FEDERAL COMMUNICATIONS COMMISSION

47 CFR Parts 1, 2, 25 and 27

[GN Docket No. 18–122; GN Docket No. 17–183; RM–11791; RM–11778; FCC 18–91]

Expanding Flexible Use of the 3.7 to 4.2 GHz Band

AGENCY: Federal Communications Commission.

ACTION: Proposed rule.

SUMMARY: In this document, the Federal Communications Commission (Commission or FCC) adopts a Notice of Proposed Rulemaking (NPRM) to pursue the joint goals of making 3.7–4.2 GHz band spectrum available for new wireless uses while balancing desired speed to the market, efficiency of use, and effectively accommodating incumbent Fixed Satellite Service (FSS) and Fixed Service (FS) operations in the band. The Commission seeks comment on various proposals for transitioning all or part of the band for flexible use, terrestrial mobile spectrum, with clearing for flexible use beginning at 3.7 GHz and moving higher up in the band as more spectrum is cleared. The Commission also seeks comment on potential changes to its rules to promote more efficient and intensive fixed use of the band on a shared basis starting in the top segment of the band and moving down the band.

DATES: Comments are due on or before October 29, 2018; reply comments are due on or before November 27, 2018.

ADDRESSES: You may submit comments, identified by GN Docket No. 18–122, by any of the following methods:

- Federal eRulemaking Portal: *http://www.regulations.gov.* Follow the instructions for submitting comments.
- Federal Communications Commission's website: *https://www.fcc.gov/ecfs/.* Follow the instructions for submitting comments.
- *People with Disabilities:* Contact the FCC to request reasonable accommodations (accessible format documents, sign language interpreters, CART, etc.) by email: *FCC504@fcc.gov,* phone: 202–418–0530 or TTY: 202–418–0432.

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

FOR FURTHER INFORMATION CONTACT: Ariel Diamond of the Wireless Telecommunications Bureau, Broadband Division, at (202) 418–2803 or *ariel.diamond@fcc.gov,* Anna Gentry of the Wireless Telecommunication Bureau, Mobility Division, at 202–418–7769 or *anna.gentry@fcc.gov,* or Christopher Bair of the International Bureau, Satellite Division, at 202–418–0945 or *chistopher.bair@fcc.gov.* For information regarding the Paperwork Reduction Act of 1995, contact Cathy Williams, Office of Managing Director, at (202) 418–2918 or *cathy.williams@fcc.gov.*

SUPPLEMENTARY INFORMATION: This is a summary of the NPRM portion of the Commission's *Order and NPRM,* GN Docket No. 18–122, FCC 18–91, adopted on July 12, 2018 and released on July 13, 2018. The complete text of this document, as well as comments, reply comments, and ex parte submissions, is available for public inspection and copying from 8 a.m. to 4:30 p.m. Eastern Time (ET) Monday through Thursday or from 8 a.m. to 11:30 a.m. ET on Fridays in the FCC Reference Information Center, 445 12th Street SW, Room CY–A257, Washington, DC 20554. The complete text is available on the Commission's website at *http://wireless.fcc.gov,* or by using the search function on the ECFS web page at *http://www.fcc.gov/cgb/ecfs/.* Alternative formats are available to persons with disabilities by sending an email to *fcc504@fcc.gov* or by calling the Consumer & Governmental Affairs Bureau at (202) 418–0530 (voice), (202) 418–0432 (tty).

Comment Filing Procedures:

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: *https://www.fcc.gov/ecfs/filings.* Filers should follow the instructions provided on the website for submitting comments. In completing the transmittal screen, filers should include their full name, U.S. Postal Service mailing address, and the applicable docket number, GN Docket No. 18–122.
- *Paper Filers:* Parties who choose to file by paper must file an original and one copy of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number. Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.
- All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th St. SW, Room TW–A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes and boxes must be disposed of before entering the building.
- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9050 Junction Dr., Annapolis Junction, Annapolis MD 20701.
- 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), 888–835–5322 (tty).

Ex Parte Rules—Permit-But-Disclose

Pursuant to § 1.1200(a) of the Commission's rules, this *Order and NPRM* shall be treated as a ''permit-but-disclose'' proceeding in accordance with the Commission's *ex parte* rules. Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within two business days after the presentation (unless a different deadline applicable to the Sunshine period applies). Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentation must (1) list all persons attending or otherwise participating in the meeting at which the *ex parte* presentation was made, and (2) summarize all data presented and arguments made during the presentation. If the presentation consisted in whole or in part of the presentation of data or arguments already reflected in the presenter's written comments, memoranda or other filings in the proceeding, the presenter may provide citations to such data or arguments in his or her prior comments, memoranda, or other filings (specifying the relevant page and/or paragraph numbers where such data or arguments

can be found) in lieu of summarizing them in the memorandum. Documents shown or given to Commission staff during *ex parte* meetings are deemed to be written *ex parte* presentations and must be filed consistent with § 1.1206(b). In proceedings governed by § 1.49(f) or for which the Commission has made available a method of electronic filing, written *ex parte* presentations and memoranda summarizing oral *ex parte* presentations, and all attachments thereto, must be filed through the electronic comment filing system available for that proceeding, and must be filed in their native format (*e.g.,* .doc, .xml, .ppt, searchable .pdf). Participants in this proceeding should familiarize themselves with the Commission's *ex parte* rules.

Initial Regulatory Flexibility Analysis

As required by the Regulatory Flexibility Act of 1980, as amended (RFA), the Commission has prepared this present IRFA of the possible significant economic impact on a substantial number of small entities by the policies and rules proposed in the attached FNPRM. Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines specified in the FNPRM for comments. The Commission will send a copy of this FNPRM, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA).

Paperwork Reduction Act

The *NPRM* may result in new or revised information collection requirements. If the Commission adopts any new or revised information collection requirements, the Commission will publish a notice in the **Federal Register** inviting the public to comment on such requirements, as required by the Paperwork Reduction Act of 1995. In addition, pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107–198, *see* 44 U.S.C. 3506(c)(4), the Commission seeks specific comment on how it might further reduce the information collection burden for small business concerns with fewer than 25 employees.

Synopsis

I. Introduction

1. In this proceeding, the Commission is pursuing the joint goals of making spectrum available for new wireless uses while balancing desired speed to the market, efficiency of use, and effectively accommodating incumbent Fixed Satellite Service (FSS) and Fixed Service (FS) operations in the band. To gain a clearer understanding of the operations of current users in the band, the Commission collects information on current FSS uses. The Commission then seeks comment on various proposals for transitioning all or part of the band for flexible use, terrestrial mobile spectrum, with clearing for flexible use beginning at 3.7 GHz and moving higher up in the band as more spectrum is cleared. The Commission also seeks comment on potential changes to the Commission's rules to promote more efficient and intensive fixed use of the band on a shared basis starting in the top segment of the band and moving down the band. To add a mobile, except aeronautical mobile, allocation and to develop rules that would enable the band to be transitioned for more intensive fixed and flexible uses, the Commission encourages commenters to discuss and quantify the costs and benefits associated with any proposed approach along with other helpful technical or procedural details.

II. Background

A. 5G Leadership and Closing the Digital Divide

2. America's appetite for wireless broadband service is surging. And while mobile traffic is surging in sections of the United States, many communities still lack access to meaningful broadband connectivity. More intensive use of spectrum can allow wireless operators to fill in gaps in the current broadband landscape. Additional spectrum must be identified, however, if the Commission is to seize the 5G future and meet the connectivity needs of all Americans.

3. Enabling next generation wireless networks and closing the digital divide will require efficient utilization of the low-, mid-, and high-bands. In recent years, the Commission has taken several steps to use low-band spectrum below 3.7 GHz more efficiently and intensely, and it has paved the way for new opportunities in high-band spectrum above 24 GHz. Having identified additional spectrum in low- and high-bands, the Commission now seeks to identify mid-band spectrum for wireless broadband services. Mid-band spectrum is well-suited for next generation wireless broadband services due to the combination of favorable propagation characteristics (compared to high bands) and the opportunity for additional channel re-use (as compared to low bands).

4. Congress recently addressed the pressing need for additional spectrum for wireless broadband, including both mobile and fixed services, in the FY 2018 omnibus spending bill, which includes the MOBILE NOW Act under Title VI of RAY BAUM'S Act. The MOBILE NOW Act directs that spectrum be made available for new technologies and to maintain America's leadership in the future of communications technology. Section 603(a)(1) of the MOBILE NOW Act requires that no later than December 31, 2022, the Secretary of Commerce, working through the National Telecommunications and Information Administration (NTIA), and the Commission ''shall identify a total of at least 255 megahertz of Federal and non-Federal spectrum for mobile and fixed wireless broadband use.'' In making 255 megahertz available, 100 megahertz below 8000 MHz shall be identified for unlicensed use, 100 megahertz below 6000 MHz shall be identified for use on exclusive, licensed basis for commercial mobile use, pursuant to the Commission's authority to implement such licensing in a flexible manner, and 55 megahertz below 8000 MHz shall be identified for licensed, unlicensed, or a combination of uses.

5. Additionally, § 605(b) of the MOBILE NOW Act specifically requires the Commission to evaluate ''the feasibility of allowing commercial wireless services, licensed or unlicensed, to use or share use of the frequencies between 3700 megahertz and 4200 megahertz,'' which the Commission sought comment on in May 1, 2018 Public Notice. The Commission notes that there is no federal allocation for the 3.7–4.2 GHz band. The Commission intends to consult with NTIA and the heads of each affected Federal agency, as required by the Act, regarding the Federal entities, stations, and operations in the band, and the required issues and assessments for the report under § 605(b). This *NPRM,* in conjunction with the report under § 605(b), furthers the Commission's evaluation of mid-band spectrum to meet § 603's statutory mandate as well as to accommodate projected future demand.

B. 2017 Mid-Band Notice of Inquiry

6. In the 2017 *Mid-Band NOI,* the Commission began an evaluation of whether spectrum in-between 3.7 GHz and 24 GHz can be made available for flexible use—particularly for wireless broadband services. The *Mid-Band NOI* sought comment in particular on three mid-range bands that have garnered interest from stakeholders for expanded flexible use (3.7–4.2 GHz, 5.925–6.425 GHz, and 6.425–7.125 GHz), and it asked commenters to identify other mid-

range frequencies that may be suitable for expanded flexible use. In the interest of clarity and expeditiously making spectrum available for wireless broadband use, this *NPRM* will evaluate the 3.7–4.2 GHz band individually, and the Commission may address other mid-band spectrum bands, including the 5.925–6.425 and 6.425–7.125 GHz bands, in subsequent item(s).

III. Notice of Proposed Rulemaking

A. The Future of Incumbent Usage of 3.7–4.2 GHz

1. Protecting Incumbent Earth Stations

7. The Commission proposes to protect incumbent earth stations from harmful interference as the Commission increases the intensity of terrestrial use in the band. The Commission seeks comment on how to define the appropriate class of incumbents for protection. For FSS earth station licensees and registrants, the Commission proposes to define incumbent stations as earth stations that: (1) Were operational as of April 19, 2018; (2) are licensed or registered (or had a pending application for license or registration) in the IBFS database as of October 17, 2018; and (3) have timely certified the accuracy of information on file with the Commission to the extent required by the *Order.* Although earth stations that have not filed an exhibit demonstrating coordination with terrestrial FS stations are unprotected from interference by FS links, that requirement is of less relevance today given the minimal FS usage in the band, as well as the fact that the Commission proposes new terrestrial uses for which coordination with existing FS users will have little value. Accordingly, the Commission proposes to protect even such earth stations so long as they meet the criteria described above.[1]

8. The Commission proposes to exclude from the definition of incumbents any earth stations that are not licensed or registered in IBFS, or that are licensed or registered in IBFS, but for which the licensee/registrant does not timely file the certification required in the *Order.* The Commission further proposes that unregistered FSS earth stations could continue to receive transmissions lawfully, but would operate on an unprotected basis as to any licensed operations in the band. The Commission also seeks comment on whether incumbents that are small entities face any special or unique issues with respect to the transition such that they should be defined differently or have different obligations.

9. The Commission asks that commenters be specific in defining a protected incumbent and in explaining the relative obligations and/or rights that protected incumbents may have under each approach for more intense terrestrial use of the band. Which categories of incumbents must new flexible use licensees relocate under each approach, what would be the standard for determining the need to relocate each category of incumbents, and what are the terms or rules pursuant to which these relocations will occur? The Commission seeks comment on specific relief that should be provided to each class of incumbents. For example, should incumbent earth station operators be provided with filters to block transmissions from flexible use operations, should they receive filters and the technical assistance necessary to install them or repoint earth station antennas as necessary, or should earth station operators be provided with a lump sum to be used at their own discretion, either to upgrade existing facilities or to enable the switch to other means of transmission? Who would be responsible for reimbursing incumbent earth station operators and C-band customers for costs incurred in any transition, and how would such cost reimbursement be accomplished? How would disputes relating to cost reimbursement be resolved? What would be the basis for establishing reasonable cost reimbursements? For example, would it take into account any required improvements or replacement to an existing antenna or its supporting structure? Would it cover any required technological assistance? How should satellite news gathering vehicles or other temporary-fixed earth stations be addressed?

a. Limiting New Earth Stations

10. On April 19, 2018, the staff released the *Freeze and 90-Day Earth Station Filing Window Public Notice,* which froze applications for new or modified earth stations in the 3.7–4.2 GHz band to preserve the current landscape of authorized operations pending action as part of the Commission's ongoing inquiry into the possibility of permitting mobile broadband use and more intensive fixed use of the band through this proceeding. The Commission now seeks comment on revising the Part 25 rules to permanently limit eligibility to file applications for earth station licenses or registrations to incumbent earth stations. This would mean that earth station operators that register or license their existing stations by October 17, 2018, would be able to modify these stations at the registered location but not add new stations in new locations, and applications for new earth station registrations would not be allowed. Limiting new earth stations in this manner would provide a stable spectral environment for more intensive terrestrial use.

b. Removing Uncertified Earth Stations

11. In response to the *Mid-band NOI,* the Commission received comments from a variety of stakeholders, many of which addressed whether the Commission's IBFS data about current operations in the band is complete and up to date. Some commenters stressed the importance of identifying existing unregistered earth stations before the Commission makes any substantial changes to the operations permitted in the band, while other commenters contend that there may be earth stations in the database that are no longer in operation.[2]

12. Regarding the first concern, in the *Freeze and 90-Day Earth Station Filing Window Public Notice,* the International Bureau announced as an exception to the freeze, a 90-day window for earth stations to register in IBFS. Also, to obtain the best information possible on existing earth stations in this band in furtherance of the Commission's ongoing inquiry without imposing a potentially unnecessary economic burden on eligible FSS earth station applicants in the 3.7–4.2 GHz band filing within the 90-day window, the International Bureau granted a temporary waiver of the frequency coordination requirement. Subsequently, the International Bureau extended the filing window by 90 days until October 17, 2018, waived additional provisions of the rules, clarified that multiple antennas located at the same address or geographic location may be filed under a single registration application and pay a single filing fee, and announced the availability of an additional option to facilitate the registration of large numbers of geographically diverse earth stations under a single ''network'' license and single fee.

13. Regarding the second concern, the staff noted that ''after the 90-day window closes, the Commission may determine to require all licensees,

[1] The Commission notes that the International Bureau waived the coordination requirement for the duration of the freeze for applications filed during the filing window (April 19, 2018 to October 17, 2018). *Freeze and 90-Day Earth Station Filing Window Public Notice* at 3–4.

[2] Registrants are required to notify the Commission when a receive-only earth station is no longer operational or when it has not been used to provide any service during any 6-month period. 47 CFR 25.131(i).

registrants, and operators with pending applications for license or registration of FSS earth stations in the 3.7–4.2 GHz band to file a certification that the earth station was operational as of the start of the freeze and remains operational at the time of the certification along with additional technical details regarding their operations to inform the Commission's resolution of issues raised in the inquiry.'' [3] In the *Order,* the Commission requires operators of earth stations licensed or registered in IBFS (except those that file new or modified registrations between April 19, 2018, and October 17, 2018, under the modified registration process outlined in the *Freeze and 90-Day Earth Station Filing Window Public Notice*) to file certifications as to the accuracy of all information in IBFS concerning their existing FSS earth station operations.[4]

14. To ensure that the Commission has the best information possible on existing earth stations in this band, the Commission proposes to update IBFS to remove 3.7–4.2 GHz band earth station licenses or registrations for which the licensee or registrant does not file the certifications required in the *Order* (to the extent they were licensed or registered before April 19, 2018). The Commission specifically proposes that an earth station registered in IBFS be automatically terminated unless the registrant timely files the certification required by the *Order* (to the extent they were licensed or registered before April 19, 2018). The Commission seeks comment on this proposal.

c. Maintenance of IBFS Data Accuracy

15. The Commission seeks comment on how—once the accuracy of 3.7–4.2 GHz band earth station data has improved—to ensure that earth station data remains accurate to facilitate frequency coordination and maximize efficient use of the spectrum. How often do the frequencies received by a given earth station change? The Commission seeks comment on whether, for a constructed and operational earth station,[5] any combination of frequency, azimuth, and elevation listed in the license or registration that is unused for more than, *e.g.,* 180 days, should be deleted from the license or registration to minimize unnecessary constraints on successful frequency coordination of new operations.

16. In addition, the Commission asks for parties to comment on whether to require an earth station licensee or registrant in the 3.7–4.2 GHz band to certify periodically, *e.g.,* annually, the continued accuracy of the information on file with the Commission. Should any requirements that the Commission adopts to help ensure that IBFS data remains accurate become effective after a transition period?

d. Revising the Coordination Policy

17. Receive-only earth stations cannot cause interference, but under the Commission's current rules they can be coordinated and licensed or registered with the Commission to protect them from terrestrial microwave stations in bands shared co-equally with the FS. Section 25.203 requires FSS applicants to coordinate their proposed frequency use prior to filing their license applications with the Commission. Earth station applicants, to the extent practicable, must select sites and frequencies in areas where the surrounding terrain and existing frequency use will minimize the possibility of harmful interference between the sharing services. An earth station applicant, prior to filing an application to register or license with the Commission, must coordinate its proposed frequency usage with existing terrestrial users and with applicants that have filed for terrestrial station authorizations. The purpose of this coordination requirement is to establish the baseline level of interference that an earth station must accept in frequency bands shared by the FS and FSS on a co-primary basis. The coordination results entitle the FSS earth station to the interference protection levels agreed to during coordination, including against subsequent FS licensees. Currently, registered or licensed earth stations in the C-band are generally coordinated and authorized to use the entire band across the full geostationary arc, a policy known as full-band, full-arc.

18. A reexamination of the full-band, full-arc coordination policy is appropriate in light of the Commission's goal to maximize spectrum efficiency and use in the 3.7–4.2 GHz band including more intensive terrestrial use of the band. Accordingly, the Commission proposes that for purposes of interference protection, earth station operators will be entitled to protection only for those frequencies, azimuths, and elevation angles and other parameters reported as in regular use (i.e., at least daily) in response to future information collections, until the incumbent starts the coordination process for an application to modify its license or registration in IBFS for its earth station. The Commission further proposes that such modification applications identify and include a coordination report for the specific combinations of frequency, azimuth, and elevation angle that the incumbent intends to use and that such technical information be reflected on the earth station application and authorization. The Commission seeks comment on this proposal.

19. At the same time, the Commission acknowledges that the full-band, full-arc policy has certain advantages, *e.g.,* it affords FSS operational flexibility, and the Commission seeks comment about the consequences of eliminating the policy. Specifically, how would this policy alter current business models and operations of C-band licensees and registrants? Are there alternatives to eliminating this policy that would have less of an impact on the current C-band business models and operations without sacrificing the efficiency maximizing goals of the Commission's proposal?

e. Information on Incumbent FSS Operations

20. In the *Order,* the Commission directs incumbent FSS earth station operators to certify as to the accuracy of existing information in IBFS, and require incumbent FSS space station operators to provide additional information. To develop a more complete record on existing FSS operations in this band, the Commission proposes to require earth station operators to file additional information on their existing facilities. To the extent that the information requested would duplicate information already available in IBFS, the Commission will direct the International Bureau to permit operators to certify that the information in IBFS remains accurate in lieu of providing the information again. Specifically, the Commission proposes and seeks comment on requiring authorized earth station operators (including operators

[3] *Freeze and 90-Day Earth Station Filing Window Public Notice* at 5. The staff also advised all potential applicants that ''the Commission may, for purposes of further action following the *NOI,* choose to take into consideration only those earth stations that are licensed, registered, or have pending applications for license or registration on file in IBFS as of [the close of the filing window].'' *Id at* 5.

[4] Above, the Commission proposes to limit the definition of incumbent earth stations to licensed or registered stations for which the operator timely files the required certification, or for which the operators timely filed for new or modified registrations between April 19, 2018 and October 17, 2018 pursuant to the *Earth Station Filing Window Public Notices.*

[5] The Commission notes that under Part 25, a station authorization shall be automatically terminated in whole or in part without further notice to the licensee upon the removal or modification of the facilities which renders the station not operational for more than 90 days, unless specific authority is requested. *Id.* § 25.161(c).

that file new or modified registrations between April 19, 2018, and October 17, 2018) to provide the following information for each antenna under each call sign: [6]

- Earth station call sign;
- geographic location;
- licensee and point of contact information;
- antenna gain;
- azimuth and elevation gain pattern;
- antenna azimuth relative to true north;
- antenna elevation angle;
- satellite(s) at which the earth station is pointed;
- transponder number(s) and how often each transponder is used: Regularly (*i.e.,* at least daily); infrequently; or backup capacity;
- antenna site elevation and height above ground.

21. The Commission's consideration of some transition options may also benefit from additional, more granular information on FSS earth station and space station operations in the band. For example, information on the type of content (*i.e.,* audio or video feeds), the total bandwidth occupied by particular users or content feeds, and the identity of the content provider could provide additional clarity on the actual usage of the band. In addition, more granular information on the nature of any periodic usage of transponder capacity (*i.e.,* daily, weekly or once a year) could provide additional clarity on the availability of spectrum in the band. The Commission seeks comment on whether to seek additional information from incumbent FSS earth station or space station operators beyond what is included in the list above. Should the Commission seek additional information on transponder loading, content type, content provider information, periodic usage, or other data that would provide a more detailed picture of the actual usage of the band? Should the Commission collect other information to more fully assess spectrum utilization in the band?

22. In the *Order,* the Commission requires operators of temporary fixed or transportable earth stations to file information concerning their existing operations, including the area within which the equipment is typically used and the frequency and duration of such use. Consistent with the Commission's proposal to collect additional information from fixed FSS earth stations, the Commission seeks comment on whether and to what extent the Commission should collect additional information specifically with respect to temporary fixed or transportable earth stations. The Commission also seeks comment on whether the categories of information proposed above for fixed FSS earth stations would need to be modified or supplemented with respect to temporary fixed or transportable earth stations.[7] For example, would it be useful to further quantify the frequency or extent of use for these operations and, if so, how should they be quantified? Commenters should provide a clear rationale for any additional information collection along with an analysis of the costs and benefits of such additional collections.

23. The Commission also seeks comment on whether to collect the information described above on a nationwide basis or whether it may be appropriate to conduct an initial information collection for an initial sample of areas. For example, should the Commission collects information from entities based on a representative sampling of different types of areas, such as urban, suburban, and rural areas? If so, how should the sample be determined? The Commission seeks comment on this and any other methodology that will effectively balance the potential burden that an information collection may impose against the need to evaluate the feasibility of clearing more spectrum in this band. The Commission also seeks comment on whether small entities and entities operating in rural areas face any special or unique issues with respect to the information collection such that they would require certain accommodations or additional time to comply. The Commission also seeks comment on the costs and benefits of an additional information collection on this band.

24. Commenters should describe, with specificity, how any additional information collection would support a given transition proposal and should provide a detailed assessment of the costs and benefits of such additional collections. The Commission also encourages commenters to submit any information that could inform the Commission's consideration of specific transition proposals, including the types of information described in this section.

2. Limiting New Space Station Operators

25. On June 21, 2018, the International Bureau released the *Space Station Freeze Public Notice,* which froze the filing of certain space-station applications in the 3.7–4.2 GHz band. To limit speculative applications for satellite usage of the band in light of this proceeding, the Commission proposes to revise the rules to similarly bar new applications for space station licenses and new petitions for market access concerning space-to-Earth operations in the 3.7–4.2 GHz band. These revisions would not extend to applications for extension, cancellation, replacement or modification of existing authorizations. Additionally, the Commission proposes that this freeze would not bar operators with existing space station authorizations in the band as of June 21, 2018, from filing applications for additional space stations, if authorization of such space stations would promote more efficient use of the band. The Commission seeks comment on the Commission's proposal.

