(Authority: 38 U.S.C. 901, 40 U.S.C. 3103)

[FR Doc. 2014–27629 Filed 11–20–14; 8:45 am]

BILLING CODE 8320–01–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

43 CFR Parts 2800 and 2880

[LLWO301000.L13400000]

RIN 1004–AE24

Competitive Processes, Terms, and Conditions for Leasing Public Lands for Solar and Wind Energy Development and Technical Changes and Corrections

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of proposed rulemaking; extension of comment period.

SUMMARY: On September 30, 2014, the Bureau of Land Management (BLM) published in the **Federal Register** with a 60-day comment period a proposed rule, to facilitate responsible solar and wind energy development and to receive fair market value for such development. *(79 FR 59021)* The proposed rule would promote the use of preferred areas for solar and wind energy development and establish competitive processes, terms, and conditions (including rental and bonding requirements) for solar and wind energy development rights-of-way both inside and outside these preferred areas. The proposed rule would also make technical changes, corrections, and clarifications to existing rights-of-way regulations. Some of these changes would affect all rights-of-way and some provisions would affect particular types of actions, such as transmission lines with a capacity of 100 Kilovolts (kV) or more, or pipelines 10 inches or more in diameter.

The BLM received requests to extend the comment period of this proposed rule. In response to these requests, the BLM is extending the comment period for 15 days beyond the end of the initial comment period. As a result of this extension, the comment period will now close on December 16, 2014.

DATES: Send your comments on this proposed rule to the BLM on or before December 16, 2014. The BLM need not consider, or include in the administrative record for the final rule, comments that the BLM receives after the close of the comment period or comments delivered to an address other than those listed below (see **ADDRESSES**).

ADDRESSES: *Mail:* U.S. Department of the Interior, Director (630), Bureau of Land Management, Mail Stop 2134 LM, 1849 C St. NW., Washington, DC 20240, Attention: 1004–AE24. *Personal or messenger delivery:* Bureau of Land Management, 20 M Street SE., Room 2134 LM, Attention: Regulatory Affairs, Washington, DC 20003. *Federal eRulemaking Portal: http://www.regulations.gov.* Follow the instructions at this Web site.

FOR FURTHER INFORMATION CONTACT: Ray Brady, Bureau of Land Management, at 202–912–7312, for information relating to the BLM's solar and wind renewable energy programs, or the substance of the proposed rule. For information pertaining to the changes made for any transmission line with a capacity of 100 kV or more, or any pipeline 10 inches or more in diameter you may contact Lucas Lucero at 202–912–7342. For information on procedural matters or the rulemaking process you may contact Jean Sonneman at 202–912–7405. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 1–800–877–8339, to contact the above individuals.

SUPPLEMENTARY INFORMATION:

Public Comment Procedures

If you wish to comment, you may submit your comments by any one of the several methods listed in the **ADDRESSES** section.

Please make your comments as specific as possible by confining them to issues directly related to the content of the proposed rule, and explain the basis for your comments. The comments and recommendations that will be most useful and likely to influence agency decisions are:

1. Those supported by quantitative information or studies; and

2. Those that include citations to, and analyses of, the applicable laws and regulations.

The BLM is not obligated to consider or include in the Administrative Record for the rule comments received after the close of the comment period (see **DATES**) or comments delivered to an address other than those listed above (see **ADDRESSES**).

Comments, including names and street addresses of respondents, will be available for public review at the address listed under **ADDRESSES** during regular hours (7:45 a.m. to 4:15 p.m.), Monday through Friday, except holidays.

Before including your address, telephone number, email address, or other personal identifying information in your comment, be advised that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

Janice M. Schneider,

Assistant Secretary, Land and Minerals Management.

[FR Doc. 2014–27639 Filed 11–20–14; 8:45 am]

BILLING CODE 4310–84–P

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Part 74

[GN Docket Nos. 14–166 and 12–268; FCC 14–145]

Spectrum Access for Wireless Microphone Operations

AGENCY: Federal Communications Commission.

ACTION: Proposed rule.

SUMMARY: This document initiates a proceeding to address how to accommodate the long-term needs of wireless microphone users. Wireless microphones play an important role in enabling broadcasters and other video programming networks to serve consumers, including as they cover breaking news and broadcast live sports events. They enhance event productions in a variety of settings—including theaters and music venues, film studios, conventions, corporate events, houses of worship, and internet webcasts. They also help create high quality content that consumers demand and value. Recent actions by the Commission, and in particular the repurposing of broadcast television band spectrum for wireless services set forth in the *Incentive Auction R&O,* will significantly alter the regulatory environment in which wireless microphones operate, which necessitates our addressing how to accommodate wireless microphone users in the future.

DATES: Comments must be filed on or before January 5, 2015, and reply comments must be filed on or before January 26, 2015.

FOR FURTHER INFORMATION CONTACT: Paul Murray, Office of Engineering and Technology, (202) 418–0688, email: *Paul Murray@fcc.gov,* TTY (202) 418–2989.

ADDRESSES: You may submit comments, identified by GN Docket Nos. 14–166

and 12–268, by any of the following methods:

▪ *Federal Communications Commission's Web site: http://fjallfoss.fcc.gov/ecfs2/.* Follow the instructions for submitting comments.

▪ *Mail:* Paul Murray, Office of Engineering and Technology, Federal Communications Commission, Room 6A162.

▪ *People with Disabilities:* Contact the FCC to request reasonable accommodations (accessible format documents, sign language interpreters, CART, etc.) by email: *FCC504@fcc.gov* or phone: 202–418–0530 or TTY: 202–418–0432.

SUPPLEMENTARY INFORMATION: This is a summary of the Commission's *Notice of Proposed Rulemaking,* GN Docket Nos. 14–166 and 16–268, FCC 14–145, adopted September 30, 2014, and released September 30, 2014. The full text of this document is available for inspection and copying during normal business hours in the FCC Reference Center (Room CY–A257), 445 12th Street SW., Washington, DC 20554. The complete text of this document also may be purchased from the Commission's copy contractor, Best Copy and Printing, Inc., 445 12th Street SW., Room, CY–B402, Washington, DC 20554. The full text may also be downloaded at: *www.fcc.gov.* 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 (1998).

▪ *Electronic Filers:* Comments may be filed electronically using the Internet by accessing the ECFS: *http://fjallfoss.fcc.gov/ecfs2/.*

▪ *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 9300 East Hampton Drive, Capitol Heights, MD 20743.

▪ U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street SW., Washington DC 20554.

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

Summary of Notice of Proposed Rulemaking

1. In the Notice of Proposed Rulemaking (*NPRM*), the Commission examines wireless microphone users' needs and technologies that can address them, and seek comment on a variety of existing and new spectrum bands that might accommodate those respective needs. The Commission seeks ways of improving access to the TV band spectrum that remains available for wireless microphones, as well as how to facilitate the transition of wireless microphones out of the 600 MHz Band spectrum repurposed for wireless services. In addition, it examines access to other spectrum bands where wireless microphones currently operate, propose various revisions, and seek comment on potential revisions that may better accommodate wireless microphones in these bands, while protecting the interests of other users that may operate in these bands. Further, the Commission seeks comment on proposals for authorizing wireless microphone operations in additional spectrum bands, consistent with its overall spectrum management goals. The Commission intends to enable the development of a suite of wireless microphone devices and applications, and to provide wireless microphone users with access to spectrum through efficient and effective sharing of the spectrum with other users.

Bands Currently Available for Wireless Microphones

2. Over the years, the Commission has authorized wireless microphone operations in different spectrum bands to accommodate the growing use of these devices by different users. The technical and operational rules for wireless microphone operations in these different bands have varied, depending on the band, and generally are designed to enable wireless microphone users to operate in shared bands along with other users. The Commission has authorized wireless microphones to operate both on a licensed basis, limited to specified users, and on an unlicensed basis.

3. *Recent actions affecting operations in the TV bands.* In recent years, the Commission has taken several actions in three proceedings affecting the TV band spectrum—which have involved the repurposing of UHF TV band spectrum for wireless services in the 700 MHz band (channels 52–69, the 698–806 MHz band), the development of rules for TV White Spaces (TVWS) devices in the TV bands, and the repurposing of the 600 MHz Band that will follow the upcoming incentive auction—that have affected and will affect the future availability of spectrum for wireless microphone uses in these bands. As discussed throughout the *NPRM,* these proceedings inform the instant proceeding, providing the foundation for many of the issues that we are addressing as part of our comprehensive evaluation of how to accommodate wireless microphone uses both in the near and longer term.

4. In January 2010, following the repurposing of TV channels 51–69 in the 700 MHz band for wireless services, the Commission adopted the *TV Bands Wireless Microphones R&O and FNPRM* (WT Dockets 08–166 and 08–167, ET Docket No. 10–24), 75 FR 9113, March 1, 2010, which required that all wireless microphones cease operations on the 700 MHz band no later than June 12, 2010, one year after the end of the DTV transition. In that decision, the Commission also first authorized unlicensed wireless microphone operations in the TV band spectrum (channels 2–51, except channel 37), pursuant to a limited waiver and certain part 15 rules, pending adoption of final rules for unlicensed operations in the TV bands.

5. In September 2010, the Commission adopted the *TV White Spaces Second MO&O,* 75 FR 75814, December 6, 2010, which took several actions that affected the availability of the TV band spectrum for wireless microphones, including adopting rules pursuant to which wireless microphone users and unlicensed TVWS device users would have access to unused TV band channels. Specifically, the Commission provided that the two unused television channels (where

available) nearest channel 37 (above and below) would be designated for wireless microphone operations and not be made available for TVWS devices. The Commission also provided that, to the extent that unused TV channels were available for use by both wireless microphones and TVWS devices at a particular location, licensed wireless microphone operators and certain qualifying unlicensed wireless microphone operators could obtain interference protection from TVWS devices by reserving channels at the specified locations during the times of operation through use of the TV bands databases.

6. In the *Incentive Auction R&O,* 79 FR 48441, August 15, 2014, the Commission adopted rules to implement the broadcast television spectrum incentive auction, which will involve reorganizing the existing television band and repurposing a portion of the UHF television band for new wireless broadband services, and which will affect wireless microphone operations across the current TV bands. The Commission took several actions to accommodate wireless microphone operations, including making rule revisions to provide additional opportunities for wireless microphone operations in the bands that will remain allocated for television following the incentive auction, permitting wireless microphone operations in the newly-designated 600 MHz Band guard bands, and providing for a transition period to give wireless microphone users that will need to cease operating in the spectrum repurposed for 600 MHz Band wireless services sufficient time to replace their equipment and move operations to other spectrum bands available for wireless microphone uses.

7. Finally, concurrent with adoption of the *Incentive Auction R&O,* the Commission adopted the *TV Bands Wireless Microphones Second R&O* to broaden the eligibility for wireless microphone operations in the TV bands to include entities that regularly utilize a substantial number of wireless microphones for large events and productions and which have the same needs for interference protection as existing LPAS licensees. Specifically, the Commission expanded Part 74 LPAS eligibility to include qualifying professional sound companies and operators of large venues that routinely use 50 or more wireless microphones.

8. *Table of bands in which wireless microphones are authorized today.* In the following table, the Commission set forth the bands in which wireless microphones and related audio devices generally operate today pursuant to the Commission's rules.

Frequency band	Licensed/unlicensed	Rule part
26.1–26.48 MHz (VHF)	Licensed	Part 74.
161.625–161.775 MHz (VHF)	Licensed	Part 74.
Portions of 169–172 MHz band (VHF)	Licensed	Part 90.
88–108 MHz (FM)	Unlicensed	Part 15.
450–451, 455–456 MHz (UHF)	Licensed	Part 74.
54–72, 76–88, 174–216, 470–608, 614–698 MHz (VHF and UHF)	Licensed and unlicensed	Part 74 and Part 15 (waiver).
944–952 MHz (UHF)	Licensed	Part 74.
902–928 MHz, 2.4 GHz, 5 GHz (ISM bands)	Unlicensed	Part 15.
1920–1930 MHz (unlicensed PCS)	Unlicensed	Part 15.
Ultra-wideband (3.1–10.6 GHz)	Unlicensed	Part 15.

9. *Additional spectrum resources used by wireless microphone operators.* Apart from operating wireless microphones in the bands where wireless microphones are specifically authorized, as identified in the table above, some wireless microphone users have gained access to other bands for temporary operations under specified conditions. For instance, in recent years professional sound engineering companies providing major event productions (e.g., major sports events) have obtained conditional access to the 1435–1525 MHz band for wireless microphone operations on a temporary, location-specific basis pursuant to time-limited grants of Special Temporary Authority (STA). In seeking temporary access to this spectrum, which is allocated for Aeronautical Mobile Telemetry (AMT) services, these parties have represented that the spectrum resources otherwise available to them at those locations are insufficient to enable them to provide the desired level of coverage for scheduled events, and they must fully coordinate their operations with representatives of the AMT service.

Overview of Operations Today

10. Most wireless microphones users today operate their devices on a secondary basis in the TV bands, with most operations occurring in the UHF TV bands. This use can be attributed to several factors. The TV bands have long been licensed for wireless microphone operations by broadcasters and similar program producers, where they have had access to many unused television channels. In addition, this spectrum has favorable propagation conditions, the signals do not suffer significantly as a result of body loss, antenna sizes are manageable, and there is relatively lower power consumption leading to longer battery life—all of which can be helpful for many wireless microphone purposes. Manufacturers have supplied numerous devices, operating on varying segments of the TV bands that provide a range of users with wireless microphones suitable for their different needs. Although there has at times been a shortage of sufficient available channels in major cities and congested areas, where unused channels are limited and numerous microphones might be needed for particular events, the overall availability of spectrum in the TV bands has enabled wireless microphone users generally to address their needs.

Overall Framework for Addressing Wireless Microphone Needs

11. The Commission seeks to develop a full record and framework for understanding the various needs of different wireless microphone users and the types of microphones that effectively can address those needs.

Users and Uses

12. Given that many different types of users employ wireless microphones in a variety of settings, we seek to develop a more complete record on the various different users of wireless microphones and to better understand their particular needs for wireless microphones. Wireless microphone operations range from professional uses, with the need for numerous high-performance microphones along with other microphones, to the need for a handheld microphone to transmit voice communications, to a range of different

uses and needs for different numbers of microphones in a given setting.

13. The Commission seeks comment on the different groups of wireless microphone operators and their various uses of microphones, including the particular applications served by the microphones, the types and number of devices used, the extent to which the devices are analog or digital, the settings in which they are used, and the frequency bands they use. The Commission asks that the different user groups, or the manufacturers of products for these groups, provide detailed information about the particular nature of wireless microphone uses by different groups of users.

14. The Commission starts by asking for specific information from broadcasters, who have relied heavily on access to the TV bands, regarding their wireless microphone uses and needs. For instance, what are their specific needs for wireless microphones with regard to ENG? What kinds of wireless microphones are used, and to what extent are the TV bands currently used for these microphones? What is the full range of types of devices and applications needed? What is the range of quality of microphones that are needed, in terms of performance quality, voice representation, latency, etc. The Commission asks that commenters discuss the different types of wireless microphones that may be needed in for different applications, including the microphones that need to have high audio quality as well as those that do not require such high fidelity. Recognizing that different numbers of microphones may be used in different settings both in studio and on an itinerant basis, what number of microphones are used in which settings? Do broadcasters make use of bands outside of the TV bands, and if so, in what ways and for what type of applications? The Commission asks commenters to provide information on the range of devices and types of applications that they employ, and the bands in which they operate.

15. Similarly, The Commission requests information from the other licensed users of the TV bands, including movie and cable program producers, other content producers, as well as the newly eligible sound engineering companies and large venue operators, about their uses and needs. It asks for comment on the same types of issues, including current uses, the operational environment in which they may operate, the numbers that may be used, the range in quality of microphones used, the bands used for different wireless microphone applications, etc.

16. In addition the Commission seeks comment from other wireless microphone users, large and small, that use wireless microphones in numerous settings. As discussed, these users include convention and conference centers, corporations, schools, houses of worship, theme parks, music bands, internet webcasts, karaoke bars, and numerous other users. What are their particular wireless microphone uses, what types of devices do they use, the numbers used depending on the settings, in which bands, etc.?

17. As noted, users range from the professional user, who may employ many microphones and coordinate their operations with other uses in the band, to the amateur user who may use only one microphone. We seek general comment on how the Commission should be thinking about these different types of users as it evaluates how to accommodate these users and uses over the long term.

18. The Commission also seeks comment on the nature of the demand for wireless microphones by various wireless microphone users. Have users been employing more wireless microphones in recent years? Has demand for their use changed, and is it growing? It requests that commenters provide a full explanation of the nature of their wireless microphone uses today and what they anticipate their uses will be in the future.

Suitability of Different Bands

19. The Commission seeks comment on additional ways in which it could accommodate various wireless microphone operations in different bands, which include a range of frequencies as low as the television VHF bands and as high as 7 GHz. These bands also vary in terms of potentially available bandwidth, including some with very small channel bandwidth. In addition, some of these bands are available for wireless microphone use only on a licensed basis, while others only an unlicensed basis.

20. The Commission seeks comment on how the nature of different bands, including the propagation features that are associated with them, should inform our consideration of how to accommodate wireless microphones. For what types of applications is lower band spectrum most suitable? What types of uses can be effective in middle or higher frequency bands? How much bandwidth is necessary for different types of wireless microphone uses? What kinds of applications are most suitable for unlicensed operations?

Development, Manufacturing, and Distribution of New Types of Wireless Microphones

21. As the Commission explores how to accommodate wireless microphones uses in different bands, it seeks comment on the factors that manufacturers take into account as they consider and evaluate whether to develop and manufacture new devices for distribution in the near and longer term. The Commission seeks general comment here on these various factors, and expects that commenters also would address these considerations with regard to the discussion specific bands and proposals in Section III of the NPRM.

22. As manufacturers consider developing new wireless microphone devices in different bands, to what extent do the propagation features, the size of band, that potential availability (or lack of availability) of different segments of the band, the extent to which the band allows licensed or unlicensed uses, the technical rules (existing or as revised), the certainty that the band will continue to be available over the long term, or other aspects contribute to the likelihood that new devices will be made for a particular band? What factors do manufactures consider with respect to developing different types of wireless microphones for different users and applications, whether for highest audio quality or for communications that does not require such performance quality? What kinds of economic factors do manufacturers consider? How important are economies of scale? To what extent will manufacturers develop microphones that are designed only for niche markets? To what extent do considerations of the harmonization of potential harmonization of our rules with those of other countries affect a manufacturer's decision to develop new microphones?

23. In addition, assuming the Commission was to adopt revised rules, or make available additional spectrum for access by wireless microphone operators, it seeks comment on manufacturer's expectations regarding the time-to-market for newly developed devices. What factors would enable devices to be developed and introduced quickly into the marketplace? Based on these factors, are certain bands more likely candidates for nearer term introduction of devices than others? What factors would result in introduction of new devices only over the longer term? What are reasonable timelines for the development, manufacture, marketing, and

distribution for new wireless microphones, and what factors contribute to shorter or longer timelines? The Commission invites comment on any other related factors that we should consider.

Transition Issues

24. With the likelihood of there being less UHF television band spectrum available for wireless microphone operators following the incentive auction, the Commission invites general comment on a range issues affecting transitioning of wireless microphone users—whether to the use of different devices operating outside of repurposed 600 MHz Band spectrum, or the use of devices in different bands that can effectively serve their needs in a more efficient fashion.

25. Although the precise amount of TV bands spectrum that will be repurposed will be known only following the auction, we anticipate that many wireless microphone users will need to move their operations out of the repurposed spectrum no later than 39 months following issuance of the *Channel Reassignment PN.* At the same time, many wireless microphone users accessing spectrum that may remain allocated for television services may seek to transition to different devices, including more efficient digital devices, or replace older devices, that may operate both in the bands likely to remain allocated for television or in other bands. The Commission invites comment on these transition issues, the extent to which they are interrelated, and how best to ensure that wireless microphone users transition to new, more efficient devices to the full extent possible.

26. What types of actions would facilitate the transitions that will be required in order to accommodate different wireless microphone operators' needs over the long term? As the Commission considers these various transition issues, what lessons might be drawn from the transition of wireless microphone operations out of the 700 MHz band following the repurposing of that band? How can we best communicate the nature of the transitions along with the necessary actions users must undertake to the large community of disparate microphone users? What timeframes are needed for users of various size and sophistication to plan for, purchase, and install new systems? How is this affected by users' decisions to remain in the TV bands or to migrate to other bands and types of microphones?

