MHz)	**Channel Nos. Employed**	**Lower Frequency (MHz)**	**Upper Frequency (MHz)**
4942.5	**1 to 5***	**4940**	**4945**
4947.5	**6**	**4945**	**4950**
4952.5	**7**	**4950**	**4955**
4957.5	**8**	**4955**	**4960**
4962.5	**9**	**4960**	**4965**
4967.5	**10**	**4965**	**4970**
4972.5	**11**	**4970**	**4975**
4977.5	**12**	**4975**	**4980**
4982.5	**13**	**4980**	**4985**
4987.5	**14 to 18****	**4985**	**4990**

* Licensees for these channels granted after the effective date of this rule may use these channels only in accordance with § 90.1219 of this chapter.

**Licensees should avoid using these channels in aggregations unless all other channels are blocked.

(2) 10 MHz bandwidth aggregation:

Center Frequency (MHz)	Channel Nos. Employed	Lower Frequency (MHz)	Upper Frequency (MHz)
4950	**6 & 7**	**4945**	**4955**
4955	**7 & 8**	**4950**	**4960**
4960	**8 & 9**	**4955**	**4965**
4965	**9 & 10**	**4960**	**4970**
4970	**10 & 11**	**4965**	**4975**
4975	**11 & 12**	**4970**	**4980**
4980	**12 & 13**	**4975**	**4985**
4985	**13 to 18***	**4980**	**4990**

*Licensees should avoid using these channels in aggregations unless all other channels are blocked.

(3) 15 MHz bandwidth aggregation:

Center Frequency (MHz)	Channel Nos. Employed	Lower Frequency (MHz)	Upper Frequency (MHz)
4952.5	**6 to 8**	**4945**	**4960**
4957.5	**7 to 9**	**4950**	**4965**
4962.5	**8 to 10**	**4955**	**4970**
4967.5	**9 to 11**	**4960**	**4975**
4972.5	**10 to 12**	**4965**	**4980**
4977.5	**11 to 13**	**4970**	**4985**
4982.5	**12 to 18***	**4975**	**4990**

*Licensees should avoid using these channels in aggregations unless all other channels are blocked.

(4) 20 MHz bandwidth aggregation:

Center Frequency (MHz)	Channel Nos. Employed	Lower Frequency (MHz)	Upper Frequency (MHz)
4955	**6 to 9**	**4945**	**4965**
4960	**7 to 10**	**4950**	**4970**
4965	**8 to 11**	**4955**	**4975**
4970	**9 to 12**	**4960**	**4980**
4975	**10 to 13**	**4965**	**4985**
4980	**11 to 18***	**4970**	**4990**

*Licensees should avoid using these channels in aggregations unless all other channels are blocked.

(5) 30 MHz bandwidth aggregation:

Center Frequency (MHz)	Channel Nos. Employed	Lower Frequency (MHz)	Upper Frequency (MHz)
4960	**6 to 11**	**4945**	**4975**
4965	**7 to 12**	**4950**	**4980**
4970	**8 to 13**	**4955**	**4985**
4975	**9 to 18***	**4960**	**4990**

*Licensees should avoid using these channels in aggregations unless all other channels are blocked.

(6) 40 MHz bandwidth aggregation:

Center Frequency (MHz)	Channel Nos. Employed	Lower Frequency (MHz)	Upper Frequency (MHz)
4965	**6 to 13**	**4945**	**4985**
4970	**7 to 18***	**4950**	**4990**

*Licensees should avoid using these channels in aggregations unless all other channels are blocked.

12. Section 90.1215 is amended by revising paragraphs (a)(1) and (2) to read as follows:

§ 90.1215 Power limits.

* * * * *

(a)(1) The maximum conducted output power should not exceed:

Channel bandwidth (MHz)	Low power maximum conducted output power (dBm)	High power maximum conducted output power (dBm)
1	7	20
5	14	27
10	17	30
15	18.8	31.8
20	20	33
30	21.8	34.8
40	23	36

(2) High power devices are also limited to a peak power spectral density of 21 dBm per one MHz. High power devices using channel bandwidths other than those listed above are permitted; however, they are limited to peak power spectral density of 21 dBm/MHz. If transmitting antennas of directional gain greater than 9 dBi are used, both the maximum conducted output power and the peak power spectral density should be reduced by the amount in decibels that the directional gain of the antenna exceeds 9 dBi. However, high power point-to-point transmitting antennas (both fixed and temporary-fixed rapid deployment) shall operate with minimum directional gain of 26 dBi, maximum 5.5 degree beamwidth and 25 dB front-to-back ratio. For point-to-point systems, the maximum equivalent isotropically radiated power (EIRP) is 65.15 dBm. High power point-to-multipoint operations (both fixed and temporary-fixed rapid deployment) may employ transmitting antennas with directional gain exceeding 26 dBi. For point-to-multipoint systems, the maximum EIRP is 55.15 dBm. Frequency coordinators may recommend reduction to the EIRP on a case-by-case basis, through reduction of the maximum conducted output power, spectral density, and/or antenna gain. Further, under § 90.1211(c)(3) thorough (4), Regional Planning Committees may recommend alternate lower limits to the allowed antenna gain, maximum conducted output power, or power spectral density of point-to-point systems.

* * * * *

13. Section 90.1219 is added to Subpart Y to read as follows:

§ 90.1219 Aeronautical mobile and robotic operation.

Entities eligible pursuant to § 90.1203(a) may conduct manned aeronautical mobile and robotic terrestrial operations on Channels 1 through 5 (4940–4945 MHz) to transmit video payload on a primary basis to terrestrial services under the following restrictions.

(a) Airborne use of these channels is limited to aircraft flying at or below 457 meters (1500 feet) above ground level. Fixed wing aircraft may use these channels at altitudes exceeding 457 meters above ground level as necessary to comply with 14 CFR § 91.119(b) through (c).

(b) Licensees may use only low power devices as defined by § 90.1215 that use Emission Mask L as defined by § 90.210(l) for aeronautical mobile use.

(c) Licensees may use only low power devices as defined by § 90.1215 for robotic applications.

(d) The applicant shall provide a description of proposed operation to demonstrate that the proposed aeronautical mobile operations protect radio astronomy operations and terrestrial services from interference.

(e) Aeronautical mobile and robotic applications must be approved in writing by the 700 MHz Regional Planning Committee or the National Regional Planning Council as part of the frequency coordination Regional Planning Committee review process before the coordinator can submit the application to the Commission.

(f) Aeronautical mobile operations are prohibited within 80.5 kilometers (50 miles) of radio astronomy sites listed in § 2.106 US385 or US131. The coordinates to be used for the Allen Telescope Array are 40° 49' 01" North latitude, 121° 28' 12" West longitude. An applicant for aeronautical mobile use whose geographic boundaries fall within 80.5 kilometers of any of these radio astronomy sites may request a waiver, but shall certify that it has served a copy of the application on affected radio astronomy observatories.

(g) The Commission has the discretion to impose special conditions and operating restrictions on individual licenses as necessary to reduce risk of interference to radio astronomy operations and terrestrial services.

(h) Transmissions in the 4940–4990 MHz band to or from unmanned aerial systems are prohibited.

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