

FACT SHEET¹

Expanding Flexible Use of the 3.7 to 4.2 GHz Band

Report and Order and Order of Proposed Modification - GN Docket No. 18-122

Background: In recognition of the ever-growing demand for spectrum-based services and to facilitate the development of advanced wireless services, including 5G, this proposed Report and Order and Order of Proposed Modification would make a significant amount of mid-band spectrum in the 3.7-4.2 GHz band available for flexible-use in a manner that ensures the continued, uninterrupted delivery of services currently offered in the band. Through a Commission-led auction, the item will ensure that 280 megahertz of spectrum is repurposed from Fixed Satellite Service (FSS) and Fixed Service (FS) to flexible-use, that the public recovers a substantial portion of the value of this resource, and that this spectrum will be made available quickly for 5G and other advanced wireless deployments.

What the Order Would Do:

- Add a mobile allocation, except aeronautical mobile, to the 3.7-4.0 GHz band.
- Transition 280 megahertz, plus a 20-megahertz guard band, from incumbent use to flexible-use in the contiguous United States by September 30, 2025, through a Commission-led public auction.
- Provide eligible space station operators with the option to accelerate the clearing according to the following accelerated timeline: (1) clearing 120 megahertz (3.7-3.82 GHz) by September 30, 2021, and (2) clearing the remaining 180 megahertz (3.82-4.0 GHz) by September 30, 2023. If they meet those benchmarks, they will receive accelerated relocation payments from flexible-use licensees.
- Require incumbent FS licensees in the contiguous United States to relocate their point-to-point links to other bands, by September 30, 2023.
- Provide both incumbent FSS and FS licensees with reimbursement of reasonable relocation costs paid by flexible-use licensees as a condition on their license.
- Establish a Relocation Payment Clearinghouse to manage the intake, payout, and auditing of relocation funds, mediate cost-related disputes, and provide progress reports to the Commission.
- Establish a Relocation Coordinator to coordinate the migration and filtering of incumbent earth stations to ensure uninterrupted service during and following the transition.
- Adopt service and technical rules for flexible-use licensees in the 280 megahertz of spectrum designated for transition to flexible-use.

What the Order of Proposed Modification Would Do:

- Propose to modify the licenses and authorizations of all 3.7-4.2 GHz band FSS licensees and market access holders within the contiguous United States to limit their operations to the 4.0-4.2 GHz band no later than September 30, 2025.

¹ This document is being released as part of a “permit-but-disclose” proceeding. Any presentations or views on the subject expressed to the Commission or its staff, including by email, must be filed in GN Docket No. 18-122, which may be accessed via the Electronic Comment Filing System (<https://www.fcc.gov/ecfs/>). Before filing, participants should familiarize themselves with the Commission’s *ex parte* rules, including the general prohibition on presentations (written and oral) on matters listed on the Sunshine Agenda, which is typically released a week prior to the Commission’s meeting. See 47 CFR § 1.1200 et seq.

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)
)
Expanding Flexible Use of the 3.7 to 4.2 GHz) GN Docket No. 18-122
Band)

REPORT AND ORDER AND ORDER OF PROPOSED MODIFICATION*

Adopted: []

Released: []

By the Commission:

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* This document has been circulated for tentative consideration by the Commission at its February 28, 2020 open meeting. The issues referenced in this document and the Commission's ultimate resolution of those issues remain under consideration and subject to change. This document does not constitute any official action by the Commission. However, the Chairman has determined that, in the interest of promoting the public's ability to understand the nature and scope of issues under consideration, the public interest would be served by making this document publicly available. The FCC's *ex parte* rules apply and presentations are subject to "permit-but-disclose" *ex parte* rules. See, e.g., 47 C.F.R. §§ 1.1206, 1.1200(a). Participants in this proceeding should familiarize themselves with the Commission's *ex parte* rules, including the general prohibition on presentations (written and oral) on matters listed on the Sunshine Agenda, which is typically released a week prior to the Commission's meeting. See 47 CFR §§ 1.1200(a), 1.1203

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I. INTRODUCTION

1. The demand for wireless broadband services and for radio spectrum continues to grow dramatically.¹ At the same time that mobile traffic is surging in many sections of the United States, however, there are some communities that still lack access to meaningful wireless broadband connectivity. To enable the development of next generation wireless networks and to help close the digital divide, the Commission has pursued a comprehensive strategy to Facilitate America's Superiority in 5G Technology (the 5G FAST Plan).² That plan embraces an all-of-the-above approach to spectrum policy, emphasizing the need to free up spectrum in the low-, mid-, and high-frequency bands for commercial, flexible use and unlicensed use so that entrepreneurs and engineers can put this resource to its highest and best use.

2. The Commission has been consistently executing that plan. The broadcast incentive auction in 2017 made 70 megahertz of licensed spectrum in the 600 MHz band—a band ideal for providing coverage in rural areas and inside buildings—available for commercial wireless operations.³ The 28 GHz auction in 2018 and the 24 GHz auction in 2019 together made 1,550 megahertz of high-band spectrum—ideal for low-latency, high-capacity operations—available for commercial use.⁴ The ongoing spectrum frontiers incentive auction is offering 3,400 megahertz of high-band spectrum in the upper 37 GHz, 39 GHz, and 47 GHz bands—that's more spectrum for next-generation services than used

¹ Ericsson predicts that total mobile traffic is expected to increase by a factor of five over the next six years, reaching 131 exabytes per month by the end of 2024. Ericsson further predicts that, in 2024, traffic generated by smartphones is projected to be 95% of total mobile data traffic and 5G networks will carry a quarter of all global mobile data traffic. See Ericsson, Mobility Report (2019), <https://www.ericsson.com/49d1d9/assets/local/mobility-report/documents/2019/ericsson-mobility-report-june-2019.pdf>. Cisco estimates that, by 2022, 22% of global internet traffic will come from mobile networks, up from 12% in 2017. See Cisco Systems Inc., Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2017-2022 White Paper (2019), <https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white-paper-c11-738429.html>.

² See <https://www.fcc.gov/5G> for a description of the 5G FAST Plan.

³ *Incentive Auction Closing and Channel Reassignment Public Notice*, AU Docket No. 14-252, Public Notice, 32 FCC Rcd 2786, 2793, para. 15 (2017). The broadcast incentive auction repurposed 84 megahertz of spectrum—70 megahertz for licensed use and another 14 megahertz for wireless microphones and unlicensed use. See Federal Communications Commission, *Broadcast Incentive Auction and Post-Auction Transition* (May 9, 2017), <https://www.fcc.gov/about-fcc/fcc-initiatives/incentive-auctions>.

⁴ *Auction of 24 GHz Upper Microwave Flexible Use Service Licenses Closes*, AU Docket No. 18-85, Public Notice, 34 FCC Rcd 4294 (2019); *Auction of 28 GHz Upper Microwave Flexible Use Service Licenses for Next-Generation Wireless Services Closes*, AU Docket No. 18-85, Public Notice, 34 FCC Rcd 75 (2019).

by all terrestrial mobile providers for their 4G LTE operations combined.⁵ Earlier in February, the Commission opened a Tribal Priority Window so that Tribal Nations in rural America have early access to 2.5 GHz spectrum—with an auction of any remaining spectrum to be scheduled after the window closes.⁶ And in June, the Commission will hold the Citizens Broadband Radio Service auction, auctioning Priority Access Licenses for 70 megahertz out of the 150 megahertz of 3.5 GHz mid-band spectrum that the Commission authorized for commercial use.⁷

3. The fifth generation of wireless technology will improve speed and reduce latency of wireless communications networks. In particular, 5G will enable services that revolutionize healthcare, transportation, agriculture, education, and many other facets of our economy and society. For example, 5G will support advanced services such as real-time, high-quality video for telemedicine and the growth in the Internet of Things. American leadership in 5G is important because 5G networks will power a digital economy of applications and services that themselves will transform our economy, boost economic growth, and improve our quality of life. Due to the promising future of next generation 5G services, U.S. leadership in 5G is a priority of the Commission. One important part of advancing U.S. leadership in next generation 5G networks is making additional mid-band spectrum available for 5G services. Mid-band spectrum is essential for 5G buildout due to its desirable coverage, capacity, and propagation characteristics. Our comprehensive mid-band spectrum strategy includes our efforts to free up spectrum in the 2.5 GHz band, 3.1-3.55 GHz band, the 3.5 GHz band, and the C-band for commercial wireless use. The C-band will be critical mid-band spectrum for 5G services.

4. Today, we expand on these efforts to close the digital divide and promote U.S. leadership in the next generation of wireless services, including fifth-generation (5G) wireless and other advanced spectrum-based services, by reforming the use of the 3.7-4.2 GHz band, also known as the C-Band. By repacking existing satellite operations into the upper 200 megahertz of the band (and reserving a 20 megahertz guard band), we make a significant amount of spectrum—280 megahertz or more than half of the band—available for flexible use throughout the contiguous United States, and we do so in a manner that ensures the continuous and uninterrupted delivery of services currently offered in the band. We will hold a public auction to ensure that the public recovers a substantial portion of the value of this resource. And we schedule that auction for later this year, with a robust transition schedule to ensure that a significant amount of spectrum is made available quickly for upcoming 5G deployments. This action is the next critical step in advancing American leadership in 5G and implementing our comprehensive 5G FAST Plan.

II. BACKGROUND

5. Mid-band spectrum is well-suited for next generation wireless broadband services given the combination of favorable propagation characteristics (as compared to high bands) and the opportunity

⁵ The *Spectrum Frontiers* proceeding made available high-band spectrum in the 24 GHz, 28 GHz, Upper 37 GHz, 39 GHz, and 47 GHz bands. *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, GN Docket No. 14-177, Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order, 32 FCC Rcd 10988, 10994-11006, paras. 15-59 (2017) (*2017 Spectrum Frontiers Order and FNPRM*); *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014, 8023-62, paras. 19-124 (2016) (*2016 Spectrum Frontiers Order and FNPRM*).

⁶ See *Transforming the 2.5 GHz Band*, WT Docket No. 18-120, Report and Order, 34 FCC Rcd 5446 (2019); *Wireless Telecommunications Bureau Announces Procedures for 2.5 GHz Rural Tribal Priority Window*, WT Docket No. 18-120, DA 20-18 (WTB 2020).

⁷ *Promoting Investment in the 3550-3700 MHz Band*, GN Docket No. 17-258, Report and Order, 33 FCC Rcd. 10598 (2018) (*2018 3.5 GHz Band Report and Order*); *Auction of Priority Access Licenses for the 3550-3650 MHz Band, Comment Sought on Competitive Bidding Procedures for Auction 105, Bidding in Auction 105 Scheduled to Begin June 25, 2020*, AU Docket No. 19-244, Public Notice, 34 FCC 9215 (Sept. 27, 2019).

for additional channel re-use (as compared to low bands). With the ever-increasing demand for more data on mobile networks, wireless network operators increasingly have focused on adding data capacity. One technique for adding capacity is to use smaller cell sizes—i.e., have each base station provide coverage over a smaller area. Using mid-band frequencies can be advantageous for deploying a higher density of base stations. The decreased propagation distances at these frequencies reduce the interference between base stations using the same frequency, thereby allowing base stations to be more densely packed and increasing the overall system capacity. Mid-band spectrum thus presents wireless providers with the opportunity to deploy base stations using smaller cells to achieve higher spectrum reuse than the lower frequency bands while still providing indoor coverage.⁸ In addition, mid-band spectrum offers more favorable propagation characteristics relative to higher bands for fixed wireless broadband services in less densely populated areas. Given these characteristics, we expect mid-band spectrum to play a prime role in next-generation wireless services, including 5G.

6. For these same reasons, mid-band spectrum was a key focus of Congress in the Making Opportunities for Broadband Investment and Limiting Excessive and Needless Obstacles to Wireless Act (MOBILE NOW Act),⁹ when it considered how to address the pressing need for more spectrum for wireless broadband.¹⁰ Specifically, section 605(b) of the MOBILE NOW Act 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.”¹¹ The MOBILE NOW Act also requires that, no later than December 31, 2022, the Secretary of Commerce and the Commission “identify a total of at least 255 megahertz of Federal and non-Federal spectrum for mobile and fixed wireless broadband use.”¹² In making 255 megahertz available, 100 megahertz below eight gigahertz shall be identified for unlicensed use,¹³ 100 megahertz below six gigahertz shall be identified for use on an exclusive, flexible-use, licensed basis for commercial mobile use,¹⁴ and 55 megahertz below eight gigahertz shall be identified for licensed, unlicensed, or a combination of uses.¹⁵

7. The United States is not alone in recognizing the potential of mid-band spectrum for 5G. International governing bodies and several other countries likewise are reviewing the suitability of a number of frequency bands for next generation 5G wireless services, including the 3.7-4.2 GHz bands.¹⁶ For example, the Radio Spectrum Policy Group of the European Commission issued a mandate to the European Conference of Postal and Telecommunications Administrations (CEPT) that the 3.4-3.8 GHz

⁸ According to the Broadband Access Coalition, the 3.7-4.2 GHz band could provide non-line-of-sight capabilities within a reasonable radius. Petition of Broadband Access Coalition, CG RM Docket No. 11791, at 17 (filed June 21, 2017), <https://ecfsapi.fcc.gov/file/1062353270786/17062202-1.pdf>.

⁹ MOBILE NOW Act, Pub. L. No. 115-141, Division P, Title VI, § 601 *et seq.* (2018). The MOBILE NOW Act became law on March 23, 2018.

¹⁰ *See, e.g.*, S. Rep. 115-4 at 1 (2017) (purpose of the MOBILE NOW Act is to help secure continued U.S. mobile and fixed broadband leadership by ensuring additional licensed and unlicensed spectrum are made available for wireless broadband use).

¹¹ MOBILE NOW Act, § 605(b). Consistent with the section 605(b) requirement, the Commission will submit a report of its findings to the Secretary of Commerce and the appropriate committees of Congress.

¹² *Id.* § 603(a)(1).

¹³ *Id.* § 603(a)(2)(A).

¹⁴ *Id.* § 603(a)(2)(B).

¹⁵ *Id.* § 603(a)(2)(C).

¹⁶ Joe Barrett, President, Global mobile Suppliers Association (“GSA”), *5G Spectrum Bands* (Feb. 22, 2017), <https://gsacom.com/5g-spectrum-bands/>.

band be the first primary band for 5G,¹⁷ and CEPT currently is developing a report that will provide recommendations for updating the European regulatory framework for this band.¹⁸ A number of European governments are taking actions to make parts of the band available for 5G. Germany intends to make the 3.4-3.8 GHz band available by the end of 2021.¹⁹ In December 2019, France announced the procedures for awarding licenses in the 3.4-3.8 GHz band, which it allocated as a “core” 5G band, consistent with the European Commission’s guidance.²⁰ And the Austrian government held its first auction of 5G licenses in the 3.4-3.8 GHz band in the spring of 2019.²¹ There is also significant interest in parts of the band in Asia and in Australia. For example, the Ministry of Internal Affairs and Communications in Japan awarded licenses in the 3.6-4.1 GHz band for 5G in 2019.²² In August 2019, Australia initiated an initial investigation of possible arrangements for fixed and mobile broadband use in the 3.7-4.2 GHz band.²³ And in November 2018, the United Arab Emirates issued licenses in the 3.3-3.8 GHz band for the establishment of 5G networks.²⁴

A. Current Use of the 3.7-4.2 GHz Band and Adjacent Bands

8. The 3.7-4.2 GHz band currently is allocated in the United States exclusively for non-

¹⁷ European Commission Directorate-General for Communications Networks, Content and Technology, Radio Spectrum Policy Group, Strategic Spectrum Roadmap Towards 5G for Europe: RSPG Second Opinion on 5G Networks at 2 (2018), https://circabc.europa.eu/sd/a/fe1a3338-b751-43e3-9ed8-a5632f051d1f/RSPG18-005final-2nd_opinion_on_5G.pdf. The European Conference of Postal and Telecommunications Administrations, CEPT All About Our Organisation, at 2 (2018), https://www.cept.org/files/1047/CEPT%20Leaflet_October%202018.pdf (“[CEPT] is an organization where policy makers and regulators from 48 countries across Europe collaborate to harmonise telecommunication, radio spectrum, and postal regulations to improve efficiency and co-ordination for the benefit of European society.”).