27. What actions should the Commission, wireless microphone manufacturers and distributors, and organizations representing wireless microphone users take to facilitate a smooth transition out of the repurposed 600 MHz Band, and to promote the use of more efficient devices to the extent possible, including devices that operate outside of the TV bands? For instance, should users be encouraged to transition their operations to new devices that meet their needs in a more efficient manner, such as digital devices? Is there a particular role that the Commission should play in helping inform consumers of these transitions and the types of devices in different bands that can accommodate their respective needs?

28. As the Commission considers these transition issues, it requests information on the timeframes that may be necessary for design, manufacture, certification, and marketing of new wireless microphone devices, such as those that would include any technical changes that we may adopt in this proceeding. What considerations or factors affect these timeframes? Similarly, the Commission seeks comment on the life-cycles and/or replacement cycles associated with different wireless microphones. What are the general life cycles associated with different wireless microphones, including both high-end microphones and consumer devices? What types of factors, other than regulatory changes, necessitate replacement or otherwise affect or influence decisions by particular users to purchase new equipment? Given that different users are continually replacing equipment, what steps should the Commission or manufacturers be taking now and in the future to help address wireless microphone users' needs over the long term?

Operations in Other Countries

29. The Commission invites comment on whether the regulatory schemes for wireless microphone operations in other countries should inform our approach in this proceeding. Are there other regulatory models that are particularly effective? Would any of those models be appropriate for particular bands as we consider revisions to our rules?

Promoting Technological Advances

30. As the Commission seeks to accommodate the needs of wireless microphone operators, it also seeks to leverage technological advances that can help ensure that these needs can be met effectively, and in a manner that promotes the efficient use of spectrum. The Commission explores here the kinds of technological advances that achieve these goals.

Advances in Wireless Microphone Radio Technologies

31. *Advances in analog and digital transmission.* The Commission has already sought comment on the extent to which wireless microphone users today use analog or digital devices. Most users in the TV bands currently use analog devices, though digital devices increasingly are being developed and sold for operations in the TV bands. In other bands, devices today may be only analog or digital, or both. The Commission seeks to develop a full record here regarding technological developments in the basic design of wireless microphones that can enable more efficient wireless microphone operations, whether analog or digital, and promoting their uses in various spectrum bands.

32. The Commission begins by asking for comment on the state of analog and digital wireless microphone technologies that are available for use today. It asks that commenters address the state of technologies available in the different bands. Are there improvements in analog technologies that are enabling more efficient uses for various wireless microphone applications? What are they, and what additional efficiency gains are foreseen? What about for digital technologies? The Commission asks that commenters provide detailed information about the kinds of improvements in digital technologies that are being made with respect to microphone's performance capabilities for different types of uses.

33. In those bands in which both analog and digital devices operate, to what extent can the use of analog devices or digital devices, or some combination of the two, affect whether the spectrum is being used most efficiently to serve wireless microphone users' needs? While the Commission recognizes, that analog devices may be appropriate or necessary at this time for certain types of applications, digital devices can be effective for others, and we seek comment on the range of efficiency gains that may be possible depending on whether analog or digital devices, or a mix of the two, are used.

34. In particular, the Commission requests that commenters provide information on the state of analog and digital technologies that operate in the TV bands, and the extent to which operators are using the most efficient microphones that can serve their particular needs. In earlier proceedings, the Commission has noted that the number of analog wireless microphones

operating on a six-megahertz television channel may be as few as 6–8 microphones. More recently, manufacturers have developed microphones that operate more efficiently, including analog microphones that may allow twice that number on a six megahertz channel. The Commission asks that commenters provide information technological advancements that enable more efficient analog use. To what extent does the number of wireless microphones that can be deployed on a channel number depend on the power levels used, other operational factors, or the specific application(s) for which the wireless microphone is being used? Similarly, how many digital devices can operate on a television channel, and what operational factors or use factors might affect this number?

35. The Commission also invites comment on analog and digital devices in other bands, and the numbers of wireless microphones that can be accommodated by use of those particular technologies. In bands where analog devices are being used, are they necessary in these bands or can digital devices be used instead? What steps can manufacturers take to make analog and digital devices more efficient, if any? How much more efficient could these devices be, and how many more microphones might be able to operate on the same amount of spectrum, and for what types of uses? Do manufacturers have plans to take such steps, and if not, why not?

36. The Commission requests that commenters fully address the benefits and tradeoffs associated with use of analog and digital technologies. In earlier proceedings on the TV bands, wireless microphone manufacturers have indicated that analog devices may be necessary for certain types of uses (e.g., those with need for high quality audio, with lower latency). The Commission seeks to develop a full record on this issue, and seek comment on the extent to which this may continue to be the case. For what types of applications are analog devices necessary or appropriate? For what types of operations are digital devices well suited? To what extent are improvements in digital technologies (e.g., reductions in latency, improvements in fidelity) enabling more wireless microphone applications to be effectively served through digital technologies?

37. Are there rule changes that the Commission can adopt generally, or with respect to operations in particular bands, that would help promote more efficient use of spectrum by wireless microphone operations, whether analog or digital? For instance, are there technological standards for wireless microphone devices that should be adopted, such as the European Telecommunications Standards Institute (ETSI) standards for analog and digital emission masks, that would help promote more efficient use? Should such standards apply to particular operations in particular bands, or be adopted more generally across bands? As more efficient standards are developed, what actions should the Commission take to ensure that these standards are utilized by wireless microphone manufacturers in the future or that our rules are updated where necessary or appropriate?

38. To the extent more efficient analog or digital devices can effectively serve the needs of particular users, the Commission seeks comment on how best to encourage wireless microphone users to employ these more efficient technologies. Is the transition to more efficient devices already occurring? Have users been migrating to the use of more efficient wireless microphones, and if so how and why? Are manufacturers and distributors taking steps to promote the transition to use of more efficient wireless microphones in cases in which those microphones would be effective in meeting the needs of the particular users? What role should manufacturers and distributors play in this respect?

39. Considering that use of more efficient wireless microphones is an important component of accommodating wireless microphone users' needs in the future, what actions should the Commission take to encourage or promote the use of more efficient technologies? Should it require the use of digital technologies for certain types of uses, and if so, by what mechanisms would we accomplish that? Should we phase out the certification or sale of inefficient wireless microphone technologies, and if so, how would we define ''inefficient,'' and in what bands and on what timetable?

40. *Use of general purpose wireless standards.* The past several decades have seen widespread development and deployment of ''general purpose'' wireless technology standards that may be used for a wide variety of end-user applications. For example, the 802.11 family of standards serves as the basis of Wi-Fi technologies in the 2.4, 5 GHz bands, and other bands; the DECT standard provides for digital audio transmission in the 1920–1930 MHz band; and the LTE standard serves, increasingly, as a basis for broadband transmissions in several different licensed spectrum bands. The Commission inquires about the extent to which these, and other, general purpose technologies are now, or will be in the future, suitable for use in the wireless microphone context. The Commission is specifically interested to understand what kinds of use cases are appropriate for general-purpose wireless technologies and which are not. To what extent do general purpose technologies increase the ability of wireless microphones to share spectrum with other kinds of applications (e.g., in the Wi-Fi bands, discussed in Section III.C., of the NPRM), thereby potentially increasing the quantity of spectrum available for wireless microphones? Could the use of such technologies potentially improve performance and reduce cost of wireless microphone equipment? Should the Commission endeavor to promote the use of general purpose wireless technologies by wireless microphone users? What are the tradeoffs?

Other Technological Advancements

41. The Commission seeks comment on other technological developments that could promote more opportunities for accommodating wireless microphone operations in different bands over the longer term. Developments in these areas are not mutually exclusive.

42. *Equipment with replaceable components.* The Commission seeks comment on the development of replaceable components (e.g., modules) for the transmitters and receivers in the wireless microphone systems that operate on specific frequencies and can be exchanged with different components that operate on other frequencies available for wireless microphone operations. The use of such components potentially could reduce the costs to consumers to the extent changes need to be made in the way they operate their microphones in the future, *e.g.* in the event that the certain frequencies are no longer available to them, or if they update their equipment to newer, more efficient devices that may be capable of dynamically using the spectrum. Do wireless microphones today incorporate modular radio components? Do manufacturers contemplate including this kind of modularity in future models? To what extent would such components mitigate the costs of replacing wireless microphones that may no longer be permitted on certain frequencies? To what extent do they add new costs? If manufacturers are not including these component features, why not? Are there performance tradeoffs associated with

respect to including such components? What steps, if any, should the Commission take to promote the use of such microphones in certain bands, such as the TV bands?

43. *Tunability of Equipment within Bands.* The Commission ask for comment on the extent to which equipment is designed to be tunable within a band. Which types of microphones are tunable for which types of users? Are tunable microphones marketed only to more sophisticated users? What costs are associated with designing a tunable wireless microphone system? Do manufacturers anticipate developing more tunable microphones in the future? The Commission requests that commenters explain their considerations when determining whether or not to design tunable microphones.

44. *Multi-Band Equipment.* The Commission invites comment on the extent to which manufacturers are, or in the future will be, developing wireless microphones that can operate in more than one spectrum band. What kinds of technical or other issues are raised, and to what extent would these issues vary to the bands may not be adjacent or nearby? For instance, to what extent might this raise design issues (e.g., antenna, battery, or other component issues)? Could these devices help ensure that users have devices that can meet their needs when operating at locations where the availability of spectrum in different bands may vary? Could development of such devices promote economies of scale? Could they help ensure that users purchasing such devices would be more assured of having access to the spectrum resources they need? If there were multi-band devices, could this allow greater reliability that the microphones could address users' needs depending on the particular locations where those wireless microphones were needed? What are the tradeoffs with regard to developing such devices?

45. *Use of databases.* Wireless microphone technologies today do not use a database as a mechanism for indicating to the wireless microphone user that particular frequencies in a particular area were available, such as at particular locations that were not being used by other users with priority over the wireless microphone users. White space devices operating in the TV bands must access a database to determine that spectrum is available for their operations and that they would not potentially be interfering with other users at specified locations and times. Would wireless microphone systems potentially benefit from the ability to access to a database? Could requiring use of a database for gaining access to spectrum in a particular band or identifying particular locations and times where they may operate without causing interference to other users in the band help to mitigate or eliminate the concerns of other users in the band that wireless microphone operations might cause harmful interference to these other users? What might be the costs and benefits of developing and using a database, and would these differ depending on the needs of particular types of wireless microphone users?

46. *Electronic key or similar mechanisms.* Are there particular technologies, such as an ''electronic key'' or similar mechanism, that would ensure that a wireless microphone device be able to access and operate only on particular frequencies at particular locations and times, but nowhere else, thus eliminating the potential for harmful interference to other users (such as other users with primary or superior spectrum rights are particularly sensitive to harmful interference) and by so doing provide additional opportunities for wireless microphone operations in bands? Are there other approaches that would effectively limit wireless microphone operation to particular locations, thus protecting other operators from harmful interference? The Commission seeks broad comment on the development and use of these types of mechanisms and the tradeoffs or practicalities associated with them. Are there particular scenarios or bands in which use of these mechanisms could provide additional opportunities to access spectrum?

47. *Use of other technologies that promote opportunities to access additional spectrum.* The Commission seeks comment on other technological advancements that could promote greater opportunities for wireless microphones to share use of spectrum in different bands. Are there technological advances that are currently available or contemplated that better enable wireless microphones to adjust dynamically to a particular interference environment, either automatically or through coordination, to promote more efficient use among the wireless microphones or among wireless microphones and other users in the band? For instance, could devices that include sophisticated dynamic power variability capabilities help promote more intensive use of the spectrum resource in a given area? Would these more dynamic capabilities enable wireless microphones to vary or adjust power levels to minimize or eliminate interference to other users in a particular setting, or facilitate more re-use of the available spectrum? The Commission invites comment on whether technological advances along these lines could both facilitate more efficient use of the spectrum while also helping to ensure that they do not cause harmful interference to other users of the spectrum. Are there technologies that could enable certain wireless microphone applications to operate on spectrum licensed to wireless providers, subject to agreements reached with such providers? Are there other technological advancements that could help accommodate the various different wireless microphone users' needs over the longer term? What are they? Are there actions the Commission should take to promote these developments so that they occur in a timely fashion?

Operations in Specific Bands

48. In this section, the Commission examines opportunities for wireless microphone operations in different spectrum bands—both those in which wireless microphones currently are authorized to operate and other bands that may hold potential for accommodating wireless microphone uses, whether in the near or longer term.

VHF/UHF Television Bands

49. As set forth in the *Incentive Auction R&O,* the current VHF/UHF television bands (channels 2–51, except channel 37) will be reorganized following the upcoming incentive auction. As a result of this auction, the amount of spectrum allocated for television services will be reduced and repacked, some of the current TV bands spectrum will be designated for 600 MHz Band guard bands (including the duplex gap), and other TV bands spectrum will be repurposed for 600 MHz Band wireless services. These revisions will affect wireless microphone operations, which currently operate throughout in existing TV bands, in several ways. The Commission seeks comment on wireless microphone operations with respect to each of these bands—the TV bands, the 600 MHz Band guard bands, and the 600 MHz Band being repurposed for wireless services.

Discussion

50. In this section, the Commission seeks comment on Part 74 rule revisions that we can make to accommodate licensed wireless microphone (and other LPAS) operations in the VHF and UHF spectrum in the repacked TV bands that will continue to be available for TV broadcast services following the incentive auction. We also invite comment on how best to facilitate the

smooth transition of wireless microphones out of the repurposed 600 MHz Band following the incentive auction.

51. In this proceeding, the Commission does not address certain issues relating to wireless microphone operations in the TV bands and in the repurposed 600 MHz Band since these matters will be addressed instead in the part 15 proceeding. In particular, we do not here address the rules for unlicensed wireless microphone operations in the TV bands and the repurposed 600 MHz Band, which will be addressed as part of the part 15 proceeding. Similarly, the Commission does not address in this proceeding, the technical rules for operations of unlicensed wireless microphones in the guard bands, including the duplex gap. Nor does it address here the technical rules for licensed wireless microphone operations in the duplex gap, since the technical issues relating to their operations are intertwined with the technical issues concerning unlicensed operations in the duplex gap and protection of licensed operations outside of the duplex gap. Finally, the Commission will address revisions pertaining to the white spaces databases in our part 15 proceeding.

TV Bands

52. In this proceeding, the Commission invited comments on potential revisions to the existing rules for part 74 wireless microphones (and other LPAS) operations in the spectrum that will remain allocated for TV services following the repacking process. Specifically, it invites comment on revisions to the technical rules for LPAS operations on the VHF band; on permitting licensed LPAS operations on channels in locations closer to the television stations (including within the DTV contour), without the need for coordination, provided that the television signal falls below specified technical thresholds; on adoption of the ETSI emission mask standard for analog and digital wireless microphones; and general comment on other potential revisions concerning licensed LPAS operations in the TV bands.

VHF Band Revisions

53. *Background.* Under the existing technical rules for LPAS operations under part 74, licensed wireless microphone users that operate on a secondary basis in the VHF band (channels 2–13) operate generally under the same technical rules as for operations in the UHF bands. However, with respect to power levels, VHF band operations are restricted to no more than 50 mW, well below the 250 mW levels permitted for operations in the UHF bands. The Commission notes that several manufacturers have developed wireless microphones that make use this VHF spectrum. Our understanding, however, is that licensees make only limited use of this band for wireless microphone operations due to the limited power levels permitted.

54. *Discussion.* The Commission seeks comment on the current uses of the VHF television channels for wireless microphone operations, and the potential for expanding use of this spectrum for wireless microphone operations in the future. Are there technical impediments to making greater use of this spectrum for wireless microphones?

55. In particular, the Commission invites comment on whether it should revise the power limits for LPAS operations in the VHF band to conform to those applicable for LPAS devices in the UHF television band? What would be the benefits or risks associated with making such revisions? Due to the propagation characteristics of this band, would allowing higher power limits raise concerns regarding potential interference to TV stations operating in the VHF bands or the wireless video assist devices that operate in the upper VHF band? Would the minimum co-channel separation distance of 4 kilometer from the contour need to be increased? If so, to what distance? Or could a tiered requirement be implemented, such as where wireless microphones operating at 50 mW or less could comply with the 4 kilometer separation distance, while higher power operations would have to comply with a greater separation distance? The Commission asks that commenters explain fully the benefits or risks, including the kinds of wireless microphone operations that would be facilitated by such changes.

56. The Commission also invites comment on any other rule revisions concerning use of the VHF television spectrum that would facilitate more use of this spectrum for wireless microphone operations. It asks that commenters provide specifics about any proposals, and address the benefits and risks associated with such changes.

Licensed Co-Channel Operations Closer Than Specified Separation Distances

57. In this proceeding, the Commission seeks to develop a more extensive record on whether it should permit licensed wireless microphone operations on a co-channel basis closer than the generally applicable separation distances set forth in our rules, without the need for coordination, provided that certain specified conditions at the locations where the wireless microphone operations would take place. Our goal is to provide more opportunities for licensed wireless microphone operations in the spectrum that will continue to be allocated for television services where the wireless microphone operations would not cause harmful interference to TV operations. Permitting such operations could help ensure that licensed operators have access to more channels, particularly in indoor locations.

58. The Commission proposes to allow LPAS licensees to operate co-channel with television closer to the television station than provided by the separation distance rules, including inside the DTV contour, in those locations in which the co-channel TV signal is below a specified threshold, which would indicate that the over-the-air TV signal unlikely to be received or receivable. Provided that an appropriate TV signal threshold were established, we believe that such a rule serve to ensure that wireless microphone operations could have access to additional channels in the TV bands spectrum without causing harmful interference to any over-the-air television viewers at those particular locations.

59. If the Commission takes this approach, what would the suitable TV signal threshold be? One commenter in the incentive auction proceeding proposed that the suitable threshold would be −80 dBm over 200 kHz. The Commission seeks comment on this threshold, or any other suitable threshold. It asks that commenters provide technical analyses of the threshold that they propose that we adopt.

60. In addition, the Commission requests comment on whether, apart from establishing such a TV signal threshold, it should adopt any other safeguards to ensure that licensed wireless microphone operators comply with this threshold and do not otherwise cause harmful interference to TV reception. The Commission notes at the outset that because we would limit these types of operations to licensed wireless microphone users, we would expect such users to have the requisite wireless microphone systems, as well as technical and operational abilities, to be able to determine the level of the co-channel TV signals at a given location, and thus would be able to comply with any threshold rule that we adopted. Is this a reasonable expectation? To what extent would a wireless microphone operation require a low TV signal to be

able operate effectively on a co-channel basis? Should we require licensed wireless microphone users to register their co-channel operations in the TV bands databases, which could provide information to any television licensee concerned about possible harmful interference? Are there other actions we should take?

61. As an alternative approach, the Commission seeks comment on whether it should permit co-channel licensed wireless microphone operations in indoor venues, such as in theaters or music auditoriums. Could an appropriate approach towards indoor operations be developed that would also effectively preclude harmful interference to any potential TV viewers at indoor locations? For instance, could certain locations be readily identified where wireless microphone operations can be permitted, provided of course that they are operated consistent with applicable technical requirements, including power limits and out-of-bound emissions requirements? Or, considering that in order to operate effectively wireless microphones need access to channels that are sufficiently interference-free, is it reasonable to expect that co-channel wireless microphone operations would only take place in indoor locations on channels with relatively low or effectively non-existent TV signal, and thus conclude that such operations would not be likely to effectively harm TV viewers? Some commenters in the incentive auction proceeding suggested that such operations may already take place without incident. As the Commission explores this approach, it seeks comment on the benefits or downsides of allowing licensed wireless microphone operations at indoor locations, or at specified types of indoor locations. The Commission asks that commenters provide any technical analysis bases for their recommendations.

62. The Commission also invites comment on other approaches that it should take on expanding wireless microphone operations on a co-channel basis closer to television station operations. Again, commenters proposing any alternative approaches should provide technical analyses to support their approaches, and discuss the benefits of such an approach and how their approaches would not cause harmful interference to channels that would be used for wireless microphone operations.

Adoption of ETSI Emission Mask Standards for Analog and Digital Wireless Microphones

63. To promote more efficient use of the available channels in the spectrum in the TV bands spectrum, the Commission proposes revising the emission masks applicable to wireless microphones and LPAS devices, both with respect to analog and digital wireless microphones, to comply with the applicable ETSI standards for analog and digital wireless microphones that operate over 200 kHz channels. Specifically, the Commission proposes to require that emissions from analog and digital unlicensed wireless microphones comply with the emission masks in Section 8.3 of ETSI EN 300 422–1, *Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; Part 1: Technical characteristics and methods of measurement.* The Commission believes that requiring wireless microphones to meet these tighter emission requirements will protect authorized services in adjacent bands from harmful interference, and will improve spectrum sharing by wireless microphones. We seek comment on this proposal.