3. Sunsetting Incumbent Point-to-Point Fixed Services

26. Due to the declining use of the band for fixed point-to-point FS links as well as the availability of other spectrum options for point-to-point links, the Commission proposes to sunset point-to-point FS use in the band. In addition, the Commission seeks comment on whether existing fixed links should be grandfathered or transitioned out of the band over some time period, after which all licenses would either be cancelled or modified to operate on a secondary, non-interference basis. If the latter, how long would incumbent users have to transition from the band? Three years? Five years? And should the Commission differentiate in treatment between those with permanent licenses and those with temporary licenses? Or those that have or are willing to relocate to the upper portion of the band?

B. Increasing the Intensity of Terrestrial Use

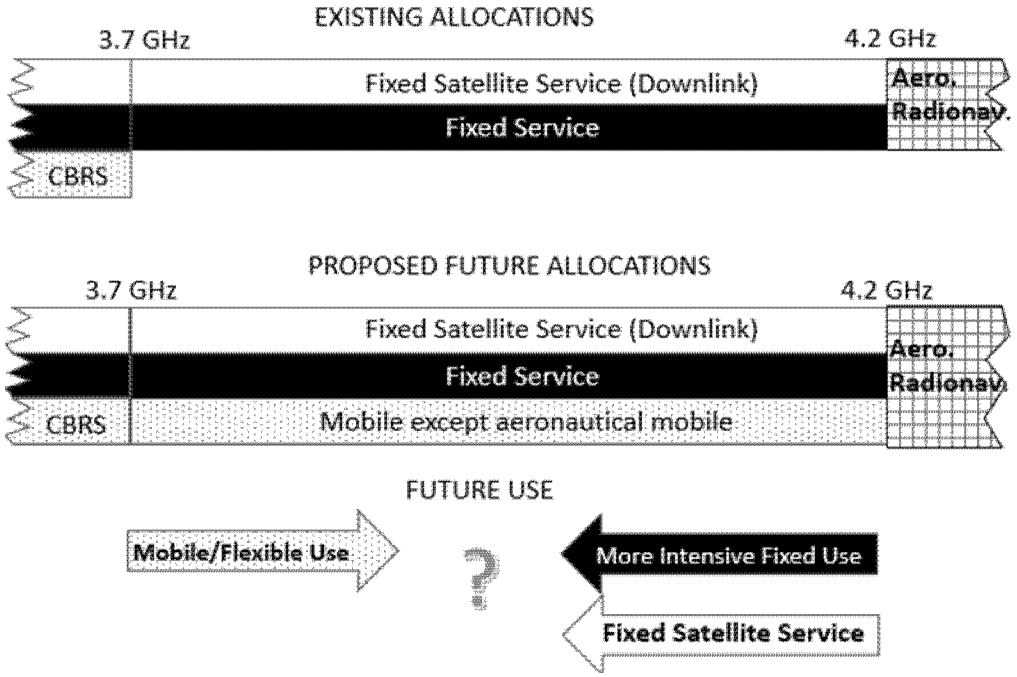
27. The Commission describes several potential approaches for repurposing the band and the Commission encourages commenters in discussing their proposals to consider the economic tradeoffs described herein. Figure 1 below demonstrates the current

[6] To reduce the burden on FSS earth station operators and ensure the accuracy of data obtained during the information collection process, IB would release a public notice that will provide guidance about how to obtain or calculate the information.

[7] SES and Intelsat provided many questions that could be asked about the nature of such earth stations and their patterns of use, but it may be difficult to quantify deployments for these earth stations other than typical capacity used when they are deployed and perhaps the area or areas within which they are typically used. Intelsat, SES July 3, 2018 *Ex Parte* Letter (GN Docket Nos. 17–183, 18–122).

and proposed future allocations and potential uses of the band.

Figure 1: 3.7-4.2 GHz Band Existing and Proposed Future Allocations and Use

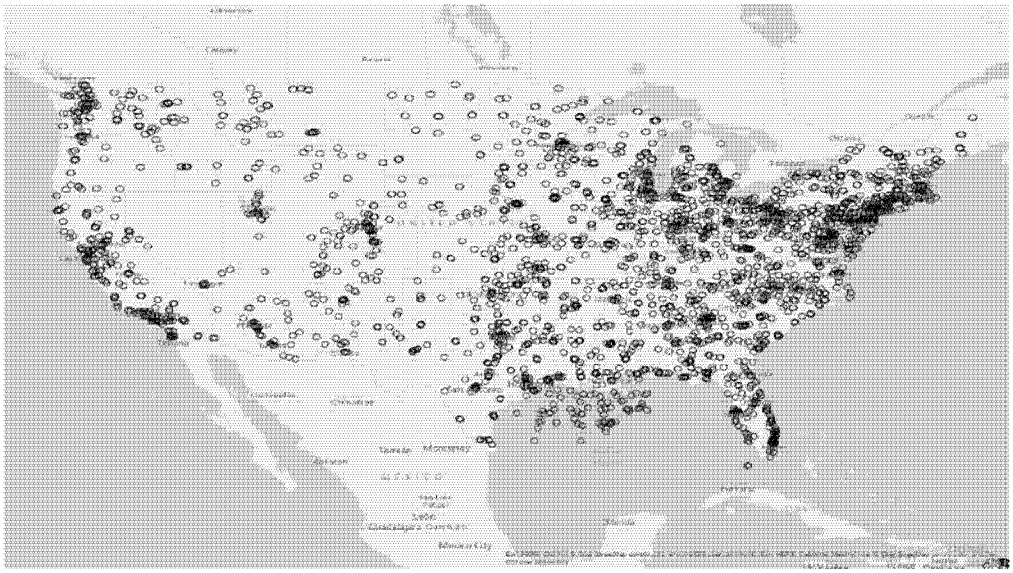


28. The Commission recognizes that co-channel sharing of spectrum between the FSS and more intensive terrestrial wireless use in the same geographic area may be difficult. For example, frequency coordination allows FSS and terrestrial fixed microwave to share the band on a co-primary basis, but coordination of mobile systems would be more complicated because the movement of the devices would require analyses and interference mitigation to FSS earth stations in this band spread over many locations within any given geographic area. In addition, because the C-band satellites are in geostationary orbit approximately 36,000 km above the equator, the signals received at the earth stations are extremely weak. This means that terrestrial mobile operations could cause harmful interference to the earth station receivers over large distances absent adequate protection.

29. Geographic sharing may be similarly difficult. Current Commission policy permits earth stations to coordinate reception across the entire GSO arc and over the entire 3.7–4.2 GHz band, which would exclude mobile wireless operations from transmitting across the entire band in a wide area around each earth station. For purposes of illustration, Figure 2 below shows a hypothetical 20 km exclusion zone around each earth station in the continental United States in the International Bureau Filing System (IBFS) database as of early May 2018.[8] These exclusion zones would cover 83.25% of the United States population.

[8] The Commission notes that commenters in this proceeding have argued that IBFS significantly undercounts the number of existing, but unregistered, earth stations. For purposes of this study the Commission used earth stations currently licensed or registered in IBFS.

Figure 2: Registered 3.7-4.2 GHz Band FSS Earth Stations in CONUS with 20 km Exclusion Zones



30. The Commission was able to establish the Citizens Broadband Radio Service in the 3550–3700 MHz despite the presence of FSS receivers because there are only FSS earth stations in 35 cities and two MSS gateways in the 3600–3700 MHz band. This is unlike the current incumbent earth station environment in the 3.7–4.2 GHz band. Therefore, subject to confirming the landscape of existing earth stations through the certifications required by the *Order,* co-channel sharing between FSS and mobile wireless could exclude a majority of the population from receiving flexible fixed and mobile broadband service in the 3.7–4.2 GHz band unless FSS use of the band is modified or FSS protection criteria are significantly relaxed. The Commission recognizes that the affected population would likely be less if the Commission was to only protect the earth stations based on the transponder frequencies received at each site and actual antenna azimuth and elevation, but the overall assessment that mobile service would not be viable for much of the population would remain the same. The Commission seeks comment on this assessment.

31. Notably, the Commission believes that increased terrestrial use of the band is ripe to meet the Commission's mandate under the MOBILE NOW Act to identify (with NTIA) 255 megahertz of spectrum for mobile and fixed wireless broadband use. For purposes of meeting § 603(a)(1), § 603(a)(3)(E) states ''[s]pectrum that the Commission determines had more than *de minimis* mobile or fixed wireless broadband operations within the band on the day before the date of enactment of this Act'' is non-eligible for purposes of satisfying the 255 megahertz requirement. The Commission believes that there was no more than a *de minimis* amount of mobile or fixed wireless broadband operations in the 3.7–4.2 GHz band on March 22, 2018 (the day before the date of enactment of the MOBILE NOW Act) for purposes of fulfilling § 603. Specifically, since FSS is neither an ''unlicensed use'' nor an ''exclusive, licensed basis for commercial mobile use,'' FSS services are not included in the *de minimis* exception under § 603(a)(3)(E). Additionally, FSS in the band is predominantly used for the delivery of video programming with only a *de minimis* portion of the satellite capacity used to provide data services. The Commission notes that there is no mobile allocation in the band and the Commission's licensing database indicates that there are only 115 fixed point-to-point licenses in the band. Thus, any portion of this band made available for flexible terrestrial or more intensive fixed use would help satisfy the requirement of § 603(a)(1) to identify a total of at least 255 megahertz of spectrum for ''mobile and fixed wireless broadband use.'' The Commission seeks comment on these findings.

32. The Commission seeks comment on approaches for expanding flexible and more intensive fixed use of the band without causing harmful interference to incumbent operations. In discussing how much of the band should be made available for flexible use, more intensive fixed use, or maintained just for incumbent uses, the Commission asks commenters to address the relative present and future economic value of each of these services to individuals and businesses in the United States. What are the tradeoffs in accommodating one type of use instead of another? And what are the costs associated with accommodating new uses? Commenters should provide a detailed cost-benefit analysis in their proposal and address the relative economic values of alternative uses and the implementation costs of their specific proposal vis-à-vis other possible approaches to the band. The Commission also asks commenters to address the economic impact of the implementation time frame associated with their chosen approach.

33. The Commission proposes to add a non-federal mobile, except aeronautical mobile, service allocation to the 3.7–4.2 GHz band, and given the Commission's conclusion that co-channel sharing is not feasible, seek comment on several proposals below to clear all or part of the band for flexible use. In particular, the Commission seeks comment on the economic benefits of introducing a new allocation for mobile, except aeronautical mobile, and flexible use relative to the introduction of point-to-multipoint FS, perhaps shared with FSS, in all or part of the 3.7–4.2 GHz band. Commenters should consider the economic value of current and future use cases for each type of service, including benefits and opportunity costs to consumers and the Nation's economy overall, as well as to unserved or underserved areas and specialized market segments (*e.g.,* education, telemedicine, and manufacturing).

Commenters should also address the benefits of international harmonization both in terms of devices and network deployments. In addition, the Commission encourages commenters to consider the economic impact on consumers and businesses in rural communities and areas that are unserved or underserved by current broadband providers, as well as any economic impact on small businesses. The Commission also asks commenters to address how long it will take to transition various amounts of this band to flexible use or to point-to-multipoint FS use, how much such a transition will cost for each 100 megahertz that is transitioned, and how expeditiously the transition can be completed.

34. The Commission also seeks comment on the current and future economic value of FSS in the band. How intensively is this spectrum used by existing FSS licensees and how intensely will it be utilized in the future? Is spectrum in the band allocated to FSS currently being used efficiently and are there technologies that may facilitate more efficient use of spectrum in the band by FSS licensees without significant disruption to consumers and businesses that rely on these services? Are there alternative technologies available that could wholly or partially replace the services provided by FSS without significant disruption to existing customers? How long would it take and how much would it cost to transition existing customers to these alternative technologies? How may the cost-benefit analysis shift depending on how much spectrum is transitioned at particular times? Are there other considerations that the Commission should consider when assessing the most economically efficient allocation of the band between services? And would such considerations differ depending on when and how much spectrum is ultimately transitioned to flexible use?

1. Mechanisms for Expanding Flexible Use

35. Repurposing of the 3.7–4.2 GHz spectrum bands allocated to FSS raises at least three economic problems, some of which have not arisen in previous spectrum auctions. The first two problems are direct consequences of the C-band licensing structure, while the last is common to all spectrum reallocations. First, because all FSS licensees have equal, nonexclusive rights to the entire band under part 25 of the Commission's rules, they cannot compete in the same way that broadcast television licensees did in the broadcast incentive auction. Second, this nonexclusive licensing problem creates an incentive for an FSS licensee to overstate the value it assigns to the spectrum in order to increase the share of auction revenue it may receive. The Commission will refer to this as the ''holdout'' problem. Third, repurposing some of the 3.7–4.2 GHz spectrum band will reduce the amount of spectrum available for FSS, which lowers industry capacity and could lead to higher prices for downstream services, such as the transmission of video to cable head ends. The Commission notes that the first and last problems create opposite incentives for FSS licensees. The first provides an incentive to repurpose less than the efficient amount of spectrum while the last may create an incentive to repurpose more than the efficient amount.

36. The broadcast incentive auction relied on competition among licensees to induce broadcast incumbents to reveal the least amount they must be paid to relinquish their spectrum rights. Many broadcast licenses were substitutes because if one licensee bid to relinquish its spectrum usage rights this could make spectrum available to repack other broadcast stations and free spectrum for flexible use. In the 3.7–4.2 GHz FSS, all licensees must agree to relinquish their spectrum rights in a given geographic area in order to reassign spectrum and therefore licenses are not substitutes and competition is limited.

37. In addition to the problem that satellite licensees will not be competing to supply spectrum in the same way that television licensees did in the broadband incentive auction, there is an additional problem concerning how the satellite licensees will split any revenues from repurposing. In order to increase its share of auction revenues, a FSS licensee may have an incentive to overstate the value it assigns to the spectrum or to withhold its consent to repurpose. The holdout problem is the inverse of a public goods problem. The 500 megahertz of spectrum allocated for FSS is a public good, in that several distinct companies make non-exclusive, non-rivalrous use of the spectrum within a geographic area.[9] Were the spectrum unallocated, the FSS providers would face a classic public goods problem since the total value of the spectrum is the sum of the values of the FSS operators. With property rights assigned to FSS operators, the Commission faces a reverse public goods problem: How to recover an efficient amount of a public good which is no longer efficiently allocated? In the classic public goods problem, if individuals are asked to pay for the public good based on their valuation of that good, they will have an incentive to understate their value for the public good to lower their payment. In the reverse problem, however, each FSS licensee has an incentive to overstate its value of the spectrum in order to increase its payment.

38. Several mechanisms have been developed to generate an efficient allocation of public goods, including one proposed by Hal Varian. In the standard public goods case, Varian proposed that individuals have the opportunity to subsidize the contributions of others towards the public good in a first-stage and then decide how much to contribute in a second-stage. Can such mechanisms be adapted to solve the holdout problem under consideration here? For example, in the first stage might each party announce the share of the payment it receives that it will give to each other party and in the second stage nominate how much spectrum to clear? Can such a mechanism be modified to mitigate the incentive to clear less than the efficient amount of spectrum? Some commenters suggest having the FSS providers meet, privately negotiate, and agree to put spectrum up for auction. The Commission seeks comment on the relative merits of FSS provider cooperation versus a more formal, non-cooperative mechanism, especially with regard to the three economic problems.

39. FSS operators currently compete to provide communication services (for example, to deliver programming content to rural cable companies). For the efficient allocation of spectrum, the social value of these services needs to be balanced against the social value of alternative services that could be provided by that spectrum, such as mobile data. Several commenters, such as the American Cable Association, contend that earth stations can and do switch providers, suggesting that competition currently exists in the C-band. Since a reduction in industry capacity generally leads to higher prices, reducing the spectrum associated with FSS may have the unintended consequence of increasing the price of FSS services and consequently of downstream services. Conversely, such a reduction should correspond with an increase in industry capacity for high-speed wireless broadband services, which would tend to lead to lower prices. How should the Commission evaluate proposed mechanisms with regard to their effect on downstream users of FSS and wireless broadband

[9] The Commission notes, however, that orbital slots are rivalrous.

services? How should the Commission take into account other opportunities to deliver these services—such as other means of transmitting programming data like alternative satellite bands [10] or fiber and other means of transmitting high-speed broadband like other mid-band spectrum or fiber—in evaluating these effects?

40. In addition, the value of spectrum in alternative uses like mobile data is likely highest in dense urban areas. When the Commission has sold spectrum by geographic region, the prices obtained have been positively correlated with population density. FSS substitutes, particularly fiber, are most prevalent in urban areas while in rural areas there are fewer FSS substitutes. Thus, in rural areas, typically the value of the spectrum remaining in FSS is relatively high while the opportunity cost of clearing less flexible-use spectrum is relatively low, suggesting that the amount of spectrum repurposed should vary across geographic areas. The Commission therefore seeks comment on whether the Commission should repurpose a minimum amount of spectrum nationwide, and make additional fully unencumbered spectrum available in any areas where it is less costly to transition earth stations to other forms of transmission. Under this approach, the Commission also seeks comment on the appropriate size of such regions. If the regions are too small, this could make mobile data use impractical because it would not give wireless providers sufficient flexibility to scale their networks using this band, while if the regions are too large, this could threaten rural services because those regions would not be attractive to small and rural wireless providers. Is it practical to create regions based on the existence of alternatives to FSS like fiber? The Commission seeks comment on whether any flexible use licenses should also be overlay licenses, for which the terrestrial licensee is obligated to protect licensed or registered earth stations and can use any spectrum that becomes available by clearing earth stations.

41. Another consideration in the geographical division of spectrum involves the parties to compensate. Instead of paying FSS operators for relinquishing spectrum usage rights nationwide or in specific geographic regions a mechanism instead might pay earth stations for relinquishing access to C-band spectrum in specific geographic areas. Such earth stations might discontinue use in these areas by discontinuing receiving content or by receiving it by alternative transmission infrastructure like fiber, where the content might be delivered to the fiber from C-band earth stations in rural areas. Would such a mechanism present an alternative supplier of spectrum—with either the FSS operators or the earth stations effectively releasing spectrum rights? The Commission notes, however, that the holdout problem for licensed earth stations is likely more severe because there are more such earth stations that are independently owned than satellite operators. The Commission seeks comment on the practicality and social value of compensating licensed earth stations in exchange for agreeing to no longer be licensed to receive in the 3.7–4.2 GHz band. In particular, would such a mechanism protect those earth stations but not unlicensed earth stations? Also, how would satellite operators be compensated for loss of revenues after the expiration of their contracts with content providers serving the licensed earth stations that discontinued their reliance on satellite delivery of content?

a. A Market-Based Mechanism

42. The commission seeks comment on whether the Commission should adopt rules that would facilitate a market-based approach to transitioning incumbents from some or all of the 3.7–4.2 GHz band. Under such an approach, the Commission would authorize incumbent FSS operators to voluntarily clear all or part of the band. Satellite operators in the band could choose to make some or all of their spectrum available to terrestrial operators on the secondary market in exchange for compensation. Under such an approach, satellite operators could be responsible for clearing the portion of the band that would be made available for flexible use, including notifying earth stations of the need to modify their operations and compensating them for any costs associated with that transition.

43. A secondary market approach might make spectrum available more quickly than other available mechanisms, such as an FCC auction, and thus could facilitate rapid deployment of next generation wireless broadband networks. In addition, such an approach could leverage the technical and operational knowledge of satellite space station operators while relying on market incentives to promote economic efficiency. The Commission seeks comment on whether a market-based approach could effectively and rapidly facilitate new terrestrial deployments in the band. The Commission also seeks comment on whether a market-based approach that allows FSS licensees to coordinate their capacity would raise any antitrust concerns.

44. The Commission seeks comment on the efficacy of using a market-based approach to transition some or all of the 3.7–4.2 GHz band to flexible terrestrial use. The Commission observes, and some commenters in the record maintain, that a significant benefit of a market-based approach may be a more rapid introduction of C-band spectrum to the market. For example, Intel, Intelsat, and SES claim that their consortium approach would result in licensed mobile services within 18–36 months of a Commission order. Commenters also should address the costs and benefits of this approach vis-à-vis the alternative proposals set forth in this section.

45. The Commission seeks comment on using a market-based approach through a Transition Facilitator, a cooperative entity created by relevant satellite operators to coordinate negotiations, clearing, and repacking the band. The Commission notes that because of the holdout problem, a market-based approach in which FSS licensees act independently is unlikely to succeed. Consequently, should the Commission allow, encourage, or require satellite operators to cooperate in negotiating with potential terrestrial mobile licensees and in clearing an agreed amount of spectrum? A market-based approach that uses a Transition Facilitator would enable the satellite operators to use private negotiations to obtain participation and agreement from the relevant satellite operators, rather than requiring the Commission to address holdouts using more regulatory mechanisms.

46. The Commission seeks comment on whether using a market-based approach in which FSS operators form a Transition Facilitator would produce an economically efficient outcome. Specifically, would allowing all potential sellers to agree on the amount and price of the spectrum that will be repurposed result in a situation in which those sellers offer a lower quantity than is socially efficient? Is that concern mitigated by the fact that the market for spectrum for high-speed broadband services is much broader than just the 3.7–4.2 GHz band? The Commission seeks comment regarding some of these concerns about the potential effects of allowing collective

[10] The Commission recognizes that other transmission methods may also compete against satellite transmission via C-band spectrum. For example, in certain urban and suburban areas where fiber is widely deployed, fiber may be a cost-effective alternative. And there may be other radio spectrum that can deliver video transmission, such as the Ku band.

action by C-band satellite operators below. The Commission also seeks comment on whether a Transition Facilitator raises any particular antitrust concerns.

47. A transition under a market-based approach could be undertaken in a four-step process. The first step would involve the industry voluntarily forming a Transition Facilitator composed of eligible C-band satellite operators.[11] In the second step, the Transition Facilitator would negotiate with any interested terrestrial operators and incumbent users. In the third step, the Commission would review the Transition Facilitator's plan and conditionally authorize terrestrial licenses in the band. And in step four, the Transition Facilitator would clear the negotiated-for spectrum, making it available for flexible use while protecting incumbent earth stations through a variety of potential means. The Commission notes as well that a market-based process need not be a one-time event—a Transition Facilitator could negotiate with parties for compensation and protection, seek Commission review and conditional authorization, and clear new spectrum multiple times to ensure the total spectrum dedicated to flexible use meets market demands. The Commission seeks comment on the effectiveness of such a four-step process. In addition, the Commission invites commenters supporting a market-based approach to suggest additional details to the steps described below or other specific approaches for implementation.

48. *Step 1: Formation of a Transition Facilitator.*—The first step in the process would be for the industry to form a Transition Facilitator. Once the Transition Facilitator is formed and ready to begin negotiations with potential licensees, the Transition Facilitator would notify the Commission of its membership, its charter, *i.e.,* its structure, objectives, and planned operation, and its compliance with any rules adopted as a result of this proceeding. Once the Transition Facilitator has filed its notification, the Commission would have 60 days to review the filing and formally object to its creation through an order. The Commission seeks comment on this process. What additional information might the Commission need to conduct such a review? Should any parties have the opportunity to formally object? Should the Commission be required to affirmatively approve or reject the formation of a Transition Facilitator, and if so on what timeline?

49. There is record support for a centralized facilitator. Intelsat and SES—the two largest incumbent satellite operators in the 3.7–4.2 GHz band—support a consortium-based facilitator. While Eutelsat raises concerns regarding how satellite operators eligible to participate in a market-based approach would be defined it has stated publicly that it wants to participate. In considering such an approach, the Commission thus asks commenters to address how to define eligibility to participate in the Transition Facilitator. The Commission seeks comment on opening eligibility to participate in the Transition Facilitator to all C-band satellite operators providing service to any part of the United States pursuant to an FCC-issued license or grant of market access. Should the Commission limit eligibility in any way, such as requiring service throughout the lower 48 states?

50. Given the holdout problem, the Commission does not propose to require that all eligible satellite operators agree to a Transition Facilitator before it can take effect. Instead, the Commission seeks comment on the appropriate number of satellite spectrum interests in the band—a majority? all but one?—that should be represented by the Transition Facilitator to effectuate a successful transition. Are a minimum number of operators required to participate in the Transition Facilitator for this approach to work? If this number is not met, should the Transition Facilitator be approved by the Commission?