¹⁸ Report A from CEPT to the European Commission responds to the mandate to develop harmonized technical conditions for spectrum use in support of the introduction of next generation (5G) terrestrial systems in the European Union and to review the harmonized technical conditions applicable to the 3.4-3.8 GHz (‘3.6 GHz’) frequency band. See European Conference of Postal and Telecommunications Administrations, CEPT Report 67 (2018) (CEPT Draft Report 67), <https://www.ecodocdb.dk/download/561367fd-1ac6/CEPT%20Report%2067.pdf>.

¹⁹ German Federal Network Agency (Bundesnetzagentur), Key Elements for the Rollout of Digital Infrastructures and Identification of Demand for Nationwide Assignments in the 2 GHz and 3.6 GHz Bands, at 14 (2017) (2017 German Federal Network Agency Rollout Plan), https://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/Areas/Telecommunications/Companies/TelecomRegulation/FrequencyManagement/ElectronicCommunicationsServices/201070704_KeyElementsDemandIdentification.pdf?__blob=publicationFile&v=1.

²⁰ Press Release, Arcep, 5G 3.4-3.8 GHz Band Frequency Awards Procedure: Arcep Invites all Players Wanting to Participate to Submit a Bid Package (Dec. 31, 2019) (Arcep 3.4-3.8 GHz Awards Procedures), https://en.arcep.fr/fileadmin/cru-1578591734/user_upload/62-19_English_version.pdf.

²¹ Press Release, Austrian Regulatory Authority for Broadcasting and Telecommunications (RTR), 5G Frequency Award 3.4-3.8 GHz – Outcome of Auction, (Mar. 7, 2019) (RTR 3.4-3.8 GHz Auction Results), <https://www.rtr.at/en/pr/PI07032019TK>.

²² Press Release, Japan Ministry of Internal Affairs and Communications, Approval of a Plan of Specific Base Station for Introduction of 5th Generation Mobile Communication Systems (Apr. 10, 2019) (Japan 3.6-4.1 GHz License Awards), https://www.soumu.go.jp/menu_news/s-news/01kiban14_02000378.html.

²³ Australian Communications and Media Authority, Planning of the 3700-4200 MHz Band – Discussion Paper (Aug. 13, 2019) (Australian 2019 Planning for 3700-4200 MHz), <https://www.acma.gov.au/consultations/2019-09/planning-3700-4200-mhz-band-consultation-272019>.

²⁴ Comms Update, TRA Confirms UAE 5G Spectrum Allocations (Nov. 19, 2018) (UAE 5G Spectrum Allocations 2018 Update), <https://www.commsupdate.com/articles/2018/11/19/tra-confirms-uae-5g-spectrum-allocations/>.

Federal use on a primary basis for Fixed Satellite Service (FSS) and Fixed Service.²⁵ 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.”²⁶ Domestically, satellite operators use the 3.7-4.2 GHz 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. FSS operators use this band to deliver programming to television and radio broadcasters throughout the country and to provide telephone and data services to consumers. The 3.7-4.2 GHz band is also used for reception of telemetry signals transmitted from satellites to earth stations, typically near the edges of the band, i.e., at 3.7 GHz or 4.2 GHz.

9. Satellites operating in the C-band typically have 24 transponders, each with a bandwidth of 36 megahertz. Thus, the 24 transponders on a satellite use 864 megahertz of spectrum, or 364 megahertz more than the 500 megahertz available. This is the result of spectrum reuse—adjacent transponders overlap, and self-interference is avoided by using opposite polarizations. Under existing rules, space station operators in the 3.7-4.2 GHz band are authorized to use all 500 megahertz exclusively at any orbital slot, but non-exclusively in terms of geographic coverage. Therefore, multiple FSS incumbents using satellites deployed at different locations in the geostationary orbit can transmit within overlapping geographic boundaries. Space stations that serve or transmit signals into the U.S. market may also be providing service to other countries.

10. For the Fixed Service in the 3.7-4.2 GHz band, 20 megahertz paired channels are assigned for point-to-point common carrier or private operational fixed microwave links.²⁷ There are fewer than 100 fixed service licensees operating in the band.²⁸

11. Last year, in response to a Bureau-level public notice, satellite operators and earth station owners filed certifications and information regarding their 3.7-4.2 GHz usage.²⁹ Intelsat License LCC (Intelsat), SES Americom, Inc. (SES), Eutelsat S.A. (Eutelsat) and Telesat Canada, ABS Global (ABS), Hispamar S.A. (Hispamar), and Star One S.A. (Star One) provided specific information on the existing C-band downlink capacity and contracted use for 66 satellites authorized to provide service in the 3.7-4.2 GHz band to the United States.³⁰ In March 2019, the most recent month of data collected, the combined FSS downlink capacity and usage of those 66 satellites was, respectively, 59,427 megahertz and 33,138 megahertz in total with 19,961 megahertz of usage providing service to the United States (i.e., 33.59% of

²⁵ 47 CFR § 2.106, United States Table of Frequency Allocations, non-Federal Table for the band 3.7-4.2 GHz.

²⁶ See 47 CFR § 25.103 (Definitions).

²⁷ 47 CFR § 101.147(h). 4.190 GHz may also be assigned for unpaired use. *Id.* § 101.147(h), n.1.

²⁸ Currently, there are 89 licensees with active Fixed Service licenses in the 3.7-4.2 GHz band in our Universal Licensing System.

²⁹ See *Deadline for Submission of Information on Earth Station and Satellite Use of the 3.7-4.2 GHz Band*, GN Docket No. 18-122, Public Notice, 34 FCC Rcd 2287 (IB/WTB/OET 2019) (*May 2019 Information Collection*). Filers included those owning temporary fixed or transportable earth stations. Some filers sought confidential treatment for information, pursuant to 47 CFR § 0.459. On August 26, 2019, the Wireless Telecommunications Bureau issued a *Protective Order* that set forth procedures to limit access to proprietary or confidential information and more strictly limit access to particularly competitively sensitive information submitted in those filings. See *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, GN Docket No. 18-122, Protective Order, 34 FCC Rcd 7700 (WTB 2019) (*Protective Order*).

³⁰ Empresa Argentina de Soluciones Satelitales S.A. (Empresa), which is authorized to operate one satellite in the 3.7-4.2 GHz band under a grant of market access to serve the United States, is the only satellite operator in this band that did not provide data in response to the *May 2019 Information Collection*.

the total capacity of the 66 satellites).³¹ Intelsat, SES, Eutelsat, Telesat Canada, and Star One have publicly disclosed the provision of service to registered earth stations in the United States in the 3.7-4.2 GHz band.

12. The spectrum band immediately below the 3.7-4.2 GHz band is already authorized for commercial wireless operations. In 2015, the Commission established the Citizens Broadband Radio Service in the 3.55-3.7 GHz band for shared use between commercial wireless operations and incumbent operations—including military radar systems, non-federal FSS earth stations, and, for a limited time, grandfathered wireless broadband licensees in the 3.65-3.7 GHz band.³² Under the Commission's rules, existing terrestrial wireless operations in the 3.65-3.7 GHz band are grandfathered for up to five years or until the end of their license term, whichever is longer.³³ The Citizens Broadband Radio Service is available for flexible wireless use and will support next generation wireless services, including 5G. Spectrum at or below the 3.7 GHz band is also used for reception of telemetry signals transmitted by satellites.³⁴ The band just above the 3.7-4.2 GHz band—4.2-4.4 GHz—is allocated for aeronautical radionavigation using radio altimeters in the United States.³⁵ In 2015, the World Radio Conference added a global co-primary allocation for wireless avionics intra-communications systems.³⁶ Radio altimeters are critical aeronautical safety-of-life systems primarily used at altitudes under 2500 feet and must operate without harmful interference. Wireless Avionics Intra-Communications systems provide communications over short distances between points on a single aircraft and are not intended to provide air-to-ground communications or communications between two or more aircraft.

B. Procedural History

13. *Mid-Band Notice of Inquiry.*—In the *NOI*, the Commission began an evaluation of whether spectrum between 3.7 GHz and 24 GHz could be made available for flexible wireless use.³⁷ The *NOI* sought comment in particular on three mid-range bands that stakeholders had identified 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

³¹ Five of those 66 satellites cannot provide coverage to any part of the contiguous United States, even according to their own coverage maps, and a number of other satellites cannot provide service to the United States because they are collocated with other satellites and would cause interference. Usage data submitted to the Commission includes service to Hawaii, Alaska, and all the territories and possessions, i.e., areas outside of the contiguous United States. Seventeen of those 66 satellites operate pursuant to market-access grants.

³² *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354, Report and Order and Second Further Notice of Proposed Rulemaking, 30 FCC Rcd 3959 (2015) (*2015 3.5 GHz Band Report and Order*).

³³ *2015 3.5 GHz Band Report and Order*, 30 FCC Rcd at 4075-80, paras. 400-12.

³⁴ See, e.g., *Amendment of the Commission's Rules with Regard to the 3650-3700 MHz Government Transfer Band; The 4.9 GHz Band Transferred from Federal Government Use*, First Report and Order and Second Notice of Proposed Rule Making, ET Docket No. 98-237, WT Docket No. 00-32, 15 FCC Rcd 20488 (2000).

³⁵ 47 CFR § 2.106, notes 5.438 and US261 (indicating that “[u]se of the band 4200-4400 MHz by the aeronautical radionavigation service is reserved exclusively for radio altimeters installed on board aircraft and for the associated transponders on the ground,” note 5.438, and indicating “use of the band 4200-4400 MHz by the aeronautical radionavigation service is reserved exclusively for airborne radio altimeters,” note US261).

³⁶ 47 CFR § 2.106, at note 4 (citing ITU Radio Regulations No. 5.436 (indicating that use of the frequency band 4 200-4 400 MHz by stations in the aeronautical mobile (R) service is reserved exclusively for wireless avionics intra-communication systems that operate in accordance with recognized international aeronautical standards)).

³⁷ *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, GN Docket No. 17-183, Notice of Inquiry, 32 FCC Rcd 6373, 6373-74, para. 1 (2017) (*NOI*).

other mid-range frequencies that may be suitable for expanded flexible use.³⁸ The Commission asked questions specific to the challenges and opportunities presented by each band. For example, the Commission asked commenters to identify options for more intensive fixed and mobile use in the 3.7-4.2 GHz band, including whether the band is desirable or suitable for mobile use, whether the existing Fixed Service rules should be modified to support more flexible and intensive fixed use, such as point-to-multipoint services.³⁹

14. *Freeze and Filing Window Public Notices.*—In April 2018, the Wireless Telecommunications, International, and Public Safety and Homeland Security Bureaus, announced a temporary freeze on the filing of new or modified applications for earth station licenses, receive-only earth station registrations, and fixed microwave licenses in the 3.7-4.2 GHz band, in order to preserve the current landscape of authorized operations in the band pending the Commission's consideration of the issues raised in response to the *NOI*.⁴⁰ In June 2018, the International Bureau established a window ending October 17, 2018 (later extended to October 31, 2018), for filing applications to license or register existing earth stations in the 3.7-4.2 GHz frequency band as a limited exception to the earth station application freeze.⁴¹ Further, the International Bureau announced a temporary freeze on the filing of certain space station applications, effective June 21, 2018.⁴²

15. *Order and Notice of Proposed Rulemaking.*—In July 2018, the Commission adopted an *Order and Notice of Proposed Rulemaking* in this proceeding.⁴³ To enable the Commission to make an informed decision about the proposals discussed in the *NPRM*, the *Order* required certain parties to file information about their operations—including information on the scope of current FSS use of the band—and it noted that several of the potential transition methods outlined in the *NPRM* might require additional earth station or space station information.⁴⁴

³⁸ *NOI*, 32 FCC Rcd at 6374, para. 2. The Commission noted that, consistent with established coordination practices, any viable proposals for flexible use in spectrum allocated for both federal and non-federal use would need to be carefully evaluated by both the Commission and the National Telecommunications and Information Administration (NTIA), taking into consideration the resources necessary to study such bands. *NOI*, 32 FCC Rcd at 6385, para. 37.

³⁹ *NOI*, 32 FCC Rcd at 6379-80, paras. 16-20.

⁴⁰ *Temporary Freeze on Applications for New or Modified Fixed Satellite Service Earth Stations and Fixed Microwave Stations in the 3.7-4.2 GHz Band*, GN Docket No. 17-183, Public Notice, 33 FCC Rcd 3841 (IB/PSHSB/WTB 2018) (*Freeze and 90-Day Earth Station Filing Window Public Notice*).

⁴¹ *International Bureau Announces 90-Day Extension of Filing Window, to October 17, 2018, to File Applications for Earth Stations Currently Operating in 3.7-4.2 GHz Band*, GN Docket No. 17-183, Public Notice, 33 FCC Rcd 6115 (IB 2018); *International Bureau Announces Two-Week Extension of Filing Window for Earth Stations Currently Operating in 3.7-4.2 GHz Band*, GN Docket No. 18-122, Public Notice, 33 FCC Rcd 10054 (IB 2018) (collectively, the *Earth Station Filing Window Public Notices*); see also *International Bureau Reminds Earth Station Operators in 3.7-4.2 GHz Band that Application Filing Window Closes October 17, 2018*, GN Docket No. 18-122, Public Notice, 33 FCC Rcd 8591 (IB 2018). Because of technical issues with the International Bureau Filing System portal around the filing deadline that significantly limited applicants' ability to file, the International Bureau has accepted as timely filed any application filed by November 7, 2018.

⁴² *International Bureau Announces Temporary Filing Freeze on New Fixed-Satellite Service Space Station Applications in the 3.7-4.2 GHz Band*, GN Docket No. 17-183, Public Notice, 33 FCC Rcd 6119 (IB 2018) (*Space Station PN*).

⁴³ See *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, Order and Notice of Proposed Rulemaking, GN Docket No. 18-122, 33 FCC Rcd 6915 (2018). We herein may refer to the entire item as the *Order and NPRM*, or, to each individually as the *Order* and the *NPRM*.

⁴⁴ *Order*, 33 FCC Rcd at 6923-25, paras. 16-25.

16. In the *NPRM*, the Commission sought comment generally on the future of incumbent use of the 3.7-4.2 GHz band and specifically on how to define the classes of incumbents, including earth stations, space stations, and point-to-point FS.⁴⁵ The Commission sought comment on revising its part 25 rules to limit eligibility to file applications for earth station licenses or registrations to incumbent earth stations, proposed to update International Bureau Filing System (IBFS) to remove 3.7-4.2 GHz band earth station licenses or registrations for which the licensee or registrant did not file the certifications required in the *Order* (to the extent they were licensed or registered before April 19, 2018), and sought comment on how to maintain the accuracy of IBFS data.⁴⁶ Regarding space stations, the Commission proposed to revise its rules to 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.⁴⁷ Given the limited number of point-to-point Fixed Service licensees in the band, the Commission proposed to sunset point-to-point Fixed Service use in the band, and it sought 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.⁴⁸

17. The Commission also sought comment on the current and future economic value of FSS in the band, on approaches for expanding flexible and more intensive fixed use of the band without causing harmful interference to incumbent operations, and on proposals to clear all or part of the band for flexible use.⁴⁹ More specifically, the Commission sought comment on a variety of approaches for expanding flexible use in the 3.7-4.2 GHz band, including market-based, auction-based, hybrid, and other approaches to repurpose some or all of the band.⁵⁰ The Commission also sought comment on the appropriate band plan, as well as the licensing, operating, and technical rules for any new flexible use licenses in the band.⁵¹ In response to the *NPRM*, comments and reply comments were due on October 29, 2018 and December 11, 2018, respectively.⁵²

18. *May Public Notice.*—On May 3, 2019, the International and Wireless Telecommunications Bureaus issued a public notice (*May 3 Public Notice*) seeking comment on positions taken by the C-Band Alliance, the Small Satellite Operators, and T-Mobile.⁵³ The *May 3 Public Notice*

⁴⁵ *NPRM*, 33 FCC Rcd at 6926-27, paras. 27-29.