64. In particular, the Commission seeks comment on the benefits of requiring unlicensed wireless microphones to comply with the ETSI limits, and whether these benefits would outweigh the costs. To what extent would adoption of the standards improve the efficiency of wireless microphone operations? If so, in what ways? To what extent would more microphones, whether analog or digital, be able to make use of the TV bands spectrum? Are these limits necessary to protect authorized services in adjacent frequency bands? To what extent would compliance with the proposed limits improve spectrum sharing by wireless microphones? To what extent have wireless microphone manufacturers developed wireless microphones that already comply with these standards? Would equipment manufacturers have difficulty in complying with these limits? Would a requirement to meet the ETSI standard affect the cost of a wireless microphone system?

65. The Commission also seeks comment on whether we should specify separate emission masks for analog and digital microphones, or whether a single mask is sufficient. For example, ETSI EN 300 422–1 suggests that its mask for digital microphones could also be used for analog microphones. If we were to decide to adopt these standards, how quickly should we require new devices to comply with the new standards? Because the ETSI emission masks are defined only over a frequency range of plus or minus one megahertz from the wireless microphone carrier frequency, we seek comment on the emission limits that should apply outside of this frequency range. For example, should this limit be the same as the emission limits at the outer edges of the ETSI masks (−90 dBc)? Is some other limit more appropriate?

66. In addition to the ETSI standards, or as an alternative, are there other technical standards that the Commission should adopt to promote more efficient use of the spectrum available for wireless microphone operations in the TV bands? If so, the Commission asks that commenters explain the bases for adoption of these standards, along with the associated benefits or potential costs. How quickly should the Commission require that wireless microphones comply with such standards?

Other TV Bands Revisions

67. The Commission also seeks comment generally on whether the Commission should adopt any other rule revisions for operations of wireless microphones in the TV bands spectrum that would facilitate more effective and efficient operations in these bands in a manner that would be consistent with the secondary status of LPAS operations in the band. To the extent that commenters contend that other rule revisions would be appropriate, the Commission asks that commenters provide detailed information on reasons for the proposed changes and the types of specific rules that they advocate.

Eligibility for Licensed Operations in the Duplex Gap

68. In the *Incentive Auction R&O,* the Commission provided that broadcasters and cable programming networks using wireless microphones on a licensed basis would be able to obtain interference protection from unlicensed devices in a portion of the duplex gap at specified times and locations, on an as-needed basis. The Commission is addressing the technical issues concerning licensed wireless microphone operations in the duplex gap in the companion part 15 proceeding.

69. The Commission seeks comment on whether it should expand eligibility for licensed wireless microphone operations in the duplex gap to include all of the entities eligible for part 74 LPAS licenses in the TV bands. Would expanding eligibility to those entities

eligible for part 74 LPAS licenses in the TV bands create problems for broadcasters or cable programming networks operating on this spectrum, or would these different users for the most part operate at different locations, such that their operations would not likely interfere with each other?

Transition Out of the 600 MHz Band Repurposed for Wireless Services

70. The Commission seeks comment on how best to facilitate a smooth transition as wireless microphone and other LPAS users cease their operations on the repurposed 600 MHz Band frequencies no later than the end of the post-auction transition period (i.e., 39 months after the issuance of the *Channel Reassignment PN*). Achieving a smooth transition will involve actions by the Commission, by manufacturers and distributors of wireless microphones, and by the various wireless microphone operators themselves, both licensed and unlicensed users. Although the specific UHF band frequencies that will be repurposed for 600 MHz Band wireless services will not be known until following the incentive auction, beginning preparation for transition as soon as possible will contribute to a smoother transition.

71. The Commission also seeks comment on steps it should take to facilitate a smooth transition in which wireless microphone operations vacate the repurposed spectrum in the 600 MHz Band. The Commission asks for comment on the extent to which consumer education and outreach can help to achieve this goal, and the means by which information can be made available to wireless microphone users in order to inform them of the need to vacate the band. The Commission also requests that commenters address whether labeling requirements, such as point of sale disclosure, can help to facilitate the transition. In addition, it proposes revising our rules to prohibit certification of part 74 wireless microphones that operate in repurposed 600 MHz Band spectrum beginning nine months after the release of the *Channel Reassignment PN,* and to prohibit the manufacture, import, sale, offer for sale, or shipment of such wireless microphones in the 600 MHz band in the United States, 18 months after the release of the *Channel Reassignment PN.* Finally, we propose to modify by rule LPAS licenses with frequencies that will be in the repurposed 600 MHz band and to delete these frequencies from LPAS licenses because they will not be available for such use after the end of the transition.

72. In addition to the specific issues the Commission raise, comments should discuss how particular steps will promote ready access to the repurposed spectrum by 600 MHz Band wireless licensees, while at the same time providing for an orderly transition process for secondary and unlicensed users that currently are serving various important consumer needs using this spectrum.

Consumer Education and Outreach; Disclosure Requirements

73. The Commission seeks comment on how to inform users of wireless microphones on the steps necessary to prevent interference to new wireless operations in the 600 MHz spectrum, consistent with the Commission's goals expressed in the *Incentive Auction R&O.* The Commission anticipates that there will be a need for significant education and outreach directed at wireless microphone users that must commence well before the auction and continue for a number of years beyond the end of the 39-month transition period. These education and outreach efforts must be undertaken by the Commission, manufacturers, wireless microphone users groups, and relevant trade publications and other possible sources of information for wireless microphone users. As a companion to these efforts to educate consumer awareness on developments concerning the operation of wireless microphones, the Commission also proposes requiring that written disclosures accompany new devices at the point of sale to provide further education to wireless microphone users on the devices' operations.

74. *Consumer Education and Outreach.* The commission seeks comment on the consumer education and outreach efforts that should be employed to educate wireless microphone users, particularly unlicensed users operating in the repurposed 600 MHz band. Our goals are to make information available so users are aware that they must cease operating their wireless microphones on the repurposed 600 MHz Band no later than the end of the transition period (*i.e.,* 39 months after the release of the *Channel Reassignment PN*); to set in motion a process so they are aware of relevant factors concerning the operation of wireless microphones that are currently in use; and to establish a means for users to locate additional spectrum and equipment for their operations. A successful consumer education and outreach campaign will involve the Commission staff working with a broad group of interested entities, including wireless microphone manufacturers, wireless microphones users, and user representatives.

75. Given that a portion of the UHF spectrum that is currently used and available for wireless microphone operations may no longer be available following the incentive auction, the Commission seeks comment on how wireless microphone users can be provided access to information on the specific frequencies and the geographic areas of repurposed spectrum that will no longer be available for wireless microphone use at the end of the transition. What specific information should be provided to wireless microphone users to ensure that they know the requirements for operating in the repurposed spectrum during the transition period and the need to exit the band by the end of the transition? Although the *Channel Reassignment PN* will provide information on the spectrum that will be repurposed and no longer available for wireless microphones, first the Commission seeks comment on what steps can be taken to provide wireless microphone users with information on the transition prior to the auction. For example, it seeks comment on whether explanations could be provided on the Commission's Web site and on the Web sites of manufacturers that would explain the steps required under the Commission's rules to vacate the repurposed 600 MHz Band, and any information on alternative spectrum that is currently available outside of this spectrum, as well any additional spectrum bands that may become available for wireless microphone operations beyond those already provided for in the rules.

76. What other means should be employed to provide wireless microphone users notice of the repurposed spectrum that will be assigned to new wireless licensees, including the specific frequencies in the UHF spectrum and the geographic locations that will no longer be available for wireless microphone operations? The Commission seeks comment on whether it would it be beneficial for wireless microphone users to have access to a database that identifies spectrum in the repurposed 600 MHz Band. For example, should some form of online mapping tool be made available to allow users to enter the location and operating frequencies of a wireless microphone and determine whether it operates in the repurposed 600 MHz Band? In the event that a database or similar approach is adopted, the Commission seeks comment on who should be responsible for developing and maintaining (hosting) it, including

who should be responsible for its cost. Commenters should provide quantitative and qualitative data on costs and benefits of their proposals.

77. Further, should the Commission work with wireless microphone manufacturers to obtain information on models of wireless microphones that the Commission could list on its Web site? For example, this information could include a list of all models of wireless microphones sold in the U.S., and all wireless microphone models that operate in the repurposed 600 MHz Band, as well as where on the device or in its product literature the user could look to determine the frequencies on which it is capable of operating. The Commission seeks comment on whether making this type of information publically available would help to facilitate a smooth transition from the 600 MHz Band. It also seeks comment on the costs and benefits of this approach, as well as alternative approaches.

78. In addition to steps that may involve manufacturers, the Commission seeks comment on what steps other parties associated with the sale and operation of wireless microphones may be able to take to provide users with information relevant to the transition. These other parties may include: Wireless microphone distributors and retailers; parties that lease or manage wireless microphones; trade associations and user groups, including those that have participated in Commission proceedings concerning wireless microphones; organizations that host Web sites and publish information that addresses wireless microphone operations and use or are reasonably expected to have significant numbers of wireless microphone users among their members and readers; and engineering and industry associations or other groups with members that use or operate wireless microphones. Involvement in education and outreach by these parties will be essential, given users' investment in wireless microphone equipment and the upcoming changes regarding wireless microphone use, including the requirement that they vacate the 600 MHz Band. Further, it is important that education and outreach extend to information concerning any newly-allocated spectrum for wireless microphone operations and the potential for users to opt for a suite of wireless microphones operating in different spectrum bands and with different capabilities, depending on the user's specific requirements. The Commission notes that wireless microphone users can encompass a wide range of entities, including both licensed and unlicensed users, and parties with differing levels of wireless microphone needs and expertise covering many different applications. Based on these considerations, it is likely that the need for information on the various spectrum bands that will be available for wireless microphone operations, and the conditions specific to each, will be vital. The Commission seeks comment on these matters, and on what steps can be taken to assure that the information to educate users on the transition will be commensurate with the appropriate needs and levels of expertise of all users.

79. The Commission seeks comment on what additional information it should make available for wireless microphone users, including Commission-issued consumer ''fact sheets'' and ''frequently asked questions'' (FAQ's) which would address, among other matters, information on operation in the 600 MHz Band, the reason for the need to operate on frequencies outside of that band following the transition, the availability of other frequency bands for wireless microphone use, and the need to comply with Commission rules. The Commission further seeks comment on how to release or distribute these materials in order to most effectively and efficiently reach the target audience of wireless microphone users.

80. The Commission seeks comment on the specific actions that wireless microphone manufacturers, distributors, retailers and other entities comprising the wireless microphone community should take to inform the wide range of wireless microphone users about the ongoing developments concerning wireless microphone use—particularly the need to vacate the repurposed 600 MHz Band, the timetable for doing so, and the conditions for operating in the band during the transition period. The Commission seeks comment on whether and to what extent these entities can make this type of information available, including, as appropriate, by posting it on their Web sites, including it in all sales literature, or taking other steps to inform current or potential wireless microphone users of matters concerning the operation of their devices. The Commission also seeks comment on whether manufacturers would consider rebates, equipment trade-ins, or similar programs to facilitate the transition, and what effect the 39-month transition period would have on a decision to implement such a program. In addition, we seek comment on the economic costs and benefits of adopting consumer outreach measures.

81. *Disclosure Requirements.* The Commission proposes to revise its point-of-sale disclosure requirement that the Commission adopted in the *Wireless Microphone Report and Order* in order to provide information to wireless microphone users that may have to purchase or lease new equipment so that they can vacate the repurposed 600 MHz Band. In the *TV Bands Wireless Microphones Report and Order,* the Commission adopted a point-of-sale requirement to help assure that consumers were informed of their rights and obligations if they chose to operate wireless microphones and other low power auxiliary stations in the core TV bands (defined in the rule as channels 2–51, excluding channel 37). Specifically, the Commission adopted a requirement for manufacturers and distributors of wireless microphones that operate in the core TV bands to provide a written disclosure informing consumers of the requirements for operating devices in that spectrum and to display the disclosure at the point of sale and on their Web sites. The Commission also provided that persons who manufacture or market wireless microphones destined for export and capable of operating in the 700 MHz Band must include labeling stating that the devices cannot be used in the United States.

82. The Commission proposes to revise the existing point-of-sale disclosure requirement in order to facilitate a smoother transition in which wireless microphone users are informed of the need to vacate the repurposed 600 MHz Band, while fully understanding their rights and obligations during the transition period and at the end of the transition period. With regard to sales of wireless microphones that are capable of operating in repurposed spectrum, it proposes to require that such sales include point-of-sale disclosures that inform buyers that they are buying a microphone that cannot be used in certain frequencies following the transition. The Commission also seeks comment on how point-of-sale disclosures could be designed to effectively address any ban on manufacturing and marketing of wireless microphones that are capable of operating in the repurposed 600 MHz Band. The Commission proposes that the revised point-of-sale disclosures should direct buyers to the manufacturer's toll free telephone number or the manufacturer's Web site where the buyer can obtain more detailed information on the extent to which the microphone may be affected by repurposing the600 MHz Band.

Should it retain the existing language in the point-of-sale disclosure requirement that includes the Commission's toll free number and the Commission's Web site where users can obtain additional information on the operation of wireless microphones during the transition period and after the transition period? What other information should be included in the disclosure?

83. The Commission proposes that the effective date for any disclosure requirement, including a point-of-sale requirement, which it may adopt in connection with this or a related proceeding, shall be 18 months after the release of the *Channel Reassignment PN*—which will mark the effective date of channel reassignments based on the repacking process, specify any specific channel assignments for television stations that will continue to broadcast, and start the clock running on the post-auction transition period—or should some other date be used instead? The Commission seeks comment on the particular factors that should enter into this determination. It notes that in adopting the current disclosure requirement, the Commission stated that it would remain in effect until the effective date of the final rules adopted in response to the 2010 *TV Bands Wireless Microphones FNPRM.*

Post-Auction Prohibition of the Certification, Manufacture, or Marketing of LPAS Devices Operating on the 600 MHz Band

84. All wireless microphones that now operate in the TV bands are certified as compliant with Part 74, Subpart H of the Commission's rules. The Commission decided in the *Incentive Auction R&O* that all wireless microphones that operate in the portion of the TV bands that will be repurposed for licensed wireless services may continue to operate in that spectrum during the post-auction transition period but must cease those operations no later than 39 months after release of the *Channel Reassignment PN.* At the end of the post-auction transition, licensed microphones will be permitted to operate in a portion of the duplex gap, and unlicensed wireless microphones will be permitted to operate in the guard bands and duplex gap.

85. Because of these future changes in the permitted operating frequency range for wireless microphones, plus the rule changes for these devices that we propose in the *NPRM* and in the *Part 15 NPRM,* the Commission need to establish cutoff dates for the certification, manufacturing, and marketing of wireless microphones in the repurposed spectrum to ensure that manufacturers cease making and marketing equipment that cannot be legally used after a certain date. Cutoff dates will encourage manufacturers to concentrate on developing wireless microphones that operate in compliance with new part 74 and part 15 rules. Because similar technical requirements would apply to both licensed and unlicensed wireless microphones, the Commission proposes to apply to both the same transition rules for certification, manufacturing, and marketing. This approach would be the least disruptive to wireless microphone manufacturers and users. The *NPRM* addresses these issues for licensed wireless microphones, and the *Part 15 NPRM* addresses these issues for unlicensed wireless microphones.

86. Because wireless microphones will no longer be authorized to operate in the 600 MHz Band beyond 39 months after the release of the *Channel Reassignment PN,* the Commission proposes revising its rules to prohibit the certification, manufacture, import, sale, lease, offer for sale or lease, or shipment (collectively, ''manufacture or marketing'') of wireless microphones devices intended for use in the repurposed 600 MHz Band in the United States. The Commission proposes taking this action pursuant to its authority under section 302(a) of the Communications Act.

87. The Commission proposes this prohibition to ensure that wireless microphones will vacate the 600 MHz spectrum by the end of the transition. This action would be consistent with Commission actions when it required wireless microphones to cease operating in the former TV bands that were repurposed for 700 MHz Band wireless services and prohibited the manufacturer and marketing of wireless microphones intended for use in the 700 MHz Band. The Commission is concerned that without this prohibition there may be greater potential for unauthorized use in the repurposed 600 MHz Band, given the difficulty in educating users about the scope of the devices' operations and problems we may otherwise encounter in enforcing a requirement that all wireless microphones users leave the band by the end of the transition. The Commission seeks comment on this proposal. It notes, however, that some frequencies may not be cleared nationwide as a result of the incentive auction, creating some impaired blocks in the 600 MHz Band. The Commission proposes that parties may no longer submit applications to certify part 74 wireless microphones that operate in repurposed TV spectrum beginning nine months after the release of the *Channel Reassignment PN.* It also proposes that we will not certify wireless microphones under part 74 that would operate in the 600 MHz guard bands or the unlicensed portion of the duplex gap. The Commission seeks comment on these proposals. In particular, it seeks comment on the appropriateness of the proposed cutoff dates. Should we provide longer or shorter time periods? Should we also require that, in any event, parties may not submit applications to certify wireless microphones that operate in repurposed TV spectrum later than 24 months after the effective date of the service rules we adopt in this proceeding, and microphones that do not comply with the new rules may not be manufactured and marketed later than 33 months after the effective date of the service rules the Commission adopts in this proceeding?

88. The Commission also proposes that the effective date of any prohibition on manufacturing or marketing these devices will be 18 months after the release of the *Channel Reassignment PN.* The Commission notes that the particular frequencies that will need to be vacated will not be known until the release of the *Channel Reassignment PN,* although parties have been on notice since at least 2012 that wireless microphones may have to transition out of portions of the 600 MHz Band. The Commission also seeks comment on the extent to which manufacturers and other entities have already begun to educate current and potential wireless microphone users about the potential for a transition out of the 600 MHz Band. In addition, the Commission seeks comment on the economic costs and benefits of different effective dates for the proposed prohibition on manufacturing or marketing.

89. Finally, to the extent that the Commission determines to prohibit such manufacture or marketing, we propose that any such ban would not apply to devices manufactured in the United States solely for export. It seeks comment on this proposal.

Modification of LPAS Licenses To Remove Authorization for Operations on the 600 MHz Band

90. Pursuant to our authority under Section 316 of the Communications Act, the Commission proposes to modify existing LPAS licenses, to the extent necessary, to delete frequencies identified as repurposed for the 600 MHz Band in the *Channel Reassignment PN,* effective on the date that the post-auction transition period ends. The Commission has already taken action in

the *TV Bands Wireless Microphones Second Report and Order* adopted earlier this year to ensure that any LPAS licenses granted between the effective date of that order and the end of the post-auction transition period would be subject to the condition that operation in the repurposed 600 MHz Band must cease by the end of the post-auction transition period.

91. The Commission's proposed actions in the instant proceeding would similarly modify, to the extent necessary, all other LPAS licenses granted prior to the effective date of *TV Bands Wireless Microphone Second Report and Order* that authorize operations on frequencies that will be repurposed for the 600 MHz Band. In addition, the Commission proposes that following these license modifications, the LPAS licenses will continue to include authorization to use all frequencies currently included in those licenses other than the repurposed 600 MHz Band. Finally, we propose that if a licensed user must cease operations of a wireless microphone prior to the end of the post-auction transition period (*i.e.,* because it causes harmful interference to any 600 MHz licensee's operations), the license relating to that wireless microphone will be modified automatically without Commission action to delete the authorization to operate on the repurposed 600 MHz Band, effective on the date that operations are required to cease.

92. The Commission seeks comment on these proposals, and on the extent to which their adoption would promote the public interest by facilitating the clearing of all licensed wireless microphone operations from the repurposed 600 MHz Band by the end of the transition period.

26.100–26.480 MHz, 161.625–161.775 MHz, 450–451 MHz, and 455–456 MHz Bands

93. The Commission seeks comment on the current use of these bands for wireless microphone operations, and the future for more expansive use of these bands. What particular types of wireless microphones are used in the bands, and for which types of applications are they best suited. Considering the small bandwidths available in each of these bands, what kinds of limitations are there on the types of applications that can be served using these bands? How many microphones can operate on these bands using today's technologies? Are there technological advances that may promote more intensive use? The Commission seeks comment on any potential revisions that it should make to facilitate the use of these bands for wireless microphone operations.

88–108 MHz FM Band

94. *Background.* Over the years there have been some wireless microphone operations in the 88–108 MHz FM band on an unlicensed basis. As discussed, wireless microphone operations on this spectrum was permitted before wireless microphones were authorized to access any channels in the TV bands. Wireless microphones that comply with the rules for unlicensed device operations in this band, as sets forth in § 5.239 of our part 15 rules, may operate on no more than a 200 kHz bandwidths with low emissions (field strength of emissions must not exceed 250 microvolts/meter at 3 meters).