51. The Commission also seeks comment on what the Transition Facilitator should do if one or more eligible C-band satellite operators choose not to participate in the Transition Facilitator. Are any Commission actions necessary if one or more eligible C-band satellite operators do not join the Transition Facilitator? The Commission notes that Intelsat and SES propose that eligible C-band satellite operators that do not join a centralized facilitator would nonetheless have their ''reconfiguration and relocation costs covered.'' How would such a process work? Should the Transition Facilitator, or members of the Transition Facilitator, negotiate with non-participating satellite companies to ensure the spectrum is successfully repurposed? Or should non-participating satellite companies be bound by the decisions of the Transition Facilitator? If the latter, would a non-participating satellite company be limited to recouping its costs? Or would it be even eligible to recoup costs so long as the Transition Facilitator adequately protects its associated incumbent earth stations?

52. If there are earth station registrants or licensees that have no contractual relationship with any of the members of the Transition Facilitator or any FSS space station operators, will that create difficulties in clearing the band during later steps in the process? If so, how can those difficulties be addressed? Is there any reason that the Transition Facilitator would not able to negotiate with earth stations that don't have contractual relationships with any of the Transition Facilitator's members? Should there be a requirement that the C-band operators participating in the Transition Facilitator have contractual relationships with a minimum percentage of protected incumbent earth stations to avoid these potential difficulties? Should the Transition Facilitator be required to work with non-participating satellite companies to protect incumbent earth stations, or should the Transition Facilitator be free to work directly with those entities?

53. To ensure that the transition process proceeds expeditiously, should the Commission establish a benchmark for the Transition Facilitator filing of six months after **Federal Register** publication of an order in this proceeding?[12] What if a Transition Facilitator is not created within the specified timeframe? Should the Commission have in place other means of reassigning the spectrum? Finally, the Commission also seeks comment on what form of supervisory authority the Commission should maintain over the Transition Facilitator, if any.

54. *Step 2: Negotiation Period.*—The next step in the process would be to undertake negotiations for spectrum rights in the band. The Commission anticipates that the Transition Facilitator would engage in a multi-step process to negotiate with prospective licensees and protected incumbent earth stations in the band. The result of these negotiations would be a Transition Facilitation Plan that would lay out what spectrum would be made available for flexible use (and where) as well as the steps the Transition Facilitator plans to take to ensure that protected incumbent earth stations continue to have access to the content or bandwidth they currently receive using C-band earth stations.

55. For example, the negotiation process could include the following steps. First, the Transition Facilitator

[11] In this context, clearing refers to relinquishing interference protection. Satellite transmissions that do not cause interference to terrestrial operations would not necessarily have to be cleared.

[12] The Commission will release a Public Notice announcing the start of the transition period.

would identify the profit-maximizing feasible amount of spectrum to make available by soliciting inquiries from all interested terrestrial wireless parties and negotiating for specific spectrum blocks and markets. This amount of spectrum demanded might adjust during the course of negotiations. The Transition Facilitator would then conclude private agreements to protect incumbent earth stations and determine the total available supply. Next, having balanced the supply and the demand, the Transition Facilitator would provide each prospective licensee with a certification of the specific spectrum block(s) and market(s) negotiated for in the associated private agreement. Finally, the Transition Facilitator would file its Transition Facilitation Plan with the Commission. The Commission seeks detailed comment on this possible approach, including what, if any, Commission oversight is warranted. The Commission also seeks comment on this approach's costs and benefits as well as any alternative approaches.

56. Given the high demand for and high-value of mid-band spectrum, the Commission should strive to adopt a mechanism that will repurpose a socially efficient amount of spectrum in the band. Intelsat-SES-Intel believe that consortium members could make approximately 100 megahertz of spectrum available for licensed terrestrial service via privately negotiated agreements between consortium members and prospective terrestrial licensees. In addition, under that proposal, consortium members would clear an additional 40 to 60 megahertz above this spectrum to act as an internal band to protect against harmful interference from transmissions in the adjacent spectrum. Intel maintains that, if the demand for terrestrial mobile spectrum is as robust as commonly believed by 5G supporters, this market-based approach could clear additional spectrum beyond the 100 megahertz proposed by Intelsat and SES in the same timeframe. The Commission notes that T-Mobile asserts that a market-based approach ''creates tremendous uncertainty regarding the availability of this spectrum for mobile broadband services and will likely result in inefficient reallocation of spectrum.'' To address this concern, the Commission seeks comment on whether to require that an Initial Minimum Spectrum Benchmark—a socially efficient amount of spectrum—be repurposed in the band in order to use a market-based approach, and what this amount should be. Should the Commission set the Initial Minimum Spectrum Benchmark to be 100 megahertz, given the comments of Intelsat and SES? Would a higher or lower benchmark be appropriate? Should the Commission require the Transition Facilitation Plan to require the clearing of at least the Initial Minimum Spectrum Benchmark for approval? In addition, the Commission seeks comment on whether an internal protection band is necessary both above and below (*i.e.,* below 3.7 GHz) the repurposed spectrum. What benchmarks should be set for clearing an internal protection band? Commenters should describe the appropriate amount of spectrum to be repurposed, taking into account economic considerations and the expected time and costs associated with repurposing the spectrum.

57. To ensure a timely transition process, should the Commission set specific benchmarks for the completion of initial negotiations with potential terrestrial licensees as well as protected incumbent earth stations? Intel, Intelsat, and SES maintain that such negotiations could be completed within three to eight months. The Commission asks commenters to consider whether eight months is an appropriate benchmark for completion of Transition Facilitator negotiations and submission of the Transition Facilitation Plan. What should be the effect of a failure to meet such a benchmark?

58. The Commission seeks comment on how to ensure that the market-based approach's negotiation process will facilitate a competitive and open market. For example, should the Commission require that all parties act in good faith? What other rules could the Commission adopt to ensure competition in the marketplace? The Commission notes that T-Mobile raises concerns that satellite operators could choose to limit the amount of spectrum available for flexible use in order to increase their profits, while others claim it will not take into sufficient account the interests of protected incumbent earth stations. How can the Commission ensure the negotiation process accounts for the interests of all stakeholders that have interests in the band—from new wireless entrants to existing satellite operators to protected incumbent earth stations, from those living in rural America to those living in cities? Would Commission oversight of this market-based approach—or over the Transition Facilitator—benefit in any way from insights from antitrust law?

59. The Commission also seeks comment on what role, if any, the Commission should play to facilitate or oversee these private market negotiations. For example, should the Commission allow some flexibility for the negotiators to make more spectrum available in some markets than others, potentially allowing a limited number of earth stations to continue to operate using wider bandwidths in certain areas where wireless operators are less interested in deploying (*e.g.,* remote rural areas)? Should the Commission have some input on the FSS frequencies to be made available for private-market negotiations? How should these determinations be made? A market-based approach would not likely result in mutually exclusive applications for the Commission to consider if, for example, a negotiated agreement with the Transition Facilitator is a prerequisite for applying for a license in this band. Would this negotiation satisfy the Commission's obligation in the public interest to use negotiation to avoid mutual exclusivity pursuant to § 309(j)(6)(E) of the Communications Act?

60. The Commission also asks commenters to discuss the requirements and safeguards that the Commission should adopt, if any, to ensure that these privately negotiated agreements result in a timely and complete transition. The Commission will expect parties to negotiate a full range of transition commitments and penalties for failure to meet transition benchmarks. Nonetheless, does the Commission need to adopt baseline requirements, such as defining comparable facilities, including the relocation of incumbent operations to another band, to fiber, and/or to more efficient technologies? What would be the relative costs and benefits associated with adopting such requirements? Would such definitions or rules minimize disruption to existing operations during the transition? Are there mechanisms the Commission can adopt to ensure that all or specific categories of incumbents are not adversely affected by repacking of this band? For example, should the Commission require FSS space station licensees that are going to cease transmitting on a primary basis to notify earth stations receiving those signals? Could the parties determine that the transitioning of facilities should be undertaken by the terrestrial licensee instead of the Transition Facilitator? If so, would the parties or the FCC establish a benchmark for completing such a transition? Should the Transition Facilitator be required to have a mechanism for receiving reports from incumbents that experience disruptions, and should the Transition Facilitator also be required to notify the

Commission when it receives such reports? The Commission invites commenters to address the specific form of notification required, the time period for providing each notification, and the costs and benefits of each notification requirement.

61. If the Commission's role were more limited, what level of transparency, if any, should be required during the negotiation process? For example, should satellite operators be required to notify the Commission regarding the status of on-going negotiations? What types of information should be included in such a notice? Further, should the Commission require the filing of periodic reports (*e.g.,* quarterly, bi-annually, annually) to ensure that the overall transition of this band will be completed in a timely manner? What should such reports include? The Commission encourages interested parties to provide detailed comments regarding the level of Commission oversight envisioned for this process including how such oversight comports with the Commission's obligation to assign spectrum in the public interest.

62. *Step 3: Conditional Authorization of Mobile Licensees.*—Upon the submission of a Transition Facilitation Plan, the next step would be Commission review and approval of the plan, followed by applications for terrestrial license authorizations filed pursuant to the plan. The Commission seeks comment on this process. To facilitate a streamlined review, the Commission seeks comment on allowing applications for new terrestrial authorizations to be filed at the same time as a Transition Facilitation Plan, or while the Commission reviews that plan. And to avoid undue delay in commencing the band clearing process, the Commission seeks comment on the appropriate timing, criteria, and conditions that should apply to new license authorizations.

63. The Commission seeks comment on conducting the review of the Transition Facilitation Plan. Most specifically, how should the Commission ensure that protected incumbent earth stations are indeed protected? What types of certifications should be required to ensure that the Commission can take all appropriate actions to ensure that the Transition Facilitator and its members carry out the Transition Facilitation Plan and appropriately protect, compensate, and ensure adequate access for relevant stakeholder? Should the Commission make the plan available to comment, and what confidential information is likely to be included? How should the Commission evaluate the various methods suggested for protecting incumbent earth stations, such as installing filters, extending fiber, offering service on new satellites or in new satellite bands, offering service over microwave links, and creating geographic separation from harmful interference (likely only in rural areas)? What level of granularity should the Commission require the steps of the Transition Facilitation Plan to meet? And how long should the Commission have to review and approve or reject a Transition Facilitation Plan?

64. The Commission seeks comment on how to address initial licensing applications. First, the Commission seeks comment on establishing a 30-day filing window for new terrestrial license applications. Prospective licensees would file an application for any new licenses they have agreed to acquire through their negotiations with the Transition Facilitator, along with a certification from the Transition Facilitator to clear that portion of the band for the terrestrial operator's use. Should the Commission require any other specific information to be submitted as part of the application process? Applications would be accepted and reviewed pursuant to the requirements and procedures set forth in part 1 of the Commission's rules, including, among other things, the filing of certain FCC forms, release of a public notice listing the application as accepted for filing, and the opportunity for third parties to file petitions to deny the application. Upon the Commission's review and confirmation that the applicant has complied with all other Commission filing and qualification requirements, the Commission would grant a license subject to certain conditions discussed below. Second, the Commission could treat the Transition Facilitation Plan as an application for all the flexible use licenses that would be made available as a result of it being carried out, and then allow the Transition Facilitator and prospective licensees to file separate applications to transfer those licenses as the parties saw fit. Under this approach, the Transition Facilitation Plan would also have to comport with the requirements and procedures set forth in Part 1 of the Commission's rules and would be conditioned as discussed below.

65. The Commission will condition authorizations for licensed terrestrial operations on the licensee not commencing operations until the Transition Facilitation Plan's protections for incumbent earth stations have been carried out in that area (and subject to those conditions to the extent the plan requires geographic or other sharing). The provisions of any private agreement to transition designated spectrum to licensed terrestrial operations would therefore need to comply with the service rules the Commission may ultimately adopt in this proceeding. For example, under this approach, the deadlines for a licensee's regulatory obligations, including construction benchmarks, would begin running on the date of license issuance. The Commission therefore anticipates that private agreements would take construction deadlines into account when negotiating the date by which the Transition Facilitator must clear the relevant spectrum such that the licensee may commence operations. However, the Commission seeks comment on whether the Commission should consider the individually negotiated time periods for band clearing when setting the deadlines for each licensee's satisfaction of its construction benchmarks. The Commission seeks comment on these and any other conditions on new license authorizations that would facilitate efficient implementation of the market-based approach.

66. Additionally, the Commission seeks comment on what, if any, conditions should be placed on the license with respect to the protection or relocation of the approximately 115 incumbent microwave links in the band that would sunset under out proposal. For example, should the Commission require as a condition of the license that new licensees either protect or relocate incumbent users under the same part 27 and part 101 rules used for incumbent microwave links in the Advanced Wireless Services (AWS) bands or under some other protection and/or relocation mechanism?

67. To ensure a timely transition process, should the Commission set specific benchmarks for the completion of its review of the Transition Facilitation Plan and the processing of conditional authorizations? Intel, Intelsat, and SES expect the review process would take two to seven months, and propose the license grant would trigger certain obligations under private agreements, including the clearing of the band within 12–20 months. The Commission seeks comment on a process whereby the Commission would take action on all unopposed applications found acceptable for filing within four months from the commencement of the filing window discussed above (*i.e.,* a 30-day filing window plus three months of review). Upon completion of the four-month application and review process,

the Commission would notify the Transition Facilitator that it may begin clearing the designated spectrum in the band. The Commission seeks comment on this approach to triggering the commencement of the band-clearing process. Should the process instead be triggered only upon the Commission's grant of all licenses negotiated by the Transition Facilitator? Or is a certain critical mass of license grants sufficient to begin clearing incumbent users from the band? For example, to avoid undue delay of licensed operations in the band, would it be appropriate to begin clearing the band upon issuance of licenses authorized for operation in a certain portion of contiguous spectrum in the band? The Commission seeks comment on these and any other benchmarks that may be appropriate.

68. The Commission also recognizes that the Transition Facilitator may find it necessary and beneficial to modify certain aspects of its Transition Facilitation Plan. The Commission therefore seeks comment on allowing the Wireless Telecommunications Bureau to approve minor amendments to the Transition Facilitation Plan that would not increase harmful interference to protected incumbent earth stations.

69. The Commission notes that the ultimate assignment of any license is subject to FCC approval under § 310(d) of the Communications Act. The Commission therefore seeks comment on the application process described above and any other application criteria that may be appropriate to fulfill the Commission's statutory obligations to license spectrum in the public interest and ensure that spectrum is put to its highest and best use.

70. *Step 4—Band Clearing.* Following approval of the Transition Facilitation Plan and grant of new terrestrial licenses in the band, the final step would be clearing certain incumbent users as needed from the designated spectrum and giving new terrestrial licensees access to their licensed spectrum. The Commission seeks comment on the best way to effectuate this process.

71. The Commission seeks comment on reasonable benchmarks for incumbents to cease transmitting on a primary basis in the portion of the 3.7–4.2 GHz band that becomes available for flexible use, a process Intel, Intelsat, and SES expect to take 12–20 months. The Commission seeks comment on providing the Transition Facilitator with 20 months to clear incumbent users from the designated spectrum in the band. Under this approach, the Transition Facilitator would be responsible for enforcing the various private agreements between new terrestrial licensees and incumbent users to clear the band. As spectrum becomes available for licensed use, the Transition Facilitator would notify licensees that they may begin operating in particular areas covered by their licenses where the spectrum has been cleared.[13] In light of the Commission's expectation that spectrum will be cleared incrementally over the course of the 20-month band-clearing process, the Commission proposes to require the Transition Facilitator to provide periodic updates notifying the Commission of the specific spectrum that has been cleared. Should the Commission require the Transition Facilitator to file status reports at various benchmarks (*e.g.,* every four months)? The Commission seeks comment on these and any other benchmarks that may be appropriate to promote timely completion of the band-clearing process.

72. Finally, in light of our goal to promote the rapid deployment of new licensed terrestrial operations in the 3.7–4.2 GHz band, the Commission seeks comment on any further safeguards that should apply during the band-clearing process to ensure the transition is completed within a reasonable period of time. The Commission expects that the private agreements between new terrestrial licensees and incumbent users would contain provisions and penalties sufficient to address either party's failure to satisfy their respective contractual obligations in a timely manner. In addition to, and independent of, those private agreements, the Commission seeks comment on any appropriate penalties that should apply in the event that the Transition Facilitator is unable to clear the designated spectrum within the 20-month time period discussed above. What, if any, opportunities to cure should the Commission provide? For example, should the Commission allow new terrestrial licensees and incumbent users that default on their private agreements to re-enter the process beginning with Step 2 negotiations? If so, should the Commission apply more abbreviated time periods for the completion of each step? The Commission seeks comment on these and any other actions that may be appropriate to provide adequate opportunity for successful completion of a market-based approach, while also ensuring a rapid and efficient transition to flexible use in the 3.7–4.2 GHz band.

[13] The entire area covered by a new license would not need to be cleared in order for licensees to begin operating. Instead, subject to their individual agreements, the Transition Facilitator could begin notifying licensees of their ability to begin operations once certain portions of the area covered by the license (*e.g.,* counties) have been cleared.

b. Auction Mechanisms

73. The Commission seeks comment on various auction approaches to expand flexible use of the band. Specifically, the Commission asks commenters to consider whether an overlay auction, incentive auction, capacity auction or other auction mechanism could be used to create opportunities for flexible use of the band.

74. *Overlay Auction.*—An overlay license authorizes operations for an entire geographic area but requires the licensee to protect existing incumbents from interference indefinitely, *i.e.,* until the rights are relinquished. The Commission notes that the Commission has used overlay licensing to transition several bands from site-based to geographic-area licensing.

75. The Commission seeks comment on whether the Commission shall accept applications for one or more overlay licenses—assigned by competitive bidding if mutually exclusive applications for it were accepted—that would permit an overlay licensee to negotiate with both incumbent space station licensees and earth station owners and operators to clear all or part of the band. The Commission also seeks comment on whether the Commission shall require the overlay licensee(s) to transfer flexible use licenses in the secondary market (*i.e.,* limit an individual licensee from holding more than a certain amount of spectrum in each market). Under this approach, the overlay licensee(s) would have the right to flexible use of any spectrum that becomes available as a result of incumbents' relinquishing their spectrum usage rights. If this approach were adopted, the Commission's presumption would be that incumbent space station licensees could bid individually, but not as a consortium. Allowing incumbents to bid collectively would eliminate the possibility of competition among them for the overlay license, and would discourage other potential bidders from participating in the auction. To encourage participation in the auction, are there rules the Commission can adopt to share the risk (between bidders and the U.S. Treasury) of a less profitable repurpose than anticipated? The Commission also seeks comment on whether, if no voluntary agreement is reached between an overlay licensee and earth station operators after some number of years, the earth station operators should be

required to discontinue operation in some portion of the 3.7–4.2 GHz band if requested by the overlay licensee and if the overlay licensee delivers equivalent quality service to the locations of the earth stations that would no longer be protected. The Commission seeks comment on how equivalent quality service should be defined, especially with respect to reliability. The Commission also seeks comment on how many years incumbent earth station operators should have before they would no longer receive protection in the 3.7–4.2 GHz band, and whether this deadline should apply to all areas or only to high-population-density areas. If the latter, how should such areas be defined?

76. Would assigning an overlay license or licenses for all of the band expedite flexible use of more of the band compared to other approaches? Compared to the market-based proposal, the overlay license approach potentially would allow non-incumbent bidders to develop innovative ways to clear the spectrum and clear more spectrum or varying amounts of spectrum depending on the relative costs and benefits of such repurposing. On the other hand, an overlay licensee may take longer to clear spectrum because the two largest FSS space station operators appear to already have an agreement on how to clear at least 100 megahertz for flexible use.

77. The Commission also seeks comment on how all parties that would be affected by repurposing 3.7–4.2 GHz band spectrum should be treated. In particular, should the space station operators relinquishing spectrum or the overlay licensee be required to provide incumbent earth station operators comparable replacement facilities or media? Would an overlay auction expedite the provision of terrestrial mobile services in the 3.7–4.2 GHz band or facilitate making more than 100 megahertz of the band available for flexible use? Commenters should also address the potential costs and benefits of an overlay approach for consumers and businesses in rural and underserved communities, as well as any economic impact on small businesses, and discuss any rules or procedures that could be implemented to ensure that the needs of these communities and businesses are adequately addressed. The Commission invites comment on these issues and on other matters that it may need to address to conduct an overlay auction in this band.

78. *Incentive Auction.*—The Commission also seeks comment on approaches using the Commission's general incentive auction authority to introduce flexible use in the 3.7–4.2 GHz band. One commenter suggests that ''[FSS incumbent] satellite operators, earth station licensees, and microwave licensees all could participate in a reverse auction and choose from among several options including, for example, vacating the band for another or a fiber alternative; limiting operations to a smaller swath of spectrum; or moving to a more remote location.'' A forward auction would then generate the revenues from new entrants to support the reverse auction results, and repack incumbents into the remaining portion of the band for FSS and/or move earth stations to more remote locations.

79. The Commission seeks comment on whether a variation of the incentive auction could work in the context of the 3.7–4.2 GHz band. The Commission notes that in the case of the Commission's incentive auction authority, there is a legal aspect to the problem of FSS satellite operators' incentives to reduce the amount of spectrum for repurposing discussed above. Specifically, the Commission's legal authority to use that mechanism depends on having ''at least two competing licensees participate in the reverse auction.'' Would the Varian approach, discussed above, satisfy the statutory requirement that an incentive auction have at least two competing bidders take part in the reverse auction? The Commission seeks comment on means of inducing supply competition, such as by bringing in alternative bands as substitutes, both to insure a more competitive and efficient outcome, and to meet the legal requirement of having competing licensees participate in the reverse auction. The Commission also seeks comment on whether provision of supply by licensed earth stations can substitute for provision by FSS operators.

80. *Capacity Auction.*—As an alternative to paying satellite incumbents to directly relinquish their rights to operate on specified frequencies, the Commission seeks comment on a reverse auction for satellite transponder capacity that could be used to compensate the satellite incumbents for giving up C-band transponder capacity in order to enable the Commission to reallocate C-band spectrum to flexible use. Under this approach, an individual bidder in the reverse auction would help to clear spectrum by bidding to relinquish some (or all) of the bundle of rights they hold under their licenses and the Commission's rules to lease capacity to other parties, so as to allow alternative use of the bands of spectrum associated with specific transponders. Potential bidders could be any FCC licensee that could make transponder capacity available in, for example, either the C-band or Ku-band, as discussed further below. Satellite operators could offer capacity created by launching new satellites in vacant orbital slots and/or by relinquishing some or all of their existing capacity.

81. At the time of any incentive auction, could satellite customers or earth stations in their own right be eligible to offer capacity? For example, could they make available capacity through mechanisms such as substituting services (*e.g.* fiber) to fulfill their capacity needs, reducing the amount or quality of programming distributed, or using greater compression to reduce the capacity required to carry a given amount of programming or data? C-band capacity lost due to the reduced amount of available spectrum and that was not relinquished in the reverse auction by C-band satellite operators, could be repacked onto replacement capacity for the remaining lives of those lost transponders. This would compensate C-band licensees for their lost capital investments, but not for the loss of their spectrum. The amount of C-band spectrum reallocated could be determined by the reverse auction in combination with a forward auction for cleared spectrum. Adapting the approach of the broadcast incentive auction, the amount cleared could be the largest amount for which forward auction revenues exceed the cost of repacking the remaining C-band services plus any other compensation, *e.g.,* for the loss of spectrum, and the cost of running the auction. The Commission seeks comment on a capacity auction and whether such a mechanism could be used to create flexible use in the band.

82. Several commenters propose that Ku-band capacity could be utilized for C-band services. Other commenters raise the concern that Ku-band capacity is not a reliable replacement spectrum for C-band services. The Commission seeks comment on Ku-band capacity as a replacement for C-band, including as an alternative for infrequent, portable, or more temporary uses such as for breaking news or live sporting events. The Commission also seeks comment on how to define capacity for purpose of this approach. What capacity definition meets the needs of such an auction? Depending on the band, what adjustments would be appropriate to ensure a unit of capacity in the band is comparable with a C-band unit of capacity? Would comparable communication capacity be defined in

terms of throughput, reliability, and operating costs?