⁴⁶ *NPRM*, 33 FCC Rcd at 6927-29, paras. 30-37.

⁴⁷ *NPRM*, 33 FCC Rcd at 6931, para. 46.

⁴⁸ *NPRM*, 33 FCC Rcd at 6932, paras. 47-48.

⁴⁹ *NPRM*, 33 FCC Rcd at 6935-36, paras. 57-59.

⁵⁰ *NPRM*, 33 FCC Rcd at 6935-51, paras. 58-115.

⁵¹ *NPRM*, 33 FCC Rcd at 6934, para. 53, 6959-76, paras. 133-188.

⁵² The Commission also incorporated filings from the *NOI* (GN Docket No. 17-183) and related petitions for rulemaking (RM-11791, RM-11778) into this proceeding. Appendix F lists those parties that participated in this proceeding.

⁵³ *International Bureau and Wireless Telecommunication Bureau Seek Focused Additional Comment in 3.7-4.2 GHz Band Proceeding*, GN Docket No. 18-122, Public Notice, 34 FCC Rcd 2904 (IB/WTB 2019) (*May 3 Public Notice*). The C-Band Alliance argued that C-band satellite operators with no U.S. customers and no U.S. revenues should not be compensated in the C-band transition process, while the Small Satellite Operators said all satellite operators should be fairly compensated for the loss of spectrum that they are authorized to use. T-Mobile suggested that earth stations, whether licensed or registered, should be compensated for harm caused by new flexible-use terrestrial operations. See Letter from Michele C. Farquhar, Counsel to the C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at Attach. C. p.10 (filed Nov. 19, 2018); Letter from Scott Blake Harris, Counsel to the Small Satellite Operators, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 1 (filed Apr. 17, 2019); Letter from Russell H. Fox, Counsel to T-Mobile USA, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 8 (filed Apr. 11, 2019).

sought comment on the enforceable interference protection rights, if any, granted to space station operators against co-primary terrestrial operations and whether those rights depend on the extent to which incumbent earth stations receive their transmissions within the United States.⁵⁴ The *May 3 Public Notice* also sought comment on the enforceable interference protection rights granted to licensed or registered receive-only earth station operators against co-primary terrestrial operations and whether registered receive-only earth station operators are eligible as “licensee[s]” under Section 309(j)(8)(G), to voluntarily relinquish their rights to protection from harmful interference in the reverse phase of an incentive auction.⁵⁵ The *May 3 Public Notice* also asked whether the Commission had authority to offer payments to such earth stations to induce them to modify or relocate their facilities.⁵⁶ The *May 3 Public Notice* also sought comment on the limits, if any, that section 316 of the Act places on the proposals raised by the Commission in the *NPRM* or by the commenters in this docket and on obligations, if any, that section 316 of the Act places on the Commission vis-à-vis licensed or registered receive-only earth station operators.⁵⁷

19. *July Public Notice.*—On July 19, 2019, the Wireless Telecommunications Bureau, International Bureau, Office of Engineering and Technology, and Office of Economics and Analytics issued a public notice (*July 19 Public Notice*) seeking comment on filings by: (1) ACA Connects – America’s Communications Association, the Competitive Carriers Association, Charter Communications, Inc. (ACA Connects Coalition); (2) AT&T; and (3) the Wireless Internet Service Providers Association, Google, and Microsoft (WISPA plan).⁵⁸ The ACA Connects Coalition proposal urged the Commission to conduct a public auction for new terrestrial licenses and transition video programming services using the C-band to fiber networks.⁵⁹ AT&T asserted that the C-Band Alliance’s proposed technical criteria for new operations in the band would constrain 5G deployment,⁶⁰ and it submitted its own technical criteria for operations in the C-band, particularly with respect to co-existence with incumbent Fixed Satellite Service earth stations.⁶¹ WISPA argued that fixed wireless point-to-multipoint services can have co-

⁵⁴ *May 3 Public Notice*, 34 FCC Rcd at 2904.

⁵⁵ *May 3 Public Notice*, 34 FCC Rcd at 2907.

⁵⁶ *May 3 Public Notice*, 34 FCC Rcd at 2907.

⁵⁷ *May 3 Public Notice*, 34 FCC Rcd at 2904, 2907.

⁵⁸ *Wireless Telecommunications Bureau, International Bureau, Office of Engineering and Technology, and Office of Economics and Analytics Seek Focused Additional Comment in 3.7-4.2 GHz Band Proceeding*, GN Docket No. 18-122, Public Notice, 34 FCC Rcd 6208 (WTB/IB/OET/OEA 2019) (*July 19 Public Notice*).

⁵⁹ See Letter from Ross Lieberman, Counsel to ACA Connects, Alexi Maltas, Counsel to CCA, and Elizabeth Andrion, Counsel to Charter, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed July 2, 2019) (ACA Connects Coalition Proposal); Letter from Pantelis Michalopoulos, Counsel for ACA Connects, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed July 9, 2019), (ACA Connects Coalition July 9, 2019 *Ex Parte*), Attach. (Cartesian Study). ACA contended that moving video programming to fiber would free up 370 megahertz of spectrum in the C-band, which could be used for terrestrial licenses. ACA Connects Coalition Proposal at 4-6; Cartesian Study at 2, 12. After video programs were moved to fiber the Commission would repack the remaining earth station users into the upper 130 megahertz of the C-band. *Id.*

⁶⁰ Letter from Henry G. Hultquist, Vice President, Federal Regulatory, AT&T Services, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed May 23, 2019), at 11 (citing Letter from Jennifer D. Hindin, Counsel for the C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Oct. 9, 2018)) (AT&T May 23, 2019 *Ex Parte*).

⁶¹ See AT&T May 23, 2019 *Ex Parte*. See also Letter from Raquel Noriega, Director, Federal Regulatory, AT&T Services, Inc., to Marlene Dortch, Secretary, FCC, GN Docket No. 18-122 (filed June 6, 2019) (AT&T June 6, 2019 *Ex Parte*). In effect, AT&T offered new and more lenient technical criteria for new operations in the C-band. AT&T May 23, 2019 *Ex Parte* at 5.

channel coexistence with Fixed Satellite Service in the C-band,⁶² and it proposed that an exclusion zone of about 10 kilometers would be sufficient to protect most FSS earth stations from harmful interference caused by co-channel point-to-multipoint systems.⁶³ In particular, the *July 19 Public Notice* sought comment on ways to increase the efficient shared use of the C-band through the submitted plans, the viability of ACA Connects Coalition's plan to move all video programming to fiber, and the viability of fiber generally.⁶⁴

III. REPORT AND ORDER

20. We believe C-band spectrum for terrestrial wireless uses will play a significant role in bringing next-generation services like 5G to the American public and assuring American leadership in the 5G ecosystem. We take action to make this valuable spectrum resource available for new terrestrial wireless uses as quickly as possible, while also preserving the continued operation of existing FSS services during and after the transition. The record in this proceeding makes clear that licensing mid-band spectrum for flexible use will lead to substantial economic gains, with some economists estimating billions of dollars in increases on spending, new jobs, and America's economy.⁶⁵ At the same time, we also recognize the significant benefit to consumers provided by incumbent FSS services throughout the United States.⁶⁶ Because we find that incumbent space station operators will be able to maintain the same services in the upper 200 megahertz as they are currently providing across the full 500 megahertz of C-band spectrum, the rules we adopt in this *Report and Order* will benefit the American public by simultaneously preserving existing FSS services and making way for the provision of next-generation wireless services throughout the contiguous United States.

21. In this *Report and Order*, we conclude that a public auction of the lower 280 megahertz of the C-band will best carry out our goals, and we add a mobile allocation to the 3.7-4.0 GHz band so that next-generation services like 5G can use the band. Relying on the *Emerging Technologies* framework, we adopt a process to relocate FSS operations into the upper 200 megahertz of the band,

⁶² Letter from Claude Aiken, President & CEO, Wireless Internet Service Providers Association, Andrew Clegg, Spectrum Engineering Lead, Google LLC, and Michael Dunn, Technology Policy Strategist, Microsoft Corp. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed July 15, 2019), Attach. (Reed Study).

⁶³ Reed Study at 2.

⁶⁴ See *July 19 Public Notice*, 34 FCC Rcd at 6210-13. Comments and reply comments received in response to the *NPRM* are cited as "[Filer Name] Comments" or "[Filer Name] Reply." We also received comments and reply comments in response to the *May 3 Public Notice* and *July 19 Public Notice*, which are cited as "[Filer Name] May 3 PN Comments/Reply" and "[Filer Name] July 19 PN Comments/Reply," respectively. Filings made outside of these comment windows are cited as *ex partes*; unless otherwise noted, *ex partes* were filed in 2019. Appendix [F] provides a list of parties that made filings in this proceeding is.

⁶⁵ See, e.g., Letter from Gregory M. Romano, Vice President, Federal Regulatory and Legal Affairs, Verizon, to Marlene H. Dortch, Secretary, FCC, at 1 (filed Oct. 9, 2019) ("One recent report concluded that licensing 400 megahertz of new mid-band spectrum would lead to more than \$154 billion on infrastructure spending, 1.3 million new jobs, and \$274 billion added to America's GDP.") (citing David Sosa and Greg Rafert, *The Economic Impacts of Reallocating Mid-Band Spectrum to 5G in the United States*, Analysis Group, at 1 (Feb. 2019), https://www.analysisgroup.com/globalassets/uploadedfiles/content/news_and_events/news/sosa-rafert-economicimpacts-of-reallocating-mid-band-spectrum-to-5g-1.pdf); C-Band Alliance Reply, Attach., Jeffrey Eisenach Declaration at 15, para. 29 (filed Dec. 7, 2018) (emphasis in original) (Eisenach Declaration) (citing Thomas W. Hazlett and Roberto E. Muñoz, "A Welfare Analysis of Spectrum Allocation Policies," *RAND Journal of Economics* 40:3 (2009) 424-454); Intel Corp., Intelsat License LLC and SES Americom, Inc. Comments, App. A, Coleman Bazelon, *Maximizing the Value of the C-Band: Comments on the FCC's NPRM to Transition C-Band Spectrum to Terrestrial Uses*, Brattle Group, at 27 (filed Oct. 29, 2018) (Brattle Group Report).

⁶⁶ See Trinity Broadcasting May 16, 2019 *Ex Parte* at 5, Attach. at 9 (the current enterprise value for 500 megahertz of C-band spectrum for satellite use equals around \$1.99 billion).

while fully reimbursing existing operators for the costs of this relocation and offering accelerated relocation payments to encourage a speedy transition. We also adopt service and technical rules for overlay licensees in the 280 megahertz of spectrum designated for transition to flexible use.

A. Public Auction of 280 Megahertz of C-Band Spectrum for Flexible Use

22. After review of the extensive record in this proceeding, we adopt a traditional Commission-administered public auction of overlay licenses in the 280 megahertz of C-band spectrum made available for flexible use. We adopt this approach because it will rapidly and effectively repurpose this band for new wireless terrestrial uses, rely on established mechanisms for putting this valuable spectrum to its highest valued use pursuant to statutory criteria designed to promote competition and other important public interest goals, and provide reasonable accommodations to eligible space station operators and incumbent earth stations. The advantages of the public auction include making a significant amount of 3.7-4.2 GHz band spectrum available quickly for flexible-use licenses and adopting a transition period that aligns stakeholders' incentives, particularly those of incumbent FSS operators, so as to achieve an expeditious transition, while ensuring effective accommodation of relocated incumbent users.

23. In the *NPRM*, the Commission sought comment on a variety of market-based mechanisms for expanding flexible use in the 3.7-4.2 GHz band, including a private sale approach, auction mechanisms, and other hybrid approaches that combined elements of various mechanisms.⁶⁷ For the private sale approach, the *NPRM* sought comment on a process whereby the satellite industry voluntarily would negotiate with any interested terrestrial operators for the sale of the satellite operators' rights in the band and then would clear the negotiated-for spectrum and make it available for flexible use while ensuring uninterrupted incumbent earth station operations through a variety of potential means.⁶⁸ With respect to more traditional, Commission-led transition mechanisms, the *NPRM* sought comment on various auction approaches, such as an overlay, incentive, and capacity auctions, including transition mechanisms used in prior proceedings.⁶⁹ The *May 3 Public Notice* sought additional comment on the Commission's authority under the Act as well as approaches raised by the C-Band Alliance and T-Mobile.⁷⁰ And the *July 19 Public Notice* sought additional comment on a public auction approach advocated by ACA Connects (the ACA Plan), among other issues.⁷¹ Under each of these approaches, the Commission sought comment on how to ensure that incumbent C-band users are effectively transitioned out of the spectrum made available for flexible-use and on whether to provide reimbursement to incumbent space station operators for the costs of transitioning their services.

24. We adopt a traditional Commission-administered public auction of overlay licenses to make the C-band spectrum available expeditiously for next-generation terrestrial wireless use. With overlay licenses, the licensees obtain the rights to geographic area licenses "overlaid" on top of the incumbent licensees, meaning that they may operate anywhere within its geographic area, subject to protecting the operations of incumbent licensees.⁷² The Commission has offered two basic forms of overlay licenses: one that grandfathers legacy incumbents and allows their voluntary relocation, and

⁶⁷ *NPRM*, 33 FCC Rcd at 6935-51, paras. 58-115.

⁶⁸ *NPRM*, 33 FCC Rcd at 6939-46, paras. 72-97.

⁶⁹ *NPRM*, 33 FCC Rcd at 6946-50, paras. 100-110.

⁷⁰ See generally *May 3 Public Notice*, 34 FCC Rcd 2904.

⁷¹ See generally *July 19 Public Notice*, 34 FCC Rcd 6208.

⁷² See *Transforming the 2.5 GHz Band*, WT Docket No. 18-120, Report and Order, 34 FCC Rcd 5446, 5473, para. 77 (2019).

another that makes relocation of incumbents to comparable facilities mandatory.⁷³ We adopt the latter approach—assigning overlay licenses via public auction with rules for clearing the band for flexible use and holding incumbents harmless—for several reasons.

25. *First*, we find that a public auction of flexible-use licenses—conditioned upon relocation of incumbent operations—will best ensure fairness and competition in the allocation of these new flexible-use licenses. The Commission has a long and successful history conducting public auctions of spectrum and has well-established oversight processes designed to promote transparency and ensure that valuable public spectrum resources are put to their highest and best use, while also promoting other public interest goals articulated in Section 309(j) of the Act. In more recent years, public auctions of new flexible-use rights have played a pivotal role in transitioning existing bands and making spectrum available for new uses.⁷⁴ Importantly, the Commission carefully designs each auction to include transparent procedures that promote fair-market pricing and robust participation from a diverse group of bidders.⁷⁵ Commission control and oversight of the auction of new flexible-use licenses in the 3.7-3.98 GHz band will ensure that a wide range of interested parties have fair and equal access to new spectrum rights that will be vital to the introduction of next-generation wireless services.

26. *Second*, a public auction will maintain the Commission’s ability to ensure that incumbent space station operators and earth station owners are able to provide and receive the services and content that they currently provide and receive both during and after mandatory relocation. The safeguards we adopt in conjunction with a public auction ensure that the clearing process is both equitable and transparent and that it provides customers of these incumbent C-band providers assurance that they will continue to be able to receive C-band services during and after the transition. In addition to licensing and technical rules designed to promote harmony between existing C-band services and new flexible uses in the band, we adopt rules for the transition process to ensure that all relevant stakeholders have access to information regarding the necessary steps, costs, respective obligations of each party, and overall timeline for transitioning existing C-band services to the upper 200 megahertz of the band. The Commission’s experience in overseeing other complicated, multi-stakeholder transitions of diverse incumbents demonstrates the need for Commission rules and oversight of the transition process to mitigate disputes among stakeholders, expedite the clearing process, and ensure all affected parties receive what they are entitled to in a timely manner.