95. *Discussion.* To what extent do wireless microphone users continue to make use of this band for their operations? If so, for what types of wireless microphone applications? To what extent will use of the spectrum in this band be useful for accommodating wireless microphone users' needs in the future? Are there any rule revisions that would facilitate use of this spectrum while also preserving these channels for use by the primary FM broadcast services? The Commission asks that commenters proposing any rule revisions submit technical information in support of their proposals, as well as analysis of the benefits of such revisions and likely impact on FM broadcasters.

169–172 MHz Band

96. *Background.* Under the Commission's part 90 rules, entities eligible to hold a Public Safety Pool or Industrial/Business Pool license may operate wireless microphones on a secondary basis on certain frequencies in the 169–172 MHz band, which is allocated primarily for federal use. Specifically, these rules permit wireless microphones to be operated on only eight frequencies: 169.445 MHz, 169.505 MHz, 170.245 MHz, 170.305 MHz, 171.045 MHz, 171.105 MHz, 171.845 MHz, and 171.905 MHz. The emission bandwidth may not exceed 54 kHz, the frequency stability of the microphones must limit the total emission to within ± 32.5 kHz of the assigned frequency, and operations may not exceed an output power level of 50 milliwatts. Entities eligible to operate wireless microphones under the part 90 rules include a variety of users, including those eligible to hold LPAS licenses under part 74 as well as many other entities, including: state and local government entities; commercial entities in general; educational, philanthropic or ecclesiastical institutions; clergy; hospitals; clinics; and medical associations.

97. Wireless microphone operations are not protected from other licensed operations in the band and must not cause interference to any government or non-government operations, and wireless microphone license applications are subject to government coordination. The federal systems in the band are required to be capable of narrowband operations on 12.5 kHz channels. The other non-federal licensed operations in the band, which also are secondary to the federal allocation in the band, operate on narrowband channels and include: (1) operations by licensees on 36 specified assignable channels, no larger than 11.25 kHz, between 169.425 MHz and 171.925 MHz, for the purpose of transmitting hydrological or meteorological data: (2) operations by licensees on 9 assignable channels, no larger than 11.25 kHz, between 170.425 MHz and 172.375 MHz, for forest firefighting and conservation purposes (four assignable east of the Mississippi River and five assignable west of the Mississippi River); and (3) operations assignable on one 11.25 kHz channel for public safety activities; and remote pickup broadcast stations on one 12.5 kHz channel at 170.15 MHz in certain parts of the country.

98. In the 2010 *TV Bands Wireless Microphones R&O and FNPRM,* the Commission sought comment on whether it should revise these part 90 rules to facilitate broader wireless microphone use in these frequencies. Some commenters in that proceeding suggested that operating in this band may offer additional opportunities for some licensed wireless microphone operations, though several indicated that wireless microphone operations under these rules may not currently provide a viable option for all wireless microphone users, particularly where ''premium professional audio quality'' is required. One comment also indicated that the few available frequencies were insufficient except for small users.

99. In this proceeding, the Commission requests information about the current use of spectrum in the 169–172 MHz band for wireless microphone operations, and it requests comment on the potential for more expansive and intensive use of this spectrum. In particular, the Commission ask for comments on different ways in which the spectrum in the band could be used for wireless microphone operations without interfering with the federal operations, and the other secondary services that may use portions of this band at particular locations. The

Commission also inquires about the technical rules that we should adopt were we to authorize additional wireless microphone use of this band.

100. Commenters should provide information about how this spectrum is currently used by wireless microphones and describe the specific uses and applications for such devices under part 90. In particular, the Commission asks that commenters address why relatively few entities are licensed to operate wireless microphones in this band. To what extent, for instance, does the relatively narrow bandwidth permitted under Part 90 (with 54 kHz emission mask limitation) affect the audio quality and the types of usage on those frequencies when compared with part 74 LPAS systems in the TV bands (permitting as much as 200 kHz)?

101. The Commission also seeks comment on whether and what steps it could take to make the existing frequencies a more viable option for more wireless microphone users. The applicable technical rules are over thirty years old, and the Commission seeks comment on the extent of subsequent technical improvements in wireless microphone technology in this band. The Commission also seeks comment on the technical specifications of current microphones in this band and what rule changes would be necessary to enable improved fidelity to support additional wireless microphone applications.

102. Commenters should also discuss the potential for future wireless microphone use in these frequencies, as well as how revisions could make this spectrum more useful for wireless microphone applications. Since the current channels available for microphones include four sets of channels that are close to each other, one possible action we might take would be to allow wireless microphone licensees to combine each of the neighboring sets of channels with each other, making four channels with larger bandwidth available for wireless microphone operations. For instance, the authorizations for operating on channels 169.445 MHz and 169.505 MHz could be combined, allowing for operations across the two channels over a bandwidth of approximately 120 kHz, with the center frequency being at 169.475 MHz. Would allowing these channels to be combined to this larger bandwidth accommodate additional wireless microphone uses, and do commenters support such action? Commenters also should discuss whether such a revision would increase the likelihood of interference to federal use or other secondary non-federal use of the spectrum, and whether the rules also should include additional provisions to protect these other users.

103. Another approach would be to make as much of the 169–172 MHz band as possible available for wireless microphone use on a secondary basis. Secondary operations are not normally coordinated with primary operations. Given the relatively low power of wireless microphones and the limited nature of their use we believe the risk to primary services is relatively small except perhaps in rare instances of operation in close proximity. Nevertheless, are there certain circumstances where coordination with the federal government or other incumbent services may be appropriate? What impact might this have on wireless microphone operations in the band, as well as on other operations in the band? Alternatively, should certain areas be excluded for licensed wireless microphones operating in this band? In considering this possible expansion of wireless microphone use across the band, the Commission notes that there are many locations, or many frequencies at particular locations, where the spectrum is not being used either by the federal government or by other secondary users. The Commission seeks comment on whether wireless microphone licensees should be allowed to operate on channels of bandwidths up to 200 kHz (if available at particular locations), the same as permitted in the TV bands, and in addition should be required to comply with the ETSI standards that we are proposing to adopt with respect to wireless microphone operations under the technical rules for LPAS device operations in the TV bands and other bands. The Commission seeks comment on this approach, and whether such an approach could be designed in such a way as to protect federal and other secondary operations from interference from wireless microphone operations. Under this approach, to what extent could certain types or locations of wireless microphone use (e.g., indoor uses) more easily be accommodated? If the Commission were to provide authorization for more expansive use by wireless microphones licensees, it seeks comment on the service rules that we should adopt. The Commission also seeks comment on the technical rules that should apply for wireless microphone operations. For instance, under this approach, to what extent should we adopt other technical requirements that would apply to LPAS devices that operation in the VHF TV bands that currently apply (including restricting power to 50 mW, the same as permitted wireless microphones currently in the 169–172 MHz band), or under our proposed revisions for operations in the TV VHF band (which would permit higher power levels, up to 250 mW)?

104. In addition, the Commission seeks comment on any other approaches it could take to facilitate wireless microphones operations in the 169–172 MHz band. Commenters proposing other approaches should provide the rationale for such approaches, including how those approaches could be designed to protect incumbent operations of other services in the band. To the extent that the Commission revises technical rules to provide more access to spectrum in these bands, it asks that manufacturers address how quickly new devices might be manufactured and made available in the marketplace. Are there other equipment issues that we should address?

944–952 MHz Band and Adjacent 941–944 MHz and 952–960 MHz Bands

105. Under current rules, broadcasters and broadcast network entities already are permitted to operate wireless microphones and other LPAS devices in 8 megahertz of spectrum in the 944–952 MHz band on a licensed basis. In this section, the Commission seeks comment generally on LPAS operations in the 944–952 MHz band, and it proposes to adopt the ETSI standards for analog and digital wireless microphone operations and to expand eligibility for licensed LPAS operations to include the same additional entities that currently are eligible to operate LPAS devices on a licensed basis in the TV bands. The Commission also proposes to permit LPAS operations on a licensed basis in portions of the two spectrum bands immediately adjacent to the 944–952 MHz band (941–944 MHz and 952–960 MHz bands), which potentially could enable licensed wireless microphone users access to up to nineteen megahertz of spectrum across the 941–960 MHz frequencies, depending of course on the availability of unused spectrum across these frequencies.

944–952 MHz Band

106. The Commission requests that commenters provide information about the current uses of this band for licensed wireless microphone operations, as well as the potential for more intensive use of this band for these operations among the other broadcast services that use the band. How extensively do LPAS licensees make use of this 8-megahertz band, and in what types of locations? How much spectrum is available for wireless microphone

uses in the band, considering that the other authorized services are point-to-point operations are at fixed locations? The Commission seeks comment on both outdoor and indoor uses. For what types of wireless microphone operations is that band used? What are the advantages and disadvantages of using this band for wireless microphone operations?

107. Similarly, the Commission requests comment on the potential for more intensive use of this band in the future. Considering that less spectrum may be available for wireless microphone operations in the UHF television bands, do licensees expect to make greater use of this band in this band, including migration particular types of uses to this spectrum when they are spectrum-constrained in the TV bands? If so, for what types of applications? Do the propagation features associated with this spectrum band, and its relatively close proximity to the UHF television band, facilitate particular types of wireless microphone applications? For instance, is this band particularly well-suited for high-quality uses? What are the potential limitations on the use of this band for licensed wireless microphone operations? Commenters should provide whatever information they believe may be helpful to the Commission as we evaluate the role that this band can play in helping accommodate the various needs of wireless microphone users over the near and long term.

108. In our discussion of licensed LPAS operations in the TV Bands, the Commission proposes to adopt the ETSI emission mask standards both for analog and digital microphones. Here, the Commission proposes adopting those standards for LPAS operations in the 944–952 MHz Band. The Commission seeks comment on this proposal.

109. In addition to seeking comment on use of this band by existing licensees, the Commission proposes expanding eligibility in the 944–952 MHz band to include additional classes of wireless microphone users, in particular all of the other entities eligible for operation of LPAS devices in the TV bands on a licensed basis, which have wireless microphone needs similar to those of broadcasters and broadcast network entities and merit license status in the TV bands. Considering that these other entities are sophisticated users, and often already coordinate their wireless microphone operations in the TV bands with broadcasters, the Commission believes that such users should be able to effectively work with broadcasters when accessing spectrum at different locations. Expanding eligibility for these uses potentially could help ensure that entities that merit licensee protection in the TV bands, and may have access to less TV bands spectrum following the incentive auction, have access to additional spectrum that they may need for their licensed operations. The Commission seeks comment on this proposal. Alternatively, should the Commission expand eligibility to include a subset of these other TV bands LPAS licensees, or some other group of entities? If so, for what reasons?

110. Are there technical limitations and other considerations we should weigh when assessing expansion of licensee eligibility in this band? Would expansion have the effect of limiting the spectrum at particular locations available for use by broadcasters? Alternatively, would the likely operations of these LPAS wireless microphones by different users at different locations help ensure that the low power, short-range operations would not overlap or cause interference among LPAS operations? Considering the technical characteristics of the fixed Aural Broadcast Auxiliary (STL and ICR) stations, and noting that these fixed services currently share use of the band with LPAS operations, what additional safeguards, if any, would be needed to insure that these fixed Aural Broadcast Auxiliary stations are protected if additional, non-broadcast classes of users are added to the band?

941–944 MHz Band and 952–960 MHz Band

111. *941–944 MHz band.* Most of this three megahertz—the two and a half megahertz between 941.5–944 MHz—is available for licensing for Private and Common Carrier Fixed Microwave Services. Broadcast auxiliary stations licensed prior to November 21, 1984 (including STL and ICR) may continue to operate in the 942–944 MHz band on a co-primary basis. After applicants were given the opportunity to file applications and to resolve disputes over frequency pairs internally and then by lottery, subsequent licenses were obtained on a first-come-first-served-basis, operating in different parts of this spectrum on channels that range from 25 kHz to 200 kHz in bandwidth. The Commission has issued approximately 820 licenses in this 941.5–944 MHz portion, where the vast majority are for Private Operational Fixed Point to Point Microwave Service, with some for Aural Broadcast Auxiliary Service (including STL and ICR), and a few for Common Carrier Fixed Point to Point Microwave Service. Fixed point-point links in these bands are typically used for long distance low data-rate links between locations that have line of sight capability. They employ directional antennas and operate with fairly high effective isotropic radiated power. Receive antennas are also directional, affording some rejection of unwanted signals off-axis from the main lobe of the antenna.

112. The other portion, the half megahertz between 941–941.5 MHz, is authorized for MAS operations. The MAS authorizations involve discrete portions of the 941–941.5 MHz band that is paired with spectrum in the 932–932.5 MHz band; more particularly, these paired blocks consist of thirty-six 12.5 kHz channel pairs (25 kHz total per pair) and one paired 50 kHz channel (100 kHz total per pair) in the 932.0–932.5 MHz and 941.0–941.5 MHz bands. The Commission designated twenty of the thirty-six 12.5 kHz channel pairs in these bands for public safety and/or private internal use. Five of these twenty are reserved for public safety services (as defined in Part 90), and the other fifteen are available for both private internal and traditional public safety services. With respect to the remaining channels consisting of sixteen 12.5 kHz paired channels and one 50 kHz paired channel (a total of 0.250 megahertz of spectrum in 941–941.5 MHz), the Commission has issued licenses on a geographic basis through a system of competitive bidding without any user restrictions, and these licensees are permitted to provide both fixed and mobile services on a co-primary basis. The 941.0 -941.5 MHz portion of the band is designated for communications from MAS master stations to remote stations; consequently, transmission from the master station is generally omni-directional, generally within a 25-mile radius, to many remote stations. The rules for MAS operations were adopted by the Commission in 1999. MAS historically has been used by the power, petroleum, and security industries for various alarm, control, interrogation and status reporting requirements as well as by the paging industry, and the licensing scheme adopted by the Commission attempted to accommodate these past and present uses. In the 941–941.5 MHz portion, there are 1,340 geographically-based MAS licenses and 1,175 site-based MAS licenses.

113. *952–960 MHz band.* Similarly, most of this eight megahertz of spectrum—6.8 megahertz of spectrum between 952.85–956.25 MHz and 956.45–959.85 MHz—is licensed for Private Operational Fixed Microwave Service (including business industrial and public safety) authorized under part

101. The Commission has issued approximately 2,850 Private Operational Fixed Point to Point Microwave Service licenses authorizing operations in the 952–960 MHz band.

114. The remaining portions of the band are authorized for MAS operations in three distinct portions, totaling 1.2 megahertz. Specifically, the MAS bands are divided into two groups with differing licensing and service characteristics. The first, commonly known as the 928/952/956 bands, include sixty-eight 12.5-kilohertz (kHz) channel pairs (25 kHz total per pair) in the 928–928.85 and 952–952.85 MHz bands (a total of 850 kilohertz in the 952–960 MHz band), and sixteen unpaired 12.5-kHz channels in the 956.25–956.45 MHz band (200 kHz total). These bands are reserved for ''private internal services,'' which are defined as those where licensees use their authorized frequencies purely for internal business purposes or public safety communications, and not for any for-hire (for-profit) or non-profit cost-shared application. The Commission awarded licenses to these bands on a first-come, first-served, site-by-site basis. The Commission has issued approximately 10,000 site-based MAS licenses in these bands.

115. The second MAS band, commonly known as the 928/959 MHz bands, consists of twelve 12.5 kHz channel pairs (25 kHz total per pair) in the 928.85–929 and 959.85–960 MHz bands (300 kHz total). The Commission licensed these bands on a geographic basis through a system of competitive bidding for use by for-profit CMRS and paging network incumbents. There are 484 geographically-based MAS licenses and approximately 120 site-based MAS licenses in this band. In addition, approximately 50 licenses permit part 22 paging operations in the 959.85–960 MHz band on a grandfathered basis.

116. In the *MAS Report and Order,* the Commission adopted flexible rules that permit licensees to conduct point-to-point and point-to-multipoint operations, and also to provide fixed or mobile services on a co-primary basis in the geographically licensed portions of the bands. The *MAS Report and Order* also grandfathered incumbent operations in the 928/952/956 MHz bands, and permitted those operations to expand services subject to the Commission's rules on interference protection and co-channel spacing. Although a system of geographic licenses using Economic Areas (EAs) awarded via auction now overlays the 928/959 bands and part of the 932/941 bands, we permitted incumbent licensees to remain in the in the 928/959 band indefinitely, but we did not permit any expansion of their services. The Commission expected that interference from these ''grandfathered'' operations would be minimal, given that they were subject to a co-channel mileage separation based on an assumed 25-mile service area.

117. The Commission proposes making unused portions of the 941–944 MHz and the 952–960 MHz bands available for licensed wireless microphone operations on a secondary basis, generally under the rules applicable for LPAS operations in the 944–952 MHz band. The Commission requests that commenters provide information about the potential availability of unused spectrum in these bands at locations where wireless microphones are used, and the extent to which it is suitable and could effectively be used for wireless microphone operations. The Commission seeks comment on the particular rules that it should adopt to facilitate wireless microphone operations in this spectrum that would also ensure that incumbent operations are not harmed. The Commission invites comment on the benefits of permitting such operations, as well as any specific concerns about how such operations might affect currently authorized users in these bands.

118. The Commission first seeks comment on whether there are potential benefits to making these bands available for wireless microphone operations to the same entities licensed for LPAS operations in the 944–952 MHz band. Considering the mix of services and licensees that currently operate in different segments in various portions of these bands, the Commission seeks comment on whether there nonetheless are many locations in these bands where spectrum is unused, potentially available, and in sufficient bandwidth (e.g., 200 kHz) suitable for wireless microphone uses similar to their uses in the TV bands and 944–952 MHz band. The Commission requests that commenters supporting wireless microphone operations in these bands explain fully how access to the available spectrum in these bands would be important for accommodating wireless microphone needs in the coming years, both in the near and longer term. Would the fact that this spectrum is adjacent to the 944–952 MHz band make this spectrum particularly suitable or involve valuable synergies (e.g., same spectrum propagation, more readily available equipment, more efficient management of wireless microphone operations, etc.)? And would the types of uses suitable for these bands be the same as for the 944–952 MHz band discussed?

119. Given that wireless microphones operate at low power over short distances, the Commission believes they are not likely to cause interference to the types of fixed or mobile operations that operate at higher power in these bands. Thus, it believes that wireless microphones should be able to co-exist and share access to the spectrum in these bands with incumbent services on a secondary basis without causing harmful interference. The Commission seeks comment. As this issue is considered, the Commission requests comment on how it can design rules for wireless microphone operations in these bands to enable effective sharing. Would users of wireless microphones often seek to operate in locations that overlap with existing services, or would they operate in other places not served by those operations?

120. Considering the different services and service rules that apply to portions of these bands, the Commission seeks comment on permitting wireless microphone operations on each of these portions. With the mix of point-to-point and point-to-multipoint services already operating in these bands, are there specific sub-bands that would be more suitable than others for sharing with wireless microphones?

121. With respect to those portions of the spectrum available for licensing for fixed microwave services other than MAS, which constitutes the majority of the spectrum in these bands, how much spectrum is unused by these fixed services at locations that could be effectively used for wireless microphone operations? To what extent can potential wireless microphone users determine the availability of suitable spectrum at particular locations? What issues and factors should we take into account to make spectrum available for wireless microphone operations while protecting the incumbent fixed services that operate in these bands?

122. The Commission similarly inquires about making the portions of the spectrum in these bands that are authorized for MAS operations also available for wireless microphone operations. For instance, considering that many MAS systems are used by utilities for Supervisory Control and Data Acquisition (SCADA) operations, we seek comment on whether these existing users operate in the same general geographic areas as wireless microphone users, or whether the wireless microphone operations would be separated geographically because these are different types of uses? Given the nature of MAS operations, how

much spectrum is unused and available for wireless microphone operations? Are there practical considerations, including the fact that there is only a relatively small amount of spectrum in discrete segments potentially unused and available, that would make authorizing wireless microphone operations more problematic or less practical in these bands? If so, are there ways in which the Commission could effectively address these concerns? Would the spectrum associated with the geographic area MAS licenses be suitable for wireless microphones, and if so could wireless microphone operations be accommodated on this spectrum through leasing arrangements with the existing market-based licensees? What other factors should we consider when determining whether and how to permit wireless microphone operations in these MAS portions?