83. Advocates for a capacity auction should specifically discuss the Commission's legal authority as well as implementation details and options. For example, could the Commission use its general incentive auction authority to hold a capacity auction? Which parties should be allowed to participate in the reverse auction? Is there a way for end users to participate and, if so, how would their costs be compensated? Would this approach incentivize bidders to make the appropriate tradeoffs among inputs such as compression technology and bandwidth in producing capacity? How could a capacity auction be designed to allocate capacity efficiently over time? Would this require the reverse auction to establish separate prices for capacity in each year? Would capacity need to be defined as packages of capacity at specified dates, and would a combinatorial auction be needed to determine auction winners and prices?

84. The Commission seeks comment on the applicability of § 647 of the Open-market Reorganization for the Betterment of International Telecommunications Act (ORBIT Act) to a capacity or other auction mechanism. The Commission tentatively concludes that the prohibition is not applicable here, as any auctioned spectrum would be used for a new domestic terrestrial service, and the spectrum capacity auction does not propose to assign by competitive bidding orbital locations or spectrum used for the provision of international or global satellite communications services. The Commission also tentatively concludes that the participation in an incentive auction by Ku-band operators to provide spectrum capacity to C-band operators would not violate the ORBIT Act, because this would not constitute an ''assignment'' of satellite spectrum, because the Ku-band operators would only be giving up some of their licensed spectrum capacity, rather than ceding their actual licenses. The Commission seeks comment on this tentative conclusion and invite commenters to discuss the ORBIT Act's application to any proposed auction mechanism.

85. The Commission also invites comment on other novel incentive auction mechanisms under the Commission's general incentive auction authority. Commenters should provide data on the costs and benefits associated with any proposed approach along with other helpful technical or procedural details. Commenters should also address the potential costs and benefits of an incentive-auction approach for consumers and businesses in rural and underserved communities, as well as any economic impact on small businesses, and they should discuss any rules or procedures that could be implemented to ensure that the needs of these communities and businesses are adequately addressed.

c. Alternative Mechanisms

86. The Commission also seeks comment on approaches that combine various elements of the mechanisms discussed above, as well as other mechanisms for transitioning all or part of the 3.7–4.2 GHz band for wireless broadband use. Commenters offering sequential alternatives should address the circumstances under which one method of transitioning the band would end and a subsequent one would begin. Are any conditions necessary to prevent one approach from precluding later alternatives?

87. In response to the *Mid-Band NOI,* T-Mobile proposed a hybrid approach that would combine elements of an incentive auction and the market-based approach. Under this proposal, a consortium of satellite operators (similar to the Transition Facilitator discussed above) and potential wireless bidders would participate in a phased auction process with both forward and reverse auction components. First, the Commission would conduct a simultaneous or near simultaneous auction of the band on a geographic basis to establish the initial price per area. Second, in those areas where satellite operators were all willing to clear all 500 megahertz at the prices established in the initial phase, the spectrum would be sold and these areas would be deemed ''cleared'' for flexible terrestrial wireless use. The Commission would then determine an appropriate amount of the remaining spectrum to reserve for satellite use and the forward and reverse auction processes would repeat until a Commission-determined amount of spectrum has been cleared. Although T-Mobile proposes that auction revenues would be split between the federal government and the satellite operators, with the latter responsible for end-user relocation costs as applicable, the Commission tentatively concludes there could be statutory barriers to this aspect of the proposal, and seek comment.

88. The Commission seeks comment on whether T-Mobile's proposal, or a variant of this proposal, would solve or ameliorate the three economic problems discussed above. As discussed, there is a legal aspect to the problem of FSS satellite operators' incentives to reduce the amount of spectrum for repurposing because the Commission's incentive auction authority requires at least two competing participants in the reverse auction. Would T-Mobile's proposal, or a variant of that proposal, comply with the requirement that an incentive auction have two competing licensees in the reverse auction, as well as other requirements associated with the Commission's general incentive auction authority?

89. The Commission seeks comment on whether a hybrid approach that combines elements of the approaches discussed above would strike a balance between incumbent and new entrant interests. If the Commission decides to clear and auction the entire band, but reserve some of the band for satellite use in certain areas, what is the minimum amount that should be cleared for flexible wireless use? Would the minimum amount differ based on geographic area? Should the Commission consider auctioning a majority of the band, versus the entire band, and if so, what would be the appropriate amount of spectrum to be cleared under such an approach? How can the Commission ensure that the band is transitioned in a timely manner? Should a backstop approach be triggered by a FSS operator's failure to clear the band in a timely manner? Is this the right balance, or is there a better way that traditional relocation could be used as a backstop approach to any hybrid mechanism? Additionally, would this approach allow the Commission to meet its statutory requirements under its general incentive auction authority?

90. The Commission asks commenters to provide data on the costs and benefits associated with any hybrid approach over other possible or suggested methods. If the Commission adopted a split-revenue approach, under which revenue would be split between the federal government and the satellite operators, how would those funds be distributed? Are there are legal obstacles to such an approach? Commenters should also address the potential costs and benefits of any hybrid or alternative approach for consumers and businesses in rural and underserved communities, as well as any economic impact on small businesses, and discuss any rules or procedures that could be implemented to ensure that the needs of these communities and businesses are adequately addressed. Commenters should provide complete proposals to the extent technically and economically feasible.

2. More Intensive Point-to-Multipoint Fixed Use

91. In connection with the Commission's proposals above to reform the full-band, full-arc earth station coordination policy, the Commission seeks comment on rule changes to Part 101 to allow point-to-multipoint FS use of the 3.7–4.2 GHz band and invite parties to offer alternative rules or requirements that will allow for the more intensive point-to-multipoint FS use of the band. In doing so, the Commission seeks comment on how permitting fixed wireless would affect the possible future clearing of the band for flexible use and the use of the band for satellite operations. The Commission seeks to protect incumbent FSS earth stations from harmful interference and avoid disruption to existing operations in the band. Accordingly, the Commission seeks comment on the impact that point-to-multipoint use would have on the flexibility of FSS earth stations to modify their operations in response to technical and business needs. The Commission emphasizes that—under the proposals in this *NPRM*—point-to-multipoint would operate on a secondary basis *vis-à-vis* FSS in any part of the band in which FSS continues to operate during a transition period to accommodate repacking and, thereafter, on a frequency-coordinated basis to protect actual FSS operations.

92. *Channel Plan.*—The Commission seeks comment on amending § 101.101 to permit point-to-multipoint FS in some portion of the 3.7–4.2 GHz band. The Commission seeks further comment on amending the existing channel plan for FS in the band (paired 20 megahertz channels for frequency division duplex (FDD)) to allow time division duplex (TDD) on unpaired 20 megahertz channels. The Commission asks commenters to address interference concerns between FDD and TDD, explain how, or if, they could coexist in the portion of the band not being used for flexible use, and discuss coordination and interference rules that must apply if both were to be permitted. Should the Commission allow licensees to aggregate contiguous 20 megahertz channels up to a maximum of 160 megahertz of bandwidth? To the extent a licensee has 40 megahertz of unconstructed spectrum in a licensed service area, should the Commission require construction before allowing the licensee to acquire additional spectrum in the licensed service area? The Commission invites alternative proposals with specific discussion of the costs and benefits as to each. The Commission also seeks comment generally on the technical improvements to allow for better band utilization.

93. The Commission seeks comment on authorizing point-to-multipoint FS service, on a primary basis, in some portion of the 3.7–4.2 GHz band that does not become available for flexible use. The Commission proposes that flexible use licensees would operate in the lower segment of the band (starting at 3.7 GHz) and, if additional spectrum is cleared in the 3.7–4.2 GHz band, it would be relatively easy and cost-effective to expeditiously deploy more flexible use in the lower segment of this band that has been cleared and is contiguous to the spectrum for which flexible use is already licensed. The Commission also seeks comment as to whether, regardless of how much spectrum becomes available for flexible use in the near term, to make available for licensed point-to-multipoint use up to 160 megahertz (*e.g.,* 4.04–4.2 GHz) to accommodate a transition from FSS to flexible use working-up from 3.7 GHz. Alternatively, the Commission seeks comment on making available for point-to-multipoint use 40 megahertz, 100 megahertz or up to 320 megahertz.

94. *Service Area of Each Point-to-Multipoint FS Access Point.*—The Commission seeks comment on the best approach to define a point-to-multipoint FS access point service area. The Broadband Access Coalition requests frequency coordinated, site-specific license areas, defined as a circle designated by a specified radial distance from a center point. Should the Commission define a service area based on a specified geographic access point location and maximum radius? As an alternative, should the Commission consider coverage arc sector(s) (*e.g.,* 0°N to 30°) around the access point location and specified radii, and what should such coverage arcs be based on (*e.g.,* antenna beamwidth)? If a maximum radius around an access point is specified, should the Commission adopt a single value for all access points or values relative to whether the access point is in densely populated or rural areas? For example, the Broadband Access Coalition proposes 10 kilometers for densely populated areas and 18 kilometers for rural areas. If the Commission allows different radii based on area population density, what threshold should the Commission use to differentiate between densely populated, rural, and other areas? Should the definition of ''rural'' for these purposes be the definition used for the E-Rate program? If based on a population density, should the population be based on residents or businesses, or perhaps some combination of both? Should this information be based on the most current available U.S. Census database at the time of the license application? Is there some other metric that would be better suited to determining the appropriate maximum radius limit? The Commission seeks comment on variations of these approaches, as well as those of alternatives that might not necessarily be limited to circles, arcs, or population density.

95. *Frequency Coordination and Interference Protection.*—The Commission seeks comment on technical requirements for frequency coordination between point-to-multipoint FS applicants and licensees and FSS under Part 25 and point-to-point FS, if they are grandfathered or otherwise remain in the band, under part 101. Under the Commission's current rules, the technical aspects of coordination between FSS and terrestrial operations are based on Appendix 7 of the International Telecommunication Union (ITU) Radio Regulations and certain recommendations of the ITU Radiocommunication Sector and the technical aspects of coordination between terrestrial licensees are based on Telecommunications Industry Association's Telecommunications System Bulletin (TSB) 10–F or other procedures generally following acceptable good engineering practices. The Commission asks parties to comment on how either of the above or other standards, such as those developed by the European Telecommunications Standards Institute (ETSI) or another organization, may be applicable or adaptable to point-to-multipoint FS operations in the 3.7–4.2 GHz band. The Commission also seeks comment on whether there are interference protection criteria set forth in other parts of the Commission's rules that may be adapted to protect FSS earth stations from interference by point-to-multipoint operations in the portion of the 3.7–4.2 GHz band that does not become available for flexible use. Are there technical operating characteristics of point-to-multipoint equipment, such as power levels, that would require us to adopt different values to protect FSS earth stations from interference by point-to-multipoint operations? The Commission asks that commenters be specific in addressing the technical requirements for coordination.

96. The Commission seeks comment on allowing a point-to-multipoint FS applicant to coordinate each access point by sector based on the radius

around the geographic coordinates of the site, the antenna characteristics (*e.g.,* beamwidth), and a maximum number of client devices to be deployed within a specific distance from the access point. Should point-to-multipoint FS applicants be required to submit frequency coordination for each access point, including geographic coordinates of the access point, frequency range, power and antenna characteristics, service area limits, maximum number of future authorized client devices, and the power and antenna characteristics of individual client devices? How will prior coordination be achieved for point-to-multipoint access points when the location, height, and technical characteristics of the client devices in the access point service area are not available at the time of access point coordination? If some probability of location/height is assigned for the maximum number of client locations in order to develop an interference profile for purposes of coordination, the resulting interference predictions will have some associated probability of interference occurrence; in that case should point-to-multipoint licensees be able to add up to the maximum number of client devices without independently coordinating each client device? Should client devices be subject to additional technical limitations, such as minimum directional antenna requirements, EIRP limits, or other criteria to limit their interference potential? Should the maximum number of client devices be specified for each channel? The Commission seeks comment on the above proposals and, whether, if a point-to-multipoint FS applicant cannot successfully coordinate a geographic service area, it should be permitted to coordinate client devices on a path-to-path basis. Parties should address the technical requirements of the above, offer alternatives, and specifically detail the costs and benefits of each proposal.

97. The Commission also seeks comment on the administrative process that should apply to the coordination of point-to-multipoint FS operations in the band. Under the current rules, the administrative aspects of the coordination process are set forth in § 101.103(d) in the case of coordination of terrestrial stations with earth stations and in § 25.203 in the case of coordination of earth stations with terrestrial stations. What modifications to §§ 101.103(d), 25.203, or to another rule must be made to govern the administrative process that will apply to the coordination of point-to-multipoint FS operations with FSS and point-to-point FS, if grandfathered or remain in the band, and the coordination of FSS and point-to-point FS, if grandfathered or remain in the band, with point-to-multipoint FS operations in the band? The Commission seeks comment on subjecting point-to-multipoint FS applicants to an expedited coordination process with mandatory electronic notification and response. Should an expedited process, if adopted, govern coordination that occurs beginning 90 days after the adoption of final rules published in the **Federal Register**? The Commission also seeks comment on any other modifications to the Commission's rules with respect to the coordination administrative process that would reduce the economic impact of the proposed rule changes on small entities.

98. Additionally, the Commission seeks comment on the possibility of adopting an automated coordination process for point-to-multipoint FS applications. There is a lack of a consensus in the record as to when, or if, the Commission will be in a position to propose and adopt rules for automated coordination of point-to-multipoint FS applications in the 3.7–4.2 GHz band. The Broadband Access Coalition contends that automated coordination should not be the same as the Spectrum Allocation Server (SAS) system for licensing in the 3.5 GHz band. However, the Broadband Access Coalition believes that the existing process can be modified and automated over time to incorporate real-time, real-world FSS protection criteria and enable coordination between and among point-to-point FS, if grandfathered or remain in the band, and point-to-multipoint FS based on FSS, point-to-point FS and point-to-multipoint FS industry standards of protection criteria to be developed by affected stake-holders. Several commenters including IEE DySPAN, OTI &PK, and Federated, support using a spectrum access database similar to the sharing system used below 3.7 GHz for the Citizens Broadband Radio Service. Google offers another variant contending that a lightweight database supported authorization framework would enable the efficient deployment of fixed broadband access (FBA) systems. However, the satellite industry and content providers have strong objections to more intensive use of the 3.7–4.2 GHz by FS and have raised very specific concerns over the lack of proven methods for spectrum sharing with more intensive fixed use in this band. Satellite operators also raise concern about the ability of point-to-multipoint systems to quickly remedy interference when it is identified or to accommodate FSS earth stations when they change frequencies. The Commission seeks comment on the above. The Commission also asks that, given the lack of consensus, parties continue to work together to offer a more widely supported proposal for the Commission to consider.

99. *Power Limits.*—The Commission seeks comment on adopting power limits for point-to-multipoint FS operations in the 3.7–4.2 GHz band. The Commission existing rules for FS provide power limits based on the link length. With point-to-multipoint FS service areas, individual links between access points and client devices will vary in length. Should the Commission apply a rule to point-to-multipoint FS links specifying a minimum path length, similar to those specified for point-to-point FS links in § 101.143 or is some other variation of this rule more applicable to point-to-multipoint FS operations? What should the Commission's power limits be for point-to-multipoint FS service? The Broadband Access Coalition has proposed a 50 dBm EIRP limit and a maximum conducted power of 1 Watt. Should the access point EIRP be scalable with bandwidth? Likewise, should client devices be limited to 50 dBm EIRP regardless of bandwidth? If not scalable, how do changes in bandwidth impact frequency coordination? Should the Commission apply the emission limits set forth in § 101.111 to point-to-multipoint FS operations in this band, or would some other limits be more appropriate to protect adjacent-band operations? The Broadband Access Coalition anticipates that point-to-multipoint FS systems would be able to meet existing Part 101 out-of-band emission limits, without modification, but the Commission seeks comment as to this issue. The Commission also invites comment on other proposals. The Commission notes that the adjacent 4.2–4.4 GHz band is allocated to the aeronautical radionavigation service on a primary basis and that, at WRC–15, the 4.2–4.4 GHz band was also allocated to the aeronautical mobile (R) service on a primary basis in all ITU Regions with use reserved for WAIC systems. WAIC systems are onboard short range wireless systems that will replace substantial portions of aircraft wiring. These systems increase aircraft safety by providing dissimilar redundancy in communications links between aircraft systems. The Commission solicits comment on the needed out-of-band emission limit required to protect the

aeronautical radionavigation service in the 4.2–4.4 GHz band.

100. *Antenna Standards.*—The Commission asks parties to provide detailed technical comments as to antenna standards that should apply to point-to-multipoint FS operations in the 3.7–4.2 GHz band. Section 101.115 of the Commission's rules specifies the maximum beamwidth, minimum antenna gain and radiation suppression envelope for FS antennas in this band. How should these antenna standards be modified to accommodate the range of antennas typically used in point-to-multipoint applications? The Broadband Access Coalition Petition proposes that, unlike point-to-point FS licensees subject to § 101.115, point-to-multipoint FS licensees be permitted to use any antenna in the 3.7–4.2 GHz band that meets the minimum performance requirements for access points and client devices. Specifically, the Broadband Access Coalition Petition proposes that a point-to-multipoint FS licensee would be required to specify the gain; azimuth; polarization; height; azimuth and elevation half-power beamwidths; and tilt (*e.g.,* −10 degrees) for sectorized antennas and gain, height and any electrical tilt for omni-directional antennas. Should the Commission specify a minimum radiation suppression at some angle from the edge of the main beam for sectorized antennas? The Commission seeks comment on the above and invite parties to offer alternative proposals. What are the relative costs and benefits for each proposal? How would each proposal affect other users in the band or provide mechanisms to address interference?

101. *Client Devices.*—The Commission seeks comment on whether the Commission should require directional antennas on outdoor point-to-multipoint client devices and if so what should those antenna standards be? Would antenna standards for client devices make coordination easier? The Commission asks that commenters address the minimum antenna gain and minimum suppression from main beam centerline. Should client devices be limited to outdoor antennas only and permanently affixed at the client location? Should the Commission allow portable indoor client devices, and should such devices be allowed under point-to-multipoint or flexible use rules? If the Commission permits portable client devices with non-directional antennas, how will this impact the access point service area frequency coordination with incumbent licensees?

102. *Frequency Agility and Radio Capabilities.*—The Commission seeks comment on whether the Commission should require point-to-multipoint FS radios (both access points and client devices) to be frequency agile and thus capable of operating across the 3.7–4.2 GHz band or allow radios to be agile over 3.7–4.2 GHz so long as the flexible use portion of the band is locked out and be able to accommodate any 20 megahertz channel assignment? The Broadband Access Coalition requests that licensed point-to-multipoint radios (both access points and client devices) be frequency agile and thus capable of operating across the entire 3.7–4.2 GHz band, and accommodate any 20 megahertz channel assignment. Additionally, should the Commission require that client devices be capable of modifying channel and bandwidth assignment when prompted by the associated access point? Should access points be software upgradable to communicate with future automated database and client devices to be capable of following instructions from associated access point to change channels and bandwidth, as necessary? The Commission seeks comment on how such requirements might be implemented in regulations, or whether any such features may instead be developed by manufacturer technical standards and/or multi-stakeholder interest groups.

103. *Construction.*—The Commission seeks comment on the construction deadlines and notifications that should apply to point-to-multipoint FS licensees in the 3.7–4.2 GHz band. Should the Commission require point-to-multipoint FS licensees to build out, within 12 months, and operate at least one access point and at least five client radios in licensed areas or lose protection for the service area? If a point-to-multipoint FS licensee fails to meet the above requirements, should the Commission allow links already in service from that access point to maintain coordinated protection on an individual, path-by-path basis to protect existing customers served by those links? In addition, the Commission encourages commenters to consider the economic impact on consumers and businesses in rural communities and areas that are unserved or underserved by current broadband providers, as well as any economic impact on small businesses. The Commission asks parties to comment on this proposal, offer alternative proposals, and discuss the relative costs and benefits for each proposal.

104. Additionally, § 101.141(a)(3)(ii) requires that ''traffic loading payload shall exceed 50 percent of payload capacity within 30 months of licensing.'' The Commission recognizes that the minimum traffic loading payload requirement in § 101.141(a)(3)(ii) was designed for symmetrical traffic and that IP traffic is often asymmetrical. Should the Commission therefore not adopt a requirement for point-to-multipoint FS licensees or do parties have alternative proposals for us to consider?

105. *Equipment Access/RF Exposure.*—Section 101.131(a) requires that ''[t]he equipment at the operating and transmitting positions must be so installed and protected that it is not accessible to, or capable of being operated by, persons other than those duly authorized by the licensee.'' The Broadband Access Coalition states that client radios providing low power point-to-multipoint services will operate from residential premises and will not present a radiofrequency (RF) hazard because, when operated at full power, the RF exposure keep-out zone for point-to-multipoint client radios operating at the proposed maximum EIRP level is less than 0.6 meters (2 feet). The Commission anticipates that client devices would likely be mounted in such a way as to provide a good connection back to the access point, free from obstructions within the transmission path, and so while such an installation may not strictly comply with the access restriction requirement in the Commission's rules, it is possible that other regulatory examples or analogies may apply to point-to-multipoint situations where home subscriber devices are involved. For example, fixed wireless licensees with home-installed consumer equipment are generally required to attach a label to transceiver antennas that: (1) Provides adequate notice regarding potential radiofrequency safety hazards, *e.g.,* information regarding the safe minimum separation distance required between users and transceiver antennas; and (2) references the applicable FCC-adopted limits for radiofrequency exposure specified in § 1.1310. The Commission seeks comment on whether a similar requirement for point-to-multipoint client devices may be a preferred alternative to § 101.1310 of the Commission's rules. In addition, the Commission seeks comment on the possibility that there may be any other potential use cases, such as wireless routers or other types of devices, that may require separate consideration for the purposes of equipment authorization and RF exposure compliance. The Commission notes that

all transmitters must comply with the Commission's exposure limits and requirements of §§ 1.1307(b), 1.1310, 2.1091, and 2.1093 of the Commission's rules, as applicable.

106. *ULS Requirements.*—What technical data should point-to-multipoint FS licensees be required to provide in ULS? The Commission notes that the Broadband Access Coalition requests in its petition that the applicant's frequency coordination should correspond to the specific equipment and antenna orientation the applicant selects, and so the Commission seeks comment on whether at least that same information used for frequency coordination should be entered into the Commission's licensing database. At a minimum should licensees be required to provide the antenna gain, azimuth, polarization, height, half-power beamwidth (azimuth and elevation), and tilt (*e.g.* −10°) for each access point by sector?

3. Service Rules for Flexible Use

107. The scope of the service rules adopted herein will vary depending on the mechanism ultimately adopted by the Commission to expand flexible use in the band. For convenience, the Commission refers to this indeterminate amount of spectrum as the Mid-Band Flexible Use or ''MBX'' spectrum. Assuming that the Commission ultimately decides to add a mobile, except aeronautical mobile, allocation and to make some or all of the 3.7–4.2 GHz band available for flexible use, in this section the Commission proposes or seeks comment on band plan, licensing and operating and technical rules for the 3.7–4.2 GHz band spectrum that becomes available for terrestrial mobile and fixed flexible-use. The Commission proposes to license this spectrum under the Commission's flexible-use, part-27 rules that permit licensees to provide any fixed or mobile service consistent with the allocations for this spectrum, subject to rules necessary to prevent or minimize harmful interference. The Commission seeks comment on this approach. The Commission also seeks comment, however, on whether there are any services, *e.g.,* Internet of Things, that would not qualify under § 603(a)(2)(B) of the MOBILE NOW Act, which requires the Commission to identify 100 megahertz below 6000 MHz for use on exclusive, licensed basis for commercial mobile use, pursuant to the Commission's authority to implement such licensing in a flexible manner?

a. Band Plan

108. *Block Sizes.*—The Commission seeks comment on appropriate block size to promote efficient and robust use of the band for next generation wireless technologies, including 5G. Currently, the 3.7–4.2 GHz band is licensed terrestrially by 20 megahertz channels for fixed use. However, the current channelization of the band should not affect the Commission's consideration of alternate band plans. Therefore, the Commission seeks comment on the appropriate block size(s) to best accommodate the fullest range of terrestrial wireless services.[14] Would 20 megahertz blocks be appropriate for the wireless technologies that are likely to be deployed in this band? Should the Commission allow blocks to be aggregated to provide greater capacity where needed? Or, would licensing the 3.7–4.2 GHz band in larger block sizes (*e.g.,* 50–100 megahertz) better support 5G services while promoting competition? Would a mix of channel sizes improve efficiency and flexibility for a wider variety of users in the band?