27. *Third*, we find that our authority to hold such an auction is firmly established. Section 309 governs the Commission’s process for granting licenses under Title III, and it expressly grants the Commission authority to hold an auction where mutually exclusive applications are accepted for initial

⁷³ See, e.g., *Transforming the 2.5 GHz Band*, WT Docket No. 18-120, Report and Order, 34 FCC Rcd 5446, 5473, para. 77 (2019); *Improving Public Safety Communications in the 800 MHz Band*, Report and Order, 19 FCC Rcd 14969, 15706-07 (2004).

⁷⁴ See, e.g., *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, GN Docket No. 14-177, Fourth Report and Order, 33 FCC Rcd 12168 (2018) (new band plans for the Upper 37 GHz, 39 GHz, and 47 GHz bands and incentive auction mechanism for issuing new licenses); *2017 Spectrum Frontiers Order and FNPRM*, 32 FCC Rcd 10988 (24 GHz band); *2016 Spectrum Frontiers Order and FNPRM*, 31 FCC Rcd 8014 (assigning new mobile license rights in the 28 GHz band, which were auctioned in Auction 102); *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Report and Order, 29 FCC Rcd 6567 (2014) (*Broadcast Incentive Auction R&O*).

⁷⁵ See CCA Reply at 8-9 (citing FCC, *Incentive Auction by the Numbers*, (Apr. 13, 2017), <https://www.fcc.gov/document/fcc-announces-results-worlds-first-broadcast-incentive-auction-0>, and arguing that the policies the Commission adopted in the Broadcast Incentive Auction resulted in the second-largest auction in FCC history, with members of the Competitive Carriers Association representing a substantial majority of the winning bidders).

spectrum licenses.⁷⁶ The Commission has used an auction of overlay licenses on a number of occasions to repurpose spectrum for a new service, by requiring incoming licensees to clear the band (typically by funding the relocation of incumbent licensees) in order to fully deploy the new service in a manner that meets the goals and requirements that the Commission had established under section 303 for providing that service.⁷⁷ Since 1992, the Commission has also adopted a series of rules to enable new licensees to enter into voluntary or mandatory negotiations with incumbent operators to clear a spectrum band after which, failing an agreement, the new entrant could involuntarily clear incumbent operations by expressing its intent to commence operations in that band and paying for all reasonable relocation costs.⁷⁸ Courts repeatedly have approved the Commission's use of this authority as a means of introducing new services and ensuring that displaced incumbents are placed in positions comparable to those that they had occupied prior to displacement.⁷⁹ In light of this well-established precedent and the Commission's repeated success in conducting such auctions in a manner that promotes the public interest, convenience, and necessity, we find that we have ample legal authority to employ an auction of overlay licenses as a means of introducing new flexible uses in the C-band.

28. *Fourth*, we find that holding a public auction will ensure this spectrum gets put to its highest, best use quickly. In formulating the transition process and rules adopted in this *Report and Order*, stakeholders have repeatedly emphasized the need to make C-band spectrum available for flexible use as quickly as possible, with the goal of conducting an auction of overlay licenses in the 3.7-3.98 GHz band by the end of 2020.⁸⁰ Indeed, by considering the Auction Procedures Comment Public Notice

⁷⁶ 47 U.S.C. § 309(j).

⁷⁷ See, e.g., *Amendment of Part 2 of the Commissions' Rules to Allocate Spectrum below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems*, ET Docket No. 00-258, Ninth Report and Order, 21 FCC Rcd 4473 (2006) (3 GHz R&O); *Amendment of Part 90 of the Commission's Rules to Provide for the Use of the 220-222 MHz Band by the Private Land Mobile Radio Service*, PR Docket No. 89-552, Third Report and Order and Fifth Notice of Proposed Rulemaking, 12 FCC Rcd 10943 (1997); *Revision of Part 22 and Part 90 of the Commission's Rules to Facilitate Future Development of Paging Systems*, WT Docket No. 96-18, Second Report and Order and Further Notice of Proposed Rulemaking, 12 FCC Rcd 2732 (1997); *Amendment of Part 90 of the Commission's Rules to Facilitate Future Development of SMR Systems in the 800 MHz Frequency Band*, PR Docket No. 93-144, First Report and Order; Eighth Report and Order; Second Further Notice of Proposed Rulemaking, 11 FCC Rcd 1463 (1995).

⁷⁸ See, e.g., *Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies*, ET Docket No. 92-9, First Report and Order and Third Notice of Proposed Rulemaking, 7 FCC Rcd 6886 (1992) (*Emerging Technologies Order*), clarified by Third Report and Order, 8 FCC Rcd 6589 (1993), modified on reconsideration, Memorandum Report and Order, 9 FCC Rcd 1943 (1994); see also 3 GHz R&O, 21 FCC Rcd at 4478, para. 8 & n.24.

⁷⁹ The D.C. Circuit has upheld the Commission's authority to require new entrants to relocate incumbent systems to comparable facilities. See, e.g., *Teledesic LLC v. FCC*, 275 F.3d 75, 84-87 (D.C. Cir. 2001); see also *Ass'n of Public Safety Communications Officials-Int'l, Inc. v. FCC*, 76 F.3d 395, 400 (D.C. Cir. 1996) (upholding elimination of an exemption for public safety incumbents from a relocation regime in which new licensees would pay all costs associated with relocating incumbents to comparable facilities).

⁸⁰ See, e.g., Letter from William H. Johnson, Senior Vice President and Associate General Counsel, Regulatory Affairs, Verizon, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Nov. 26, 2019) (Verizon Nov. 26, 2019 *Ex Parte*); Letter from Michael P. Goggin, Assistant Vice President, Senior Legal Counsel, AT&T, to Marlene H. Dortch, FCC, GN Docket No. 18-122 (filed Nov. 26, 2019) (AT&T Nov. 26, 2019 *Ex Parte*); Letter from Steve B. Sharkey, Vice President, Government Affairs, T-Mobile, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Dec. 18, 2019) (T-Mobile Dec. 18, 2019 *Ex Parte*); Letter from Grant B. Spellmeyer, Vice President, Federal Affairs & Public Policy, U.S. Cellular, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, Attach. at 2 (filed Dec. 18, 2019) (U.S. Cellular Dec. 18, 2019 *Ex Parte*); Letter from Pantelis Michalopoulos, Counsel to ACA Connects, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed

(continued....)

concurrently with this *Report and Order*, we immediately initiate the necessary Commission processes to prepare for an auction. Notably, while satisfying the administrative procedures and requirements associated with a Commission-administered auction, the timelines we adopt in this *Report and Order* result in spectrum being made available for flexible use at least as quickly as any of the other transition mechanisms proposed in this proceeding.⁸¹

29. Our decision to hold a public auction has overwhelming support in the record. A range of commenters with diverse interests support Commission-led auctions approaches—including those involving spectrum clearing and geographic clearing—and they emphasize the importance, regardless of the chosen transition approach, that the Commission maintain oversight throughout the transition process.⁸² CCA argues that a public auction “will ensure an impartial and transparent process so that all potential bidders can have a fair opportunity to acquire the spectrum they need.”⁸³ Comcast urges the Commission “to rely on its licensing and technical expertise and adopt a legally sound, time-tested system of competitive bidding that balances the interests of the many stakeholders involved through a transparent, public process.”⁸⁴ Verizon states that “[t]he Commission has broad authority, plus decades of expertise gained through its *Emerging Technologies* policies, to adopt a tailored clearing framework that will accelerate 5G’s benefits and deliver massive gains for American consumers and the U.S. economy.”⁸⁵ Several commenters support a traditional forward auction, using a standard clock auction format such as that used in Auction 102 for the 24 GHz band.⁸⁶ Many commenters that support a public auction of

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Dec. 26, 2019) (ACA Connects Dec. 26, 2019 *Ex Parte*); Letter from Michael Calabrese, New America’s Open Technology Institute, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 3 (filed Dec. 9, 2019).

⁸¹ We discuss the respective timelines of the major alternative proposals, as compared to our adopted approach, below.

⁸² See, e.g., Letter from Colleen King, Vice President, Regulatory Affairs, Charter, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Dec. 27, 2019); Letter from Kathryn A. Zachem, Comcast, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 4 (filed Nov. 19, 2019) (Comcast Nov. 19, 2019 *Ex Parte*); Letter from Rick Kaplan, General Counsel and Executive Vice President, Legal and Regulatory Affairs, NAB, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Nov. 19, 2019); CCA Comments at 7-8; Dynamic Spectrum Alliance Comments at 6; Letter from Nicole Tupman, Assistant General Counsel, Midcontinent Communications, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Feb. 25, 2019) (Midcontinent Feb. 25, 2019 *Ex Parte*); Letter from Hank Hultquist, AT&T, et al., to Marlene H. Dortch, FCC, GN Docket No. 18-122, Attach. at 1 (Oct. 29, 2019) (AT&T et al. Oct. 29, 2019 *Ex Parte*) (industry agreement from AT&T, Bluegrass Cellular, C-Band Alliance, Pine Belt Wireless, U.S. Cellular, and Verizon supporting and proposing principals for a Commission-led auction); Letter from Alexi Maltas, CCA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Oct. 18, 2019) (CCA Oct. 18, 2019 *Ex Parte*); PISC Comments at 22-32; Letter from Representative Tony Cárdenas and Representative Adam Kinzinger, to Ajit Pai, Chairman, FCC, GN Docket No. 18-122 (filed Jan. 17, 2019) (Representatives Cárdenas and Kinzinger Jan. 17, 2019 *Ex Parte*); U.S. Cellular Comments at 8-11; Letter from Steve Sharkey, Vice President, Government Affairs, Technology and Engineering Policy, T-Mobile USA, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 1-3 (filed Jan 30, 2019) (T-Mobile Jan. 30, 2019 *Ex Parte*); NCTA Comments at 31-32 (supporting an auction of overlay licenses requiring new licensees to negotiate with all satellite providers, capacity and transponder lessees, and earth station operators in the geographic areas in which they have licenses regarding the amount of the band to clear and compensation to make those parties whole).

⁸³ Letter from Alexi Maltas, Senior Vice President and General Counsel, CCA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 1 (filed Dec. 19, 2019) (CCA Dec. 19, 2019 *Ex Parte*).

⁸⁴ Comcast Nov. 19, 2019 *Ex Parte* at 4.

⁸⁵ Letter from William H. Johnson, Senior Vice President and Associate General Counsel, Regulatory Affairs, Verizon, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 1 (filed Jan. 24, 2019)

⁸⁶ See, e.g., Verizon Nov. 26, 2019 *Ex Parte* at 1; AT&T et al. Oct. 29, 2019 *Ex Parte*, Attach. at 1 (industry agreement from AT&T, Bluegrass Cellular, C-Band Alliance, Pine Belt Wireless, U.S. Cellular, and Verizon

(continued....)

flexible-use licenses in a portion of the 3.7-4.2 GHz band emphasize that the approach must also include a condition on the licenses requiring new flexible-use licensees to reimburse incumbent C-band users for their relocation costs.⁸⁷ Indeed, even certain parties that originally advocated for alternate transition mechanisms in this proceeding have come to support a public auction of overlay licenses as an effective approach to repurposing C-band spectrum for flexible use.⁸⁸

30. Next, we designate 280 megahertz of C-band spectrum (3.7-3.98 GHz) throughout the contiguous United States to be cleared for auction plus another 20 megahertz (3.98-4.0 GHz) to be cleared to serve as a guard band. Given the high demand for mid-band spectrum, the Commission in the *NPRM* sought comment on whether to set a “socially efficient amount of [C-band] spectrum” for repurposing in order to ensure this valuable spectrum is put to its highest and best use.⁸⁹ The C-Band Alliance initially supported clearing 200 megahertz, with commenters such as Boeing and QVC/HSN supporting this amount.⁹⁰ Subsequently, the C-Band Alliance proposed clearing 280 megahertz plus a 20 megahertz guard band.⁹¹ Other commenters express a variety of views on this issue: Ericsson and CTIA ask us to set an “aggressive benchmark in the hundreds of megahertz;”⁹² Paul Litchfield, Qualcomm, U.S. Cellular, and T-Mobile argue that all 500 megahertz should be made available for flexible use;⁹³ CCA argues that we should aim to clear at least 320 megahertz of spectrum;⁹⁴ and some broadcasters and cable operators argue that we must limit the cleared spectrum to 100 megahertz to protect the viability of C-band programming delivery.⁹⁵

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supporting an auction similar to the 24 GHz auction); T-Mobile Dec. 18, 2019 *Ex Parte* at 4; Letter from Paul Litchfield to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Dec. 13, 2019) (Paul Litchfield Dec. 13, 2019 *Ex Parte*); CCA Dec. 19, 2019 *Ex Parte* at 1; U.S. Cellular Dec. 18, 2019 *Ex Parte*, Attach. at 2.

⁸⁷ See, e.g., Letter from Carlos M. Nalda, Eutelsat, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Dec. 19, 2019) (Eutelsat Dec. 19, 2019 *Ex Parte*); Letter from Scott Blake Harris, Counsel to Small Satellite Operators, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Jan. 3, 2020); Letter from Pantelis Michalopoulos, Counsel to ACA Connects, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Dec. 11, 2019) (ACA Connects Dec. 11, 2019 *Ex Parte*); Paul Litchfield Dec. 13, 2019 *Ex Parte*; Letter from Michael Calabrese, Open Technology Institute, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Dec. 13, 2019) (supporting reimbursement of relocation costs, but arguing against additional payments above relocation costs); CCA Dec. 19, 2019 *Ex Parte*; T-Mobile Dec. 18, 2019 *Ex Parte* at 5-10.

⁸⁸ See, e.g., Eutelsat Dec. 19, 2019 *Ex Parte*; T-Mobile Dec. 18, 2019 *Ex Parte*.

⁸⁹ See *NPRM*, 33 FCC Rcd at 6941-42, para. 81.

⁹⁰ See C-Band Alliance Comments at 25; Boeing Reply at 3; QVC/HSN Comments at 2; Broadband Access Coalition Comments at 33. As the Commission noted in the *NPRM*, in responding to the *NOI* the satellite industry initially suggested it could clear 100 megahertz. See *NPRM*, 33 FCC Rcd at 2921-22, para. 14; see also Letter from Henry Gola, Counsel to Intelsat, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-183, Attach. at 1 (filed Feb. 14, 2018).

⁹¹ See Letter from Bill Tolpegin, Chief Executive Officer, C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Oct. 28, 2019) (C-Band Alliance Oct. 28, 2019 *Ex Parte*); Letter from Bill Tolpegin, Chief Executive Officer, C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Nov. 8, 2019) (C-Band Alliance Revised Transition Implementation Process).

⁹² Ericsson Reply at 4; CTIA Comments at 10.

⁹³ See Paul Litchfield Reply at 5-17; Qualcomm Comments at 6, 7; U.S. Cellular Comments at 4; T-Mobile Comments at 2-7.

⁹⁴ CCA Reply at 6-7.

⁹⁵ See, e.g., Am. Cable Ass’n Reply at 3-4; Letter from Matthew S. DelNero, Counsel for the Content Companies, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, Attach. at 1 (filed June 7, 2019) (advocating that “no more than 200 MHz (inclusive of guard band spectrum) should be repurposed).

31. We find that clearing the lower 280 megahertz (plus a 20 megahertz guard band) of the C-band strikes the appropriate balance between making available as much spectrum as possible for terrestrial use in a short timeframe and ensuring sufficient spectrum remains to support and protect incumbent uses.⁹⁶ In particular, we find that making 280 megahertz available for flexible use is sufficiently large to spur necessary investment in equipment and network deployment resources for next-generation wireless services in this band.⁹⁷ Numerous commenters support clearing 280 megahertz or more to support terrestrial 5G use.⁹⁸

32. Our approach will permit all incumbents to maintain comparable service for existing customers and to obtain future customers in the upper part of the band, while making more efficient use of the band as a whole. C-band space station operators that currently are serving U.S. customers are in a unique position to quickly clear a significant portion of this band spectrally by transitioning their services to the upper portion of the band.⁹⁹ Through a process of “satellite grooming,” each satellite company can use their internal fleet management resources to determine the most efficient way to migrate customers to the upper portion of the band, including in some instances by migrating customers to transponders on a different satellite operator’s fleet.¹⁰⁰ The C-Band Alliance and Eutelsat submitted several technical demonstrations and detailed transition plans describing how they could accommodate incumbent users and avoid disruption to existing C-band services.¹⁰¹ As ABS, Hispamar, and Star One acknowledge, because of compression and filtering technologies, incumbent space station operators will be able to

⁹⁶ See, e.g., C-Band Alliance Comments at 25; C-Band Alliance Reply at 14-17; CCA Reply at 6-7.