123. The Commission also seeks specific comment on designing rules that would be necessary to address any interference concerns with incumbent operations that could arise. If it were to authorize wireless microphone operations in these bands, to what extent are protections necessary to prevent harmful interference to incumbent operations from the low power, short-range wireless microphone operations? Would certain types of services, such as fixed microwave services, generally not be prone to interference? Would other types of operations be more susceptible to interference, such as certain MAS operations involving SCADA operations, and would those operations benefit from rules that would provide protection (e.g., rules to specify minimum separation distances or creation of protection zones)? What specific technical requirements or limitations should we place on wireless microphone operations in the bands? On frequencies licensed for SCADA operations that involve transmissions between master stations and outdoor remotes, should we place limitations on power levels used by wireless microphones or limit wireless microphones to indoor uses? The Commission asks commenters to provide technical analyses to support their positions on these issues.

124. The Commission asks that commenters propose any specific technical rules that would apply to wireless microphone operations in these bands. As indicated, the Commission proposes permitting wireless microphones to operate under the technical rules for LPAS operations that apply to operations in the 944–952 MHz band (e.g., power limits, maximum bandwidth, Out of Band Emissions (OOBE)), which would include the ETSI standards that we propose to apply to such operations. The Commission seeks comment on this proposal, and whether these rules should apply in whole or in part with respect to these bands, or portions of these bands, and if not, why not? Commenters should explain and provide technical analyses on these issues. The Commission also seeks comment on the equipment issues that would pertain to wireless microphone operations in these bands, including the certification process. Commenters also should address any equipment issues pertaining to wireless microphone operations in these bands. What is the potential availability of equipment for operations in these bands? Realizing that it may depend on the particular rules, how long might it take for manufacturers to develop equipment that operates in these bands? Would the availability of devices operating in the adjacent 944–952 MHz band help speed development and distribution of these devices? To the extent that manufacturers may need to modify equipment designed for the 944–952 MHz band, or use equipment designed for use in other bands, what are the constraints on such modifications, and how long would it take to bring such modified equipment to market? As regards certification, should manufacturers be able to certificate equipment under the same rules and procedures for LPAS devices that operate in the 944–952 MHz band, or do they need to develop new equipment for these bands that would be certificated in a different manner?

Unlicensed Operations in the 902–928 MHz, the 2.4 GHz, and the 5 GHz Bands

125. The 902–928 MHz, 2.4 GHz (2400–2483.5 MHz), and 5 GHz (5725–5850 MHz) bands generally permit operations of unlicensed devices pursuant to two part 15 rules, §§ 15.247 and 15.249. Earlier this year, the Commission consolidated the rules for the digitally modulated devices that operate in the 5 GHz band under § 15.407. Wireless microphones are among the devices that operate on an unlicensed basis in these bands under these rules.

126. Wireless microphones operating in these bands pursuant to § 15.247, like other unlicensed devices operating under this rule, are required to operate as spread spectrum transmitters, and are limited to frequency hopping systems and systems using digital modulation. Digitally modulated systems must use a minimum bandwidth of 500 kHz but are not required to hop frequencies. Both frequency hopping and digitally modulated systems are permitted to use output powers of up to 1 watt, however, most devices use lower power for various design reasons, such as conserving battery life. Spread spectrum modulation reduces the power density of the transmitted signal at any frequency, thereby reducing the possibility of causing interference to other signals occupying the same spectrum. Similarly, at the receiver end, the power density of interfering signals is minimized, making spread spectrum systems relatively immune to interference from outside sources.

127. Wireless microphones operating in these bands pursuant to § 15.249, as with any other unlicensed device operation, is permitted subject to the field strength limits specified in this section. There are no requirements for devices operating under this provision to hop frequencies or use a minimum transmit bandwidth, and there are no maximum bandwidth or transmission duration limits. Devices operating under this rule could be either analog or digital devices. Many types of devices operate under this rule section including cordless telephones, video transmitters, wireless speaker and headphone systems, and automated utility meter reading equipment.

128. Section 15.407 provides general technical requirements for unlicensed national information infrastructure (U–NII) devices that operate in the 5 GHz band. The recently revised § 15.407 rules are intended to better ensure that unlicensed 5 GHz band devices do not cause harmful interference to authorized Federal and non-Federal users in these bands and to eliminate a loophole in the former rules that allowed devices to be certified under the § 15.247 rules and then modified to operate as U–NII devices without complying with all of the technical requirements of the U–NII rules.

902–928 MHz Band

129. The Commission seeks to develop a full record on the current and potential uses of the 902–928 MHz band for various wireless microphone uses. It ask that commenters provide information on devices currently in the marketplace that serve such needs. To what extent are these devices digital, operating as spread spectrum devices under the technical rules set forth in § 15.247, or analog or digital operating under § 15.249 requirements? What specific types of applications are these devices best suited, and what are the limitations on the types of applications for which they may be used? To what extent can devices operating in this

band address the needs, for instance, of non-professional users? The Commission asks that commenters provide relevant technical data regarding performance features (e.g., with respect to latency, voice fidelity, etc.) that inform and may affect the suitability of these devices for particular types of applications. To what extent is the effectiveness of the applications dependent on the operating environment (e.g., outdoor or indoor uses)? Are wireless microphone users whose needs can effectively be addressed through devices that operate in this band migrating their operations from other bands, such as the TV bands, to this band? What are manufacturers and those marketing wireless microphone devices promoting use of devices that use this band?

130. Have there been technological advances that have improved the ability of these devices to co-exist and share use of the band with the other users that also have access to the band? If so, what types? What kinds of advancements might be anticipated in the future that could increase the use of this band for wireless microphone applications?

131. To the extent devices operating in this band are effective in meeting wireless microphone applications, should manufacturers and those marketing wireless microphones do more to promote use of devices that operate in this band, or to indicate that devices operating in this band may be effective in addressing their needs that historically have operated in the TV bands? What steps, if any, should the Commission take to promote more use of this band for wireless microphone applications?

2.4 GHz Band

132. As with our discussion on the 902–928 MHz band, the Commission also seeks to develop a full record on the current and potential uses of the 2.4 GHz band for various wireless microphone uses. It asks that commenters provide information on devices currently in the marketplace, and the extent are these devices digital, operating as spread spectrum devices under the technical rules set forth in § 15.247, or analog or digital operating under § 15.249 requirements. For what types of specific applications are 2.4 GHz wireless microphones best suited, and what limitations are associated with their use, including any that may result from the nature of signal propagation in the band. To what extent can devices operating in this band address the needs of non-professional users? As above, we ask that commenters provide relevant technical data regarding performance features (e.g., with respect to latency, voice fidelity, etc.) that inform and may affect the suitability of these devices for particular types of applications. What types of operating environment (e.g., outdoor or indoor uses) affect their effectiveness for specific applications? How are manufacturers and those marketing wireless microphone devices promoting use of devices that use this band?

133. The Commission also asks that commenters discuss technological advances that have improved the ability of these devices to co-exist and share use of the band with the other users that operate in the band. Are advancements anticipated that could increase the use of this band for wireless microphone applications? Finally, to the extent devices operating in this band are effective in meeting wireless microphone applications, should more be done to promote use of devices that operate in this band?

5 GHz Band

134. The Commission also asks that commenters provide information on the current and potential uses of this band for different types of wireless microphone operations. To what extent are devices that function as wireless microphones operating in this band today, and for what kinds of applications? Considering the available bandwidth, the propagation features associated with this spectrum, and other relevant factors, for what types of applications is this band well-suited? What types of users are most likely to make use of wireless microphones in this band? In what types of operational environments do these devices work best? Are there technological advances forthcoming that could create more opportunities for using this spectrum for wireless microphone applications? Should more be done to promote use of this band for wireless microphone applications?

1920–1930 MHz Unlicensed PCS Band

135. Currently the major use of the 1920–1930 MHz band is for unlicensed cordless telephones that operate under part 15 of the Commission's rules many manufacturers make wireless microphones using this spectrum.

136. The Commission invites comment on the current and potential uses of the 1920–1930 MHz UPSC band for wireless microphone applications. The Commission seeks comment on current uses of the band for wireless microphones, including the types of purposes for which they are used as well as the types of venues in which they are used. How many microphones generally can be deployed at the same time in a particular area? To the extent that wireless microphones operating in this band may not be sufficient for high-end, professional broadcast, music, or theater uses, are there other types of uses for which they provide effective wireless microphone communications capabilities? What is the range of audio capabilities for wireless microphone devices that operate in this band under our rules? For instance, are there potential advances in technology, such as improvements in the digital protocol to better enable high quality audio? In sum, the Commission invites comments generally on the types of applications for which wireless microphones using this band may be best suited. Should the Commission consider any technical revisions that could make this band more useful for wireless microphone applications without adversely affecting operations of other users in the band?

1435–1525 MHz Band

137. The Commission proposes, as one option, making the 1.4 GHz band spectrum available for use by wireless microphones on a secondary licensed basis, and seek comment. Because of the importance of ensuring that the AMT systems are protected against harmful interference, and given that most wireless microphone operations can be accommodated within other spectrum, the Commission proposes that use of this band be limited to licensed professional users at specified locations and times, and include specified safeguards designed to protect AMT use of the band. The Commission seeks comment on how and under what conditions this band can be shared, and on the types of applications best suited for this band.

138. Our proposal to allow wireless microphones to operate in this spectrum is based on several critical factors. We recognize that professional use for certain large events (e.g., major sports or theater productions) often involve use of more than 100 wireless microphones. Where these have previously operated in the TV bands, there is no assurance that sufficient spectrum will remain to accommodate this extent of use, nor is it certain that the other provisions for wireless microphones could accommodate such use. Limiting the licensing for these types of applications, which are typically associated with specific locations, should make sharing of the spectrum manageable. Although we would authorize such use on a secondary basis, in this instance we believe that frequency coordination with federal and non-federal users is critical and is consistent with the

practice that already has been used for special temporary authority in this band, although on a more limited basis. In addition, the Commission believes it is necessary to ensure that a mechanism must be established to ensure that wireless microphone systems marketed for use in this spectrum can only be operated after successful coordination, such as through an electronic key or other means. The Commission also seeks to ensure that any wireless microphones operating in this spectrum are spectrally efficient and frequency agile when sharing the spectrum. The Commission discusses these topics in detail below. Where it asks general questions they should be viewed through the prism of these principles.

139. Generally, as the Commission considers authorizing wireless microphone operations in the 1.4 GHz band on a secondary use basis, what issues should it consider when evaluating the compatibility of wireless microphone operations in the same band as AMT? What limitations might the Commission consider imposing to ensure that wireless microphone operations would not cause harmful interference to AMT?

140. To what extent is the 1.4 GHz spectrum suited for wireless microphone operations? What type of wireless microphone uses might be best suited to operate in this band, and what types of uses would be less well-suited or unsuitable? How would proponents of access to this spectrum plan to make use of the band for wireless microphone operations? What are the technical advantages and disadvantages of using 1.4 GHz band spectrum for wireless microphone operations, in terms of signal propagation, types of operations that could be deployed, battery power, form factors, body absorption, or other aspects that would inform the types of wireless microphone uses to which the spectrum might be put?

141. The Commission proposes that wireless microphone operations be secondary, and thus must protect the primary AMT services that operate in the band. As it considers the appropriate framework for wireless microphone operations in the band, we note that the Commission already has permitted secondary, low power short-range devices to share use of another band where AMT operations were primary when in 2012 it authorized Medical Body Area Network (MBAN) devices to operate in the 2360–2390 MHz portions of the 2360–2400 MHz band. In permitting MBAN devices to share access to that spectrum, the Commission was careful in developing rules that limited the locations where MBAN systems could operate and in designing a coordination process that would ensure that primary AMT operations would be protected from interference.

142. As a general matter, the Commission proposes only limited use of the 1.4 GHz band for wireless microphone applications. While it seeks to provide wireless microphone users in need of additional spectrum resources with access to the 1.4 GHz band spectrum to help accommodate those needs, at the same time the Commission is not proposing to open this particular band either for widespread or for itinerant uses throughout the nation. Given the paramount need to protect AMT operations, the Commission is proposing only limited access for wireless microphone operations. In particular, it proposes that wireless microphone uses be restricted to specific fixed locations, such as large venues (whether outdoor or indoor), where there may a need to deploy large numbers of microphones, e.g., 100 or more. In addition, the Commission proposes allowing operations at those locations only at specified times. The Commission seeks comment on these proposals.

143. Prior coordination with AFTRCC will be required. The Commission seeks to develop appropriate rules that will ensure through this process that wireless microphone operations will not cause interference to the primary AMT operations in the band. In particular, it seeks comment on coordination mechanisms that can ensure that wireless microphone operations only occur at the locations and times where authorized through the coordination process, and would be effective in preventing the use of these devices at any other location or time without authorization.

144. As noted, the Commission authorized MBAN devices to operate on a secondary basis in the 2360–2390 MHz band provided that they register the devices and follow a coordination framework. With regard to registration, MBAN device operators are required to register each device with the frequency coordinator and provide specified information—including the specific frequencies to be used, the location of the devices, the power levels used, and point of contact information regarding the entity responsible for the MBAN device operations. The Commission codified certain coordination procedures as well. These begin with the initial determination of whether the MBAN location is within line-of-site of AMT operations, and the potential interference risks that would be associated with MBAN operations at that location. The Commission also provided the frequency coordinators with significant flexibility to work out mutually agreeable coordination agreements and MBAN devices' operating parameters at particular locations. The Commission recognized that specific tools, such as electronic keys, could be useful to coordinators as they sought to achieve mutually agreeable coordination agreements, and required that MBAN devices cease transmission in the absence of a control message. At the same time, the Commission did not codify requirements for an electronic key and relied on frequency coordinators to work out the MBAN operating parameters through their agreements as needed. To what extent are the rules for MBAN operations appropriate with regard to permitting wireless microphone use in the 1.4 GHz band at specified locations, frequencies, and times, pursuant to specified operational parameters? The Commission asks that commenters explain in detail the coordination procedures that they assert should apply with regard to operations in the 1.4 GHz band.

145. The Commission also seeks comment on the extent to which the Commission might prescribe particular tools to ensure that wireless microphones operate only at the locations and times authorized, and not anywhere else. For instance, the Commission seeks comment on requiring that the wireless microphone systems, which often are moved from one location to another (e.g., when used to cover different events), could only operate through use of an automatic mechanism (such as an electronic key, and location-awareness capability, or similar mechanisms) that would serve to prevent wireless microphones from operating unless on approved frequencies in the 1.4 GHz band at the approved location/venue(s) during approved time(s). What kind of technologies can achieve this purpose in an effective manner? If we were to adopt such a requirement, should the authorized operations be enabled only through permission granted by the FCC or an FCC-certified entity once AFTRCC has concurred with the particular wireless microphone operations? Are there other means of coordinating operations that would ensure that the microphones only operate where and when authorized? The Commission seeks comment on these proposals, including how an automatic mechanism might be included within design of a wireless microphone system. In

addition, the Commission invites comment on whether it should adopt point-of-sale restrictions that would enable only entities licensed to operate in this band to obtain the devices.

146. In keeping with the types of wireless microphone operations that the Commission envisions for this band, it proposes limiting eligibility to professional users, including broadcasters, professional television and cable programmers, and professional sound engineering companies, and operators at major venues that manage and coordinate wireless microphone operations, i.e., the entities eligible for licensed LPAS operations in the TV bands. The Commission invites comment on this proposal.

147. To the extent the Commission decides to authorize wireless microphone operations in this band, it seeks comment on the technical rules that would apply to devices that would use the band. Commenters should submit detailed discussions of recommendations for the applicable technical rules. In designing technical rules, what types of technical concerns should we consider and address to ensure that the primary AMT operations protected? The Commission requests detailed information about the type(s) of wireless microphone equipment that could use the band. What power levels and bandwidths should we permit for wireless microphones? To what extent should we permit certain devices already on the market today to access the band? Should the technical rules be the similar to wireless microphones that operate in other bands?

148. In particular, the Commission seeks comment on adopting the technical rules for LPAS device operations in the TV bands, as well as the ETSI standards that it is proposing to adopt for those devices. To what extent are some or all of these technical standards appropriate for wireless microphones operating in the 1.4 GHz band? The Commission asks that commenters provide any relevant technical information supporting their positions.

149. To preserve maximum flexibility for wireless microphone operations in the band, should the Commission consider requiring wireless microphones to have the capability of tuning across the band? The Commission also seeks comment on requiring wireless microphones that are designed to operate in the 1.4 GHz band to have modular transmitting components that, if necessary, could be replaced to enhance frequency agility. How long would it take to develop devices that would operate consistent with the proposals we discussed above? Should there be an interim process for permitting wireless microphone operations in the band as any necessary new devices are being made? In addition, the Commission invites comment on the certification process that should be employed.

150. Consistent with its proposal, the Commission envisions adding a secondary mobile except aeronautical mobile service allocation to the 1435–1525 MHz band for limited use under the service rules it adopts for the band. The Commission also request comment on any other regulatory or technical issues that would be relevant to our consideration of whether to authorize wireless microphone operations in the 1.4 GHz band. Commenters should provide detailed bases and explanations for their proposals and views.

3.5 GHz Band

151. In the *3.5 GHz Band FNPRM* adopted in April 2014, the Commission sought comment on a three-tiered authorization framework that would allow different types of users to access portions of the 3550–3650 MHz Band. To the extent that the band was not being used by incumbent users (primary operations, including incumbent federal users and grandfathered Fixed Satellite Service earth stations) under the Incumbent Access tier, the Commission proposed making spectrum available through the Priority Access and General Authorized Access (GAA) tiers outside of the specified geographic exclusion zones. The Commission also invited comment on whether to allow certain users (''Contained Access Users'') to receive interference protection for their device operations within the confines of their facilities on a portion (up to 20 megahertz) of the frequencies included in the GAA tier.

152. The Commission notes the comments have been filed in the 3.5 GHz band proceeding (GN Docket No. 12–354) on potential uses of this band by wireless microphone users. Shure indicated that the GAA tier, for instance, could potentially support certain wireless applications, and asserted that were the Commission to establish a class of ''Contained Access Users'' then indoor wireless microphone use should qualify for such access.

153. All of the issues regarding the policies and rules for operations in the 3.5 GHz proceeding will be decided in that proceeding, based on the record in that proceeding, and the Commission is not seeking comment in this instant proceeding on those issues. Nonetheless, considering that the Commission is seeking to develop a comprehensive understanding of the potential landscape for different types of wireless microphone operations in different bands, it seeks general comment on whether and how wireless microphone operations potentially could be employed in the 3.5 GHz band to help accommodate particular needs of users. Without prejudging the specific rules that the Commission may adopt in the 3.5 GHz proceeding, the Commission invites comment on any impact the proposed rules for the 3.5 GHz band would have on the broader aims of this proceeding. If 3.5 GHz spectrum were made available, how much of a wireless microphone operator's needs could potentially be accommodated in this band, for instance, given the propagation characteristics of the band? If operations were permitted in this band, to what extent might this band potentially serve as a supplement spectrum resource for certain types of uses? To the extent that rules for the 3.5 GHz band are adopted that can help meet wireless microphone users' needs, how long might it take for user equipment to be developed and available for use? To avoid a bifurcated record on issues related to the 3.5 GHz band, the Commission asks that commenters submit any comments on these issues in this docket as well as in the 3.5 GHz band proceeding.

6875–7125 MHz Band

154. The Commission proposes to permit licensed wireless microphone operations on available channels in this band, on a secondary basis, for entities that are eligible to hold BAS or CARS licenses, and seek comment. Considering the existing fixed and mobile services in the band that currently operate in different portions of this band, and the likelihood of significant areas of unused spectrum throughout this band that potentially could be made available for relatively low power, short-range wireless microphone operations, the Commission request comment on whether access to this spectrum could help accommodate certain types of wireless microphone applications without interfering with existing services. The Commission also seeks comment on the applicable rules that should apply, were we to decide to grant such authorization.

155. To what extent would access to the 7 GHz band help address needs of wireless microphone operators? Considering the propagation features or other factors associated with this spectrum, what types of wireless microphone applications may be well-suited for operations in this band? Given that BAS and CARS licensees

already use the 7 GHz spectrum for certain types of video applications and programming production, would there be synergies in permitting wireless microphone operations that could supplement those existing applications? How much spectrum in the 7 GHz band may be potentially available at those kinds of locations, whether indoors or outdoors, where users may have need for wireless microphones?

156. What particular rules would facilitate wireless microphone operations in the band while also protecting existing services? Could we make spectrum in any part of the 7 GHz band available for wireless microphone operations on a secondary, non-interfering basis, under rules drawn from the LPAS technical rules for operations in the TV bands or on the 944–952 MHz band? To what extent would low power wireless microphone operations pose the potential of interfering with any of the current mix of fixed and mobile BAS services and private and commercial fixed microwave that operate in the band?