109. The Commission also seeks comment on whether the appropriate block sizes should be affected by the specific transition mechanism adopted by the Commission. For example, if the Commission adopts a market-based approach, the Commission seeks comment on allowing parties to define block sizes in their agreements. In this regard, would a default block size that could be aggregated and disaggregated help facilitate a market-based process? Commenters should discuss and quantify the costs and benefits of their proposals.

110. *Spectrum Block Configuration.*—The Commission generally has licensed bands that support mobile broadband services on a paired basis but specified the downlink and uplink bands only when necessary to avoid harmful interference, *e.g.,* to Federal incumbents. The Commission recognizes that the 3.7–4.2 GHz spectrum that becomes available for flexible use could be configured in any number of paired or unpaired modes. The Commission therefore seeks comment on a range of options. If the Commission adopts an unpaired approach, are any administrative measures necessary to keep track of how spectrum blocks are being used? The Commission invites comment on what approach to take, and the costs and benefits of particular approaches. Above, the Commission discusses various mechanisms for expanding flexible use in all or part of the band. The Commission asks proponents of the various approaches described whether there are issues specific to this section and their preferred approach.

111. *Use of Geographic Licensing.*—Consistent with the Commission's approach in several other bands used to provide fixed and mobile services, the Commission proposes to license the 3.7–4.2 GHz MBX spectrum on an exclusive, geographic area basis. Geographic area licensing provides flexibility to licensees, promotes efficient spectrum use, and helps facilitate rapid assignment of licenses, utilizing competitive bidding when necessary. The Commission seeks comment on this approach, including the costs and benefits of adopting a geographic area licensing scheme. In the event that a party does not support using geographic licensing, it should explain its position, describe what type of licensing scheme it supports and identify the costs and benefits associated with its alternative licensing proposal.

112. *Service Areas.*—The Commission seeks comment on the appropriate service areas for any flexible use licenses. In determining the appropriate geographic license size, the Commission must consider several factors, including: (1) Facilitating access to spectrum by both small and large providers; (2) providing for the efficient use of spectrum; (3) encouraging deployment of wireless broadband services to consumers, especially those in rural areas and Tribal lands; and (4) promoting investment in and rapid deployment of new technologies and services. In light of these statutory considerations, the Commission asks commenters to discuss and quantify the economic, technical, and other public interest considerations of licensing on a PEA, county, nationwide, or other basis. The Commission asks commenters to address the costs and benefits of their recommended licensing approach.

113. The Commission also seeks comment on a licensing approach for the Gulf of Mexico. In AWS–1, AWS–3, AWS–4, and the H Block, the Commission issued separate licenses for the Gulf of Mexico. In the Upper 700 MHz band, however, the Commission included the Gulf of Mexico in larger service areas. Commenters who advocate a separate service area or areas to cover the Gulf of Mexico should discuss what boundaries should be used, and whether special interference protection criteria or performance requirements are necessary due to the unique radio propagation characteristics and antenna siting challenges that exist for Gulf licensees.

[14] The use of 20 megahertz blocks will enable transmission efficiencies achieved by 5G voluntary standards, including Long-Term Evolution (''LTE'') derivatives. Vivint Wireless Comments at 3.

114. The Commission also seeks comment on whether the service areas should be affected by the specific transition mechanism adopted by the Commission. For example, if the Commission adopts a market-based approach, the Commission seeks comment on allowing parties to define service areas in their agreements. In this regard, would a default service-area size smaller than the contiguous 48 states that could be aggregated and disaggregated help facilitate a market-based process? If the Commission adopts an overlay auction, the Commission seeks comment on issuing a single nationwide license, or alternatively issuing licenses for five regions: (1) The contiguous 48 states and the Gulf of Mexico, (2) Alaska, (3) Hawaii, (4) Puerto Rico and the U.S. Virgin Islands, and (5) Guam, the Northern Mariana Islands, and American Samoa. Commenters should discuss and quantify the costs and benefits of their proposals.

115. The Commission also seeks comment on a licensing approach for the Gulf of Mexico. In AWS–1, AWS–3, AWS–4, and the H Block, the Commission issued separate licenses for the Gulf of Mexico. In the Upper 700 MHz band, however, the Commission included the Gulf of Mexico in larger service areas. Commenters who advocate a separate service area or areas to cover the Gulf of Mexico should discuss what boundaries should be used, and whether special interference protection criteria or performance requirements are necessary due to the unique radio propagation characteristics and antenna siting challenges that exist for Gulf licensees.

b. Licensing and Operating Rules

116. The Commission seeks to afford licensees the flexibility to align licenses in the 3.7–4.2 GHz band with licenses in other spectrum bands governed by Part 27 of the Commission's rules. The Commission therefore proposes that licensees in the 3.7–4.2 GHz band comply with licensing and operating rules that are applicable to all Part 27 services, including assignment of licenses by competitive bidding, flexible use, regulatory status, foreign ownership reporting, compliance with construction requirements, renewal criteria, permanent discontinuance of operations, partitioning and disaggregation, and spectrum leasing. The Commission seeks comment on this approach and ask commenters to identify any aspects of the Commission's general Part 27 service rules that should be modified to accommodate the particular characteristics of the 3.7–4.2 GHz band. The Commission asks proponents of the various mechanisms described above whether there are issues specific to this section and their preferred approach.

117. In addition, the Commission seeks comment on service-specific rules for the 3.7–4.2 GHz band, including eligibility, mobile spectrum holdings policies, license term, performance requirements, renewal term construction obligations, and other licensing and operating rules. In addressing these issues, commenters should discuss the costs and benefits associated with these proposals and any alternatives that commenters propose.

118. *Eligibility.*—Consistent with established Commission practice, the Commission proposes to adopt an open eligibility standard for licenses in the 3.7–4.2 GHz band. The Commission seeks comment on this approach. Specifically, the Commission seeks comment on whether adopting an open eligibility standard for the licensing of the 3.7–4.2 GHz band would encourage efforts to develop new technologies, products, and services, while helping to ensure efficient use of this spectrum. The Commission notes that an open eligibility approach would not affect citizenship, character, or other generally applicable qualifications that may apply under the Commission's rules. Commenters should discuss the costs and benefits of the open eligibility proposal on competition, innovation, and investment. Above, the Commission discusses various mechanisms for expanding flexible use in all or part of the band. The Commission asks proponents of the various approaches described above whether there are issues specific to this section and their preferred approach. Finally, a person who has been, for reasons of national security, barred by any agency of the Federal Government from bidding on a contract, participating in an auction, or receiving a grant is ineligible to hold a license that is required by 47 U.S.C. Chapter 13 (the Spectrum Act) to be assigned by a system of competitive bidding under § 309(j) of the Communications Act. In the event that the Commission assigns licenses through competitive bidding, the Commission proposes to apply this ineligibility provision to the 3.7–4.2 GHz band.

119. *Mobile Spectrum Holdings.*—Spectrum is an essential input for the provision of mobile wireless services, and to implement provisions of the Communications Act, the Commission has developed policies to ensure that spectrum is assigned in a manner that promotes competition, innovation, and efficient use.

120. The Commission seeks comment generally on whether and how to address any mobile spectrum holdings issues involving 3.7–4.2 GHz spectrum to meet the Commission's statutory requirements and ensure competitive access to the band. Similar to the Commission's approach in the *2017 Spectrum Frontiers Order and FNPRM,* the Commission proposes not to adopt a pre-auction bright-line limit on the ability of any entity to acquire spectrum in the 3.7–4.2 GHz band through competitive bidding at auction. Since such pre-auction limits may unnecessarily restrict the ability of entities to participate in and acquire spectrum in an auction, the Commission is not inclined to adopt such limits absent a clear indication that they are necessary to address a specific competitive concern, and the Commission seeks comment on any specific concerns of this type.

121. The Commission also seeks comment on whether this band should be included in the Commission's spectrum screen, which helps to identify markets that may warrant further competitive analysis, for evaluating proposed secondary market transactions. If the Commission does determine that an auction is appropriate, the Commission seeks comment on reviewing holdings on a case-by-case basis when applications for initial licenses are filed post-auction to ensure that the public interest benefits of having a threshold on spectrum applicable to secondary market transactions are not rendered ineffective. The Commission seeks comment on whether and how the similarity of this spectrum to spectrum currently included in the screen should be factored into the Commission's analysis, including the suitability of 3.7–4.2 GHz spectrum for use in the provision of mobile telephony or broadband services. Commenters should discuss and quantify any costs and benefits associated with any proposals on the applicability of mobile spectrum holdings policies to 3.7–4.2 GHz spectrum. The Commission discusses above various mechanisms for expanding flexible use in all or part of the band. The Commission asks proponents of the various approaches described above whether there are issues specific to this section and their preferred approach. For example, should the Commission impose limits on the amount of spectrum acquired by one party through a market-based mechanism?

122. *License term.*—The Commission seeks comment on a 15-year term for licenses in the 3.7–4.2 GHz band.[15] The Commission believes that 15 years will afford licensees sufficient time to achieve this significant buildout obligation. The Commission seeks comment on the costs and benefits of this proposal. In addition, the Commission invites commenters to submit alternate proposals for the appropriate license term, which should similarly include a discussion on the costs and benefits.

123. *Performance requirements.*—The Commission establishes performance requirements to ensure that spectrum is intensely and efficiently utilized. The Commission has applied different performance and construction requirements to different spectrum bands based on considerations relevant to those bands. The Commission continues to believe that performance requirements play a critical role in ensuring that licensed spectrum does not lie fallow.

124. Accordingly, considering the unique characteristics of this band, and to ensure that licensees begin providing service to consumers in a timely manner, the Commission seeks comment on adopting specific quantifiable benchmarks as an important component of its performance requirements. The Commission seeks comment on requiring a 3.7–4.2 GHz band licensee, relying on mobile or point-to-multipoint service in accordance with the Commission's part 27 rules, to provide reliable signal coverage and offer service to at least forty-five (45) percent of the population in each of its license areas within six years of the license issue date (first performance benchmark), and to at least eighty (80) percent of the population in each of its license areas within 12 years from the license issue date (second performance benchmark). For licensees relying on point-to-point service, the Commission seeks comment on requiring them to demonstrate within six years of the license issue date (first performance benchmark) that they have four links operating and providing service, either to customers or for internal use, if the population within the license area is equal to or less than 268,000. If the population within the license area is greater than 268,000, the Commission seeks comment on requiring a licensee relying on point-to-point service to demonstrate it has at least one link in operation and providing service per every 67,000 persons within a license area. The Commission seeks comment on requiring licensees relying on point-to-point service to demonstrate within 12 years of the license issue date (final performance benchmark) that they have eight links operating and providing service, either to customers or for internal use, if the population within the license area is equal to or less than 268,000. If the population within the license area is greater than 268,000, the Commission seeks comment on requiring a licensee relying on point-to-point service to demonstrate it is providing service and has at least two links in operation per every 67,000 persons within a license area. The Commission seeks comment on whether in order to be eligible to be counted under the point-to-point buildout standard, a point-to-point link must operate with a transmit power greater than + 43 dBm.[16]

125. The Commission believes that 12 years will provide sufficient time for any 3.7–4.2 GHz licensee to meet the proposed coverage requirements. The Commission anticipates that after satisfying the 12-year second performance benchmark, a licensee will continue to provide reliable signal coverage, or point-to-point links, as applicable, and offer service at or above that level for the remaining three years in the proposed 15-year license term prior to renewal. Establishing benchmarks before the end of the license term will ensure continuity of service over the license term, which is essential to the Commission's evaluation under the Commission's renewal standards.

126. The Commission also seeks comment on whether the proposals discussed above represent the appropriate balance between license-term length and a significant final buildout requirement. The Commission seeks comment on the proposed buildout requirements and any potential alternatives. The Commission, for example, seeks comment on alternative methodologies for measuring population coverage requirements in the Gulf of Mexico. Above, the Commission discusses various mechanisms for expanding flexible use in all or part of the band. The Commission asks proponents of the various approaches described above whether there are issues specific to this section and their preferred approach. The Commission also seeks comment on whether small entities face any special or unique issues with respect to buildout requirements such that they would require certain accommodations or additional time to comply. Finally, commenters should discuss and quantify how any supported buildout requirements will affect investment and innovation, as well as discuss and quantify other costs and benefits associated with the proposal.

127. *Internet of Things (IoT) Performance Requirements.*—While the Commission proposes performance benchmarks based on population coverage applicable for a range of fixed and mobile services, the Commission recognizes that 3.7–4.2 GHz licenses have flexibility to provide services potentially less suited to a population coverage metric. In particular, licensees providing IoT-type fixed and mobile services may benefit from an alternative performance benchmark metric, and the Commission seeks comment on the appropriate metric to accommodate such service offerings. As the Commission did in *Spectrum Frontiers,* the Commission acknowledges that some IoT-type services may have difficulty meeting the population-based metrics that the Commission proposes for fixed and mobile services. In *Spectrum Frontiers,* the Commission modified its existing part 30 rules to adopt a specific definition of ''fixed point-to-point link,'' which includes the use of point-to-point stations as already defined in part 30 and is based on power level. This definition is intended to separate ''traditional'' point-to-point links from the sensor and device connections the Commission anticipates will be part of new Internet of Things networks in these bands. This definition applies to a network of fixed sensors or smart devices operating at low power over short distances. The Commission seeks comment on applying the same framework here and invite commenters to suggest new metrics that will accommodate innovative services in mid-band spectrum. The Commission also seeks comment on how relatively lower power point-to-point operations at or below a transmit power of + 43 dBm should be required to meet the buildout rules for 3.7–4.2 GHz licensees.

[15] The Communications Act does not specify a term limit for wireless radio services licenses. The only statutory limit on license terms is eight years for licenses in the broadcast services. *See* 47 U.S.C. 307(c)(1); *see also* 47 CFR 73.1020(a).

[16] In *Spectrum Frontiers,* the Commission defined a ''fixed point-to-point link'' as ''a radio transmission between point-to-point stations (as already defined in part 30), where transmit power exceeds + 43 dBm.'' Under this definition, stations or devices transmitting using lower power levels will not count towards the number of fixed links required under the performance metric. Licensees whose networks include such low-power connections may rely on another part of their network to demonstrate buildout (*e.g.,* mobile area coverage or higher-power fixed backhaul links). *See 2017 Spectrum Frontiers Order and FNPRM,* 32 FCC Rcd at 11008–09, paragraph 66 through 68.

128. The Commission seeks additional comment on what metric it should adopt to accommodate IoT services, while recognizing the difficulty of crafting an IoT-specific metric, especially while the relevant technologies and use cases are still being developed. For example, a performance metric based on geographic area coverage (or presence) could allow for networks that provide meaningful service but deploy along lines other than residential population. Consistent with the Commission's approach above seeking comment on a first and second performance benchmark, the Commission seeks comment on the following metrics as an option for MBX-spectrum licensees to fulfill their buildout requirements: geographic area coverage of 35 percent of the license area at the first (six-year) performance benchmark, and geographic area coverage of 65 percent of the license area at the second (12-year) performance benchmark. The Commission also seeks comment on an alternative requirement of presence in 35 percent of subset units of the license area, such as census tracts, counties, or some other area at the first performance benchmark, and presence in 65 percent of subset units at the second benchmark. A standard requiring presence in subset units of a license area could accommodate deployments, such as sensor networks, that are not designed to provide mobile or point-to-multipoint area coverage, and for whom calculating ''coverage of 65 percent of the area'' would therefore not be a meaningful standard. Licensees would demonstrate compliance with this metric through a showing of the equipment or deployments that are part of a network that is actually providing service, either to external customers or for internal uses.

129. The Commission suggests these levels of geographic coverage as an attempt to maintain parity between the requirements in these metrics and the requirements of its earlier proposal based on population coverage.[17] The Commission seeks comment on these coverage levels, including any suggestions of alternative levels of coverage that might be more appropriate. The Commission also emphasizes that any metric it adopts to accommodate IoT services would, like the population coverage and fixed link metrics ultimately adopted, be available to any MBX-spectrum licensee. While the Commission suggests an additional metric in order to facilitate the deployment of IoT and other innovative services, there would be no requirement that a licensee build a particular type of network or provide a particular type of service in order to use whatever metric the Commission ultimately adopts. Above, the Commission discusses various mechanisms for expanding flexible use in all or part of the band. The Commission asks proponents of the various approaches described above whether there are issues specific to this section and their preferred approach. The Commission strongly encourages stakeholders to fully develop a record on this issue.

130. *Penalty for Failure to Meet Performance Requirements.*—Along with performance benchmarks, the Commission seeks to adopt meaningful and enforceable penalties for failing to meet the benchmarks. The Commission seeks comment on which penalties will most effectively ensure timely build-out. Specifically, the Commission proposes that, in the event a 3.7–4.2 GHz MHz licensee fails to meet the first performance benchmark, the licensee's second benchmark and license term would be reduced by two years, thereby requiring it to meet the second performance benchmark two years sooner (at 10 years into the license term) and reducing its license term to 13 years. The Commission further proposes that, in the event a 3.7–4.2 GHz licensee fails to meet the second performance benchmark for a particular license area, its authorization for each license area in which it fails to meet the performance requirement shall terminate automatically without Commission action.

131. The Commission proposes that, in the event a licensee's authority to operate terminates, the licensee's spectrum rights would become available for reassignment pursuant to the competitive bidding provisions of § 309(j). Further, consistent with the Commission's rules for other licenses, including AWS–1, AWS–3, AWS–4 and H Block, the Commission proposes that any 3.7–4.2 GHz licensee who forfeits its license for failure to meet its performance requirements would be precluded from regaining the license.

132. *Compliance Procedures.*—In addition to compliance procedures applicable to all Part 27 licensees, including the filing of electronic coverage maps and supporting documentation, the Commission proposes that such electronic coverage maps must accurately depict the boundaries of each license area in the licensee's service territory. If a licensee does not provide reliable signal coverage to an entire license area, the Commission proposes that its map must accurately depict the boundaries of the area or areas within each license area not being served. Further, the Commission proposes that each licensee also must file supporting documentation certifying the type of service it is providing for each licensed area within its service territory and the type of technology used to provide such service. Supporting documentation must include the assumptions used to create the coverage maps, including the propagation model and the signal strength necessary to provide reliable service with the licensee's technology. The Commission seeks comment on the Commission's proposal. The Commission also seeks comment on whether small entities face any special or unique issues with respect to the transition such that they would require additional time to comply.

133. *Renewal Term Construction Obligation.*—In addition to, and independent of, the general renewal requirements contained in § 1.949 of the Commission's rules, which apply to all Wireless Radio Services (WRS) licensees, the Commission also seeks comment on application of specific renewal term construction obligations to 3.7–4.2 GHz licensees.

134. The *WRS Renewal Reform FNPRM* proposed to apply rules adopted in that proceeding to all flexible geographic licenses. Given the Commission's proposal to license this band on a geographic basis for flexible use, any additional renewal term construction obligations proposed in the *WRS Renewal Reform FNPRM* also would apply to licenses in the 3.7–4.2 GHz band. The Commission seeks comment on whether there are unique characteristics of the 3.7–4.2 GHz band that might require a different approach than the various proposals raised by the *WRS Renewal Reform FNPRM.* For example, while the vast majority of existing wireless radio services have 10-year license terms, here the Commission seeks comment on a 15-year license term for the 3.7–4.2 GHz band. Do any of the Commission's proposals for this band, such as potentially longer license terms, necessitate a more tailored approach than the rules of general applicability proposed in the *WRS Renewal Reform FNPRM*? For instance, should the Commission requires buildout to 85 percent of the population by the end of second license term? Commenters advocating rules specific to the 3.7–4.2 GHz band should address the costs and benefits of their proposed

[17] In most license areas, the residential population is unevenly distributed. In those areas, building a network covering 65% of the geographic area would require more intensive deployment than one covering 65% of the population, suggesting that a lower percent coverage requirement for geographic area could be appropriate.

rules and discuss how a given proposal will encourage investment and deployment in areas that might not otherwise benefit from significant wireless coverage. Above, the Commission discusses various mechanisms for expanding flexible use in all or part of the band. The Commission asks proponents of the various approaches described above whether there are issues specific to this section and their preferred approach. The Commission seeks comment on whether to require an applicant deploying IoT applications in the 3.7–4.2 GHz band to exceed its original construction metric by an additional five percent in its next full renewal term.

135. *Competitive Bidding Procedures.*— The Commission seeks comment above on the types of licenses for the 3.7–4.2 GHz band that would best serve the public interest. In the event that the Commission accepts mutually exclusive applications for licenses in the band, the Commission will grant the licenses through a system of competitive bidding, consistent with the Commission's statutory mandate. Accordingly, the Commission seeks comment on a number of proposals relating to competitive bidding for licenses for spectrum in this band, including the costs and benefits of those proposals.

136. Consistent with the competitive bidding procedures the Commission has used in previous auctions, the Commission proposes that the Commission would conduct any auction for licenses for spectrum in the 3.7–4.2 GHz band in conformity with the general competitive bidding rules set forth in part 1, subpart Q, of the Commission's rules. Specifically, the Commission proposes to employ the part 1 rules governing competitive bidding design, designated entity preferences, unjust enrichment, application and certification procedures, payment procedures, reporting requirements, and the prohibition on certain communications between auction applicants. Under this proposal, such rules would be subject to any modifications that the Commission may adopt for its part 1 general competitive bidding rules in the future. In this *NPRM,* the Commission seeks comment on general application of the part 1 competitive bidding rules to any auction of 3.7–4.2 GHz licenses. The Commission also seeks comment on whether any of the Commission's part 1 rules would be inappropriate or should be modified for an auction of licenses in this frequency band. In particular, the Commission seeks comment on the following proposals for bidding credits for designated entities in this band. As with other flexible use licenses in recent years, the Commission proposes in this band to adopt bidding credits for the two larger designated entity business sizes provided in the part 1 rules. The Commission also proposes to offer rural service providers a designated entity bidding credit for licenses in this band. Commenters addressing these proposals should consider what details of licenses in the band may affect whether designated entities will apply for them. The Commission seeks comment on new or revised rules that would be necessary to implement an incentive auction if the Commission adopted that approach. Would a tailored version of the rules adopted for the reverse auction portion of the broadcast incentive auction be appropriate?

c. Technical Rules

137. *Power Limits for Fixed and Base Stations.*—The current rules for AWS–1, AWS–3 and AWS–4 limit base station power in non-rural areas to 1640 watts EIRP for emission bandwidths less than one megahertz and to 1640 watts per MHz EIRP for emission bandwidths greater than one megahertz and they double these limits (3280 watts EIRP or 3280 watts/MHz) in rural areas. The same limits apply to broadband PCS stations. There are a few services that have a power limit of 2000 Watts per MHz, most notably, the recent 600 MHz band. In the Commission's experience the AWS limits have provided good service while avoiding harmful interference. Further, the higher power limit for rural areas may promote the Commission's goals of furthering rural deployment of broadband services. Therefore, the Commission proposes to extend § 27.50(d)(1)–(2) to apply to both fixed and base stations in the 3.7–4.2 GHz MBX-spectrum. Thus, the power limits are proposed to be 1640 watts EIRP for emission bandwidths less than one megahertz and to 1640 watts per MHz EIRP for emission bandwidths greater than one megahertz. For operation in rural areas, defined as any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, the power limits are proposed to be 3280 watts EIRP for emission bandwidths less than one megahertz and to 3280 watts per MHz EIRP for emission bandwidths greater than one megahertz. These power limits apply to the sum of the power of all antenna elements of the fixed or base station. The Commission seeks comment on this proposal. Are the power levels the Commission proposes sufficient to provide robust mobile broadband service as well as being practical and realistic in this particular spectrum? Alternatively, would the proposed power levels need to be reduced to avoid the blocking of receivers operating in the adjacent Citizen's Broadband Radio Service at 3.5–3.7 GHz? The Commission invites commenters who propose alternative solutions to provide specific technical details and thorough analysis to support their proposals.

138. It is anticipated that this new band may be able to accommodate much wider channel bandwidths than in the past. Current plans for 5G deployments are capable of channel bandwidths of as much as 100 MHz at frequencies below 6 GHz. There is some concern regarding the total power of a wide bandwidth channel when the power limit is specified as a power density level. Should the Commission propose a limit on the total power of a base station in order to relieve potential blocking? One possible solution is that the total power of a base station should be limited to 75 dBm EIRP, summed over all antenna elements, for fixed and base stations. The Commission seeks comment on this proposal.

139. The Commission notes that the power limit for most AWS services is specified based on an RMS-equivalent or average power measurement. This power measurement methodology is preferred for advanced digital modulation schemes that could create very short duration power spikes, while the overall power remains low. There are a few services whose power limit is specified based on a peak power measurement. The Commission proposes that the power limit be based on the average power measurement and seek comment on this proposal.