⁹⁷ See, e.g., C-Band Alliance Comments at 1, 33; Ericsson Reply at 4; CTIA Comments at 10.

⁹⁸ See, e.g., AT&T et al. Oct. 29, 2019 *Ex Parte*, Attach. at 1 (industry agreement from AT&T, Bluegrass Cellular, C-Band Alliance, Pine Belt Wireless, U.S. Cellular, and Verizon supporting at least 280 megahertz for flexible use); Comcast Nov. 19, 2019 *Ex Parte* at 4; Letter from Carlos M. Nalda, Counsel, Eutelsat, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 2 (filed Nov. 7, 2019) (Eutelsat Nov. 7, 2019 *Ex Parte*); Letter from Scott Blake Harris, Counsel to Small Satellite Operators, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 1 (filed Oct. 10, 2019); Letter from Grant B. Spellmeyer, U.S. Cellular, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 1 (filed Sept. 25, 2019) (at least 300 megahertz); Letter from Steve B. Sharkey, T-Mobile USA, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (Oct. 24, 2019) (at least 300 megahertz); CCA Oct. 18, 2019 *Ex Parte* at 2 (at least 300 megahertz or more); CCA Reply at 6-7 (same); Paul Litchfield Reply at 5-17 (full 500 megahertz should be auctioned); Qualcomm Comments at 2-3 (all 500 megahertz should be made available for flexible use); QVC/HSN Comments at 2 (200 megahertz).

⁹⁹ See, e.g., Letter from Karen R. Johnson, Owner, LinkUp Communications, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 2 (filed Jan. 29, 2020) (LinkUp “enthusiastically endorses the [C-Band Alliance’s] expertise and urges the Commission to lean on the experience to successfully transition the C-band.”).

¹⁰⁰ See, e.g., Letter from Jennifer D. Hindin, Counsel for the C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, Attach. at 4 (filed Apr. 9, 2019) (C-Band Alliance Apr. 9, 2019 *Ex Parte*).

¹⁰¹ See, e.g., C-Band Alliance Oct. 28, 2019 *Ex Parte*; C-Band Alliance Revised Transition Implementation Process; C-Band Alliance Apr. 9, 2019 *Ex Parte* (Transition Plan); Letter from Henry Gola, Counsel to the C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, Attach. Customer Commitment Letter (filed Apr. 3, 2019); Letter from Jennifer Hindin, Counsel to the C-Band Alliance, to Marlene H. Dortch, Secretary, FCC (filed Mar. 4, 2019) (C-Band Alliance Mar. 4, 2019 *Ex Parte*) (Technical Statement); Letter from Jennifer Hindin, Counsel to C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Feb. 7, 2019); Letter from Joseph A. Godles, Counsel to Telesat Canada, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed April 11, 2019); Letter from Bruce A. Olcott, Counsel to Eutelsat, S.A., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Apr. 9, 2019) (collectively, Grooming Plans). Currently, Intelsat, SES, Telesat Canada, and Eutelsat collectively are authorized to operate 62 satellites in this band to serve the contiguous United States. The Grooming Plans indicate that they will transition to serving the contiguous United States using 24 satellites (10, 7, 3, and 4 respectively) with SES also operating an in-orbit spare. Five of those satellites would be new. Transition Plan at 6.

deliver the equivalent quality of service and even expand that service in the remaining 200 megahertz of C-band spectrum.¹⁰² In short, the record adequately demonstrates the satellite industry's ability to clear 280 megahertz for public auction, along with a 20 megahertz guard band, while also ensuring that its customers and incumbent earth station operators are adequately transitioned and able to continue operations without interruption. Furthermore, the rules that we adopt in this *Report and Order* will ensure that incumbent operations are adequately accommodated and can continue to make use of existing satellite services, while incurring no significant transition costs. We therefore find that an auction of the lower 280 megahertz of C-band spectrum across the contiguous United States will best advance the Commission's goal of ensuring the United States' leadership in 5G deployment and service offerings without compromising the continued operation of existing C-band services.¹⁰³

33. Our decision to hold a public auction of overlay licenses to operate in the 3.7-3.98 GHz band is the result of careful review of the extensive record in this proceeding, which included transition mechanism proposals submitted by a variety interested parties across stakeholder groups. We briefly summarize below the record on the three primary alternative approaches proposed by the C-Band Alliance, T-Mobile, and ACA Connects Coalition, respectively, and address the legal and public interest issues that informed our decision to reject those alternative approaches in favor of the transition mechanism adopted in this *Report and Order*.

34. *C-Band Alliance*.—Following the Commission's adoption of the *NPRM*, Intelsat, SES, Eutelsat, and Telesat Canada announced the creation of a consortium called the C-Band Alliance, which advocated for a private sale approach that they would lead.¹⁰⁴ On September 3, 2019, Eutelsat announced its withdrawal from the C-Band Alliance, stating that it was “not in alignment with other [C-Band Alliance] members on certain issues,” but that it continued to support the overall C-Band Alliance proposal for a private sale approach.¹⁰⁵ Since then, the C-Band Alliance has twice adjusted upward the amount of spectrum that it proposes to clear if it (or its members) are given the opportunity to implement a private sale approach. It also has filled in details on how it would implement a market-based transition, and it responded to certain arguments in the record.¹⁰⁶

35. In its most recent filings in support of a private sale approach, the C-Band Alliance proposes to transition customers into the upper portion of the band and clear existing spectrum usage on enough satellite transponders to make 280 megahertz of spectrum available for 5G use in the contiguous

¹⁰² See, e.g., Letter from Scott Blake Harris, Counsel to Small Satellite Operators, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Sept. 13, 2019) (Small Satellite Operators Sept. 13, 2019 *Ex Parte*) (“300 megahertz of C-band spectrum could be made available for 5G within 18 to 36 months through the use of non-proprietary, readily available compression technology”); see also C-Band Alliance Revised Transition Implementation Process at 4 (“a variety of upgrades, including video compression, modulation/coding, and HD to SD down-conversion at downlink locations, will be used” to effectuate the clearing of 300 megahertz).

¹⁰³ See, e.g., Boeing Reply at 1; C-Band Alliance Comments at 25; CCA Reply at 6-7; Ericsson Reply at 4.

¹⁰⁴ See Letter from Jennifer D. Hindin, Counsel, Intelsat, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, Attach. B. (filed Oct. 9, 2018).

¹⁰⁵ See Letter from Bruce A. Olcott, Counsel, Eutelsat, to Ajit Pai, Chairman, FCC, GN Docket No. 18-122 (filed Sep. 3, 2019). Filings from the C-Band Alliance after that date therefore represent the positions only of Intelsat, SES, and Telesat Canada. To the extent Eutelsat, after its withdrawal from the consortium, has filed in support of a given C-Band Alliance position, we cite the relevant filings.

¹⁰⁶ See, e.g., C-Band Alliance Oct. 28, 2019 *Ex Parte*; C-Band Alliance Revised Transition Implementation Process; C-Band Alliance Mar. 4, 2019 *Ex Parte*; C-Band Alliance Apr. 9, 2019 *Ex Parte*; Letter from Bill Tolpegin, Chief Executive Officer, C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed May 21, 2019) (C-Band Alliance May 21, 2019 *Ex Parte*).

United States, plus a 20 megahertz guard band, within 36 months of its private auction.¹⁰⁷ It proposes to meet the following a two-step clearing process. First, the C-Band Alliance proposes to clear 100 megahertz (plus a 20 megahertz guard band) in 46 of the top 50 Partial Economic Areas (PEAs) within 18 months of Commission action in this proceeding.¹⁰⁸ The C-Band Alliance claims it could achieve this deadline without the need to launch new satellites. To achieve this, the C-Band Alliance proposes to provide passband filters to all earth stations that potentially may be affected by wireless terrestrial operations anywhere within the PEA, including earth stations that are outside of, but near enough to, the PEA to experience harmful interference.¹⁰⁹ Second, the C-Band Alliance would clear the remaining PEAs for the first 120 megahertz (3.7-3.82 GHz), as well as an additional 180 megahertz (3.82-4.0 GHz) throughout the contiguous United States within 36 months of its private auction, thereby clearing a total of 280 megahertz for flexible use (3.7-3.98 GHz), plus a 20 megahertz guard band (3.98-4.0 GHz).¹¹⁰ The C-Band Alliance revised its proposal to reduce the number of protected Telemetry, Tracking, and Command sites to an unspecified four and to locate them outside of metropolitan areas.¹¹¹ By way of example, it noted that SES was considering retaining Telemetry, Tracking, and Command sites in Brewster, Washington and Hawley, Pennsylvania.¹¹²

36. In its initial proposal, the C-Band Alliance contended that a private sale approach offered the most reliable means of rapidly repurposing C-band spectrum for new flexible uses while also ensuring uninterrupted incumbent FSS operations.¹¹³ Many commenters support a private sale approach as an effective means of leveraging the expertise of satellite operators and the incentives of secondary markets

¹⁰⁷ See C-Band Alliance Oct. 28, 2019 *Ex Parte*; C-Band Alliance Revised Transition Implementation Process at 1; C-Band Alliance Comments at 25; C-Band Alliance May 21, 2019 *Ex Parte* at 1-2; C-Band Alliance Apr. 9, 2019 *Ex Parte*, Attach. at 3, 9. In describing its plan, the C-Band Alliance uses the phrase “continental” United States. See, e.g., C-Band Alliance Comments at 2. The “continental” United States, however, is the area of the *United States* of America that is located *in the* continent of North America, and would therefore include Alaska. Because the C-Band Alliance’s proposal is limited to the lower-48 states and explicitly excludes Alaska, we understand the C-Band Alliance actually intends to refer to the *contiguous* United States, and all references herein to the “contiguous United States” are intended to refer to the contiguous lower-48 states.

¹⁰⁸ See C-Band Alliance Oct. 28, 2019 *Ex Parte*; C-Band Alliance Revised Transition Implementation Process at 5. The initial spectrum cleared would be in the portion of the band beginning at 3.7 GHz. C-Band Alliance Apr. 9, 2019 *Ex Parte*, Attach. at 9. This tranche excludes the Baltimore-Washington, Atlanta, and Denver PEAs (PEAs 5, 11 and 20) due to the need to protect Telemetry, Tracking, and Command (TT&C) sites and the Honolulu PEA (PEA 42) because continued service will be provided in Hawaii across the 3700-4200 MHz band. See C-Band Alliance May 21, 2019 *Ex Parte*, Attach. at 3.

¹⁰⁹ C-Band Alliance Revised Transition Implementation Process at 5; C-Band Alliance Apr. 9, 2019 *Ex Parte*, Attach. at 9-10.

¹¹⁰ See C-Band Alliance Revised Transition Implementation Process at 6; C-Band Alliance Apr. 9, 2019 *Ex Parte*, Attach. at 9-10. A transition in the contiguous United States would exclude the Honolulu, Anchorage, Kodiak, Fairbanks, and Juneau PEAs (numbers 42, 212, 264, 298 and 360). See C-Band Alliance May 21, 2019 *Ex Parte*, Attach. at 3. We note that, by virtue of its proposal to limit the transition to the continental United States, C-Band Alliance’s proposal also would exclude Puerto Rico (412), Guam-Northern Mariana Islands (413), U.S. Virgin Islands (414), American Samoa (415), and Gulf of Mexico (416). The C-Band Alliance originally proposed to protect 14 Telemetry, Tracking, and Command sites. See C-Band Alliance Comments, Technical Annex at 3.

¹¹¹ C-Band Alliance Transition Implementation Process at 10; C-Band Alliance July 19 PN Comments at 30.

¹¹² C-Band Alliance July 19 PN Comments at n.80. Although AT&T has expressed concern that one of the protected sites would be in New Jersey, the C-Band Alliance seems to have already eliminated this site from its proposed TT&C locations. See C-Band Alliance July 19 PN Comments at 18.

¹¹³ C-Band Alliance Comments at 8; C-Band Alliance Reply at 3.

to facilitate a rapid repurposing of the C-band.¹¹⁴ Other commenters, such as CCA, Dynamic Spectrum Alliance, and NCTA, oppose the C-Band Alliance's approach in favor of a public auction or other transition mechanisms.¹¹⁵ NCTA and Midcontinent Communications argue that a private sale of spectrum rights would not include procedural protections comparable to the protections provided by a Commission-led auction. They contend that such protections are designed to foster competition and ensure that spectrum is managed in a way that promotes the "public convenience, interest, and necessity," as required by the Act.¹¹⁶ Still other commenters are open to a private sale approach, but argue for more information or certain changes to the C-Band Alliance's proposal.¹¹⁷

37. We decline to adopt the C-Band Alliance proposal for a private sale approach led by incumbent C-band satellite operators. We find that, relative to the C-Band Alliance proposal, the use of a public auction will provide a greater benefit to potential bidders, ensure Commission oversight and protect the interests of displaced incumbent C-band users, promote a rapid transition, and be more firmly grounded in established legal authority. *First*, the C-Band Alliance proposal would place the licensee selection process for an entire band of newly configured spectrum into private hands by vesting private entities with the exclusive ability to allocate new terrestrial rights to valuable C-band spectrum through privately negotiated sales that would not be subject to any of the procedural protections or public interest requirements that Commission-led auctions are designed to promote. Such an approach lacks the

¹¹⁴ See CB2.0 Comments at 4-5; Digital Networks Reply at 3-4; Extreme Reach Comments at 4-5; Information Technology & Innovation Foundation Comments at 1-4; Luken Communications Reply at 4; Motorola Comments at 2; Olympusat Comments at 3; PSSI Global Comments at 11-12; Robert Bosch and Supporting Parties Reply at 2-3; Speedcast Communications at 9-10; TIA Comments at 4-7; World Teleport Association Comments at 1.

¹¹⁵ CCA Comments at 7-8 (arguing an auction mechanism could be appropriately structured to better maximize mid-band spectrum and provide the most pro-competitive approach to freeing up the band); Dynamic Spectrum Alliance Comments at 6; Midcontinent Feb. 25, 2019 *Ex Parte*; PISC Comments at 22-32; Representatives Cárdenas and Kinzinger Jan. 17, 2019 *Ex Parte*; U.S. Cellular Comments at 8-11. The Dynamic Spectrum Alliance and T-Mobile argue that a market-based approach led by satellite operators is impermissible because it gives the incumbent operators that hold licenses only for FSS operations, the right to sell flexible-use spectrum rights that they do not possess. See Dynamic Spectrum Alliance Reply at 23; T-Mobile Jan. 30, 2019 *Ex Parte* at 1-3 (arguing the Commission has never granted expanded spectrum rights to an entity solely so that they can be immediately sold).

¹¹⁶ NCTA Comments at 28 (citing 47 U.S.C. § 303); Midcontinent Feb. 25, 2019 *Ex Parte* at 1-2; see also CCA Comments at 7-8; CCA Reply at 8-9; Letter from Barry J. Ohlson, Vice President, Regulatory Affairs, Cox, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 2-3 (filed Mar. 5, 2019); Dynamic Spectrum Alliance Reply at 16-22; NCTA Reply at 17-18; Representatives Cárdenas and Kinzinger Jan. 17, 2019 *Ex Parte* at 2; T-Mobile Reply at 26-28; U.S. Cellular Comments at 8-10. Comcast and PISC argue that a private sale approach contravenes section 309(j) of the Act because it fails to produce money for the U.S. Treasury and instead will result in a windfall to a small group of private entities that a Commission-led auction is designed to avoid. See Comcast Reply at 9; PISC Comments at 22-29; PISC Reply at 25-28; see also Dynamic Spectrum Alliance Reply at 17, 21-22; T-Mobile Comments at 12; T-Mobile Reply at 25-26.