157. Alternatively, should the Commission consider making certain portions of the 7 GHz band available for wireless microphone operations, both as a means to facilitate wireless microphone operations as well as to preclude any possibility of harmful interference to existing operations? For instance, are there certain 25-megahertz channels, or smaller-sized portions of such channels, that we should make available for wireless microphone operations, and if so, how much and where? Would some channels or portions of channels be preferable for wireless microphone operations? As noted, while BAS and CARS are authorized to operate on the entire 25 megahertz in a channel, FS services may operate on 5, 8.33, and 25 megahertz channels. Are there opportunities for wireless microphone operations on portions of particular channels to the extent not being used by incumbent licensees at a given location? For instance, if an incumbent licensee were using only 5 or 8.33 megahertz channels, could wireless microphones operate on some balance of that 25-megahertz channel without interfering with existing services? Are there particular segments in the 7 GHz band that would be more suitable, such as the 25 megahertz segments that are currently reserved for BAS use nationwide? Are other channels or portions of channels more suitable, and if so should we take steps to restrict additional authorizations in that spectrum or otherwise open that spectrum for wireless microphone uses? If commenters have specific ideas about whether certain portions of the 7 GHz band should be made available, the Commission asks that they submit a full discussion of which portions, and how that might affect any existing BAS, CARS, or FS authorized in those portions of the band.

158. To what extent should coordination of wireless microphone operations be required? Should we require formal or informal coordination of operations? We also seek comment on whether wireless microphone users could share operations among themselves on the same private-sector, frequency-coordinated basis that exists for the use of BAS mobile shared spectrum.

159. The Commission is proposing that any wireless microphone operations in these bands be licensed to entities eligible for BAS or CARS licensees. It generally would expect that these are the entities that may wish to operate wireless microphones in the band for some of their production-related services. The Commission also believes that licensing wireless microphone operations to these entities would help address interference or coordination concerns that may arise when making use of the 7 GHz band spectrum. The Commission seeks comment on this proposal. The Commission also invites comment on alternative proposals.

160. The Commission also invites comment on the technical rules that would apply to wireless microphone operations in the band. In particular, it seeks comment on whether the technical rules should be modeled on those that apply to LPAS operations, including the ETSI standards that we are proposing. The Commission asks that commenters provide information on any proposed rules and the rationale for adopting such rules. Commenters should also address any potential interference concerns that could arise. If we were to allow wireless microphone operations in the band, would any incumbent operations need geographic exclusion zones? Apart from exclusion zones, is there interference criteria that could facilitate sharing? What OOBE limits would be appropriate to protect incumbent services in the bands directly adjacent to wireless microphone operations? Considering the propagation characteristics in the 7 GHz band and recognizing that operation in this band typically requires line of sight between the transmitter and receiver, would limiting wireless microphones to indoor use create greater sharing possibilities? The Commission asks commenters to provide technical analyses to support their position on these issues.

161. In addition, the Commission seeks comment on equipment availability for wireless microphones in these bands. Does wireless microphone equipment already exist for these bands? How much time would manufacturers need to develop new equipment for these bands?

Ultra-Wideband

162. *Background.* The Commission's rules for ultra-wideband (UWB) unlicensed devices are set forth in part 15, subpart F. UWB devices operate by employing very narrow or short duration pulses that result in very large or wideband transmission bandwidths. UWB technology enables development of an array of applications, including imaging systems, vehicular radar systems, and communications and measurement systems. Operating pursuant to the technical rules set forth in part 15, UWB devices can use spectrum occupied by existing radio services without causing harmful interference, thereby permitting scarce spectrum resources to be used more efficiently.

163. Wireless microphones operating under these rules would be required to operate pursuant to the UWB rules for communications systems, which permit operations in the 3.1–10.6 GHz band. Under the UWB rules, these devices must be designed to ensure that operation can occur indoors only, or must consist of hand-held devices that may be employed for such activities as peer-to-peer operation. The Commission notes that at least one wireless microphone manufacturer has developed and markets wireless microphones that operate under these rules.

164. The Commission seeks comment on the current and potential uses of UWB devices for wireless microphone applications. Recognizing that UWB operates across a number of frequencies, the Commission asks commenters to discuss the ways in which UWB devices could be used effectively for wireless microphone uses. Are there particular uses for which wireless microphones operating under UWB rules are well suited, such as indoor and/or short-range operations? What are the benefits and constraints associated with the UWB rules, including the wide bandwidths associated with operations and the propagation aspects related to operating in these high frequency bands? Are manufacturers promoting the use of UWB wireless microphones for particular applications? Finally, we invite comment regarding steps that the

Commission should take to facilitate use of UWB devices for wireless microphone uses.

Other Potential Bands

165. In this section, the Commission invites comment on whether there are other bands not currently available for wireless microphone operations that may be useful in helping their use. The Commission seeks comment on bands that might offer opportunities both in the nearer term and over the longer term.

166. For instance, in 2008 the Public Interest Spectrum Coalition (PISC) filed a petition for rulemaking to create a general wireless microphone service in the 2020–2025 MHz band. PISC argued that, as a result of the Commission's proposal to license the 2175–2180 MHz band on an unpaired basis, the 2020–2025 MHz band could be allocated for wireless microphones on a primary basis and free of white space devices and interference. Would this band be suitable for wireless microphone use? If so, the Commission asks that commenters address the technical suitability of this five megahertz band, the potential equipment availability, and other issues that would have to be addressed. The Commission also asks commenters to address how a decision to permit wireless microphones to operate in the 2020–2025 MHz band would impact or be affected by the Commission's earlier decision to allocate those five megahertz for non-federal fixed and mobile service.

167. To the extent that commenters propose additional bands for consideration, we ask that they provide a full explanation for the proposal. In particular, the Commission seeks comment on the ways in which the band or bands could be helpful in accommodating wireless microphone operations while advancing the Commission's spectrum management goals, including promoting efficient use of spectrum.

Procedural Matters

Paperwork Reduction Analysis

168. The *NPRM* contains proposed new information collection requirements. The Commission, as part of its continuing effort to reduce paperwork burdens, invites the general public and OMB to comment on the proposed information collection requirements contained in this document, as required by the PRA. In addition, pursuant to the Small Business Paperwork Relief Act, the Commission seeks specific comment on how it might further reduce the information collection burden for small business concerns with fewer than 25 employees.

Initial Regulatory Flexibility Analysis

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

Need for, and Objectives of, the Proposed Rules

170. This proceeding is initiated to explore additional steps we can take to accommodate the needs of wireless microphone users over the coming years by ensuring that they have access to available spectrum resources that they need.[4] Wireless microphones play an essential role in enabling broadcasters and other video programming networks to serve consumers, including helping to cover breaking news and broadcasting live sports events. They are used to significantly enhance event productions in a variety of settings—including theaters and music venues, film studios, conventions, corporate events, houses of worship, and internet webcasts. They also have become integral to creating high quality content that consumers demand and value, and as part of that content production process contribute substantially to our economy.[5] Recent actions by the Commission, and in particular the repurposing of broadcast television band spectrum for wireless services set forth in the *Incentive Auction R&O,* will significantly alter the regulatory environment in which wireless microphones operate[6] and we see an urgent need to assess new options for wireless microphone users going forward.

171. Wireless microphone users rely heavily on access to unused channels in the television band to provide their important services. Following the incentive auction, with the repacking of the television band and the repurposing of current television spectrum for wireless services, there will be fewer frequencies in the UHF band available for use for wireless microphone operations. In taking several steps in the *Incentive Auction R&O* to accommodate wireless microphone operations—including providing more opportunities to access spectrum on the channels that will remain allocated for television post-auction and making the 600 MHz Band guard bands available for wireless microphone operations—the Commission also recognized that the reduction of total available UHF band spectrum will require many wireless microphone users to make adjustments over the next few years regarding the spectrum that they access and the equipment they use.[7] To help ensure that wireless microphone users could make these adjustments, the Commission provided that users could continue to access spectrum repurposed for wireless services for a substantial period of time as they transition affected services to alternative spectrum.[8] The Commission promised to initiate this proceeding to explore steps that it can take to address wireless microphone users' longer term needs, including accessing spectrum resources in additional frequency bands.[9]

Legal Basis

172. The proposed action is authorized under sections 4(i), 7(a) 301, 303(f), 303(g), 303(r), 307(e) and 332 of the Communications Act of 1934, as amended, 47 U.S.C. 151, 154(i), 157(a),

[1] *See* 5 U.S.C. 603. The RFA, *see* 5 U.S.C. 601–612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Public Law 104–121, Title II, 110 Stat. 857 (1996).

[2] *See* 5 U.S.C. 603(a).

[3] *See id.*

[4] *See* Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, GN Docket No. 12–268, *Report and Order* (FCC 14–50), 29 FCC Rcd 6567, 6704 para. 316 (adopted May 15, 2014) (*Incentive Auction R&O*) (stating the Commission's intent to initiate a proceeding to explore steps to accommodate the long-term needs of wireless microphone users). When we use the term ''wireless microphones'' in this proceeding, we collectively refer to wireless microphones and related audio devices.

[5] *See, e.g.,* Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, GN Docket No. 12–268, *Report and Order* (FCC 14–50), 29 FCC Rcd 6567, 6696 para. 300 (adopted May 15, 2014) (*Incentive Auction R&O*).

[6] *See generally* Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, GN Docket No. 12–268, *Report and Order* (FCC 14–50), 29 FCC Rcd 6696–6704 paras. 299–316; 6844–6847 para. 682–688, (adopted May 15, 2014) (*Incentive Auction R&O*).

[7] *See Incentive Auction R&O,* 29 FCC Rcd at 6567 paras. 299–315.

[8] *See Incentive Auction R&O,* 29 FCC Rcd at 6567 paras. 682–688.

[9] *Incentive Auction R&O,* 29 FCC Rcd at 6567 para. 316.

301, 303(f), 303(g), 303(r), 307(e), and 332.

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

173. The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.[10] The RFA generally defines the term ''small entity'' as having the same meaning as the terms ''small business,'' ''small organization,'' and ''small governmental jurisdiction.'' [11] In addition, the term ''small business'' has the same meaning as the term ''small business concern'' under the Small Business Act.[12] A small business concern is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.[13]

174. Small Businesses, Small Organizations, and Small Governmental Jurisdictions. Our action may, over time, affect small entities that are not easily categorized at present. We therefore describe here, at the outset, three comprehensive, statutory small entity size standards.[14] First, nationwide, there are a total of 28.2 million small businesses, according to the SBA.[15] In addition, a ''small organization'' is generally ''any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.''[16] Nationwide, as of 2012, there were approximately 2,300,000 small organizations.[17] Finally, the term ''small governmental jurisdiction'' is defined generally as ''governments of cities, towns, townships, villages, school districts, or special districts, with a population of less than fifty thousand.''[18] Census Bureau data for 2012 indicate that there were 90,056 local governments in the United States.[19] Thus, we estimate that most governmental jurisdictions are small.

175. LPAS Licensees. There are a total of more than 1,200 Low Power Auxiliary Station (LPAS) licenses in all bands and a total of over 600 LPAS licenses in the UHF spectrum.[20] Existing LPAS operations are intended for uses such as wireless microphones, cue and control communications, and synchronization of TV camera signals. These low power auxiliary stations transmit over distances of approximately 100 meters.[21]

176. Low Power Auxiliary Device Manufacturers: Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing. The Census Bureau defines this category as follows: ''This industry comprises establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment. Examples of products made by these establishments are: transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment.''[22] The SBA has developed a small business size standard for Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing, which is: all such firms having 750 or fewer employees.[23] According to Census Bureau data for 2007, there were a total of 939 establishments in this category that operated for the entire year.[24] Of this total, 912 establishments had employment of less than 500, and an additional 10 establishments had employment of 500 to 999.[25] Thus, under this size standard, the majority of firms can be considered small.

177. Low Power Auxiliary Device Manufacturers: Other Communications Equipment Manufacturing. The Census Bureau defines this category as follows: ''This industry comprises establishments primarily engaged in manufacturing communications equipment (except telephone apparatus, and radio and television broadcast, and wireless communications equipment).'' [26] The SBA has developed a small business size standard for Other Communications Equipment Manufacturing, which is: all such firms having 750 or fewer employees.[27] According to Census Bureau data for 2007, there were a total of 452 establishments in this category that operated for the entire year.[28] Of this total, 448 establishments had employment below 500, and an additional 4 establishments had employment of 500 to 999.[29] Thus, under this size standard, the majority of firms can be considered small.

178. Television Broadcasting. This Economic Census category ''comprises establishments primarily engaged in broadcasting images together with sound. These establishments operate television broadcasting studios and facilities for the programming and transmission of programs to the public.'' [30] The SBA has created the

[10] 5 U.S.C. 603(b)(3).

[11] 5 U.S.C. 601(6).

[12] 5 U.S.C. 601(3) (incorporating by reference the definition of ''small business concern'' in 15 U.S.C. 632). Pursuant to the RFA, the statutory definition of a small business applies ''unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the **Federal Register**.'' 5 U.S.C. 601(3).

[13] Small Business Act, 15 U.S.C. 632 (1996).

[14] *See* 5 U.S.C. 601(3)–(6).

[15] *See* SBA, Office of Advocacy, ''Frequently Asked Questions,'' *http://www.sba.gov/sites/default/files/FAQ_March_2014_0.pdf* (last visited May 2, 2014; figures are from 2011).

[16] 5 U.S.C. 601(4).

[17] National Center for Charitable Statistics, The Nonprofit Almanac (2012).

[18] 5 U.S.C. 601(5).

[19] U.S. Census Bureau, Government Organization Summary Report: 2012 (rel. Sep. 26, 2013), *http://www2.census.gov/govs/cog/g12_org.pdf* (last visited May 2, 2014).

[20] FCC, Universal Licensing System (ULS), *available at http://wireless.fcc.gov/uls/index.htm?job=home* (last visited May 13, 2014).

[21] 47 CFR 74.801.

[22] U.S. Census Bureau, 2012 NAICS Definitions: 334220 Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing, *http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=334220* &search=2012 (last visited May 6, 2014).

[23] 13 CFR 121.201, NAICS code 334220.

[24] U.S. Census Bureau, Table No. EC0731SG3, Manufacturing: Summary Series: General Summary: Industry Statistics for Subsectors and Industries by Employment Size: 2007 (NAICS code 334220), *http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_31SG3*. The number of ''establishments'' is a less helpful indicator of small business prevalence in this context than would be the number of ''firms'' or ''companies,'' because the latter take into account the concept of common ownership or control. Any single physical location for an entity is an establishment, even though that location may be owned by a different establishment. Thus, the numbers given may reflect inflated numbers of businesses in this category, including the numbers of small businesses.

[25] *Id.* An additional 17 establishments had employment of 1,000 or more.

[26] U.S. Census Bureau, *2012 NAICS Definitions: 334290 Other Communications Equipment Manufacturing, http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=334290&search=2012* (last visited May 6, 2014).

[27] 13 CFR 121.201, NAICS code 334290.

[28] U.S. Census Bureau, Table No. EC0731SG3, Manufacturing: Summary Series: General Summary: Industry Statistics for Subsectors and Industries by Employment Size: 2007 (NAICS code 334290), *http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_31SG3&prodType=table* (last visited May 6, 2014). The number of ''establishments'' is a less helpful indicator of small business prevalence in this context than would be the number of ''firms'' or ''companies,'' because the latter take into account the concept of common ownership or control. Any single physical location for an entity is an establishment, even though that location may be owned by a different establishment. Thus, the numbers given may reflect inflated numbers of businesses in this category, including the numbers of small businesses.

[29] *Id.* There were no establishments that had employment of 1,000 or more.

[30] U.S. Census Bureau, *2012 NAICS Definitions: 515120 Television Broadcasting,* (partial definition), *http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=515120&search=2012* (last visited May 6, 2014).

following small business size standard for Television Broadcasting firms: those having $38.5 million or less in annual receipts.[31] The Commission has estimated the number of licensed commercial television stations to be 1,388.[32] In addition, according to Commission staff review of the BIA Advisory Services, LLC's *Media Access Pro Television Database* on March 28, 2012, about 950 of an estimated 1,300 commercial television stations (or approximately 73 percent) had revenues of $14 million or less.[33] We therefore estimate that the majority of commercial television broadcasters are small entities.

179. We note, however, that in assessing whether a business concern qualifies as small under the above definition, business (control) affiliations must be included.[34] Our estimate, therefore, likely overstates the number of small entities that might be affected by our action because the revenue figure on which it is based does not include or aggregate revenues from affiliated companies. In addition, an element of the definition of ''small business'' is that the entity not be dominant in its field of operation. We are unable at this time to define or quantify the criteria that would establish whether a specific television station is dominant in its field of operation. Accordingly, the estimate of small businesses to which rules may apply does not exclude any television station from the definition of a small business on this basis and is therefore possibly over-inclusive to that extent.

180. In addition, the Commission has estimated the number of licensed noncommercial educational (NCE) television stations to be 396.[35] These stations are non-profit, and therefore considered to be small entities.[36]

181. There are also 2,414 low power television stations, including Class A stations and 4,046 television translator stations.[37] Given the nature of these services, we will presume that all of these entities qualify as small entities under the above SBA small business size standard.

182. Cable Television Distribution Services. Since 2007, these services have been defined within the broad economic census category of Wired Telecommunications Carriers; that category is defined as follows: ''This industry comprises establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired telecommunications networks. Transmission facilities may be based on a single technology or a combination of technologies.'' [38] The SBA has developed a small business size standard for this category, which is: All such firms having 1,500 or fewer employees.[39] Census data for 2007 shows that there were 3,188 firms that operated for the duration of that year.[40] Of those, 3,144 had fewer than 1,000 employees, and 44 firms had more than 1,000 employees. Thus under this category and the associated small business size standard, the majority of such firms can be considered small.

183. Cable Companies and Systems. The Commission has also developed its own small business size standards, for the purpose of cable rate regulation. Under the Commission's rules, a ''small cable company'' is one serving 400,000 or fewer subscribers, nationwide.[41] Industry data indicate that of approximately 1,100 cable operators nationwide, all but ten are small under this size standard.[42] In addition, under the Commission's rules, a ''small system'' is a cable system serving 15,000 or fewer subscribers.[43] Current Commission records show 4,945 cable systems nationwide.[44] Of this total, 4,380 cable systems have fewer than 20,000 subscribers, and 565 systems have 20,000 or more subscribers, based on the same records. Thus, under this standard, we estimate that most cable systems are small entities.

184. Cable System Operators. The Communications Act of 1934, as amended, also contains a size standard for small cable system operators, which is ''a cable operator that, directly or through an affiliate, serves in the aggregate fewer than 1 percent of all subscribers in the United States and is not affiliated with any entity or entities whose gross annual revenues in the aggregate exceed $250,000,000.'' [45] The Commission has determined that an operator serving fewer than 677,000 subscribers shall be deemed a small operator, if its annual revenues, when combined with the total annual revenues of all its affiliates, do not exceed $250 million in the aggregate.[46] Industry data indicate that of approximately 1,100 cable operators nationwide, all but ten are small under this size standard.[47] We note that the Commission neither requests nor collects information on whether cable system operators are affiliated with entities whose gross annual revenues exceed $250 million,[48] and therefore we are unable to estimate more accurately the number of cable system operators that would qualify as small under this size standard.

185. Direct Broadcast Satellite (''DBS'') Service. DBS service is a nationally distributed subscription service that delivers video and audio programming via satellite to a small parabolic ''dish'' antenna at the

[31] 13 CFR 121.201 (NAICS code 515120) (updated for inflation in 2010).

[32] *See FCC News Release,* Broadcast Station Totals as of December 31, 2013 (rel. January 8, 2014), *http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0108/DOC-325039A1.pdf.*

[33] We recognize that BIA's estimate differs slightly from the FCC total given.

[34] ''[Business concerns] are affiliates of each other when one concern controls or has the power to control the other or a third party or parties controls or has to power to control both.'' 13 CFR 21.103(a)(1).

[35] *See FCC News Release,* Broadcast Station Totals as of December 31, 2013 (rel. January 8, 2014), *http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0108/DOC-325039A1.pdf.*

[36] *See generally* 5 U.S.C. 601(4), (6).

[37] *See FCC News Release,* Broadcast Station Totals as of December 31, 2013 (rel. January 8, 2014), *http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0108/DOC-325039A1.pdf.*

[38] U.S. Census Bureau, *2012 NAICS Definitions: 517110 Wired Telecommunications Carriers, http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517110&search=2012* (last visited May 5, 2014).

[39] U.S. Small Business Administration, Table of Small Business Size Standards Matched to North American Industry Classification System Codes, at 28 (2014), *http://www.sba.gov/sites/default/files/files/size_table_01222014.pdf.*

[40] *See* U.S. Census Bureau, American FactFinder, 2007 Economic Census of the United States, Table No. EC0751SSSZ5, Establishment and Firm Size: Employment Size of Firms for the United States: 2007, NAICS code 517110, *http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ5* (last visited May 7, 2014).