140. *Power Limits for Mobiles and Portables.*—The Commission proposes to limit the power of mobiles and portables in the 3.7–4.2 GHz MBX spectrum to 1 Watt (30 dBm). While power limits for flexible use mobile services vary in the Commission's rules (*e.g.,* 50 milliwatts per MHz EIRP for WCS, 2 Watts EIRP for PCS, 3 Watts ERP in the 600 MHz band, 1 Watt EIRP for the AWS–1 and AWS–3 uplink bands, and 2 Watts EIRP for the AWS–4 uplink band); most device operate at levels under 1 Watt to preserve battery life, meet exposure limits and meet power control requirements. The limit the Commission proposes falls within a range of values typically seen in AWS services, and should provide adequate power for the 5G mobile applications envisioned for the MBX spectrum

considering the similarity in propagation characteristics for the MBX-spectrum band and AWS bands. Indeed, most commercial services, including LTE, CDMA and UMTS, commonly deploy mobile devices which operate at a maximum output power of 23 dBm (200 milliwatts), regardless of higher FCC power limits. However, there are a few new power class II LTE devices being developed with slightly higher output power of 26 dBm. Similar devices are expected for the new 5G standard as well. This development warrants continued flexibility in the rules to allow for a wider range of devices types. The Commission seeks comment on this proposal. The Commission further proposes that mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

141. *Out of Band Emissions Limits.*—The limits the Commission sets on out of band emissions are important to protecting services in adjacent bands. This band is adjacent to the 3.5 GHz Citizens Broadband Radio Service and will also be adjacent to any service that remains in a portion of the 3.7–4.2 GHz FSS band after the Commission adopts and completes a transition plan. The Commission proposes that out of band emissions be kept to a level that will provide protection to incumbent services in adjacent bands, while allowing the full use of the new band. The Commission proposes to apply the longstanding limit on out of band emissions of −13 dBm/MHz at the authorized channel edge as measured at the antenna terminals. This out of band emission level has been used successfully to protect adjacent operations from harmful interference in several AWS bands. The Commission seeks comment on this proposal and whether to apply more stringent out of band emission limits beyond the band edge, as described below.

142. The out of band emission limits that the Commission adopts for the MBX spectrum will depend on the characteristics of the services likely to be deployed in the MBX spectrum and the coexistence needs of services in the adjacent bands. Notably, to ensure effective coexistence with adjacent band services, it may be necessary to adopt more stringent out of band emission limits beyond the edges of the band. For example, in the Citizens Broadband Radio Service, the Commission limits out of band emission to −25 dBm/MHz at or beyond 10 megahertz outside of the band edge and −40 dBm/MHz at or beyond 20 megahertz outside of the band edge. The Commission seeks comment on the out of band emission limits that will be needed to facilitate widespread deployment of next generation wireless services in the MBX spectrum while ensuring effective coexistence with the services operating in the adjacent bands. Commenters should analyze the costs and benefits of different options and provide detailed technical analysis in support of their proposals.

143. To fully define an emissions limit, the Commission's rules generally specify details on how to measure the power of the emissions, such as the resolution bandwidth. For most AWS bands, the resolution bandwidth used to determine compliance with this limit for base stations is one megahertz or greater, except that within one megahertz of the channel edge where a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. Rather than allow use of a bandwidth dependent resolution bandwidth near the channel edge, the Upper Microwave Flexible Use Service (UMFUS) rules under Part 30 instead specify use of a one megahertz resolution bandwidth but allow an out of band emission limit of −5 dBm per megahertz from the channel edge out to 10 percent of the channel. Considering that the MBX spectrum, like UMFUS, will likely employ much larger signal bandwidths than AWS, should the MBX spectrum rules adopt the AWS approach to defining the resolution bandwidth or follow the UMFUS approach?

144. Finally, should the same out of band emission limits apply to both base stations and mobile handsets? While the Commission finds that mobile handsets can meet the out of band emission limit the Commission has proposed, they also operate at lower power levels and their size could restrict the implementation of more stringent emission limits that would require nonstandard filtering. However, base station equipment may have more flexibility to implement more stringent filters if necessary to protect adjacent services. The Commission seeks comment on all aspects of the emission limits for mobile and portable devices as part of the discussion above.

145. *Coexistence with FSS Operations Above the MBX Spectrum.*—The Commission seeks comment on whether additional technical protection criteria, beyond out of band emission limits, are necessary to ensure effective coexistence with adjacent band FSS operations. As discussed above, several of the transition mechanisms under consideration could make available a portion of the 3.7–4.2 GHz band available for flexible use, while allowing continued widespread FSS operations in adjacent portions of the band. For example, under the proposal submitted by Intelsat and SES, the 3700–3800 MHz portion of the band would be initially cleared for flexible use along with an additional 40 to 60 megahertz of guard band adjacent to and above it. As part of the clearing process, Intelsat and SES have proposed to install a filter or replace the Low Noise Block converter (LNB) in every earth station so as to prevent 5G transmission in the 3700–3800 MHz from saturating the LNB of the earth stations. Intelsat and SES state that they are working with manufacturers to define the desired filter characteristics such as the rejection, roll-off, and insertion loss, but have not provided any specific numbers. The Commission seeks comment on whether such additional requirements are necessary to ensure coexistence with adjacent band operations.

146. In general, the width of the guard band and roll-off of the filter determine the amount of out-of-band rejection provided to a receiver. The Commission seeks comment on the earth station receiver protection criteria, necessary rejection performance from the external filter, and amount of spectrum it requires for the filter roll off. Should the protection limit of the FSS earth stations be based solely on interference-to-noise ratio (I/N) regardless of the actual FSS carrier power and/or earth station configuration? Should the Commission establish a baseline FSS earth station configuration (antenna, LNB, receiver) for any interference and protection assumptions? Given the signal strength differential between the terrestrial and satellite systems, can terrestrial wireless base or mobile stations cause saturation of the LNB of FSS earth stations? Could an external filter be tunable across 3700–4200 MHz band? Will there be a minimum distance separation required between MBX transmitters and earth station receivers? What are the tradeoffs among filter performance, required guard band, level of protection, and cost of such filter? The Commission requests commenters to provide details of assumptions and analysis including MBX transmit power level, earth station protection limit, propagation model, antenna aperture and off-axis isolation.

147. Alternatively, should the Commission define the MBX transmit power limit, out of band emission limits, and guard band and allow the satellite service providers to determine how to protect the earth station receivers? The Commission typically

does not specify receiver performance, and there are many variables that contribute to the receiver blocking performance from strong transmit signals in an adjacent band, including external filter, low-noise amplifier (LNA), mixer and other RF components, and digital signal processing in the baseband. Given the current design and operation of the earth stations, each earth station receiver may be impacted differently for a given MBX transmit power. Therefore, it may be more practical for satellite service providers to determine how to protect the earth station receivers given the allowed transmit power level and out of band emission limits. The Commission seeks comment on this proposal.

148. The guard band used for receiver filter rejection can also be used to enhance the out of band emission performance of MBX transmitters. The Commission seeks comment on the out of band emission limit necessary at the upper end of guard band in order to ensure coexistence with earth station receivers. Does this out of band emission limit allow ubiquitous operation of base stations and mobile stations or does it require a minimum distance separation from earth station receivers? The Commission requests commenters to include proposed out of band emission at the upper end of guard band, propagation model, antenna gains and off-axis isolation between MBX transmitters and earth station receivers in their analysis. The Commission also seeks comment on whether this guard band could be used for other purposes such as coordinated fixed point-to-multipoint operations, a low power wireless broadband system, indoor-only system, or unlicensed use.

149. *Coexistence with FSS Operations in the MBX Spectrum.* There may be some FSS earth stations operating co-channel with MBX, depending on the mechanisms of expanding flexible use as described above. The Commission seeks comment on the coexistence challenges between terrestrial mobile services and the FSS earth stations that may remain in the cleared spectrum and on any specific rules that should be adopted to ensure effective coexistence between these services. In other bands, the Commission has adopted exclusion or coordination zones to protect co-channel FSS earth stations from harmful interference. Would exclusion zones or coordination zones be appropriate to protect any existing FSS earth stations in the MBX spectrum? If so, how should the size of the exclusion zone or coordination zone be determined? Should the Commission instead specify interference protection limits that the terrestrial systems must meet to protect the earth stations? Such protection limits could take the form, for example, of an interference-to-noise ratio (I/N), carrier to interference-plus-noise ratio (C/I+N),[18] or a power density at the FSS receiver. If so, how would such a protection limit be modeled and enforced? In applying a protection limit, exclusion zone, or coordination zone, how should the aggregate interference from multiple base stations and associated mobile devices from the different MBX licensees be taken into account? Should the Commission require that earth stations remaining in the band be moved to less populated areas or can RF shielding of earth stations be employed to reduce the size of exclusion or coordination zones?

150. *Coexistence with FSS Operation Below 3700 MHz.*—There are 120 FSS earth stations that are authorized in the 3600–3700 MHz band. Yet, unlike FSS earth stations operating above 3800 MHz, Intelsat and SES have not proposed any particular means of protecting these earth stations against interference. Given that there will be no guard band to help prevent interference in this band, should operators of these stations be included in any transition mechanisms, including possible relocation to transponders above the MBX spectrum? How should these earth stations be treated during any transition process that is adopted for the MBX spectrum? If an earth station continues to receive signals below 3700 MHz, could the receiver be modified to protect the LNB from the MBX transmitters (*e.g.,* by adding a filter)? The Commission seeks comment on alternative means for mitigating interference to protect any continued FSS downlink operation below 3700 MHz.

151. The Commission seeks comment and quantitative analysis to demonstrate if the proposed MBX spectrum power and emission limits are sufficient, without additional mitigation methods, to protect any FSS earth station operation below 3700 MHz. The Commission expects that a minimum propagation loss plus additional attenuation would be required to protect FSS earth stations below 3700 MHz, depending on the separation distance between FSS and MBX-spectrum transmitters, the RF propagation environment, and FSS antenna (gain) orientation. Would exclusion zones or coordination zones be required around the earth stations?

152. The Commission seeks comment on the achievable RF shielding around the FSS earth stations and the cost thereof. Would using RF shielding be sufficient to protect FSS earth stations below 3700 MHz? In addition, or alternatively, would it be possible for the MBX spectrum licensees to engineer around the FSS antenna sites, such that the predicted propagation loss and additional attenuation of base/mobile emissions (fundamental power and out of band emission) would be sufficient to ensure that co-channel/out of band emission and blocking FSS thresholds were not exceeded?

153. *Coexistence with Telemetry, Tracking, and Command.*—FSS Earth stations that are used for telemetry, tracking and command of satellites have assignments near 3700 MHz, 3950 MHz, and 4200 MHz. These telemetry, tracking and command licenses may list widely varying bandwidths in IBFS. Most assignments are no more than 1–2 megahertz wide; however, others are less specific, and are recorded across the entire passband of the earth station receiver (*i.e.,* 3625–4200 MHz). Since there are a limited number of telemetry, tracking and command earth stations, should the Commission consider protection on a case-by-case basis through coordination between MBX-spectrum licensees and FSS earth station operators? What are the appropriate coexistence criteria for telemetry, tracking and command receivers[19] and do they differ from other earth station receivers? What interference mitigation techniques could be used to protect telemetry, tracking and command earth stations? For example, could RF shielding effectively reduce the interference to the telemetry, tracking and command earth stations? The Commission also seeks comment on whether telemetry, tracking and command earth stations located in or near densely populated areas could be relocated to more remote locations and, if so, how much such relocations would cost. Because telemetry, tracking and command transmissions are a function of satellite design and cannot be changed following launch, the Commission recognizes that earth stations receiving telemetry, tracking and command transmissions in the

[18] The carrier power is the power received by the earth station from the satellite.

[19] The Commission has adopted specific rules to protect TT&C earth stations that operate in in and adjacent to the 3.55–3.7 GHz band. These rules require that the aggregate passband RF power spectral density at the output of a reference RF filter and antenna at the location of a TT&C FSS earth station produced by all Citizens Broadband Service Devices within 40km of the earth station shall not exceed a median RMS value of −129 dBm/MHz. *See* 47 CFR 96.17.

MBX spectrum will require protection for the lifetime of the satellite. The Commission seeks comment on if protection of these operations would require a different approach depending on whether telemetry, tracking and command earth stations are within or outside of the MBX spectrum.

154. *Coexistence with Citizens Broadband Radio Service Operations in the 3550–3700 MHz Band.*—The Commission seeks comment on the compatibility between Citizens Broadband Radio Service and MBX systems, including the suitability of the out of band emission limit proposed above.[20] One concern about deploying a robust mobile broadband service adjacent to the Citizens Broadband Radio Service arises from the relatively higher power limits proposed above. One possibility for preventing interference between the services would be to impose adjacent channel power limits that could limit the differential between power levels for adjacent stations operating in the same area. Such a limit would be specified as a ratio between the total power in the channels immediately adjacent to an MBX-spectrum station to the total power in the MBX-spectrum station's emission bandwidth. Should the Commission specify such a ratio for MBX-spectrum devices, and if so, what limit would be appropriate?

155. *Field Strength Limit and Market Boundaries.*—If the Commission ultimately decide to license the MBX spectrum based on geographic service areas that are less than nationwide, the Commission will have to ensure that such licensees do not cause interference to co-channel systems operating along common geographic borders. The current rules for AWS–1, AWS–3 and AWS–4 address the possibility of harmful co-channel interference between geographically adjacent licenses by setting a field strength limit from base stations of 47 dBμV/m at the edge of the license area. In the 600 MHz band, the Commission adopted a field strength limit of 40 dBμV/m. In the UMFUS rules, the Commission adopted a limit of -76 dBm/m^2/MHz at a height of 1.5 meters above ground at the border of a licensee's service area.

156. The 47 dBμV/m limit that has been used in the AWS rules was developed at a time when signal bandwidths were much smaller than are likely to be used in the MBX spectrum. Furthermore, the 47 dBμV/m limit did not have an associated bandwidth. In the H Block proceeding, Sprint requested that the Commission modify the boundary limit to set a reference measurement bandwidth of 1 MHz, with the aim of limiting boundary power density to the equivalent of that first applied to PCS systems in 1993. At that time, operators were deploying mostly Digital AMPS, PCS1900 and CDMA technologies, which had channel bandwidths of 30 kHz, 200 kHz and 1.25 MHz, respectively. Sprint claims that because today's LTE transmissions operate on much wider bandwidths up to 20 MHz, a 47 dBμV/m limit measured over the full channel bandwidth will effectively result in a comparatively lower power level. Sprint proposed to adjust the field strength limit from 47 dBμV/m to 62 dBμV/m per MHz. Verizon has made a similar claim in the Incentive Auctions proceeding, proposing a field strength limit of 50 dBμV/m per MHz.

157. The Commission agrees with Sprint and Verizon that the market boundary limit should be related to the signal bandwidth. The Commission proposes to adopt the same -76 dBm/m^2/MHz power flux density limit at the service area boundaries as is used for the UMFUS rules. This UMFUS limit was calculated based on an interference criterion of 0 dB I/N and made assumptions about a typical antenna gain. The Commission seeks comment on whether the interference criterion and technical assumptions are appropriate

158. Finally, the Commission proposes that adjacent affected area licensees may voluntarily agree upon higher field strength boundary levels. This concept is already codified in the field strength rules for both PCS and AWS services, as Sprint acknowledges. Accordingly, to maintain consistency with the PCS and other AWS bands, the Commission proposes to permit adjacent area licensees to agree to a higher field strength limit

159. *Antenna Height Limits.*—The Commission proposes, as discussed below, that the flexible antenna height rules that apply to AWS–1 and AWS–3 should generally also apply to MBX spectrum. Specific antenna height restrictions for AWS–1 and AWS–3 base stations are not set forth in part 27 of the Commission rules. However, all part 27 services are subject to § 27.56, which bans antenna heights that would be a hazard to air navigation. Furthermore, the limitations of field strength at the geographical boundary of the license discussed above also effectively limit antenna heights. The Commission similarly proposes that no unique antenna height limits are needed for MBX-spectrum facilities; rather, the Commission believes that the general height restrictions are sufficient. The Commission seeks comment on this proposal, including the costs and benefits of the proposal and any alternatives. The Commission does not propose a height limit for fixed stations in the MBX spectrum. Although fixed stations were limited to 10 meters above ground in the AWS–1 band and were prohibited in the AWS–3 band. There are no antenna height limits for fixed stations in the AWS–4 band, since, unlike the former, it is not directly adjacent to certain Federal incumbents. Using this same reasoning, the Commission proposes no antenna height limits for fixed operation in the MBX spectrum. The Commission seeks comment on this proposal and request technical support for any alternative proposals.

160. *Canadian and Mexican Coordination.*—Section 27.57(c) of the Commission's rules provide that several AWS services, including WCS, AWS–1, AWS–3, AWS–4 and the H Block, are subject to international agreements with Mexico and Canada. The Commission proposes to apply the same limitation to the new MBX spectrum. Until such time as any adjusted agreements between the United States, Mexico, and/or Canada can be agreed to, operations must not cause harmful interference across the border, consistent with the terms of the agreements currently in force. The Commission notes that further modification (of the proposed or final rules) might be necessary in order to comply with any future agreements with Canada and Mexico regarding the use of these bands. The Commission seeks comment on this issue, including the costs and benefits of alternative approaches to this issue.

161. *General Part 27 Rules*—There are several additional technical rules applicable to all Part 27 services, including §§ 27.51 Equipment authorization, 27.52 RF safety, 27.54 Frequency stability, 27.56 Antennas structures; air navigation safety, and 27.63 Disturbance of AM broadcast station antenna patterns. As operations in the MBX spectrum will be a Part 27 service, the Commission proposes that all of these general Part 27 rules should

[20] In the Citizens Broadband Radio Service, the Commission has adopted out-of-channel emission limits of -13 dBm/MHz starting at the channel edges and -25 dBm/MHz beyond 10 megahertz of the channel edges. Additionally, the Commission adopted an out of band emission limit of -40 dBm/MHz beyond 20 megahertz of the 3.5 GHz band edges. 47 CFR 96.41(e). The Commission is currently considering proposals to change the emission limits based on claims that more relaxed limits are necessary to facilitate wider channels in the 3.5 GHz band. *See Promoting Investment in the 3550–3700 MHz Band,* Notice of Proposed Rulemaking and Order Terminating Petitions, 32 FCC Rcd 8071, 8089–8092 paragraph. 50 through 58 (2017).

apply to all MBX-spectrum licensees, including licensees who acquire their licenses through partitioning or disaggregation (to the extent the rules permit such aggregation). The Commission seeks comment on this approach, including its costs and benefits.

IV. Initial Regulatory Flexibility Analysis

162. As required by the Regulatory Flexibility Act of 1980, as amended (RFA), the Commission has prepared this Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on a substantial number of small entities by the policies and rules proposed in this *NPRM.* The text of the IRFA is set forth in Appendix B of the NPRM. Written comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments on the *NPRM.* The Commission will send a copy of the *NPRM,* including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA). In addition, the *NPRM* and IRFA (or summaries thereof) will be published in the **Federal Register**.

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

163. The *NPRM* seeks comment and makes proposals on a range of potential opportunities for more intensive fixed or flexible uses—particularly for wireless broadband services—in 500 megahertz of mid-band spectrum between 3.7–4.2 GHz (the band). In doing so, the *NPRM* proposes to add a mobile, except aeronautical mobile, allocation to the band and seeks comment on transitioning all or part of the band to terrestrial wireless broadband services. The actions are another step in the Commissions efforts to close the digital divide by providing wireless broadband connectivity across the nation and to secure U.S. leadership in the next generation of wireless services, including fifth-generation (5G) wireless, Internet of Things (IoT), and other advanced spectrum-based services.

164. In this proceeding, the Commission is pursuing the joint goals of making spectrum available for new wireless uses while effectively accommodating incumbent Fixed Satellite Service (FSS) and Fixed Service (FS) operations in the band. The *NPRM* seeks comment on various proposals for transitioning all or part of the band for flexible use. The *NPRM* also proposes and seeks comment on revisions to Parts 25 and 101 of the Commission's rules to promote more intensive fixed use of the band. Additionally, as part of the Commission's proposal to add a mobile, except aeronautical mobile, allocation, and to develop rules that would enable the band to be transitioned for more intensive fixed and flexible uses, the Commission encourages commenters to discuss and quantify the costs and benefits associated with any proposed approach along with other helpful technical or procedural details.

165. The 3.7–4.2 GHz band is currently allocated in the United States exclusively for non-federal use on a primary basis for the FSS (space-to-Earth) and the FS. For FSS, the 3.7–4.2 GHz band (space-to-Earth or downlink) is paired with the 5.925–6.425 GHz band (Earth-to-space or uplink), and collectively these bands are known as the ''conventional C-band.'' Domestically, satellite operators use this band to provide downlink signals of various bandwidths to licensed transmit receive, registered receive-only, and unregistered receive-only earth stations throughout the United States. Geostationary orbit (GSO) FSS satellites operating in the C-band typically have 24 transponders, each with a bandwidth of 36 megahertz received by one or more earth stations. Predominant GSO FSS uses include delivery of programming content to television and radio broadcasters, including transportable antennas used to cover live news and sports events, cable television and small master antenna systems, as well as the backhaul of telephone and data traffic. The band is also used for reception of telemetry signals transmitted by satellites, typically near 3.7 or 4.2 GHz.

166. Mid-band spectrum, in conjunction with lower and higher bands, is well suited for next generation wireless broadband services due to the combination of favorable propagation characteristics (as comparted to bands above 24 GHz) and the opportunity for additional channel re-use (as compared to bands below 3.7 GHz). With the ever-increasing demand for more data on mobile networks, wireless network operators have increasingly focused on providing more data capacity rather than providing coverage over large areas from individual base stations. One technique for providing increased capacity is to use smaller cell sizes—i.e., have each base station provide coverage over a smaller area. Using higher frequencies can be advantageous for deploying a higher density of base stations. The decreased propagation distances at higher frequencies reduces the interference between base stations using the same frequency, thereby allowing base stations to be more densely packed and increasing the overall system capacity. Therefore, mid-band spectrum presents wireless providers with the opportunity to deploy base stations using smaller cells to get higher spectrum reuse than the lower frequency bands while still providing indoor coverage. Relative to higher bands, mid-band spectrum also offers favorable propagation characteristics for fixed wireless broadband services in less densely populated areas.

167. In the *NPRM* the Commission proposes to add a non-federal mobile, except aeronautical mobile, service allocation to the 3.7–4.2 GHz band, and based on the Commission's conclusion that co-channel sharing is not feasible, the Commission seeks comment on several proposals to clear all or part of the band for flexible use. Because the *NPRM* seeks comment on several alternate approaches for making portions of the band available for flexible use, the appropriate operational and technical restrictions on terrestrial and FSS use of the band will depend on the selected mechanism for expanding flexible use in the band. Specifically, the *NPRM* seeks comment on three potential mechanisms for expanding flexible use in the 3.7–4.2 GHz band: (1) A market-based mechanism, (2) auctions mechanisms, and (3) alternative mechanisms. In pursuing the Commission's goal of creating additional opportunities for wireless broadband in mid-band spectrum, under each approach, the Commission seeks to balance incumbent interests, speed to market, and efficiency of use.

B. Legal Basis

168. The proposed action is taken pursuant to sections 1, 2, 3, 4(i), 7, 201, 301, 302, 303, 304, 307, 308, 309, and 310 of the Communications Act of 1934, as amended, 47 U.S.C. 151, 152, 153, 154(i), 157, 201, 301, 302, 303, 304, 307, 308, 309, 310, and section 706 of the Telecommunications Act of 1996, as amended, 47 U.S.C. 1302.

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

169. 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 rules, if adopted. The RFA generally defines the term ''small entity'' as having the same meaning as the terms ''small business,'' ''small organization,'' and ''small governmental jurisdiction.'' In addition, the term ''small business'' has the same meaning as the term

''small business concern'' under the Small Business Act. A small business concern is one that: (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.

170. *Small Businesses, Small Organizations, and Small Governmental Jurisdictions.* The Commission's action may, over time, affect small entities that are not easily categorized at present. The Commission therefore describes here, at the outset, three broad groups of small entities that could be directly affected herein. First, while there are industry specific size standards for small businesses that are used in the regulatory flexibility analysis, according to data from the SBA's Office of Advocacy, in general a small business is an independent business having fewer than 500 employees. These types of small businesses represent 99.9 percent of all businesses in the United States, which translates to 28.8 million businesses.