¹¹⁷ See Small Satellite Operators Comments at 8-12 (arguing small satellite operators also must be eligible to participate in the transition facilitator mechanism); AT&T Reply at 4-9 (arguing that Commission oversight is necessary to fair and efficient transition); CTIA Comments at 9-10 (Commission should require more than 180 megahertz be repurposed); Letter from Stephen Diaz Gavin, Counsel to PSSI Global, L.L.C., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Feb. 22, 2019) (arguing no more than 100 megahertz should be repurposed for flexible use); QVC/HSN Comments at 2 (arguing that incumbents should be given no less than 60 months to complete transition); QVC/HSN Reply at 4 (arguing that incumbents need further guarantees regarding protections); R Street Institute Comments at 9-12 (arguing for a clearing target of 300 megahertz); TIA Comments at 4-7 (the Commission should consider additional approaches to make more spectrum available, e.g., through transition to non-C-band solutions); U.S. Electrodynamics Reply at 3-5 (commercial, technical, and operational details regarding the C-Band Alliance Market-Based Mitigation Plan need to be revealed and clearly communicated to stake-holders before any decision can be made).

transparency and procompetitive features of a public auction and would provide bidders with less certainty about fair and equal access to new flexible-use licenses. In contrast to a private sale conducted by private entities whose primary incentive would be to maximize profits, a Commission-led auction will be driven by broader public interests, including robust participation by a diverse group of bidders, competitive pricing, and transparent allocation of this valuable public resource.

38. *Second*, Commission oversight of the public auction and issuance of flexible-use licenses conditioned upon relocation of incumbent operations will more effectively ensure that all incumbent C-band users are made whole upon completion of the transition. The C-Band Alliance's proposal would give certain incumbent space station operators substantial discretion to decide whether and to what extent all affected C-band users should be accommodated in the transition and compensated for their relocation costs.¹¹⁸ This responsibility is directly at odds with satellite operators' fiduciary duties to their shareholders to maximize the retained profits from the private sale. In contrast, Commission oversight of a public auction and the transition process will be specifically designed to ensure that incumbent C-band users are able to maintain their existing services and are reimbursed for all reasonable costs associated with the transition.

39. *Third*, we find that our public auction of overlay licenses will make spectrum available for flexible-use just as fast as a private sale approach.¹¹⁹ Indeed, we plan to hold the public auction this year—just as the C-Band Alliance had proposed for its private sale—and we incorporate aspects of their proposed transition process and deadlines into this *Report and Order*. We disagree with the C-Band Alliance argument that any Commission-led auction mechanism would fail to overcome the holdout problem due to non-exclusive incumbent rights in the band and would require significant Commission intervention that would delay the auction approach relative to a market-based approach.¹²⁰ Despite its initial claim that its private sale proposal would solve the holdout problem by incentivizing incumbent space station operators to cooperate in the transition and collectively sell their shared spectrum rights to new flexible-use licensees, only three incumbent C-band satellite operators are members of the C-Band Alliance and have fully supported the C-Band Alliance's proposal.¹²¹ Unless the Commission were to adopt rules granting the C-Band Alliance exclusive authority to lead the transition and compelling non-member satellite operators to cooperate with the C-Band Alliance's approach, there would be a potential, and indeed likely, holdout problem that could undermine the success of such a transition. We believe such exclusive authority would raise significant competitive concerns in the absence of unanimity among incumbent space station operators. In other words, due to the existing licensing regime in this band, the potential holdout problem needs to be addressed regardless of whether the Commission adopts a public auction or private sale approach. The rules we adopt in this *Report and Order* are specifically designed to

¹¹⁸ See, e.g., Small Satellite Operators May 3 PN Comments at 10-19 (arguing that a grant of authority to the C-Band Alliance to decide the relocation and reimbursement rights of C-band stakeholders that it does not represent would be arbitrary, capricious, and unlawful).

¹¹⁹ See, e.g., CCA Reply at 9 ("There is no real evidence that a private sale process could make spectrum available for terrestrial services any more quickly than a public or hybrid auction, and any purported speed benefits must be balanced against procedural fairness and inclusive participation. An FCC-led auction-based mechanism or hybrid approach appear more likely to efficiently achieve these goals. The Commission should be skeptical of any proposals that do not clearly demonstrate how they would attain similar public interest benefits. The FCC also should proceed with caution when exploring any private sale approach that could degrade Commission authority to manage spectrum for the public benefit." (citing T-Mobile Comments at 2-3; U.S. Cellular Comments at 4; Google Comments at 10)).

¹²⁰ C-Band Alliance Comments at 6, 55-56 (citing Brattle Group Paper at 32-40); C-Band Alliance Reply at 29-33.

¹²¹ In fact, the record in this proceeding clearly indicates that the C-Band Alliance and non-member satellite operators are not in alignment on a variety of issues that are crucial to the success of the private sale approach. See, e.g., Eutelsat Withdrawal Letter.

reduce the risk of potential holdouts by aligning the incentives of all relevant C-band satellite operators with the Commission's goals of rapid introduction of C-band spectrum into the marketplace, and we find that our public auction approach will provide for rapid clearing upon final action in this proceeding.

40. *Finally*, we find that a public auction is more consistent with the Commission's long-standing legal authority to manage spectrum in the public interest than a private sale conducted by incumbent space station operators. In contrast to the Commission's well-established authority to conduct auctions of overlay licenses conditioned upon the relocation of incumbent users, the C-Band Alliance proposal would require an unprecedented grant of authority to private entities to negotiate with new entrants for the conveyance of spectrum-use rights that FSS licensees do not currently have.¹²² While the Commission has previously modified the existing licenses of incumbents to assign new license rights without creating a mechanism to allow for the filing of mutually exclusive applications, such modifications were adopted in order to authorize the incumbent licensees to provide new or additional services.¹²³ Under the C-Band Alliance proposal, the Commission would be granting incumbent space station operators new flexible-use rights *solely* for the purpose of allowing the incumbents to sell those rights on the secondary market, without actually requiring them to meet any buildout requirements or initiate terrestrial service. Indeed, given the full-band, full-arc nature of FSS licenses, incumbent space station operators could not provide terrestrial mobile services without causing interference to existing C-band satellite services.

41. *T-Mobile Proposal.*—T-Mobile proposes an incentive auction consisting of three steps: (1) a forward auction in which terrestrial operators would bid to establish a purchase price for the 3.7-4.2 GHz band in every PEA; (2) that purchase price would be offered to satellite operators and earth station registrants; and (3) the purchase price in a PEA would be awarded to whichever group is willing to clear the band for the least amount of money.¹²⁴ Under this proposal, up to 500 megahertz of 3.7-4.2 GHz band spectrum would be made available for flexible use in geographic areas where either: (1) the satellite operators agree to clear by repacking existing transponder use or (2) the earth station owners agree to clear by transitioning to alternative delivery mechanisms such as fiber.¹²⁵ In more recent filings, however, T-Mobile has modified its position to support a more traditional forward auction of flexible-use licenses, arguing that it is a more straight-forward approach and that the Commission and potential

¹²² Two approaches for conveyance of new flexible-use rights were proposed in the record: (1) FSS licensees would negotiate the relinquishment of their interference rights with prospective new flexible-use licensees, and such agreements would be a pre-condition of the new entrant's eligibility to apply for a flexible-use license; or (2) the Commission would assign flexible-use rights to incumbent FSS licensees that would then sell those flexible-use rights on the secondary market. In either approach, the result is the same—incumbent FSS licensees would be the sole conveyors of newly-created flexible-use rights in this band.

¹²³ See, e.g., *Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band*, WT Docket No. 07-293, Report and Order and Second Report and Order, 25 FCC Rcd 11710, 11711, para. 1 (2010); *Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands et al.*, IB Docket No. 01-185 et al., Report and Order and Notice of Proposed Rulemaking, 18 FCC Rcd 1962, 2068-69, paras. 220-21 (2003); *Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-2200 MHz Bands*, Report and Order and Order of Proposed Modification, 27 FCC Rcd 16102, 16164, para. 162 (2012) (*AWS-4 Service Rules R&O*) (appeal pending).

¹²⁴ Letter from Steve Sharkey, Vice President, Government Affairs, Technology and Engineering Policy, T-Mobile USA, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Feb. 15, 2019) (T-Mobile Feb. 15, 2019 *Ex Parte*).

¹²⁵ T-Mobile Feb. 15, 2019 *Ex Parte* at 1-2; Letter from Steve B. Sharkey, Vice President, Government Affairs, Technology and Engineering Policy, T-Mobile USA, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed June 21, 2019) (T-Mobile June 21, 2019 *Ex Parte*), at 2-3, Attachment: Estimating Cost of Fiber Replacement for C-Band Sites (Roberson Study).

bidders already have extensive experience with such an auction format.¹²⁶

42. U.S. Cellular supports T-Mobile's alternative method of conducting an incentive auction.¹²⁷ Several commenters oppose T-Mobile's proposal, including the Small Satellite Operators, the C-Band Alliance, iHeart Communications, Intel/Intelsat/SES, Meredith Corp., and NCTA.¹²⁸ Opponents argue that the Commission lacks the legal authority to conduct such an incentive auction.¹²⁹ They further argue that an incentive auction would be too costly and complex,¹³⁰ require too much Commission intervention,¹³¹ and harm incumbents through inferior service and inconsistent clearing across markets.¹³²

43. We decline to adopt T-Mobile's proposal. *First*, Verizon and WISPA correctly point out that T-Mobile's proposal exceeds our incentive auction authority. Section 309(j)(8)(G) restricts our use of incentive auctions so that only "licensees" may voluntarily relinquish licensed "spectrum usage rights" in exchange for accelerated relocation payments.¹³³ Unlike the incumbent space station operators, earth station registrants are not licensees.¹³⁴ The Communications Act defines the term "license" narrowly as "that instrument of authorization *required by* [the Act] or the rules and regulations of the Commission made pursuant to [the Act], for the use or operation of apparatus for *transmission* of energy, or communications, or signals by radio, by whatever name the instrument may be designated by the Commission."¹³⁵ Since 1979 the Commission has found that licensing receive-only earth stations was not

¹²⁶ T-Mobile Dec. 18, 2019 *Ex Parte* at 4.

¹²⁷ U.S. Cellular Comments at 6.

¹²⁸ See Small Satellite Operators May 3 PN Comments at 19-30; Small Satellite Operators May 3 PN Reply at 17-22; Letter from Scott Blake Harris, Counsel to the Small Satellite Operators, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 10 (filed Mar. 25, 2019) (Small Satellite Operators Mar. 25, 2019 *Ex Parte*); Letter from Henry Gola, Counsel to the C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Mar. 7, 2019) (C-Band Alliance Mar. 7, 2019 *Ex Parte*); iHeart Communications Reply at 9-10; Intel/Intelsat/SES Brattle Paper at 33-34; Intel/Intelsat/SES Brattle Paper at 33-34; Meredith Corp. Reply at 1-4; NCTA Comments at 10-14.

¹²⁹ Small Satellite Operators May 3 PN Comments at 22-30; Small Satellite Operators May 3 PN Reply at 17-22; Small Satellite Operators Mar. 25, 2019 *Ex Parte* at 10; C-Band Alliance Mar. 7, 2019 *Ex Parte* at 2-4.

¹³⁰ C-Band Alliance Mar. 7, 2019 *Ex Parte* at 6; Intel/Intelsat/SES Brattle Paper at 34; NCTA Comments at 10-11.

¹³¹ Intel/Intelsat/SES Brattle Paper at 34.

¹³² C-Band Alliance Mar. 7, 2019 *Ex Parte* at 5-6; Meredith Corp. Reply at 1-4; NCTA Comments at 12-14.

¹³³ 47 U.S.C. § 309(j)(8)(G)(ii)(I).

¹³⁴ See, e.g., Verizon May 3 PN Comments at 2, 8-10; Dynamic Spectrum Alliance May 3 PN Comments at 12-14; OTI May 3 PN Comments at 17-21; WISPA May 3 PN Comments at 4-13; Verizon May 3 PN Reply at 3-4; WISPA May 3 PN Reply at 4; C-Band Alliance May 3 PN Reply at 11-14.

¹³⁵ 47 U.S.C. § 153(49) (emphasis added). Title III governs the use of "channels of radio transmission" under licenses granted by the Commission and provides that "no person shall use or operate any apparatus for the transmission of energy or communications or signals by radio . . . except under and in accordance with this Act and with a license in that behalf granted under the provisions of this Act." 47 U.S.C. § 301. In an *ex parte* letter T-Mobile notes that the Act defines "transmission of energy by radio" as including "both such transmission and all instrumentalities, facilities, and services incidental to such transmission," and argues that because receive-only earth stations can be considered incidental to satellite operators' transmissions, such receive-only earth stations should be considered licensees. Letter from Russell H. Fox, Counsel to T-Mobile, to Marlene Dortch, FCC, GN Docket No. 18-122 at 2 (filed Mar. 19, 2019), *citing* 47 U.S.C. § 153(57). T-Mobile also cites to a 2007 decision in which the Commission determined that television receivers should be considered "apparatus" that are "incidental" to the transmission of television broadcasts. *T-Mobile Letter* at 2, *citing Second Periodic Review of Rules and Policies Affecting the Conversion to DTV*, MB Docket No. 03-15, Second Report and Order, 22 FCC Rcd 8776, 8784-85, paras. 16-17 (2007). While that 2007 decision found that pursuant to the Commission's ancillary authority

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required by the Communications Act because, by definition, such earth stations do not transmit energy, communications, or signals by radio, and since 1991 receive-only earth stations have not been eligible to apply for a Commission license.¹³⁶ While some receive-only earth stations in the C-band are licensed to transmit in another band (i.e. licensed transmit-receive earth stations), that license to transmit does not provide the earth station operator with the right to transmit in the C-band, where they hold no “licensed spectrum usage rights.”¹³⁷ Because receive-only earth stations are (and must be) unlicensed and have no “transmission” authority, earth station registrants may not participate in the supply-side of an incentive auction.¹³⁸

44. *Second*, because FSS licensees in the C-band share the same non-exclusive rights to transmit nationwide, across the full 500 megahertz, their license rights are not substitutes such that they could compete against one another in a reverse auction to forfeit those rights; all incumbent space station operators would need to clear their existing services from a portion of the band in order to make that spectrum available for flexible use. As the Small Satellite Operators note, “T-Mobile’s proposal would require licensees with non-competing, and indeed, *complementary*, use rights to bid for the right to supply a given market,” this would result in a “supply-side mismatch [that] would dismantle the price discovery mechanisms of a traditional reverse auction.”¹³⁹ Section 309(j)(8)(G) specifically requires that, in order for the Commission to hold an incentive auction, “at least two *competing* licensees participate in the reverse auction.”¹⁴⁰ Because incumbent C-band satellite operators are not competing licensees that could bid against one another in a reverse auction, T-Mobile’s proposal would be an unlawful exercise of the

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television sets could be *regulated* by the Commission and manufacturers required to adopt certain point of sale consumer disclosures, it made no determination that receiver owners were *licensees*. T-Mobile argues, in the alternative, that even if receiving facilities are not considered “incidental” to radio transmissions, their registrations authorize the operation or use of an apparatus for “communications.” *T-Mobile Letter* at 2. Because Commission-issued registrations do not permit receive-only earth stations to transmit any form of communications, this argument also fails.

¹³⁶ *Regulation of Domestic Receive-only satellite earth stations*, CC Docket No. 78-374, First Report and Order, 74 F.C.C.2d 205, 2017, para. 31. In 1991 the Commission eliminated the availability of even a voluntary license for receive-only earth stations, creating instead the current voluntary registration regime. *Amendment of Part 25 of the Commission’s Rules and Regulations to Reduce Alien Carrier Interference Between Fixed-Satellites at Reduced Orbital Spacings and to Revise Application Processing Procedures for Satellite Communications Services*, CC Docket No. 86-496, 6 FCC Rcd 2806, 2806-07, para. 4 (1991). 47 CFR § 25.131(b) (providing that receive only earth stations “may be registered with the Commission to protect them from interference from terrestrial microwave stations in bands shared co-equally with the Fixed Service”). In contrast, transmit-and-receive earth stations in the C-band must be licensed for the transmission portion of their operations. 47 CFR § 25.115(a)(1) (providing that Commission authorization is required for authority to operate a transmitting earth station).