[41] 47 CFR 76.901(e). The Commission determined that this size standard equates approximately to a size standard of $100 million or less in annual revenues. Implementation of Sections of the 1992 Cable Act: Rate Regulation, *Sixth Report and Order and Eleventh Order on Reconsideration,* 10 FCC Rcd 7393, 7408 (1995).

[42] Industry Data, National Cable & Telecommunications Association, *https://www.ncta.com/industry-data* (last visited May 6, 2014); R.R. Bowker, *Broadcasting & Cable Yearbook 2010,* ''Top 25 Cable/Satellite Operators,'' p. C–2 (data current as of December, 2008).

[43] 47 CFR 76.901(c).

[44] The number of active, registered cable systems comes from the Commission's Cable Operations and Licensing System (COALS) database on Aug. 28, 2013. A cable system is a physical system integrated to a principal headend.

[45] 47 U.S.C. 543(m)(2); *see* 47 CFR 76.901(f) & nn. 1–3.

[46] 47 CFR 76.901(f); *see* Public Notice, *FCC Announces New Subscriber Count for the Definition of Small Cable Operator,* DA 01–158 (Cable Services Bureau, Jan. 24, 2001).

[47] R.R. Bowker, *Broadcasting & Cable Yearbook 2006,* ''Top 25 Cable/Satellite Operators,'' pages A–8 & C–2 (data current as of June 30, 2005); Warren Communications News, *Television & Cable Factbook 2006,* ''Ownership of Cable Systems in the United States,'' pp. D–1805 to D–1857.

[48] The Commission does receive such information on a case-by-case basis if a cable operator appeals a local franchise authority's finding that the operator does not qualify as a small cable operator pursuant to 76.901(f) of the Commission's rules. See 47 CFR 76.909(b).

subscriber's location. DBS, by exception, is now included in the SBA's broad economic census category, Wired Telecommunications Carriers,[49] which was developed for small wireline firms. Under this category, the SBA deems a wireline business to be small if it has 1,500 or fewer employees.[50] To gauge small business prevalence for the DBS service, the Commission relies on data currently available from the U.S. Census for the year 2007. According to that source, there were 3,188 firms that in 2007 were Wired Telecommunications Carriers. Of these, 3,144 operated with less than 1,000 employees, and 44 operated with more than 1,000 employees. However, as to the latter 44 there is no data available that shows how many operated with more than 1,500 employees. Based on this data, the majority of these firms can be considered small.[51] Currently, only two entities provide DBS service, which requires a great investment of capital for operation: DIRECTV and EchoStar Communications Corporation (''EchoStar'') (marketed as the DISH Network).[52] Each currently offers subscription services. DIRECTV[53] and EchoStar[54] each report annual revenues that are in excess of the threshold for a small business. Because DBS service requires significant capital, we believe it is unlikely that a small entity as defined by the SBA would have the financial wherewithal to become a DBS service provider.

186. Cable and Other Subscription Programming. This industry comprises establishments primarily engaged in operating studios and facilities for the broadcasting of programs on a subscription or fee basis. The broadcast programming is typically narrowcast in nature (e.g., limited format, such as news, sports, education, or youth-oriented). These establishments produce programming in their own facilities or acquire programming. The programming material is usually delivered to a third party, such as cable systems or direct-to-home satellite systems, for transmission to viewers.[55] The SBA size standard for this industry establishes as small any company in this category which receives annual receipts of $38.5 million or less.[56] Based on U.S. Census data for 2007, a total of 659 establishments operated for the entire year.[57] Of that 659, 197 operated with annual receipts of $10 million or more. The remaining 462 establishments operated with annual receipts of less than $10 million. Based on this data, the Commission estimates that the majority of establishments operating in this industry are small.

187. Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing. The Census Bureau defines this category as follows: ''This industry comprises establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment. Examples of products made by these establishments are: Transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment.''[58] The SBA has developed a small business size standard for Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing, which is: All such firms having 750 or fewer employees.[59] According to Census Bureau data for 2007, there were a total of 939 establishments in this category that operated for part or all of the entire year. Of this total, 912 had less than 500 employees and 17 had more than 1000 employees.[60] Thus, under that size standard, the majority of firms can be considered small.

188. Audio and Video Equipment Manufacturing. The SBA has classified the manufacturing of audio and video equipment under in NAICS Codes classification scheme as an industry in which a manufacturer is small if it has fewer than 750 employees.[61] Data contained in the 2007 U.S. Census indicate that 492 establishments operated in that industry for all or part of that year. In that year, 488 establishments had fewer than 500 employees; and only 1 had more than 1000 employees.[62] Thus, under the applicable size standard, a majority of manufacturers of audio and video equipment may be considered small.

189. Wireless Telecommunications Carriers (except satellite). The Census Bureau defines this category as follows: ''This industry comprises establishments engaged in operating and maintaining switching and transmission facilities to provide communications via the airwaves. Establishments in this industry have spectrum licenses and provide services using that spectrum, such as cellular phone services, paging services, wireless Internet access, and wireless video services.''[63] The appropriate size standard under SBA rules is for the category Wireless Telecommunications Carriers (except Satellite). The size standard for that category is that a business is small if it has 1,500 or fewer employees.[64] For this category, census data for 2007 show that there were 1,383 firms that operated for the entire year.[65] Of this total, 1,368 firms had employment of 999 or fewer employees and 15 had employment of

[49] *See* 13 CFR 121.201 (NAICS code 517110).

[50] *Id.*

[51] *See* U.S. Census Bureau, Table No. EC0751SSSZ5, *Information: Subject Series—Establishment and Firm Size: Employment Size of Firms for the United States: 2007* (NAICS code 517110), *http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ5.*

[52] *See Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming,* Fifteenth Annual Report, MB Docket No. 12–203, 28 FCC Rcd 10496, 10507, para. 27 (2013) (''*15th Annual Report*'').

[53] As of June 2012, DIRECTV is the largest DBS operator and the second largest MVPD, serving an estimated 19.8% of MVPD subscribers nationwide. *See 15th Annual Report,* 28 FCC Rcd at 687, Table B–3.

[54] As of June 2012, DISH Network is the second largest DBS operator and the third largest MVPD, serving an estimated 13.01% of MVPD subscribers nationwide. *Id.* As of June 2006, Dominion served fewer than 500,000 subscribers, which may now be receiving ''Sky Angel'' service from DISH Network. *See id.* at 581, para. 76.

[55] U.S. Census Bureau, *2012 NAICS Definitions: 515210 Cable and Other Subscription Programming, http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=515210&search=2012* (last visited Mar. 6, 2014).

[56] *See* 13 CFR 121.201 (NAICS code 515210).

[57] *See* U.S. Census Bureau, Table No. EC0751SSSZ1, Information: Subject Series—Establishment and Firm Size: Receipts Size of Establishments for the United States: 2007 (NAICS code 515210), *http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ1.*

[58] U.S. Census Bureau, 2012 NAICS Definitions: 334220 Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing, *http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=334220&search=2012* (last visited Mar. 6, 2014).

[59] 13 CFR 121.201 (NAICS code 334220).

[60] See U.S. Census Bureau, Table No. EC0731SG3, *Manufacturing: Summary Series: General Summary: Industry Statistics for Subsectors and Industries by Employment Size: 2007* (NAICS code 334220), *http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_31SG3.*

[61] 13 CFR 121.201 (NAICS code 334310).

[62] *See* U.S. Census Bureau, Table No. EC0731SG3, *Manufacturing: Summary Series: General Summary: Industry Statistics for Subsectors and Industries by Employment Size: 2007* (NAICS code 334310), *http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_31SG3.*

[63] U.S. Census Bureau, *2012 NAICS Definitions: 517210 Wireless Telecommunications Carriers (except Satellite), http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517210&search=2012* (last visited Mar. 6, 2014).

[64] 13 CFR 121.201 (NAICS code 517210).

[65] U.S. Census Bureau, Table No. EC0751SSSZ5, *Information: Subject Series—Establishment and Firm Size: Employment Size of Firms for the United States: 2007* (NAICS code 517210), *http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ5.*

1000 employees or more.[66] Similarly, according to Commission data, 413 carriers reported that they were engaged in the provision of wireless telephony, including cellular service, PCS, and Specialized Mobile Radio (''SMR'') Telephony services.[67] Of these, an estimated 261 have 1,500 or fewer employees and 152 have more than 1,500 employees.[68] Consequently, the Commission estimates that approximately half or more of these firms can be considered small. Thus, using available data, we estimate that the majority of wireless firms can be considered small.

190. Manufacturers of Unlicensed Devices. In the context of this FRFA, manufacturers of Part 15 unlicensed devices that are operated in the UHF–TV band (channels 14–51) for wireless data transfer fall into the category of Radio and Television and Wireless Communications Equipment Manufacturing. The Census Bureau defines this category as follows: ''This industry comprises establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment. Examples of products made by these establishments are: Transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment.'' [69] The SBA has developed the small business size standard for this category as firms having 750 or fewer employees.[70] According to Census Bureau data for 2007, there were a total of 939 establishments in this category that operated for the entire year.[71] Of this total, 912 had less than 500 employees and 17 had more than 1000 employees. Thus, under that size standard, the majority of firms can be considered small.

191. Personal Radio Services/Wireless Medical Telemetry Service (''WMTS''). Personal radio services provide short-range, low power radio for personal communications, radio signaling, and business communications not provided for in other services. The Personal Radio Services include spectrum licensed under part 95 of our rules.[72] These services include Citizen Band Radio Service (''CB''), General Mobile Radio Service (''GMRS''), Radio Control Radio Service (''R/C''), Family Radio Service (''FRS''), Wireless Medical Telemetry Service (''WMTS''), Medical Implant Communications Service (''MICS''), Low Power Radio Service (''LPRS''), and Multi-Use Radio Service (''MURS'').[73] There are a variety of methods used to license the spectrum in these rule parts, from licensing by rule, to conditioning operation on successful completion of a required test, to site-based licensing, to geographic area licensing. Under the RFA, the Commission is required to make a determination of which small entities are directly affected by the rules adopted. Since all such entities are wireless, we apply the definition of Wireless Telecommunications Carriers (except Satellite), pursuant to which a small entity is defined as employing 1,500 or fewer persons.[74] For this category, census data for 2007 show that there were 1,383 firms that operated for the entire year.[75] Of this total, 1,368 firms had employment of 999 or fewer employees and 15 had employment of 1000 employees or more.[76] Thus under this category and the associated small business size standard, the Commission estimates that the majority of personal radio service and WMTS providers are small entities.

192. However, we note that many of the licensees in these services are individuals, and thus are not small entities. In addition, due to the mostly unlicensed and shared nature of the spectrum utilized in many of these services, the Commission lacks direct information upon which to base a more specific estimation of the number of small entities under an SBA definition that might be directly affected by our action.

193. Motion Picture and Video Production. The Census Bureau defines this category as follows: ''This industry comprises establishments primarily engaged in producing, or producing and distributing motion pictures, videos, television programs, or television commercials.'' [77] The SBA has developed a small business size standard for this category, which is: all such businesses having $30 million dollars or less in annual receipts.[78] Census data for 2007 show that there were 9,478 establishments that operated that year.[79] Of that number, 9,128 had annual receipts of $24,999,999 or less, and 350 had annual receipts ranging from not less than $25,000,000 to $100,000,000 or more.[80] Thus, under this size standard, the majority of such businesses can be considered small entities.

194. Radio Broadcasting. The SBA defines a radio broadcast station as a small business if such station has no more than $38.5 million in annual receipts.[81] Business concerns included in this industry are those ''primarily engaged in broadcasting aural programs by radio to the public.'' [82] According to review of the BIA Publications, Inc. Master Access Radio Analyzer Database as of November 26, 2013, about 11,331 (or about 99.9 percent) of 11,341 commercial radio stations have revenues of $35.5 million or less and thus qualify as small entities under the SBA definition. The Commission notes, however, that, in assessing whether a business concern qualifies as small under the above definition, business (control) affiliations [83] must be included. This estimate, therefore, likely

[66] *Id.* Available census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with 1000 employees or more.

[67] *See Trends in Telephone Service* at Table 5.3.

[68] *See id.*

[69] U.S. Census Bureau, *2012 NAICS Definitions: 334220 Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing, http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=334220&search=2012* (last visited Mar. 6, 2014).

[70] 13 CFR 121.201 (NAICS code 334220).

[71] U.S. Census Bureau, Table No. EC0731SG3, *Manufacturing: Summary Series: General Summary: Industry Statistics for Subsectors and Industries by Employment Size: 2007* (NAICS code 334220), *http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_31SG3.*

[72] 47 CFR part 95.

[73] The Citizens Band Radio Service, General Mobile Radio Service, Radio Control Radio Service, Family Radio Service, Wireless Medical Telemetry Service, Medical Implant Communications Service, Low Power Radio Service, and Multi-Use Radio Service are governed by subpart D, subpart A, subpart C, subpart B, subpart H, subpart I, subpart G, and subpart J, respectively, of part 95 of the Commission's rules. *See generally* 47 CFR part 95.

[74] 13 CFR 121.201 (NAICS Code 517210).

[75] U.S. Census Bureau, Table No. EC0751SSSZ5, *Information: Subject Series—Establishment and Firm Size: Employment Size of Firms for the United States: 2007* (NAICS code 517210), *http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ5.*

[76] *Id.* Available census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with 1000 employees or more.

[77] U.S. Census Bureau, *2012 NAICS Definitions: 512110 Motion Picture and Video Production, http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=512110&search=2012* (last visited Mar. 6, 2014).

[78] 13 CFR 121.201, 2012 NAICS code 512110.

[79] U.S. Census Bureau, Table No. EC0751SSSZ5, *Information: Subject Series—Establishment and Firm Size: Employment Size of Firms for the United States: 2007* (NAICS code 512110), *http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ5.*

[80] *See id.*

[81] 13 CFR 121.201, 2012 NAICS code 515112.

[82] U.S. Census Bureau, *2012 NAICS Definitions: 515112 Radio Broadcasting, http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=515112&search=2012* (last visited Mar. 6, 2014).

[83] *See* n.14.

overstates the number of small entities that might be affected, because the revenue figure on which it is based does not include or aggregate revenues from affiliated companies.

195. In addition, an element of the definition of ''small business'' is that the entity not be dominant in its field of operation. The Commission is unable at this time to define or quantify the criteria that would establish whether a specific radio station is dominant in its field of operation. Accordingly, the estimate of small businesses to which rules may apply does not exclude any radio station from the definition of a small business on this basis and therefore may be over-inclusive to that extent. Also, as noted, an additional element of the definition of ''small business'' is that the entity must be independently owned and operated. The Commission notes that it is difficult at times to assess these criteria in the context of media entities and the estimates of small businesses to which they apply may be over-inclusive to this extent.

196. Radio, Television, and Other Electronics Stores. The Census Bureau defines this economic census category as follows: ''This U.S. industry comprises: (1) Establishments known as consumer electronics stores primarily engaged in retailing a general line of new consumer-type electronic products such as televisions, computers, and cameras; (2) establishments specializing in retailing a single line of consumer-type electronic products; (3) establishments primarily engaged in retailing these new electronic products in combination with repair and support services; (4) establishments primarily engaged in retailing new prepackaged computer software; and/or (5) establishments primarily engaged in retailing prerecorded audio and video media, such as CDs, DVDs, and tapes.'' [84] The SBA has developed a small business size standard for Electronic Stores, which is: All such firms having $32.5 million or less in annual receipts.[85] According to Census Bureau data for 2007, there were 11,358 firms in this category that operated for the entire year.[86] Of this total, 11,323 firms had annual receipts of under $25 million, and 35 firms had receipts of $25 million or more but less than $50 million.[87] Thus, the majority of firms in this category can be considered small.

Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements

197. *Use of databases.* The NPRM seeks comment on the use of use of databases. Wireless microphone technologies today do not use a database as a mechanism for indicating to the wireless microphone user that particular frequencies in a particular area were available, such as at particular locations that were not being used by other users with priority over the wireless microphone users. White space devices operating in the TV bands must access a database to determine that spectrum is available for their operations and that they would not potentially be interfering with other users at specified locations and times.[88] Would wireless microphone systems potentially benefit from the ability to access to a database? Could requiring use of a database for gaining access to spectrum in a particular band or identifying particular locations and times where they may operate without causing interference to other users in the band help to mitigate or eliminate the concerns of other users in the band that wireless microphone operations might cause harmful interference to these other users? What might be the costs and benefits of developing and using a database, and would these differ depending on the needs of particular types of wireless microphone users?

198. *Use of other technologies that promote opportunities to access additional spectrum.* We seek comment on other technological advancements that could promote greater opportunities for wireless microphones to share use of spectrum in different bands.

199. Are there technological advances that are currently available or contemplated that better enable wireless microphones to adjust dynamically to a particular interference environment, either automatically or through coordination, to promote more efficient use among the wireless microphones or among wireless microphones and other users in the band? For instance, could devices that include sophisticated dynamic power variability capabilities help promote more intensive use of the spectrum resource in a given area? Would these more dynamic capabilities enable wireless microphones to vary or adjust power levels to minimize or eliminate interference to other users in a particular setting, or facilitate more re-use of the available spectrum? We invite comment on whether technological advances along these lines could both facilitate more efficient use of the spectrum while also helping to ensure that they do not cause harmful interference to other users of the spectrum.

200. Are there particular technologies, such as an ''electronic key'' or similar mechanism, that would ensure that a wireless microphone device be able to access and operate only on particular frequencies at particular locations and times, but nowhere else, thus eliminating the potential for harmful interference to other users (such as other users with primary or superior spectrum rights are particularly sensitive to harmful interference) and by so doing provide additional opportunities for wireless microphone operations in bands? [89] Are there other approaches that would effectively limit wireless microphone operation to particular locations, thus protecting other operators from harmful interference? We seek broad comment on the development and use of these types of mechanisms and the tradeoffs or practicalities associated with them. Are there particular scenarios or bands in which use of these mechanisms could provide additional opportunities to access spectrum?

201. *Other technological advances.* Are there other technological advancements that could help to ensure that the various different wireless microphone users' needs are accommodated over the longer term? What are they? Are there actions the Commission should take to promote these developments so that they occur in a timely fashion?

202. In this proceeding, the Commission invites comment on potential revisions to the existing rules for Part 74 wireless microphone (and other LPAS) operations in the spectrum that will remain allocated for TV services following the repacking process. Specifically, we invite comment on revisions to the technical rules for LPAS operations on the VHF

[84] U.S. Census Bureau, *2012 NAICS Definitions, 443142 Electronics,http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=443142&search=2012* NAICS Search (last visited May 6, 2014).

[85] 13 CFR 121.201, NAICS code 443142.

[86] U.S. Census Bureau, 2007 Economic Census, Subject Series: Retail Trade, Estab & Firm Size: Summary Statistics by Sales Size of Firms for the United States: 2007, NAICS code 443142 (released 2010), *http://www2.census.gov/econ2007/EC/sector44/EC0744SSSZ4.zip* (last visited May 7, 2014). Though the current small business size standard for electronic store receipts is $30 million or less in annual receipts, in 2007 the small business size standard was $9 million or less in annual receipts. In 2007, there were 11,214 firms in this category that operated for the entire year. Of this total, 10,963 firms had annual receipts of under $5 million, and 251 firms had receipts of $5 million or more but less than $10 million. *Id.*

[87] *Id.* An additional 33 firms had annual receipts of $50 million or more.

[88] 47 CFR 15.711(b)(3).

[89] See Section III.C.8, above (discussion of use of an electronic key when accessing the 1.4 GHz band).

band; on permitting licensed LPAS operations on channels in locations closer to the television stations (including within the DTV contour), without the need for coordination, provided that the television signal falls below specified technical thresholds; on adoption of the ETSI emission mask standard for analog and digital wireless microphones; and general comment on other potential revisions concerning licensed LPAS operations in the TV bands.

203. *Consumer Education and Outreach.* We seek comment on the consumer education and outreach efforts that should be employed to educate wireless microphone users, particularly unlicensed users operating in the repurposed 600 MHz band. Our goals are to make information available so users are aware that they must cease operating their wireless microphones on the repurposed 600 MHz Band no later than the end of the transition period (*i.e.,* 39 months after the release of the *Channel Reassignment PN*); to set in motion a process so they are aware of relevant factors concerning the operation of wireless microphones that are currently in use; and to establish a means for users to locate additional spectrum and equipment for their operations. A successful consumer education and outreach campaign will involve the Commission staff working with a broad group of interested entities, including wireless microphone manufacturers, wireless microphones users, and user representatives.