171. Next, the type of small entity described as a ''small organization'' is generally ''any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.'' Nationwide, as of August 2016, there were approximately 356,494 small organizations based on registration and tax data filed by nonprofits with the Internal Revenue Service (IRS).

172. Finally, the small entity described as a ''small governmental jurisdiction'' is defined generally as ''governments of cities, counties, towns, townships, villages, school districts, or special districts, with a population of less than fifty thousand.'' U.S. Census Bureau data from the 2012 Census of Governments indicate that there were 90,056 local governmental jurisdictions consisting of general purpose governments and special purpose governments in the United States. Of this number there were 37,132 General purpose governments (county, municipal and town or township) with populations of less than 50,000 and 12,184 Special purpose governments (independent school districts and special districts) with populations of less than 50,000. The 2012 U.S. Census Bureau data for most types of governments in the local government category show that the majority of these governments have populations of less than 50,000. Based on this data we estimate that at least 49,316 local government jurisdictions fall in the category of ''small governmental jurisdictions.''

173. *Wireless Telecommunications Carriers (except Satellite).* This industry comprises establishments engaged in operating and maintaining switching and transmission facilities to provide communications via the airwaves. Establishments in this industry have spectrum licenses and provide services using that spectrum, such as cellular services, paging services, wireless internet access, and wireless video services. The appropriate size standard under SBA rules is that such a business is small if it has 1,500 or fewer employees. For this industry, U.S. Census data for 2012 show that there were 967 firms that operated for the entire year. Of this total, 955 firms had employment of 999 or fewer employees and 12 had employment of 1000 employees or more. Thus under this category and the associated size standard, the Commission estimates that the majority of wireless telecommunications carriers (except satellite) are small entities.

174. *Satellite Telecommunications.* This category comprises firms ''primarily engaged in providing telecommunications services to other establishments in the telecommunications and broadcasting industries by forwarding and receiving communications signals via a system of satellites or reselling satellite telecommunications.'' Satellite telecommunications service providers include satellite and earth station operators. The category has a small business size standard of $32.5 million or less in average annual receipts, under SBA rules. For this category, U.S. Census Bureau data for 2012 show that there were a total of 333 firms that operated for the entire year. Of this total, 299 firms had annual receipts of less than $25 million. Consequently, the Commission estimates that the majority of satellite telecommunications providers are small entities.

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

175. The potential rule changes proposed in this *NPRM,* if adopted, could impose some new reporting, recordkeeping, or other compliance requirements on some small entities. In addition to the proposed rule changes associated with the proposed mechanisms for expanding flexible use in the 3.7–4.2 GHz band, there could be new service rule compliance obligations. For new licensed flexible uses in the 3.7–4.2 GHz band, the *NPRM* seeks comment on various service rules that should apply, including construction benchmarks and technical operating requirements. In the event the Commission adopts the proposed service rules and issues licenses for flexible use in the band, any small entity licensee would be required to satisfy construction requirements, and comply with limits on power, out of band emissions, field strength, antenna height, and other existing coordination requirements. Licensees would be responsible for making certain construction demonstrations with the Commission through the Universal Licensing System showing that they have satisfied the relevant construction benchmarks.

176. The projected reporting, recordkeeping, and other compliance requirements proposed in the *NPRM* will apply to all entities in the same manner. The Commission believes that applying the same rules equally to all entities in this context promotes fairness. The revisions the Commission may ultimately adopt however, should benefit small entities by giving them more information about opportunities in the 3.7–4.2 GHz band, more flexibility to provide a wider range of services, and more options for gaining access to wireless spectrum.

177. *Application/Petition Freeze & Part 25 and 101 Modifications.* Applications for new or modified earth stations, applications for new or modified fixed microwave stations, and applications for new space stations operating in the 3.7–4.2 GHz band were previously frozen by the International, Wireless Telecommunications, and Public Safety and Homeland Security Bureaus.[21] The Bureaus took these actions to preserve the current landscape of authorized operations while the Commission proceeded with an ongoing inquiry into the possibility of permitting mobile broadband use and more intensive fixed use of the band in this proceeding. To reexamine the existing full-band, full-arc coordination policy, the *NPRM* proposes to revise the Commission's rules to bar new applications for space station licenses

[21] On April 19, 2018, the staff froze applications for new or modified fixed microwave stations and earth stations in the 3.7–4.2 GHz band to preserve the current landscape of authorized operations pending action as part of the Commission's ongoing inquiry into the possibility of permitting mobile broadband use and more intensive fixed use of the band through this proceeding. To provide the Commission and commenters with more accurate information about existing earth stations, however, the International Bureau, as a limited exception to the freeze, concurrently opened a 90-day window during which entities that own or operate existing FSS earth stations in the 3.7–4.2 GHz band could file an application to register or license the earth station, or file an application to modify an existing registration or license. On June 21, 2018, the International Bureau extended this filing-window for an additional 90 days until October 17, 2018, and also imposed a freeze on new space stations in the 3.7–4.2 GHz band.

and new petitions for market access concerning space-to-Earth operations in the 3.7–4.2 GHz band. Additionally, the *NPRM* seeks comment on modifying the Commission's part 25 rules to require operators of licensed or registered FSS earth stations receiving in the 3.7–4.2 GHz band to coordinate only the specific combinations of frequency, azimuth, and elevation angle that they regularly use and that such technical information be reflected on each earth station application and authorization. The *NPRM* seeks comment on whether this information should form the basis for protection from terrestrial stations.

178. The *NPRM* further proposes to update IBFS to remove 3.7–4.2 GHz band earth station licenses or registrations for which the licensee or registrant does not file the certifications required in the *Order* (to the extent they registered before April 19, 2018) and, more specifically, proposes that an earth station licensed or registered in IBFS be automatically terminated unless the licensee or registrant timely files the certification required by the *Order.* The *NPRM* seeks comment on revising the part 25 rules to limit eligibility to file applications for earth station licenses or registrations to incumbent earth stations, including comments on the relative costs and benefits of such a restriction.

179. The *NPRM* proposes to define incumbent earth stations as only those earth stations that (1) were operational as of April 19, 2018, (2) are licensed or registered in IBFS, or had a pending application for license or registration as of October 17, 2018, and (3) the licensee/registrant timely filed the certification required by the *Order.* The Commission further proposes that unregistered FSS earth stations lawfully receiving transmissions could continue to operate on an unprotected basis. The Commission seeks comment on whether incumbents that are small entities face any special or unique issues with respect to the transition such that they should be defined differently or have different obligations.

180. Because the Commission's consideration of some transition options may benefit from additional, more granular information on FSS earth station and space station operations in the band, the *NPRM* seeks comment on whether to seek additional information from FSS earth station or space station operators,[22] including information on transponder use, satellite points of communication, and other technical and operational data that would provide a more detailed picture of the actual usage of the band. The Commission also seeks comment on whether small entities face any special or unique issues with respect to proposed information collections such that they would require certain accommodations or additional time to comply. Commenters have been asked to describe, with specificity, how any additional information collection would support a given transition proposal and should provide a detailed assessment of the costs and benefits of such additional collections.

181. Comments have also been sought by the Commission on amending § 101.101 of the Commission's rules to permit point-to-multipoint FS broadband service in a portion of the 3.7–4.2 GHz band. In order to accommodate point-to-multipoint operations, the *NPRM* seeks comment on several amendments that may be necessary to part 25 and part 101 of the Commission's rules that currently apply to FS. The part 25 and 101 rules that would apply to point-to-multipoint FS operators would include regulatory requirements and restrictions including power limits, frequency coordination, and potential construction requirements. The *NPRM* also seeks comment on the appropriate channel plan, power limits, service areas, antenna standards, and construction requirements for point-to-multipoint operations in the band. Further, the NPRM seeks comment on any necessary technical requirements for frequency coordination between point-to-multipoint FS applicants and licensees and other operators in the band, including equipment authorizations for client devices that may be operated by persons other than those duly authorized by the licensee. The *NPRM* also seeks comment on whether to sunset the existing point-to-point FS operations in the band.

182. *Transitioning Mechanisms.* The transition to more intensive fixed and flexible use in the 3.7–4.2 GHz band will require Commission action to clear existing incumbent users from the band. The *NPRM* discusses various mechanisms for clearing incumbent users from the band. Each of these potential mechanisms for transitioning the band to flexible use—(1) a market-based mechanism, (2) auctions mechanisms, (3) alternative mechanisms—would require small entities that are incumbent operators in the band to participate in some sort of negotiation and agreement (either through the secondary market or through a Commission-administered auction) to reassign their spectrum access rights. Incumbents operating in the spectrum designated for new licensed flexible use would further be required to relocate their operations to different bands, potentially requiring reconfiguration or replacement of their existing facilities. However, once relocated, such operators and licensees would remain subject to the same Commission rules and obligations under which they are already operating.

183. In light of the differing approaches to transitioning the band to flexible use and the obligations that would result, the *NPRM* seeks comment from the parties on each mechanism. Specifically, for the market-based mechanism, the *NPRM* seeks comment on whether the Commission should adopt rules that would enable a market-based mechanism to the clearing of incumbents from some or all of the 3.7–4.2 GHz band, introducing flexible use in the band or encouraging more intensive fixed use while simultaneously protecting critical services offered by incumbents (*i.e.,* FSS space stations, FSS earth stations, FS licensees). Under such an approach, the Commission would seek to encourage incumbent FSS operators to voluntarily clear the spectrum. Satellite operators in the band could choose to make some or all of their spectrum available to terrestrial operators on the secondary market. In return, terrestrial operators would compensate affected incumbents. A secondary market approach could make spectrum available more quickly than other available mechanisms, such as an auction, and thus could facilitate rapid deployment of next generation wireless broadband networks. Moreover, such an approach could leverage the technical and operational knowledge of satellite space station operators while relying on market incentives to promote economic efficiency. The *NPRM* seeks comment on whether a market-based mechanism could effectively and rapidly facilitate new terrestrial deployments in the band.

184. More specifically, the *NPRM* states that a transition under a market-based mechanism could be undertaken in a four-step process. The first step would involve the industry voluntarily forming a Transition Facilitator composed of eligible C-band satellite operators. In the second step, the Transition Facilitator would negotiate with any interested terrestrial operators and incumbent users. In the third step, the Commission would review the Transition Facilitator's plan and conditionally authorize terrestrial licenses in the band. And in step four, the Transition Facilitator would clear

[22] In the *Order,* the Commission directed temporary fixed or transportable FSS earth station operators and FSS space station operators in the 3.7–4.2 GHz band to provide certain information on their current operations.

the negotiated-for spectrum, making it available for flexible use while protecting incumbent earth stations through a variety of potential means. The *NPRM* notes as well that a market-based process need not be a one-time event—a Transition Facilitator could negotiate with parties for compensation and protection, seek Commission review and conditional authorization, and clear new spectrum multiple times to ensure the total spectrum dedicated to flexible use meets market demands.

185. For auctions as a transition mechanism, the *NPRM* seeks comment on approaches using the Commission's general auction authority to introduce flexible use in the 3.7–4.2 GHz band. Incentive auctions provide the Commission with new tools to make additional spectrum available for broadband. Incentive auctions are a voluntary, market-based means of repurposing spectrum by encouraging licensees to compete to voluntarily relinquish spectrum usage rights in exchange for a share of the proceeds from an auction of new licenses to use the repurposed spectrum. The *NPRM* therefore seeks comment on whether an incentive auction could work in the context of the 3.7–4.2 GHz band.

186. Recognizing that the band's incumbent structure presents unique issues distinct from those present in the broadcast incentive auction, the *NPRM* seeks comment on possible approaches to inducing satellite incumbents to reveal the least amount they must be paid to relinquish any given amount of spectrum. The *NPRM* also seeks comment on whether the Commission should accept applications for overlay licenses—assigned by competitive bidding if mutually exclusive applications for it were accepted—that would permit the overlay licensees to negotiate with incumbent licensees to clear all or part of the band and then transfer flexible use licenses in the secondary market. An overlay license authorizes operation for an entire geographic area but requires the licensee to protect existing incumbents from interference indefinitely, *i.e.,* until the rights are relinquished. The *NPRM* seeks comment on whether assigning overlay licenses in the band would expedite flexible use of more of the band compared with other approaches. Under this approach, the overlay licensee would have the right to flexible use of any spectrum that becomes available as a result of incumbents' relinquishing their spectrum usage rights. The *NPRM* seeks comment on how other parties that would be affected by repurposing 3.7–4.2 GHz band spectrum should be treated, and whether the overlay licensee or the satellite incumbents relinquishing spectrum should be required to provide incumbent earth station operators comparable replacement facilities or media.

187. With the auctions mechanism, the *NPRM* further seeks comment, as an alternative to paying satellite incumbents to relinquish spectrum usage rights, on conducting a reverse auction for satellite transponder capacity that could be used to replace lost C-band transponder capacity resulting from reallocating C-band spectrum to flexible use. Under this approach, an individual bidder in the reverse auction could contribute towards clearing spectrum. Potential bidders could be any FCC licensee that could make transponder capacity available in either C-band or Ku-band. Satellite bidders could offer capacity created by launching new satellites in vacant orbital slots and by relinquishing existing capacity. Satellite customers can offer capacity made available by substituting services (*e.g.* fiber) to fulfill their capacity needs, reducing the amount or quality of programming distributed, or using greater compression to reduce the capacity required to carry a given amount of programming or data. C-band transponder capacity that is lost due to the reduced amount of available spectrum and that was not relinquished in the reverse auction by C-band satellite operators, could be repacked onto replacement capacity for the life of those lost transponders. This would compensate C-band licensees for their lost capital investments, but not for the loss of their spectrum. The *NPRM* seeks comment on whether under this approach such additional compensation for the loss of spectrum should be accomplished by extending the length of time free replacement capacity is offered or by some other means, *e.g.,* a financial payment.

188. As another possible transition mechanism, the *NPRM* seeks comment on approaches that combine various elements of the mechanisms discussed above, as well as other mechanisms for transitioning all or part of the 3.7–4.2 GHz band for wireless broadband use. For example, the *NPRM* seeks comment on a hybrid approach under which the Commission would auction a majority of the band under traditional mechanisms and grant FSS operators flexible use authority (*i.e.,* allowing them to use a market-based approach) for the rest of the band so long as they timely clear the auctioned portion. The *NPRM* asks whether the Commission could use this approach or another combination of approaches to strike a balance between incumbent and new entrant interests and, if so, how much of the band should be cleared under a traditional mechanism and how much could be left for FSS space station operators to clear under a market approach. The *NPRM* seeks comment on how the Commission can ensure the band is transitioned in a timely manner and whether a backstop mechanism should be triggered by a FSS operator's failure to clear the band in a timely manner. The *NPRM* asks commenters to provide data on the costs and benefits associated with any alternative mechanism over other possible or suggested methods.

189. Recognizing that the transition to flexible use licenses in the 3.7–4.2 GHz band will be complicated logistically and needs to be carried out promptly in order to get the repurposed spectrum into the hands of flexible use licensees to address spectrum needs, the *NPRM* seeks comment on a range of transition issues applicable to each of the alternative mechanisms for expanding flexible use discussed above. The *NPRM* seeks comment on reasonable deadlines for implementation of each mechanism, or other approaches suggested by commenters, including deadlines for incumbents to cease transmitting on a primary basis in the portion of the 3.7–4.2 GHz band that becomes available for flexible use. The *NPRM* seeks comment on how to define the appropriate class of incumbents for protection and possible reimbursement purposes and the relative obligations and/or rights that each category of incumbents may have under each mechanism. Further, the *NPRM* seeks comment on what requirements and safeguards the Commission should adopt to ensure the timely and complete transition of all required incumbents pursuant to each mechanism for expanding flexible use in the band. Such requirements and safeguards could include, among others: Requiring all parties act in good faith; adopting a definition of comparable facilities; adopting financial or regulatory protections that can ensure that all transition obligations are satisfied in the event of bankruptcy or other events; and any technical rules that the Commission needs to adopt to apply specifically during the transition. Finally, the *NPRM* seeks comment on whether the Commission should seek additional information from FSS earth station and space station operators in the 3.7–4.2 GHz band that would provide additional clarity on the actual usage and availability of spectrum in the band.

190. Assuming that the Commission ultimately decides to add a mobile,

except aeronautical mobile, allocation and make some or all of the 3.7–4.2 GHz band available for flexible use, the *NPRM* proposes and seeks comment on band plans, licensing and operating, and technical rules for the 3.7–4.2 GHz band spectrum that becomes available for terrestrial mobile and fixed flexible use. The *NPRM* proposes to license this spectrum under the Commission's flexible use, part 27 rules that permit licensees to provide any fixed or mobile service consistent with the allocations for this spectrum, subject to rules necessary to prevent or minimize harmful interference.

191. *Band Plan(s).* The *NPRM* seeks comment on whether to license according to part 27 nationwide or only in the contiguous 48 states and whether there are issues unique to any of the areas outside of the contiguous 48 that would make it impractical to transition all or part of the band to flexible use. The *NPRM* seeks comment on appropriate block size(s) to promote efficient and robust use of the band for next generation wireless technologies, including 5G. Recognizing that the 3.7–4.2 GHz spectrum that becomes available for flexible use could be configured in any number of paired or unpaired modes, the *NPRM* seeks comment on a range of options for paired and/or unpaired blocks and the costs and benefits of particular approaches. Finally, consistent with the Commission's approach in several other bands used to provide fixed and mobile services, the *NPRM* proposes to license the 3.7–4.2 GHz Mid-Band Flexible Use (MBX) spectrum on an exclusive, geographic area basis. The *NPRM* seeks comment on an appropriate geographic license area size(s) for this band and asks commenters to discuss and quantify the economic, technical, and other public interest considerations of licensing on a PEA, county, nationwide, or other basis.

192. *Licensing and Operating Rules.* In order to afford licensees the flexibility to align licenses in the 3.7–4.2 GHz band with licenses in other spectrum bands governed by part 27 of the Commission's rules, the *NPRM* proposes that licensees in the 3.7–4.2 GHz band comply with licensing and operating rules that are applicable to all part 27 services, including assignment of licenses by competitive bidding, flexible use, regulatory status, foreign ownership reporting, compliance with construction requirements, renewal criteria, permanent discontinuance of operations, partitioning and disaggregation, and spectrum leasing, and seeks comment on this approach. The *NPRM* also proposes an open eligibility standard for licenses in the 3.7–4.2 GHz band and seeks comments on the proposal that should include a discussion of the costs and benefits of the open eligibility proposal on competition, innovation, and investment. The adoption of an open eligibility approach would not affect citizenship, character, or other generally applicable qualifications that may apply under the Commission's rules. The *NPRM* further seeks comment on a 15-year term for licenses in the 3.7–4.2 GHz band. Finally, in the event that the Commission assigns licenses for the 3.7–4.2 GHz band through competitive bidding, the Commission proposes to exclude from eligibility a person who has been, for reasons of national security, barred by any agency of the Federal Government from bidding on a contract, participating in an auction, or receiving a grant.

193. Regarding mobile spectrum holding policies, the Commission proposes not to adopt a pre-auction bright-line limit on the ability of any entity to acquire spectrum in the 3.7–4.2 GHz band through competitive bidding at auction similar to the Commission's approach in the *2017 Spectrum Frontiers Order and FNPRM.* Additionally, if an auction is chosen as the mechanism to transition to flexible uses in the 3.7–4.2 GHz band, the Commission proposes to review holdings on a case-by-case basis when applications for initial licenses are filed post-auction to ensure that the public interest benefits of having a threshold on spectrum applicable to secondary market transactions are not rendered ineffective.

194. *Performance Requirements.* The *NPRM* seeks comment on requiring a 3.7–4.2 GHz band licensee, relying on mobile or point-to-multipoint service in accordance with the Commission's part 27 rules, to provide reliable signal coverage and offer service to at least forty-five (45) percent of the population in each of its license areas within six years of the license issue date (first performance benchmark), and to at least eighty (80) percent of the population in each of its license areas within 12 years from the license issue date (second performance benchmark). For licensees relying on point-to-point service, the *NPRM* seeks comment on requiring them to demonstrate within six years of the license issue date (first performance benchmark) that they have four links operating and providing service, either to customers or for internal use, if the population within the license area is equal to or less than 268,000. If the population within the license area is greater than 268,000, the *NPRM* seeks comment on requiring a licensee relying on point-to-point service to demonstrate it has at least one link in operation and providing service per every 67,000 persons within a license area. Further, the *NPRM* seeks comment on requiring licensees relying on point-to-point service to demonstrate within 12 years of the license issue date (final performance benchmark) that they have eight links operating and providing service, either to customers or for internal use, if the population within the license area is equal to or less than 268,000. If the population within the license area is greater than 268,000, the *NPRM* seeks comment on requiring a licensee relying on point-to-point service to demonstrate it is providing service and has at least two links in operation per every 67,000 persons within a license area.

195. While the *NPRM* seeks comment on performance benchmarks based on population coverage applicable for a range of fixed and mobile services, the *NPRM* recognizes that 3.7–4.2 GHz licenses have flexibility to provide services potentially less suited to a population coverage metric. In particular, licensees providing Internet of Things-type fixed and mobile services may benefit from an alternative performance benchmark metric, and the *NPRM* seeks comment on the appropriate metric to accommodate such service offerings.

196. Along with performance benchmarks, the *NPRM* seeks comment on which penalties will most effectively ensure timely build-out. Specifically, the *NPRM* states that, in the event a 3.7–4.2 GHz licensee fails to meet the first performance benchmark, the licensee's second benchmark and license term would be reduced by two years, thereby requiring it to meet the second performance benchmark two years sooner (at 10 years into the license term) and reducing its license term to 13 years. The *NPRM* proposes that, in the event a 3.7–4.2 GHz licensee fails to meet the second performance benchmark for a particular license area, its authorization for each license area in which it fails to meet the performance requirement shall terminate automatically without Commission action. Additionally, the Commission also proposes that, in the event a licensee's authority to operate terminates, the licensee's spectrum rights would become available for reassignment pursuant to the competitive bidding provisions of § 309(j). Further, consistent with the Commission's rules for other licenses, including AWS–1, AWS–3, AWS–4, and H Block, the *NPRM* proposes that any

3.7–4.2 GHz licensee who forfeits its license for failure to meet its performance requirements would be precluded from regaining the license.

197. *Compliance Procedures.* In addition to compliance procedures applicable to all part 27 licensees, including the filing of electronic coverage maps and supporting documentation, the *NPRM* proposes that such electronic coverage maps must accurately depict the boundaries of each license area in the licensee's service territory. If a licensee does not provide reliable signal coverage to an entire license area, the *NPRM* proposes that its map must accurately depict the boundaries of the area or areas within each license area not being served. Further, the *NPRM* proposes that each licensee also must file supporting documentation certifying the type of service it is providing for each licensed area within its service territory and the type of technology used to provide such service. Supporting documentation must include the assumptions used to create the coverage maps, including the propagation model and the signal strength necessary to provide reliable service with the licensee's technology. The Commission seeks comment on these proposals. The Commission also seeks comment on whether small entities face any special or unique issues with respect to the transition such that they would require additional time to comply.

198. *Renewal Term Construction Obligations.* The *WRS Renewal Reform FNPRM* proposed to apply rules adopted in that proceeding to all flexible geographic licenses. Given the proposal to license this band on a geographic basis for flexible use, any additional renewal term construction obligations proposed in the *WRS Renewal Reform FNPRM* also would apply to licenses in the 3.7–4.2 GHz band. Accordingly, the *NPRM* seeks comment on whether there are unique characteristics of the 3.7–4.2 GHz band that might require a different approach than the various proposals raised by the *WRS Renewal Reform FNPRM.*

199. *Competitive Bidding Procedures.* Consistent with the competitive bidding procedures the Commission has used in previous auctions, the *NPRM* proposes that the Commission would conduct any auction for licenses for spectrum in the 3.7–4.2 GHz band in conformity with the general competitive bidding rules set forth in part 1, Subpart Q, of the Commission's rules. Specifically, the *NPRM* proposes to employ the part 1 rules governing competitive bidding design, designated entity preferences, unjust enrichment, application and certification procedures, payment procedures, reporting requirements, and the prohibition on certain communications between auction applicants. Under this proposal, such rules would be subject to any modifications that the Commission may adopt for its part 1 general competitive bidding rules in the future. The *NPRM* seeks comment on whether any of the Commission's part 1 rules would be inappropriate or should be modified for an auction of licenses in this frequency band. In particular, the *NPRM* seeks comment on the following proposals for bidding credits for designated entities in this band. As with other flexible use licenses in recent years, the *NPRM* proposes to adopt in this band, bidding credits for the two larger designated entity business sizes provided in the part 1 rules. The *NPRM* also proposes to offer rural service providers a designated entity bidding credit for licenses in this band. The *NPRM* asks commenters addressing these proposals to consider what details of licenses in the band may affect whether designated entities will apply for them.