¹³⁷ While, for example, the Commission regulates mobile handsets owned by subscribers of mobile services, which do transmit as well as receive, the Commission requires no license for them but considers them “included in the authorization held by the licensee providing service to them.” 47 CFR § 1.903(c).

¹³⁸ In the broadcast incentive auction, the Commission concluded that while the Communications Act does not define “spectrum usage rights,” “only a station *license* confers on the holder the right to ‘use’ the station to transmit signals,” and that “spectrum usage rights” means “the right of a broadcaster to use spectrum *pursuant to a station’s license*.” *Broadcast Incentive Auction R&O*, 29 FCC Rcd at 6718-19, para. 356 & n.1055 (emphasis added) (quoting the Act’s definition of “license”). In that case, the Commission was distinguishing between broadcast licensees with spectrum usage rights and holders of mere construction permits, who lacked such rights. *Accord*, *Request for Declaratory Ruling by Meredith Corp.*, MB Docket No. 14-150, Declaratory Ruling, 30 FCC Rcd 6078, 6100, para. 49 (MB 2015) (subsequent history omitted) (virtual channel assignments “have no bearing on a station’s spectrum usage rights on its RF channel”).

¹³⁹ Small Satellite Operators Mar. 25, 2019 *Ex Parte* at 10 (emphasis in original).

¹⁴⁰ 47 U.S.C. § 309(j)(8)(G)(ii)(II) (emphasis added).

Commission's incentive auction authority.

45. *Third*, the incentive auction described in T-Mobile's proposal would result in a patchwork of spectrum and geographic areas being made available for flexible use, rather than a uniform block of spectrum being cleared throughout the contiguous United States. T-Mobile's proposal would allow incumbent earth station owners to agree to clear geographically, for example by switching existing C-band services to fiber. This would likely result in a disproportionate amount of C-band spectrum being made available in urban areas, where the demand for C-band spectrum is higher and the costs of transitioning to alternative transition mechanisms is lower than in rural areas.¹⁴¹ We therefore find that T-Mobile's proposal would undermine the Commission's stated goals for this proceeding to close the digital divide and promote the introduction of next-generation wireless services in all communities, both rural and urban, throughout the contiguous United States.

46. Because our public auction of overlay licenses provides a Commission-led auction mechanism to make 280 megahertz available for flexible use throughout the contiguous United States and compensate incumbent C-band users for their relocation costs, we find that it captures all the benefits of T-Mobile's proposal while avoiding the legal and practical complications of an incentive auction in this band. Indeed, T-Mobile now agrees that a traditional forward auction of overlay licenses will be a more straight-forward approach to implement than the incentive auction it originally proposed.¹⁴²

47. *ACA Connects Coalition Proposal.*—ACA Connects, the Competitive Carriers Association, and Charter (collectively, ACA Connects Coalition), jointly sketched out a proposal to repurpose 370 megahertz (or more) of C-band spectrum for 5G use.¹⁴³ Their proposal has three key elements: (1) a Commission-driven auction that would award new terrestrial licenses and assign obligations for transition costs,¹⁴⁴ (2) a plan to transition multichannel video programming distributor (MVPD) earth station operators to fiber,¹⁴⁵ and (3) a plan for satellite operators to repack remaining earth station users to the upper portion of the band.¹⁴⁶

48. NTCA generally supports the proposal, particularly its focus on transitioning the MVPD industry to fiber and its reliance on a Commission-driven auction to award new terrestrial licenses.¹⁴⁷

¹⁴¹ C-Band Alliance Reply at 35; Comcast Comments at 18 (transitioning earth stations to fiber would be expensive and time consuming "particularly in rural and remote areas with little or no fiber today, and would likely be prohibitively expensive in many areas"); Content Companies Reply at 4 ("current fiber deployments are not extensive enough to replace nationwide C-band usage (especially but not exclusively in rural areas)"); Satellite Industry Association Reply at ii ("[f]iber networks are limited to the largest cities and cannot economically be extended to serve less populated areas").

¹⁴² T-Mobile Dec. 18, 2019 *Ex Parte* at 4.

¹⁴³ ACA Connects Coalition Proposal; ACA Connects Coalition July 9, 2019 *Ex Parte*, Attach. Cartesian Study.

¹⁴⁴ ACA Connects Coalition Proposal at 4-6; Cartesian Study at 2, 12.

¹⁴⁵ See Cartesian Study at 3 (estimating that the transition to fiber could be accomplished within 18 months in urban areas, within three years in the majority of remaining areas, and within five years for a few hard-to-reach areas). See also Letter from Pantelis Michalopoulos, Counsel for ACA Connects, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed July 15, 2019) (ACA Connects July 15, 2019 *Ex Parte*) (discussing temporary technical conditions that will need to be placed on licenses to avoid interference from 5G base stations and mobile handsets operating in areas cleared within 18 months to C-band earth stations in adjacent areas cleared in later stages).

¹⁴⁶ ACA Connects Coalition Proposal at 4; Cartesian Study at 6, 10. See generally AT&T May 23, 2019 *Ex Parte* at 13 (unlike a cable head-end or satellite collection facility receiving linear content for hundreds of channels, earth stations supporting radio stations, one or two religious channels, and occasional use, transportable operations typically only need to use a limited number of transponders); AT&T June 6, 2019 *Ex Parte*, Attach. at 7 (proposing exploration of efficiencies gained from repacking low transponder-need applications to upper edge of the FSS band).

¹⁴⁷ See NTCA July 19 PN Comments at 2, 4.

Other commenters oppose the ACA Connects Coalition proposal and argue that it underestimates the complexity and costs required to transition from C-band satellite to fiber delivery,¹⁴⁸ incorrectly assumes that satellites covering the continental United States are fungible,¹⁴⁹ incorrectly asserts that its transition would not require new satellites within 36 months of Commission action,¹⁵⁰ and minimizes the difficulty of making fiber as reliable as C-band spectrum.¹⁵¹

49. We decline to adopt the ACA Connects Coalition proposal to transition MVPD earth stations to fiber and repack remaining earth station users into the upper portion of the band. *First*, while the ACA Connects Coalition proposes a public auction to award new terrestrial flexible-use licenses and assign obligations for transition costs, it does not provide potential bidders with the same certainty as the public auction of overlay licenses we adopt here. Importantly, the ACA Connects Coalition suggests that programmers, MVPDs, and C-band service providers would negotiate contracts and develop plans for the transition “in the period between an FCC decision and the completion of an auction.”¹⁵² However, such private contract negotiations would involve decisions—such as how much spectrum will be made available, in which geographic areas, and on what timeline—that would be crucial for potential bidders to understand in advance of the auction. It is unclear from the ACA Connects Coalition proposal when these decisions would be made and how that information would be conveyed to potential bidders such that they could make informed decisions about the spectrum band and geographic areas they would compete for at auction. We find that our public auction of overlay licenses will provide bidders with more certainty by designating a uniform block of 280 megahertz that will be made available for flexible use throughout the contiguous United States.

50. *Second*, we find that our approach will more effectively ensure that all incumbent C-band users are adequately transitioned and able to continue receiving C-band services after the introduction of new terrestrial wireless operations in the 3.7 GHz Service. We agree with those commenters who point out that the ACA Connects Coalition proposal lacks important implementation details, such as how to manage the transition of a wide variety of stakeholders, including the design, testing, construction, and integration of nationwide fiber networks and the necessary provisions for maintaining fiber operations in the future.¹⁵³ Broadcasters and programmers express concern that satellite operators are unlikely to

¹⁴⁸ See C-Band Alliance July 19 PN Comments at 5; Learfield IMG College July 19 PN Comments at 1-2; LinkUp Communications July 19 PN Comments at 1; Riverfront Broadcasting July 19 PN Comments at 1; Small Satellite Operators July 19 PN Reply at 3; ABC Television Affiliates Association et al. July 19 PN Reply at 6; AETN July 19 PN Reply at 1; Encompass July 19 PN Reply at 1; *see also* WTVY-TV July 19 PN Comments at 1.

¹⁴⁹ See, e.g., C-Band Alliance July 19 PN Comments at 7; Learfield IMG College July 19 PN Comments at 3; LinkUp Communications July 19 PN Comments at 3; Riverfront Broadcasting July 19 PN Comments at 3; WTVY-TV July 19 PN Comments at 3.

¹⁵⁰ See, e.g., C-Band Alliance July 19 PN Comments at 8-9 (noting, for example, the fact that satellites are nearing end-of-life, the need for additional capacity due to near-100% use post repacking, the need for dual-illumination, and the already heavy use of C-Band capacity); Learfield IMG College July 19 PN Comments at 3; LinkUp Communications July 19 PN Comments at 3; Riverfront Broadcasting July 19 PN Comments at 3; WTVY-TV July 19 PN Comments at 3; *see also* SpaceConnection July 19 PN Reply at 2-3.

¹⁵¹ See, e.g., Globecast July 19 PN Comments at 4; Learfield IMG College July 19 PN Comments at 2; LinkUp Communications July 19 PN Comments at 2; North American Broadcasters Association July 19 PN Comments at 3; Riverfront Broadcasting July 19 PN Comments at 2; WTVY-TV July 19 PN Comments at 2; NAB July 19 PN Reply at 3,4; ABC Television Affiliates Association et al. July 19 PN Reply at 5; AETN July 19 PN Reply at 1-2.

¹⁵² Letter from Brian Hurley, Vice President of Regulatory Affairs, ACA Connects, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, Attach. 15 (filed Sep. 25, 2019) (ACA Connects Coalition 5G Plus Plan).

¹⁵³ See, e.g., CBS et al. July 19 PN Comments at 2-3; C-Band Alliance July 19 PN Comments at 5; Riverfront Broadcasting July 19 PN Comments at 1; LinkUp Communications July 19 PN Comments at 1; WTVY-TV July 19

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remain in business to provide service to a fraction of their customer base once MVPDs are transitioned to fiber, and earth station owners emphasize the difficulty of making fiber as reliable as existing C-band delivery.¹⁵⁴ In contrast to the ACA Connects Coalition proposal, the approach we adopt here ensures that incumbent earth station owners will be effectively transitioned and will be able to receive the same C-band services after the transition as they do today.

51. *Third*, we find that the ACA Connects Coalition proposal is likely to underestimate the complexities and costs of transitioning from C-band satellite spectrum to fiber and would be unlikely to facilitate more rapid and extensive deployment of terrestrial wireless services than the approach we adopt in this *Report and Order*.¹⁵⁵ The ACA Connects Coalition proposes that clearing would be conducted on a market-by-market basis, which would have “some urban markets” available for flexible-use in approximately 30 months, the “majority of remaining markets” in three years, and the last, “hard-to-build areas” in five years.¹⁵⁶ We share the concerns of many commenters who doubt that the ACA Connects Coalition proposal could be completed by those timelines.¹⁵⁷ Content Companies argue that “even in urban areas this transition would more likely take at least five years in a best case scenario, and more than a decade for the transition to occur nationwide,” and agree with the C-Band Alliance that the design phase alone could take more than two years.¹⁵⁸ This is particularly true of rural areas, where fiber is much less readily available and would require extensive investment in order to replace existing C-band services.¹⁵⁹ We find that our approach minimizes the costs, complexities, and risks of delay inherent in the ACA Connects Coalition proposal and is therefore more likely to clear a substantial amount of C-band spectrum in a faster timeframe via a more efficient mechanism.

52. *Fourth*, we find that the approach we adopt in this *Report and Order* is more consistent with the Commission’s legal authority to manage spectrum and conduct auctions in the public interest than the ACA Connects Coalition proposal. The ACA Connects Coalition suggests that the Commission could implement its approach with either a traditional forward auction or an incentive auction, but that in either case, auction proceeds would be used to reimburse incumbents’ relocation costs. Section 309(j) of the Act requires that all proceeds from the use of a competitive bidding system must be deposited in the

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PN Comments at 1; Learfield IMG July 19 PN Comments at 1; Raytheon July 19 PN Reply at 7-8; QVC/HSN July 19 PN Comments at 3; NAB July 19 PN Comments at 5-8; Alaska Telecom July 19 PN Comments at 2-4.

¹⁵⁴ See, e.g., NAB July 19 PN Comments at 2-3; Globecast July 19 PN Comments at 3-4; Riverfront Broadcasting July 19 PN Comments at 2-3; LinkUp Communications July 19 PN Comments at 2-3; WTVY-TV July 19 PN Comments at 2-3; Learfield IMG College July 19 PN Comments at 2-3; QVC/HSN July 19 PN Comments at 8.

¹⁵⁵ Several commenters have argued throughout this proceeding that a complete transition of C-band services to fiber would require construction of vast fiber infrastructure and would be cost-prohibitive. See, e.g., American Cable Association Mar. 25 *Ex Parte* at 4; Charter Comments at 5; Globecast Jan. 15, 2019 *Ex Parte* at 1; Altice Comments at 2-3; CBS et al. July 19 PN Comments at 5-13; C-Band Alliance July 19 PN Comments at 14-16; Riverfront Broadcasting July 19 PN comments at 2-3; LinkUp Communications July 19 PN Comments at 2-3; WTVY-TV July 19 PN Comments at 2-3; Learfield IMG College July 19 PN Comments at 2-3.

¹⁵⁶ ACA Connects Coalition 5G Plus Plan at 36.

¹⁵⁷ See, e.g., QVC/HSN July 19 PN Comments at 5-8; PSSI Global July 19 PN Comments at 7; CBS et al. July 19 PN Comments at 2-3, 9-10; NTCA July 19 PN Comments at 3; Small Satellite Operators July 19 PN Comments at 3-4; Globecast July 19 PN Comments at 5; Verizon July 19 PN Comments at 15.

¹⁵⁸ CBS et al. July 19 PN Comments at 9; see also C-Band Alliance July 19 PN Comments at 20.

¹⁵⁹ See, e.g., NTCA July 19 PN Comments at 2; Alaska Telecom July 19 PN Comments at 3; C-Band Alliance July 19 PN Comments at 9, 11.

U.S. Treasury.¹⁶⁰ The ACA Connects Coalition proposal that the Commission retain a portion of the revenues from a traditional forward auction to cover the C-band incumbents' relocation costs would therefore violate the provisions of Section 309(j). There is an exception to this rule where the Commission exercises its incentive auction authority to incentivize incumbent licensees to relinquish their spectrum usage rights in exchange for a share of the auctions proceeds.¹⁶¹ However, because satellite operators have non-exclusive rights the full C-band nationwide, an incentive auction in this band would fail to satisfy the Section 309(j)(8)(G) requirement that at least two competing licensees must participate in the reverse auction.¹⁶² We therefore find that the ACA Connects Coalition proposal would be an unlawful exercise of the Commission's incentive auction authority.

53. Moreover, we find that the ACA Connects Coalition proposal brings with it a bevy of challenges. Does the Commission have authority not just to modify but to eliminate the interference protection rights of an entire class of earth station registrants entirely? If so, under what statutory provision and what are the limits of such authority? Given that, to continue to serve their customers, satellite operators cannot stop transmitting video programming until every registered earth station has transitioned to fiber, does that mean no wireless operator can deploy until every earth station is connected to fiber? Would such a transition give wireless providers the certainty they need to bid in an auction? These are just a few of the challenges apparent from the face of the plan—challenges that we cannot answer given the lack of details in the record.