204. Given that a portion of the UHF spectrum that is currently used and available for wireless microphone operations may no longer be available following the incentive auction,[90] we seek comment on how wireless microphone users can be provided access to information on the specific frequencies and the geographic areas of repurposed spectrum that will no longer be available for wireless microphone use at the end of the transition. What specific information should be provided to wireless microphone users to ensure that they know the requirements for operating in the repurposed spectrum during the transition period and the need to exit the band by the end of the transition? Although the *Channel Reassignment PN* will provide information on the spectrum that will be repurposed and no longer available for wireless microphones,[91] we first seek comment on what steps can be taken to provide wireless microphone users with information on the transition prior to the auction. For example, we seek comment on whether explanations could be provided on the Commission's Web site and on the Web sites of manufacturers that would explain the steps required under the Commission's rules to vacate the repurposed 600 MHz Band, and any information on alternative spectrum that is currently available outside of this spectrum, as well any additional spectrum bands that may become available for wireless microphone operations beyond those already provided for in the rules.[92]

205. What other means should be employed to provide wireless microphone users notice of the repurposed spectrum that will be assigned to new wireless licensees, including the specific frequencies in the UHF spectrum and the geographic locations that will no longer be available for wireless microphone operations? We seek comment on whether it would it be beneficial for wireless microphone users to have access to a database that identifies spectrum in the repurposed 600 MHz Band. For example, should some form of online mapping tool be made available to allow users to enter the location and operating frequencies of a wireless microphone and determine whether it operates in the repurposed 600 MHz Band? In the event that a database or similar approach is adopted, we seek comment on who should be responsible for developing and maintaining (hosting) it, including who should be responsible for its cost. Commenters should provide quantitative and qualitative data on costs and benefits of their proposals.

206. Further, should the Commission work with wireless microphone manufacturers to obtain information on models of wireless microphones that the Commission could list on its Web site? For example, this information could include a list all models of wireless microphones sold in the U.S., and all wireless microphone models that operate in the repurposed 600 MHz Band, as well as where on the device or in its product literature the user could look to determine the frequencies on which it is capable of operating.[93] We seek comment on whether making this type of information publically available would help to facilitate a smooth transition from the 600 MHz Band.

207. In addition to steps that may involve manufacturers, we seek comment on what steps other parties associated with the sale and operation of wireless microphones may be able to take to provide users with information relevant to the transition. These other parties may include: Wireless microphone distributors and retailers; parties that lease or manage wireless microphones; trade associations and user groups, including those that have participated in Commission proceedings concerning wireless microphones; organizations that host Web sites and publish information that addresses wireless microphone operations and use or are reasonably expected to have significant numbers of wireless microphone users among their members and readers; and engineering and industry associations or other groups with members that use or operate wireless microphones. Involvement in education and outreach by these parties will be essential, given users' investment in wireless microphone equipment and the upcoming changes regarding wireless microphone use, including the requirement that they vacate the 600 MHz Band. Further, it is important that education and outreach extend to information concerning any newly-allocated spectrum for wireless microphone operations and the potential for users to opt for a suite of wireless microphones operating in different spectrum bands and with different capabilities, depending on the user's specific requirements. We note that wireless microphone users can encompass a wide range of entities, including both licensed and unlicensed users, and parties with differing levels of wireless microphone needs and expertise covering many different applications. Based on these considerations, it is likely that the need for information on the various spectrum bands that will be available for wireless microphone operations, and the conditions specific to each, will be vital. We seek comment on these matters, and on what steps can be taken to assure

[90] *Incentive Auction R&O,* 29 FCC Rcd 6704–05 para. 316.

[91] In addition to initiating the 39-month transition period, the *Channel Reassignment PN* will identify the new channel assignments for full power and Class A television stations that have been reassigned to different channels resulting from the incentive auction and the repacking process. See *Incentive Auction R&O,* 29 FCC Rcd at 6782 para. 525.

[92] Elsewhere in the *NPRM,* we seek comment on whether a number of other spectrum bands should be allocated for wireless microphone use. See Sections III.C.5, III.C.8, and III C.10, above.

[93] As part of the transition of wireless microphones from the 700 MHz band, the Commission made available a list of many wireless microphones that operated on the 700 MHz band, as provided by a number of manufacturers. *See http://www.fcc.gov/encyclopedia/wireless-microphones-manufacturers-equipment-list.* Wireless microphone users could look at this information and determine if their devices were 700 MHz wireless microphones and thus could not be used after the transition deadline, or given information to contact the Commission for additional assistance if the manufacturer of their devices was not listed.

that the information to educate users on the transition will be commensurate with the appropriate needs and levels of expertise of all users.

208. The Commission seeks comment on what additional information we should make available for wireless microphone users, including Commission-issued consumer ''fact sheets'' and ''frequently asked questions'' (''FAQ's'') which would address, among other matters, information on operation in the 600 MHz Band, the reason for the need to operate on frequencies outside of that band following the transition, the availability of other frequency bands for wireless microphone use, and the need to comply with Commission rules. We further seek comment on how to release or distribute these materials in order to most effectively and efficiently reach the target audience of wireless microphone users.

209. The Commission seeks comment on the specific actions that wireless microphone manufacturers, distributors, retailers and other entities comprising the wireless microphone community should take to inform the wide range of wireless microphone users about the ongoing developments concerning wireless microphone use—particularly the need to vacate the repurposed 600 MHz Band, the timetable for doing so, and the conditions for operating in the band during the transition period. We seek comment on whether and to what extent these entities can make this type of information available, including, as appropriate, by posting it on their Web sites, including it in all sales literature, or taking other steps to inform current or potential wireless microphone users of matters concerning the operation of their devices. We also seek comment on whether manufacturers would consider rebates, equipment trade-ins, or similar programs to facilitate the transition, and what effect the 39-month transition period would have on a decision to implement such a program. In addition, we seek comment on the economic costs and benefits of adopting consumer outreach measures.

210. *Disclosure Requirements.* The Commission proposes to revise our point-of-sale disclosure requirement that the Commission adopted in the *Wireless Microphone Report and Order* in order to provide information to wireless microphone users that may have to purchase or lease new equipment so that they can vacate the repurposed 600 MHz Band. In the *TV Bands Wireless Microphones Report and Order,* the Commission adopted a point-of-sale requirement to help assure that consumers were informed of their rights and obligations if they chose to operate wireless microphones and other low power auxiliary stations in the core TV bands (defined in the rule as channels 2–51, excluding channel 37).[94] Specifically, the Commission adopted a requirement for manufacturers and distributors of wireless microphones that operate in the core TV bands to provide a written disclosure informing consumers of the requirements for operating devices in that spectrum and to display the disclosure at the point of sale and on their Web sites.[95] The Commission also provided that persons who manufacture or market wireless microphones destined for export and capable of operating in the 700 MHz Band must include labeling stating that the devices cannot be used in the United States.[96]

211. We propose to revise the existing point-of-sale disclosure requirement in order to facilitate a smoother transition in which wireless microphone users are informed of the need to vacate the repurposed 600 MHz Band, while fully understanding their rights and obligations during the transition period and at the end of the transition period. With regard to sales of wireless microphones that are capable of operating in repurposed spectrum, we propose to require that such sales include point-of-sale disclosures that inform buyers that they are buying a microphone that cannot be used in certain frequencies following the transition. We also seek comment on how point-of-sale disclosures could be designed to effectively address any ban on manufacturing and marketing of wireless microphones that are capable of operating in the repurposed 600 MHz Band.[97] We propose that the revised point-of-sale disclosures should direct buyers to the manufacturer's toll free telephone number or the manufacturer's Web site where the buyer can obtain more detailed information on the extent to which the microphone may be affected by repurposing of 600 MHz Band. Should we retain the existing language in the point-of-sale disclosure requirement that includes the Commission's toll free number and the Commission's Web site where users can obtain additional information on the operation of wireless microphones during the transition period and after the transition period? What other information should be included in the disclosure?

212. We propose that the effective date for any disclosure requirement, including a point-of-sale requirement, which we may adopt in connection with this or a related proceeding, shall be 12 months after the release of the *Channel Reassignment PN*—which will mark the effective date of channel reassignments based on the repacking process, specify any specific channel assignments for television stations that will continue to broadcast, and start the clock running on the post-auction transition period—or should some other date be used instead? We seek comment on the particular factors that should enter into this determination. We note that in adopting the current disclosure requirement, the Commission stated that it would remain in effect until the effective date of the final rules adopted in response to the *2010 TV Bands Wireless Microphones FNPRM.*[98]

[94] *See TV Bands Wireless Microphones R&O,* 25 FCC Rcd at 687–691 paras. 91–106.

[95] *See TV Bands Wireless Microphone R&O,* 25 FCC Rcd at 688–689 para. 96; 47 CFR 15.216. The required disclosure states: ''Most users do not need a license to operate this wireless microphone system. Nevertheless, operating this microphone system without a license is subject to certain restrictions: The system may not cause harmful interference; it must operate at a low power level (not in excess of 50 milliwatts); and it has no protection from interference received from any other device. Purchasers should also be aware that the FCC is currently evaluating use of wireless microphone systems, and these rules are subject to change. For more information, call the FCC at 1–888–CALL–FCC (TTY: 1–888–TELL–FCC) or visit the FCC's wireless microphone Web site at *http://www.fcc.gov/cgb/wirelessmicrophones.*'' *See* 47 CFR 15.216, Appendix. The Commission noted that manufacturers and distributors could satisfy the disclosure requirement in more than one way, including by displaying the text in a prominent manner on the product box via a label or sticker; displaying the text immediately adjacent to the device in a manner clearly associated with the device; and, for wireless microphones offered online or via direct mail or catalog, displaying the text in close proximity to the images and descriptions of each wireless microphone. *See TV Bands Wireless Microphones Report and Order*, 25 FCC Rcd at 689 para. 100.

[96] *See TV Bands Wireless Microphones R&O*, 25 FCC Rcd at 666 para. 43; *see also* 47 CFR 74.851(h). In the *TV Bands Wireless Microphones FNPRM*, the Commission also sought comment on whether to adopt labeling and other marketing restrictions to help ensure that devices certificated as low power auxiliary stations under part 74 were marketed only to parties eligible for a part 74 license. In particular, the Commission sought comment on whether to require manufacturers to direct marketing of part 74-certificated devices only to parties eligible to operate them; whether to require manufacturers to track the parties to whom their products are marketed; whether to require manufacturers to provide a label visible at the time of purchase or instructions in the user manual advising purchasers of the requirement to obtain a license; and whether to prohibit manufacturers and distributors from selling devices certificated under Part 74 unless the sale is to a party that has committed in writing that it is a bona fide reseller or eligible for a license under Part 74. *See TV Bands Wireless Microphones FNPRM*, 25 FCC Rcd at 701–702 paras. 141–144.

[97] *See infra* Section III.C.1.b(iii).

[98] *See TV Bands Wireless Microphones FNPRM,* 25 FCC Rcd at 689 para. 100.

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

213. The RFA requires an agency to describe any significant alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): (1) The establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.[99]

214. In the *NPRM* we request comment on whether, apart from establishing such a TV signal threshold, we should adopt any other safeguards to ensure that licensed wireless microphone operators comply with this threshold and do not otherwise cause harmful interference to TV reception. We note at the outset that because we would limit these types of operations to licensed wireless microphone users, we would expect such users to have the requisite wireless microphone systems, as well as technical and operational abilities, to be able to determine the level of the co-channel TV signals at a given location, and thus would be able to comply with any threshold rule that we adopted. Is this a reasonable expectation? To what extent would a wireless microphone operations require a low TV signal to be able operate effectively on a co-channel basis? Should we require licensed wireless microphone users to register their co-channel operations in the TV bands databases, which could provide information to any television licensee concerned about possible harmful interference? Are there other actions we should take?

215. As an alternative approach, the Commission seeks comment on whether it should permit co-channel licensed wireless microphone operations in indoor venues, such as in theaters or music auditoriums. Could an appropriate approach towards indoor operations be developed that would also effectively preclude harmful interference to any potential TV viewers at indoor locations? For instance, could certain locations be readily identified where wireless microphone operations can be permitted, provided of course that they are operated consistent with applicable technical requirements, including power limits and out-of-bound emissions requirements? Or, considering that in order to operate effectively wireless microphones need access to channels that are sufficiently interference-free, is it reasonable to expect that co-channel wireless microphone operations would only take place in indoor locations on channels with relatively low or effectively non-existent TV signal, and thus conclude that such operations would not be likely to effectively harm TV viewers? Some commenters in the incentive auction proceeding suggested that such operations may already take place without incident.[100] As we explore this approach, the Commission seeks comment on the benefits or downsides of allowing licensed wireless microphone operations at indoor locations, or at specified types of indoor locations. We ask that commenters provide any technical analysis bases for their recommendations.

216. We also invite comment on other approaches that we should take on expanding wireless microphone operations on a co-channel basis closer to television station operations. Again, commenters proposing any alternative approaches should provide technical analyses to support their approaches, and discuss the benefits of such an approach and how their approaches would not cause harmful interference to channels that would be used for wireless microphone operations.

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

217. None.

Congressional Review Act

218. The Commission will send a copy of the Notice of Proposed Rulemaking to Congress and the Government Accountability Office pursuant to the Congressional Review Act, *see* 5 U.S.C. 801(a)(1)(A).

Ordering Clauses

219. Pursuant to sections 1, 4(i), 7(a), 301, 303(f), 303(g), 303(r), 307(e) and 332 of the Communications Act of 1934, as amended, 47 U.S.C. 151, 154(i), 157(a), 301, 303(f), 303(g), 303(r), 307(e), and 332, the Notice of Proposed Rulemaking *is adopted.*

220. The Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, *shall send* a copy of the Notice of Proposed Rule Making, including the Initial Regulatory Flexibility Analysis to the Chief Counsel for Advocacy of the Small Business Administration.

List of Subjects in 47 CFR part 74

Communications equipment, Education, Reporting and recordkeeping requirements.

Federal Communications Commission.

Marlene H. Dortch,

Secretary.

For the reasons discussed in the preamble, the Federal Communications Commission proposes to amend 47 CFR part 74 to read as follows:

PART 74—EXPERIMENTAL RADIO, AUXILIARY, SPECIAL BROADCAST AND OTHER PROGRAM DISTRIBUTIONAL SERVICES

Subpart H—Low Power Auxiliary Stations

■ 1. The authority citation for part 74 continues to read as follows:

Authority: 47 U.S.C. 154, 302a, 303, 307, 309, 336 and 554.

■ 2. Section 74.801 is amended by adding the definition for ''Repurposed 600 MHz Band'' in alphabetical order to read as follows:

§ 74.801 Definitions.

* * * * *

Repurposed 600 MHz Band. Frequencies that will be reallocated and reassigned for part 27 600 MHz Band services as determined by the outcome of the auction conducted pursuant to *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, Report and Order,* GN Docket No. 12–268 (FCC 14–50), 29 FCC 6567 (2014).

* * * * *

■ 3. Section 74.832 is amended by revising paragraph (d) to read as follows:

§ 74.832 Licensing Requirements and procedures.

* * * * *

(d) Cable television operations, motion picture and television program producers, large venue owners or operators, and professional sound companies may be authorized to operate low power auxiliary stations in the bands allocated for TV broadcasting and in the 944–952 MHz band.

* * * * *

■ 4. Section 74.851 is amended by revising the section heading and paragraph (i), and adding paragraphs (j) through (l) to read as follows:

[99] *See* 5 U.S.C. 603(c).

[100] *See, e.g.,* Sennheiser Reply Comments (Docket No. 12–268) at 18.

§ 74.851 Certification of equipment; prohibition on manufacture, import, sale, lease, offer for sale or lease, or shipment of devices that operate in the 700 MHz Band or the 600 MHz Band; labeling for 700 MHz or 600 MHz band equipment destined for non-U.S. markets; disclosures.

* * * * *

(i) Effective nine months after the release of the Commission's Channel Reassignment Public Notice issued pursuant to *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions,* Report and Order, GN Docket No. 12–268 (FCC 14–50), 29 FCC 6567 (2014), certification may no longer be obtained for low power auxiliary stations or wireless video assist devices that are capable of operating in the repurposed 600 MHz band as defined in § 74.801.

(j) Effective eighteen months after the release of the Commission's Channel Reassignment Public Notice issued pursuant to *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions,* Report and Order, GN Docket No. 12–268 (FCC 14–50), 29 FCC 6567 (2014), no person shall manufacture, import, sell, lease, offer for sale or lease, or ship low power auxiliary stations or wireless video assist devices that are capable of operating in the repurposed 600 MHz band as defined in § 74.801. This prohibition does not apply to devices manufactured solely for export.

(k) Effective eighteen months after the release of the Commission's Channel Reassignment Public Notice issued pursuant to *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions,* Report and Order, GN Docket No. 12–268 (FCC 14–50), 29 FCC 6567 (2014), any person who manufactures, sells, leases, or offers for sale or lease low power auxiliary stations or wireless video assist devices that are destined for non-U.S. markets and that are capable of operating in the repurposed 600 MHz band as defined in § 74.801, shall include labeling and make clear in all sales, marketing, and packaging materials, including online materials, relating to such devices that the devices cannot be operated in the U.S.

(l) Any person, whether such person is a wholesaler or a retailer, who manufactures, sells, leases, or offers for sale or lease low power auxiliary stations or wireless video assist devices that operate in the repurposed 600 MHz band is subject to the disclosure requirements in § 15.216 of this chapter.

■ 5. Section 74.861 is amended by adding paragraphs (d)(4) and (e)(7) to read as follows:

§ 74.861 Technical Requirements.

* * * * *

(d) * * *

(4) Effective as of [date of publication of final rule], emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in Section 8.3 of ETSI EN 300 422–1, *Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; part 1: Technical characteristics and methods of measurement.*

* * * * *

(e) * * *

(7) Effective as of [date of publication of final rule], emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in Section 8.3 of ETSI EN 300 422–1, *Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; part 1: Technical characteristics and methods of measurement.*

* * * * *

[FR Doc. 2014–26675 Filed 11–20–14; 8:45 am]

BILLING CODE 6712–01–P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 223

RIN 0648–XA984

Endangered and Threatened Species; Proposed Listing Determinations for Nassau Grouper; Public Hearing

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice of public hearing.

SUMMARY: We (NMFS) will hold a public hearing in St. Thomas, U.S. Virgin Islands, in December 2014 for the purpose of accepting public comments on the proposal to list the Nassau grouper (*Epinephelus striatus*) as threatened under the Endangered Species Act of 1973, as amended (ESA).

DATES: The meeting will be held on December 9, 2014, at 7 p.m. Atlantic Standard Time.

ADDRESSES: The meeting will be held at the Marriott Frenchmans Reef Hotel, 5 Estate Bakkeroe, St. Thomas, U.S. Virgin Islands. Information about the proposed listing of the Nassau grouper under the ESA is available at: *http://sero.nmfs.noaa.gov/protected_resources/listing_petitions/species_esa_consideration/index.html.*

Comments, identified by NOAA–NMFS–2014–0101, may also be submitted by any of the following methods:

- *Electronic Submissions:* Submit all electronic comments via the Federal eRulemaking Portal. Go to *www.regulations.gov/#!docketDetail;D=NOAA-NMFS-2014-0101,* click the ''Comment Now!'' icon, complete the required fields, and enter or attach your comments.
- *Facsimile (fax)*: 727–824–5309.
- *Mail:* NMFS, Southeast Regional Office, 263 13th Avenue South, St. Petersburg, FL 33701.
- *Hand delivery:* You may hand deliver written information to our office during normal business hours at the street address given above.

FOR FURTHER INFORMATION CONTACT: Jason Rueter, NMFS, Southeast Regional Office (727) 824–5350; or Lisa Manning, NMFS, Office of Protected Resources (301) 427–8466.

SUPPLEMENTARY INFORMATION:

Background

On September 2, 2014, we published a proposed rule to list the Nassau grouper (*Epinephelus striatus*) as threatened under the ESA (79 FR 51929). While the species still occupies its historical range, spawning aggregations have been reduced in size and number due to fishing pressure. The lack of adequate management measures to protect these aggregations increases the extinction risk of Nassau grouper. Based on these considerations, described in more detail in the proposed rule (79 FR 51929; September 2, 2014), we concluded that the Nassau grouper is not currently in danger of extinction throughout all or a significant portion of its range, but is likely to become so within the foreseeable future.

We are currently soliciting relevant information that may inform the final listing and designation of critical habitat. In particular we seek comments containing: (1) Information concerning the location(s) and status of any spawning aggregations of the species; and (2) Information concerning the threats to the species; and (3) Efforts being made to protect the species throughout its current range. See **ADDRESSES** section above for information on how to submit comments. The public comment period on the proposed rule is open until December 31, 2014.