200. *Technical Rules.* Consistent with existing rules for other advanced wireless services, the *NPRM* proposes power limits for fixed and base stations of 1640 watts EIRP for emission bandwidths less than one megahertz and to 1640 watts per MHz EIRP for emission bandwidths greater than one megahertz. For mobiles and portables in the 3.7–4.2 GHz band, the *NPRM* proposes to limit the power to 1 Watt (30 dBm). The *NPRM* also proposes that the power limit measurement methodology be based on the average power measurement and seeks comment on this proposal. Additionally, the *NPRM* proposes that mobile and portable stations operating in the 3.7–4.2 GHz band must employ a means for limiting power to the minimum necessary for successful communications.

201. For out-of-band-emissions, the *NPRM* proposes that emissions be kept to a level that will provide protection to incumbent services in adjacent bands, while allowing the full use of the new band, and therefore proposes to apply the longstanding limit on out-of-band-emission of -13 dBm/MHz at the authorized channel edge as measured at the antenna terminals. Further, the *NPRM* seeks comment on whether additional technical protection criteria, beyond out-of-band-emission limits, are necessary to ensure effective coexistence with adjacent band FSS operations.

202. To implement field strength limit at market boundaries, the *NPRM* proposes to adopt a -76 dBm/m^2/MHz power flux density limit at the service area boundaries, and further proposes that adjacent affected area licensees may voluntarily agree upon higher field strength boundary levels and to permit such agreement. Regarding antenna height, the *NPRM* proposes that the part 27 flexible antenna height rules that apply to AWS–1 and AWS–3 should generally also apply to MBX spectrum, that no unique antenna height limits are needed for MBX-spectrum facilities and that no antenna height limits are needed for fixed operation in the MBX spectrum. The Commission seeks comments on these proposals, including cost and benefit information.

203. For new MBX spectrum, the *NPRM* proposes to apply the limitations to Canada and Mexico from § 27.57(c) of the Commission's rules that provide that several AWS services, including WCS, AWS–1, AWS–3, AWS–4 and H Block are subject to international agreements with Mexico and Canada. Lastly, the *NPRM* proposes that several additional technical rules applicable to all part 27 services, including §§ 27.51 Equipment authorization, 27.52 RF safety, 27.54 Frequency stability, 27.56 Antennas structures; air navigation safety, and 27.63 Disturbance of AM broadcast station antenna patterns should apply to all MBX-spectrum licensees, including licensees who acquire their licenses through partitioning or disaggregation (to the extent the rules permit such aggregation). The Commission seeks comment on this approach, including its costs and benefits.

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

204. The RFA requires an agency to describe any significant, specifically small business, alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): ''(1) The establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for 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.''

205. In this proceeding, the Commission seeks to identify potential opportunities for additional flexible access—particularly for wireless broadband services—in 500 megahertz

of mid-band spectrum between 3.7–4.2 GHz. While lacking specific data in general, which includes data on small entities, the Commission has taken steps to enable it to minimize the economic burden on small entities that could occur if some of the rule changes or approaches proposed in the *NPRM* are adopted. Throughout the *NPRM,* the Commission seeks comment on whether small entities face any special or unique issues with respect to the information collection such that they would require certain accommodations or additional time to comply. The Commission also seeks comment on modifications that could be made to the Commission's rules regarding administrative processes that would reduce the economic impacts of proposed rule changes on small entities. Seeking comments specifically targeting small entities should provide the Commission with the requisite data to consider the most cost-effective approach to minimize the economic impact for such entities while achieving its statutory objectives.

206. With respect to the application freeze and information collection for incumbent earth stations operating in the 3.7–4.2 GHz band, the Commission has taken several steps to reduce the economic burden of its actions. During the freeze on new earth station applications and filing window for incumbent FSS earth station operators, the International Bureau granted a temporary waiver of the frequency coordination requirement in the band. To ensure that earth station data contained in the Commission's IBFS remains accurate to facilitate frequency coordination and maximize efficient use of the spectrum, the *NPRM* seeks comment on whether, for a constructed and operational earth station, any combination of frequency, azimuth, and elevation listed in the license or registration that is unused for more than, *e.g.,* 180 days, must be deleted from the license or registration. By proposing to delete data for earth stations that are unused, the *NPRM* seeks to minimize unnecessary constraints on successful frequency coordination of new operations, which reduces the economic impact on small entities, who often have more limited resources to allocate towards such regulatory compliance burdens. The *NPRM* also proposes to adopt specific definitions of each class of incumbents that would require protection and be entitled to possible reimbursement for clearing the band. This proposal has the dual benefit to small entities of creating a means for compensating any unexpected costs they may experience as a result of transitioning the band to flexible use, as well as providing a clear definition of the class of operators that requires interference protection and coordination, thereby avoiding overly burdensome and unnecessary obligations.

207. The *NPRM* seeks comment on several ways to facilitate more intensive fixed use of the 3.7–4.2 GHz band by allowing point-to-multipoint operations in the band through rules that will promote more efficient use of the limited spectrum available. In doing so, the *NPRM* makes several proposals to reduce the burden of frequency coordination for any new point-to-multipoint licensees, which would benefit small entities, and seeks comment on rules that are narrowly tailored to the needs of point-to-multipoint operations in particular, without the need for unnecessary regulatory burdens. The *NPRM* seeks comment on subjecting point-to-multipoint FS applicants to an expedited coordination process with mandatory electronic notification and response, and on the possibility of adopting an automated coordination process for point-to-multipoint FS applications. The *NPRM* asks commenters to discuss specifically any modifications that could be made to the Commission's coordination rules that would reduce the economic impact on small entities. In seeking comment on the appropriate construction requirements to apply to point-to-multipoint operations, the *NPRM* asks commenters to consider the economic impact on consumers and businesses in rural communities and areas that are unserved or underserved by current broadband providers, as well as any economic impact on small businesses.

208. The *NPRM* discusses various proposals to reallocate and transition the 3.7–4.2 GHz band to more intensive fixed and flexible use, and seeks comment on ways to minimize the economic impact of any rule changes specifically with respect to small entities. For example, in seeking comment on whether to seek additional information from FSS earth station registrants or space station licensees, the *NPRM* asks whether small entities face any special or unique issues with respect to the information collection such that they would require certain accommodations or additional time to comply.

209. Further, in its discussion of the three potential mechanisms for transitioning the band to flexible use—(1) market-based mechanism, (2) auctions mechanisms, (3) alternative mechanisms—the Commission seeks specific comment on the costs, benefits, and potential economic impact on small businesses, and asks commenters to discuss any rules or procedures that could be implemented to ensure that the needs of these communities and businesses are adequately addressed. Each of these transition mechanisms rely heavily on a competitive marketplace to set the value of spectrum and compensate incumbents for the costs of relocating, reconfiguring, and potentially lost opportunity cost. Specifically, for small entities that may be incumbent satellite or earth station operators in the band, the Commission is focused on facilitating competition in the band and ensuring that all relevant interests, not just those of the largest companies, are represented. This will help to reduce the potential economic impact on small entities.

210. The *NPRM* also seeks comment on applying 15-year license terms for any licensees issued in the 3.7–4.2 GHz band. Specifically for small entities who must allocate resources carefully over the length of their license term, and have more limited funds should they be required to compete at auction for a particular license, the certainty of a longer license term would provide licensees with sufficient incentive to make the long-term investments necessary for compliance.

211. The Commission finds an overriding public interest in encouraging investment in wireless networks, facilitating access to scarce spectrum resources, and promoting the rapid deployment of mobile services to Americans. All licensees, including small entities, play a crucial role in achieving these goals. Thus while the *NPRM* does not propose any exemption for small entities, as mentioned above, the Commission seeks comment on alternative obligations, timing for implementation, scope of subject licenses, penalties for failure, and other measures that could accommodate the needs and resources of small entities. The Commission will carefully consider these matters as it relates to small entities before adopting final rules in this proceeding.

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

212. None.

V. Ordering Clauses

213. *It is ordered,* pursuant to the authority found in sections 1, 2, 3, 4(i), 7, 201, 301, 302, 303, 304, 307, 308, 309, and 310 of the Communications Act of 1934, 47 U.S.C. 151, 152, 153, 154(i), 157, 201, 301, 302, 303, 304, 307, 308,

309, 310, and section 706 of the Telecommunications Act of 1996, as amended, 47 U.S.C. 1302, and 1.411 of the Commission's Rules, 47 CFR 1.411, that this Notice of Proposed Rulemaking *is hereby adopted.*

214. *It is further ordered* that *notice is hereby given* of the proposed regulatory changes described in this Notice of Proposed Rulemaking, and that comment is sought on these proposals.

215. *It is further ordered* that the Petition for Rulemaking filed by the Broadband Access Coalition on June 21, 2017, RM–11791, *is granted* to the extent indicated herein and is otherwise denied.

216. *It is further ordered* that the Petition for Rulemaking filed by the Fixed Wireless Communications Coalition, Inc, on October 11, 2016, RM–11778, *is granted* to the extent indicated herein and is otherwise denied.

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

List of Subjects 47 CFR Parts 1, 2, 25 and 27

Practice and procedure, Communications common carrier, Communications equipment, Reporting and recording requirements, Satellites.

Federal Communications Commission.

Marlene Dortch,

Secretary.

Proposed Rules

For the reasons discussed in the preamble, the Federal Communications Commission proposes to amend 47 CFR parts 1, 2, 25, and 27 as follows:

PART 1—PRACTICE AND PROCEDURE

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

Authority: 47 U.S.C. 151, 154(i), 154(j), 155, 157, 160, 201, 225, 227, 303, 309, 332, 1403, 1404, 1451, 1452, and 1455, unless otherwise noted.

■ 2. Amend § 1.907 by revising the definition of ''Covered Geographic Licenses'' to read as follows:

§ 1.907 Definitions.

* * * * *

Covered Geographic Licenses. Covered geographic licenses consist of the following services: 1.4 GHz Service (part 27, subpart I); 1.6 GHz Service (part 27, subpart J); 24 GHz Service and Digital Electronic Message Services (part 101, subpart G); 218–219 MHz Service (part 95, subpart F); 220–222 MHz Service, excluding public safety licenses (part 90, subpart T); 600 MHz Service (part 27, subpart N); 700 MHz Commercial Services (part 27, subpart F and H); 700 MHz Guard Band Service (part 27, subpart G); 800 MHz Specialized Mobile Radio Service (part 90, subpart S); 900 MHz Specialized Mobile Radio Service (part 90, subpart S); Mid-Band Flexible Use Service (part 27, subpart O); Advanced Wireless Services (part 27, subparts K and L); Air-Ground Radiotelephone Service (Commercial Aviation) (part 22, subpart G); Broadband Personal Communications Service (part 24, subpart E); Broadband Radio Service (part 27, subpart M); Cellular Radiotelephone Service (part 22, subpart H); Dedicated Short Range Communications Service, excluding public safety licenses (part 90, subpart M); H Block Service (part 27, subpart K); Local Multipoint Distribution Service (part 101, subpart L); Multichannel Video Distribution and Data Service (part 101, subpart P); Multilateration Location and Monitoring Service (part 90, subpart M); Multiple Address Systems (EAs) (part 101, subpart O); Narrowband Personal Communications Service (part 24, subpart D); Paging and Radiotelephone Service (part 22, subpart E; part 90, subpart P); VHF Public Coast Stations, including Automated Maritime Telecommunications Systems (part 80, subpart J); Upper Microwave Flexible Use Service (part 30); and Wireless Communications Service (part 27, subpart D).

* * * * *

■ 3. Amend § 1.9005 by adding paragraph (mm) to read as follows:

§ 1.9005 Included services.

* * * * *

(mm) The Mid-Band Flexible Use Service in the 3700–4200 MHz band.

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

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

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

■ 5. Amend § 2.106, the Table of Frequency Allocations, by revising page 41 and, under ''Non-Federal Government (NG) Footnotes,'' adding footnote NG182 to read as follows:

§ 2.106 Table of Frequency Allocations.

* * * * *

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Table of Frequency Allocations	3500-5460 MHz (SHF)				Page 41
International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
(See previous page)	3500-3700 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile Radiolocation 5.433	3500-3600 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 5.433A Radiolocation 5.433	3500-3550 RADIOLOCATION G59 AERONAUTICAL RADIONAVIGATION (ground-based) G110	3500-3550 Radiolocation	Private Land Mobile (90)
			3550-3650 RADIOLOCATION G59 AERONAUTICAL RADIONAVIGATION (ground-based) G110	3550-3600 FIXED MOBILE except aeronautical mobile US105 US433	Citizens Broadband (96)
3600-4200 FIXED FIXED-SATELLITE (space-to-Earth) Mobile		3600-3700 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile Radiolocation 5.433		3600-3650 FIXED FIXED-SATELLITE (space-to-Earth) US107 US245 MOBILE except aeronautical mobile	Satellite Communications (25) Citizens Broadband (96)
			US105 US107 US245 US433	US105 US433	
			3650-3700 US109 US349	3650-3700 FIXED FIXED-SATELLITE (space-to-Earth) NG169 NG185 MOBILE except aeronautical mobile US109 US349	
		5.435			
	3700-4200 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile		3700-4200	3700-4200 FIXED FIXED-SATELLITE (space-to-Earth) NG180, NG182	Satellite Communications (25) Wireless

		MOBILE except aeronautical mobile	Communications (27) Fixed Microwave (101)
4200-4400 AERONAUTICAL RADIONAVIGATION 5.438 5.439 5.440	4200-4400 AERONAUTICAL RADIONAVIGATION 5.440 US261		Aviation (87)
4400-4500 FIXED MOBILE 5.440A	4400-4940 FIXED MOBILE	4400-4500	
4500-4800 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 MOBILE 5.440A		4500-4800 FIXED-SATELLITE (space-to-Earth) 5.441 US245	
4800-4990 FIXED MOBILE 5.440A 5.442 Radio astronomy 5.149 5.339 5.443	US113 US245 US342	4800-4940 US113 US342	
	4940-4990 5.339 US342 US385 G122	4940-4990 FIXED MOBILE except aeronautical mobile 5.339 US342 US385	Public Safety Land Mobile (90Y)
4990-5000 FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY Space research (passive) 5.149	4990-5000 RADIO ASTRONOMY US74 Space research (passive) US246		

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Non-Federal Government (NG) Footnotes

* * * * *

NG182 In the band 3700–4200 MHz, the following provisions shall apply to geostationary satellite orbit (GSO) fixed-satellite service (space-to-Earth) operations:

(a) Space stations authorized prior to, or authorized as a result of an application filed prior to, June 21, 2018 may continue to operate on a primary basis, but no applications for new space station authorizations or new petitions for market access shall be accepted for filing after that date, other than applications by existing operators in the band seeking to make more efficient use of the band. Applications for extension, cancellation, replacement, or modification of existing space station authorizations in the band will continue to be accepted and processed normally.

(b) Earth station operations shall not claim protection from terrestrial stations, unless the requirements of 47 CFR 25.203(n) are satisfied.

PART 25—SATELLITE COMMUNICATIONS

■ 6. The authority citation for Part 25 continues to read as follows:

Authority: 47 U.S.C. 154, 301, 302, 303, 307, 309, 310, 319, 332, 605, and 721, unless otherwise noted.

■ 7. Amend § 25.203 by adding paragraph (n) to read as follows:

§ 25.203 Choice of sites and frequencies.

* * * * *

(n) Earth stations operating in the 3700–4200 MHz band shall receive interference protection from terrestrial stations only to the extent that (1) the earth station was operational as of April 19, 2018, (2) the earth station was licensed or registered (or had a pending application for license or registration) in the IBFS database as of October 17, 2018, and (3) the operator timely certified the accuracy of information on file with the Commission to the extent required by the Order adopted in FCC 18–XXX. Earth stations failing to satisfy any of the above may continue to operate, but such operations shall be on an unprotected basis.

PART 27—MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

■ 8. The authority citation for part 27 continues to read as follows:

Authority: 47 U.S.C. 154, 301, 302a, 303, 307, 309, 332, 336, 337, 1403, 1404, 1451, and 1452, unless otherwise noted.

■ 9. Amend § 27.1 by adding paragraph (b)(15) to read as follows:

§ 27.1 Basis and purpose.

* * * * *

(b) * * *

(15) 3700–4200 MHz.

* * * * *

■ 10. Amend § 27.13 by adding paragraph (m) to read as follows:

§ 27.13 License period.

* * * * *

(m) *3700–4200 MHz band.* Authorizations for the 3700–4200 MHz band will have a term not to exceed 15 years from the date of issuance or renewal.

■ 11. Amend § 27.14 by revising the first sentence of paragraphs (a) and (k), and adding paragraph (u) to read as follows:

§ 27.14 Construction requirements.

(a) AWS and WCS licensees, with the exception of WCS licensees holding authorizations for the 600 MHz band, Block A in the 698–704 MHz and 728–734 MHz bands, Block B in the 704–710 MHz and 734–740 MHz bands, Block E in the 722–728 MHz band, Block C, C1 or C2 in the 746–757 MHz and 776–787 MHz bands, Block A in the 2305–2310 MHz and 2350–2355 MHz bands, Block B in the 2310–2315 MHz and 2355–2360 MHz bands, Block C in the 2315–2320 MHz band, Block D in the 2345–2350 MHz band, and 3700–4200 MHz band, and with the exception of licensees holding AWS authorizations in the 1915–1920 MHz and 1995–2000 MHz bands, the 2000–2020 MHz and 2180–2200 MHz bands, or 1695–1710 MHz, 1755–1780 MHz and 2155–2180 MHz bands, must, as a performance requirement, make a showing of ''substantial service'' in their license area within the prescribed license term set forth in § 27.13. * * *

* * * * *

(k) Licensees holding WCS or AWS authorizations in the spectrum blocks enumerated in paragraphs (g), (h), (i), (q), (r), (s), (t), and (u) of this section, including any licensee that obtained its license pursuant to the procedures set forth in paragraph (j) of this section, shall demonstrate compliance with performance requirements by filing a construction notification with the Commission, within 15 days of the expiration of the applicable benchmark, in accordance with the provisions set forth in § 1.946(d) of this chapter. * * *

* * * * *

(u) The following provisions apply to any licensee holding an authorization in the 3700–4200 MHz band:

(1) A licensee shall provide reliable signal coverage and offer service within six (6) years from the date of the initial license to at least forty-five (45) percent of the population in each of its license areas (''First Buildout Requirement'').

(2) A licensee shall provide reliable signal coverage and offer service within twelve (12) years from the date of the initial license to at least eighty (80) percent of the population in each of its license areas (''Second Buildout Requirement'').

(3) If a licensee fails to establish that it meets the First Buildout Requirement for a particular license area, the licensee's Second Buildout Requirement deadline and license term will be reduced by two years.

(4) If a licensee fails to establish that it meets the Second Buildout Requirement for a particular license area, its authorization for each license area in which it fails to meet the Second Buildout Requirement shall terminate automatically without Commission action, and the licensee will be ineligible to regain it if the Commission makes the license available at a later date.

(5) To demonstrate compliance with these performance requirements, licensees shall use the most recently available decennial U.S. Census Data at the time of measurement and shall base their measurements of population served on areas no larger than the Census Tract level. The population within a specific Census Tract (or other acceptable identifier) will be deemed served by the licensee only if it provides reliable signal coverage to and offers service within the specific Census Tract (or other acceptable identifier). To the extent the Census Tract (or other acceptable identifier) extends beyond the boundaries of a license area, a licensee with authorizations for such areas may include only the population within the Census Tract (or other acceptable identifier) towards meeting the performance requirement of a single, individual license. For the Gulf of Mexico license area, the licensee shall demonstrate compliance with these performance requirements, using off-shore platforms, including production, manifold, compression, pumping and valving platforms as a proxy for population in the Gulf of Mexico.

■ 12. Amend § 27.50 by revising the introductory text to paragraphs (d), (d)(1), and (d)(2) and paragraph (d)(4) to read as follows:

§ 27.50 Power limits and duty cycle.

* * * * *

(d) The following power and antenna height requirements apply to stations transmitting in the 1695–1710 MHz, 1710–1755 MHz, 1755–1780 MHz,

1915–1920 MHz, 1995–2000 MHz, 2000–2020 MHz, 2110–2155 MHz, 2155–2180 MHz, 2180–2200 MHz, and 3700–4200 MHz bands:

(1) The power of each fixed or base station transmitting in the 1995–2000 MHz, 2110–2155 MHz, 2155–2180 MHz, 2180–2200 MHz band, or 3700–4200 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to:

* * * * *

(2) The power of each fixed or base station transmitting in the 1995–2000 MHz, the 2110–2155 MHz 2155–2180 MHz band, 2180–2200, or 3700–4200 MHz band and situated in any geographic location other than that described in paragraph (d)(1) of this section is limited to:

* * * * *

(4) Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band and mobile and portable stations operating in the 1695–1710 MHz, 1755–1780 MHz, and 3700–4200 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710–1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

* * * * *

■ 13. Amend § 27.53 by revising paragraph (h)(1) to read as follows:

§ 27.53 Emission limits.

* * * * *

(h) *AWS emission limits*—(1) *General protection levels.* Except as otherwise specified below, for operations in the 1695–1710 MHz, 1710–1755 MHz, 1755–1780 MHz, 1915–1920 MHz, 1995–2000 MHz, 2000–2020 MHz, 2110–2155 MHz, 2155–2180 MHz, 2180–2200 MHz, and 3700–4200 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB.

* * * * *

■ 14. Amend § 27.55 by adding paragraph (d) to read as follows:

§ 27.55 Power strength limits.

* * * * *

(d) *Power flux density for stations operating in the 3700–4200 MHz band.* The predicted or measured Power Flux Density from any Base Station operating in the 3700–4200 MHz bands at any location on the geographical border of a licensee's service area shall not exceed $-76 dBm/m^2/MHz$ (measured at 1.5 meters above ground) unless the adjacent affected service area licensee(s) agree(s) to a different PFD.

■ 15. Amend § 27.57 by revising paragraph (c) to read as follows:

§ 27.57 International coordination.

* * * * *

(c) Operation in the 1695–1710 MHz, 1710–1755 MHz, 1755–1780 MHz, 1915–1920 MHz, 1995–2000 MHz, 2000–2020 MHz, 2110–2155 MHz, 2155–2180 MHz, 2180–2200 MHz, and 3700–4200 MHz bands is subject to international agreements with Mexico and Canada.

■ 16. Add subpart O to read as follows:

Subpart O—3700–4200 MHz Band

Sec.

§ 27.1400 3700–4200 MHz band subject to competitive bidding.

Mutually exclusive initial applications for 3700–4200 MHz band licenses are subject to competitive bidding. The general competitive bidding procedures set forth in 47 CFR part 1, subpart Q of this chapter will apply unless otherwise provided in this subpart.

§ 27.1401 Designated entities in the 3700–4200 MHz band.

(a) *Eligibility for small business provisions*—(1) *Definitions*—(i) *Small business.* A small business is an entity that, together with its affiliates, its controlling interests, and the affiliates of its controlling interests, has average gross revenues not exceeding $55 million for the preceding three (3) years.

(ii) *Very small business.* A very small business is an entity that, together with its affiliates, its controlling interests, and the affiliates of its controlling interests, has average gross revenues not exceeding $20 million for the preceding three (3) years.

(2) *Bidding credits.* A winning bidder that qualifies as a small business, as defined in this section, or a consortium of small businesses may use the bidding credit of 15 percent, as specified in § 1.2110(f)(2)(i)(C) of this chapter. A winning bidder that qualifies as a very small business, as defined in this section, or a consortium of very small businesses may use the bidding credit of 25 percent, as specified in § 1.2110(f)(2)(i)(B) of this chapter.

(b) *Eligibility for rural service provider bidding credit.* A rural service provider, as defined in § 1.2110(f)(4)(i) of this chapter, that has not claimed a small business bidding credit may use the bidding credit of 15 percent specified in § 1.2110(f)(4) of this chapter.

[FR Doc. 2018–18288 Filed 8–28–18; 8:45 am]

BILLING CODE 6712–01–P