1. Allocation of the 3.7-4.2 GHz Band

54. We adopt rules to add a primary non-Federal mobile, except aeronautical mobile, allocation to the 3.7-4.0 GHz band nationwide. In the United States, that band currently has exclusive non-Federal allocations for FSS and Fixed Service.¹⁶³ In addition, the International Table of Frequency Allocations also has a mobile allocation worldwide in the band, with the limitation that in the Americas, Southeast Asia, Australia, and New Zealand, the mobile allocation excludes aeronautical mobile.¹⁶⁴

55. As the Commission noted in the *NPRM*, Section 303(y) provides the Commission with authority to provide for flexibility of use if: “(1) such use is consistent with international agreements to which the United States is a party; and (2) the Commission finds, after notice and opportunity for public comment, that (A) such an allocation would be in the public interest; (B) such use would not deter investment in communications services and systems, or technology development; and (C) such use would not result in harmful interference among users.”¹⁶⁵ Adopting a primary non-Federal mobile, except aeronautical mobile, allocation to the 3.7-4.0 GHz band and revising the FSS allocation within the contiguous United States will foster more efficient and intensive use of mid-band spectrum to facilitate

¹⁶⁰ 47 U.S.C. § 309(j)(8)(A). There are a few exceptions to this rule regarding retention of revenues to cover Commission costs and for deposits to the Spectrum Relocation Fund or the Digital Television Transition and Public Safety Trust Fund, but none of those exceptions apply here. *See id.* § 309(j)(8)(B), (D), (E), and (F).

¹⁶¹ 47 U.S.C. § 309(j)(8)(G).

¹⁶² 47 U.S.C. § 309(j)(8)(G)(ii)(II).

¹⁶³ 47 CFR § 2.106, Table of Frequency Allocations.

¹⁶⁴ 47 CFR § 2.106, Table of Frequency Allocations. Globally, the International Telecommunications Union divides the world into three regions. Region 1, which includes Europe, Africa and northern Asia, has a secondary mobile allocation in the 3.7-4.2 GHz band. Region 2 (the Americas) and Region 3 (Southeast Asia, Australia and New Zealand), have a primary mobile allocation in the band. 47 CFR § 2.106, Table of Frequency Allocations; *see also* 47 CFR § 2.104.

¹⁶⁵ *See* 47 U.S.C. § 303(y); *NPRM*, 33 FCC Rcd at 6962, para. 143. While some commenters argued that the Commission should limit the amount of C-band spectrum allocated for flexible use, no commenters opposed changes to the allocation outright.

and incentivize investment in next generation wireless services.¹⁶⁶ Mid-band spectrum is important for next generation wireless broadband service due to its favorable propagation and capacity characteristics.¹⁶⁷ Allocating the 3.7-4.0 GHz band nationwide for mobile services also meets the Commission's mandate under the MOBILE NOW Act to identify spectrum for mobile and fixed wireless broadband use.¹⁶⁸ In addition, adopting this allocation will harmonize the Commission's allocations for the 3.7-4.0 GHz band with international allocations.¹⁶⁹ We agree with Qualcomm and United States Cellular Corporation that adding a primary mobile service allocation will provide the ability to make as much mid-band spectrum available as possible, which will help to ensure the nation's success in deploying the next generation of wireless services.¹⁷⁰ Finally, because we adopt rules designating 3.98-4.0 GHz as a guard band and requiring FSS and Fixed Service licensees to transition their services to the upper portion of the band and to other bands, respectively, the introduction of mobile use will not result in harmful interference among users of the 3.7-4.2 GHz band.

56. We also remove the FSS allocation within the contiguous United States in the 3.7-4.0 GHz band. To allow for flexible use of the 3.7-3.98 GHz band within the contiguous United States and for fixed use outside of the contiguous United States, we leave in place the existing Fixed Service allocation to the 3.7-4.2 GHz band while sunsetting the existing licenses for point-to-point operations within the contiguous United States. Authorizations for FSS and Fixed Service operations outside of the contiguous United States may continue to operate in the entire 3.7-4.2 GHz space. Commenters argue, and we agree, that the Commission should exclude locations outside of the contiguous United States from the public auction and relocation.¹⁷¹ Locations outside of the contiguous United States have a greater need for C-band services, particularly for the provision of services necessary for the protection of life and property—including telehealth, E911, and education services. Alaska-based operators support excluding Alaska from any reallocation and repurposing to terrestrial use because C-band service is often the only option available to reach remote villages to provide basic telephone service, E911, and broadband service used to support applications such as telehealth and distance learning.¹⁷² Hawaii Pacific Teleport shares

¹⁶⁶ *NPRM*, 33 FCC Rcd at 6923, para. 18.

¹⁶⁷ *NPRM*, 33 FCC Rcd at 6917, para. 3.

¹⁶⁸ MOBILE NOW Act, § 605(b); *NPRM*, 33 FCC Rcd at 6934, para. 53.

¹⁶⁹ 47 U.S.C. § 303(y)(1). *See, e.g.*, CEPT Draft Report 67 at 3 (responding to the European Commission mandate that the 3.4-3.8 GHz band be the first primary band for 5G); 2017 German Federal Network Agency Rollout Plan at 14 (Germany's plan to make 3.4-3.8 GHz band available for 5G use by the end of 2021); Arcep 3.4-3.8 GHz Awards Procedures (French procedures, to commence in 2020, for issuing 5G licenses in 3.4-3.8 GHz band); RTR 3.4-3.8 GHz Auction Results (Austrian telecommunications regulatory authority awarded mobile licenses in the 3.4-3.8 GHz band in March 2019); Japan 3.6-4.1 GHz License Awards (in April 2019, Japanese regulatory body awarded mobile licenses in the 3.6-4.1 GHz band); Australian 2019 Planning for 3700-4200 MHz (in August 2019, the Australian government initiated an investigation of possible introduction of fixed and mobile broadband use in the 3.7-4.2 GHz band); UAE 5G Spectrum Allocations 2018 Update (in November 2018, the UAE awarded mobile 5G licenses in the 3.3-3.8 GHz band).

¹⁷⁰ Qualcomm Comments at 1-2; U.S. Cellular Comments at 4.

¹⁷¹ North American Broadcasters Association Reply at 4; Alaska Telecom Assoc. Reply at 3; Alaska Telecom Association July 19 PN Comments at 1-4; Alaska Comm. Comments at 17-22; Alaska Comm. Reply at 1-5; Letter from Richard R. Cameron, Counsel, Alaska Comm., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 1 (filed June 21, 2019) (Alaska Comm. June 21, 2019 *Ex Parte*); Alaska Comm. July 19 PN Comments at 3-8; Letter from Jennifer D. Hindin, Wiley Rein LLP, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, Attach. at 1 (filed Oct. 17, 2018) (C-Band Alliance Oct. 17, 2018 *Ex Parte*); CCA Reply at 4-5; Letter from Jason E. Rademacher, Counsel, Church of Jesus Christ of Latter-day Saints, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 5 (filed Dec. 19, 2019).

¹⁷² *See* Alaska Communications Internet Comments at 1-5; Alaska Telecommunications Association Comments at 2-3; GCI Comments at 18-19 (supporting a transition of at least five years for rural areas to the extent any spectrum is

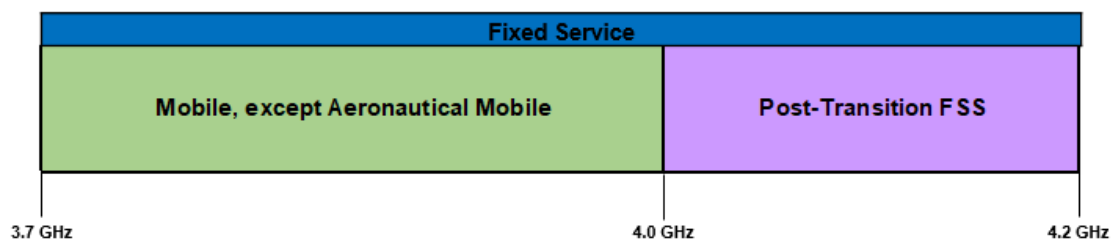
(continued....)

similar concerns about its provision of vital public safety services to remote locations in the Pacific, and it asks the Commission to ensure that sufficient C-band spectrum remains available for FSS use in the Pacific.¹⁷³ And incumbent space station operators have explicitly excluded Alaska, Hawaii, and the U.S. territories from being repurposed for terrestrial wireless use.¹⁷⁴ As a result, we believe it is appropriate to retain the FSS allocation across the 3.7-4.2 GHz band outside the contiguous United States.

57. We also modify footnote NG457A which describes the status of earth stations on vessels in 3700-4200 MHz to be consistent with our new band plan. NG457A will now provide that incumbent licensees may continue to provide service to earth stations on vessels on an unprotected basis vis-à-vis both fixed service operations and the new mobile services. In addition, NG457A will now limit the band where ESVs may be coordinated for up to 180 days to 4.0-4.2 GHz rather than 3.7-4.2 GHz as in the existing footnote because FSS will no longer have primary status below 4 GHz. These changes are necessary because of the addition of mobile services and the deletion of FSS in the 3.7-4.0 GHz band. While these changes to NG457A were not specifically proposed in the *NRPM*, they logically follow from the allocation changes that were proposed because earth stations on vessels are an application of the FSS and we proposed to remove FSS from some or all of the band in the *NPRM*.

58. Our plan will ensure that content that FSS now delivers to incumbent earth stations will continue uninterrupted as an essential element of the transition mechanism. Although we allocate the 3.98-4.0 GHz band to mobile services, except aeronautical, for flexible use, we decline at this time to establish service rules for that band. Instead, it will function as a guard band to protect earth station registrants from harmful interference both during and after the transition. We also decline to add a mobile allocation to the 4.0-4.2 GHz band reserved for primary FSS use at this time, as doing so could undermine investment in content distribution.¹⁷⁵ Figures 1 and 2 below demonstrate the post-transition allocation and uses of the band in the contiguous United States and in the rest of the United States, respectively.¹⁷⁶

Figure 1: Post-Transition 3.7-4.2 GHz Band Allocations in the Contiguous United States



(Continued from previous page) _____

cleared); Letter from Jessica DeSimone Gyllstrom, Counsel to GCI Communications Corp., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Dec. 4, 2019) (GCI Dec. 4, 2019 *Ex Parte*).

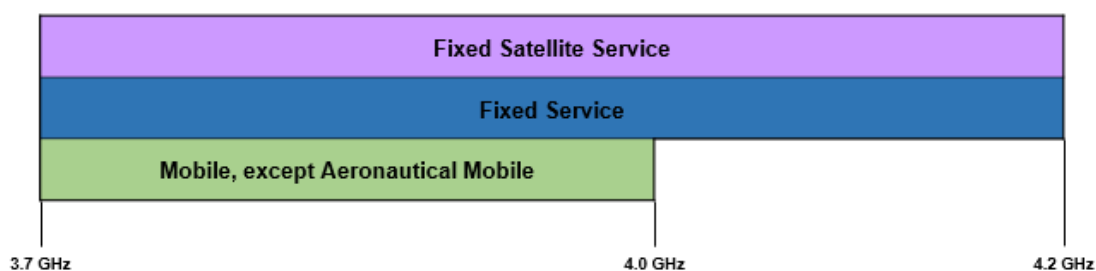
¹⁷³ Letter from Leeana Smith-Ryland, Chief Executive Officer, Hawaii Pacific Teleport, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Nov. 4, 2019) (Hawaii Pacific Teleport Nov. 4, 2019 *Ex Parte*); see also RigiNet Satcom, Inc. Reply.

¹⁷⁴ C-Band Alliance Comments at 22, n.50.

¹⁷⁵ NAB Comments at 8.

¹⁷⁶ The contiguous United States consists of the contiguous states and the District of Columbia (PEAs 1-41, 43-211, 213-263, 265-297, 299-359, and 361-411). In this context, the rest of the United States consists of Honolulu, Anchorage, Kodiak, Fairbanks, Juneau, Puerto Rico, Guam-Northern Mariana Islands, U.S. Virgin Islands, American Samoa, and the Gulf of Mexico (PEAs numbers 42, 212, 264, 298, 360, 412-416).

Figure 2: Post-Transition 3.7-4.2 GHz Band Allocations Outside the Contiguous United States



2. Competitive Bidding Rules

59. The Communications Act requires that we resolve any mutually exclusive applications for new flexible-use licenses in this band through a system of competitive bidding.¹⁷⁷ In the *NPRM*, the Commission sought comment on our proposal to conduct any auction for licenses in this band in conformity with the general competitive bidding rules set forth in part 1, subpart Q, of the Commission's rules.¹⁷⁸ The Commission specifically proposed to employ part 1 rules governing competitive bidding design, application and certification procedures, reporting requirements, the prohibition on certain communications regarding the auction, and designated entity preferences and unjust enrichment. These competitive bidding rules provide a framework for the auction process. More detailed, auction-specific procedures will be addressed in the separate pre-auction process.¹⁷⁹

60. T-Mobile, the only commenter to directly address which competitive bidding rules to adopt in response to the *NPRM*, supports the use of part 1 competitive bidding procedures.¹⁸⁰ Subsequently, several parties in *ex parte* filings endorsed auction principles and procedures that the Commission has followed based on these rules.¹⁸¹

61. Given the record and our experience in successfully conducting auctions pursuant to the part 1 rules, we adopt our proposal to employ those rules when developing the auction for new licenses in this band. Should the Commission subsequently modify its general competitive bidding rules, the modifications would apply as well.

62. We note that section 647 of the Open-market Reorganization for the Betterment of International Telecommunications Act (ORBIT Act) prohibits the Commission from assigning by competitive bidding either orbital locations or spectrum used for the provision of international or global satellite communications services.¹⁸² In the *NPRM*, the Commission tentatively concluded that the ORBIT Act prohibition would not apply here, since any auctioned spectrum would be used for a new domestic terrestrial service, and the auction mechanisms would not be used to assign by competitive

¹⁷⁷ 47 U.S.C. § 309(j)(1).

¹⁷⁸ *NPRM*, 33 FCC Rcd at 6969-70, para. 163.

¹⁷⁹ We separately adopt today a Public Notice seeking comment on procedures for an auction of new licenses in this band, thereby beginning the separate pre-auction process.

¹⁸⁰ See T-Mobile Comments at 31.

¹⁸¹ See AT&T et al. Oct. 29, 2019 *Ex Parte*, Attach. at 1 (industry agreement from AT&T, Bluegrass Cellular, C-Band Alliance, Pine Belt Wireless, U.S. Cellular, and Verizon; relying on past Commission auctions as a model and specifically prohibiting joint bidding agreements and calling for Commission enforcement of the rule prohibiting certain communications).

¹⁸² Open-market Reorganization for the Betterment of International Telecommunications Act, Pub. L. No. 106-80, § 647, 114 Stat. 48 (2000) (ORBIT Act); see also 47 U.S.C. § 765(f) (Satellite auctions); see also *NPRM*, 33 FCC Rcd at 6949-50, para. 109.

bidding orbital locations or spectrum used for the provision of international or global satellite communications services.¹⁸³ Although the C-Band Alliance contends that transitioning the band based on competitive bidding for flexible-use licenses “could be subject to potential legal challenges under section 647,”¹⁸⁴ the American Cable Association counters that the ORBIT Act does not bar auctions of licenses for non-satellite use of the spectrum, such as terrestrial flexible use, and that the Commission’s proposed reallocation of a portion of the band for flexible use prior to assigning new terrestrial licenses would avoid application of section 647 in the first place.¹⁸⁵

63. We affirm our tentative conclusion. Based on the record before us and consistent with precedent on this issue, we find that section 647 of the ORBIT Act does not prohibit the Commission from assigning terrestrial licenses in this band through a system of competitive bidding.¹⁸⁶

a. Designated Entity Provisions

64. In the *NPRM*, the Commission sought comment on a proposal for bidding credits to be offered to designated entities when conducting an auction of new licenses in this band.¹⁸⁷ In authorizing the Commission to use competitive bidding, Congress mandated that the Commission “ensure that small businesses, rural telephone companies, and businesses owned by members of minority groups and women are given the opportunity to participate in the provision of spectrum-based services.”¹⁸⁸ Based on the Commission’s prior experience with the use of bidding credits in spectrum auctions, we find that using bidding credits is an effective tool to achieve the statutory objective of promoting participation of designated entities in the provision of spectrum-based service.¹⁸⁹

65. *Small Businesses.*—One way the Commission fulfills this mandate is through the award of bidding credits to small businesses. In the *Competitive Bidding Second Memorandum Opinion and Order*, the Commission stated that it would define eligibility requirements for small businesses on a service-specific basis, taking into account the capital requirements and other characteristics of each

¹⁸³ *NPRM*, 33 FCC Rcd at 6949-50, para. 109.

¹⁸⁴ C-Band Alliance Comments at 38.

¹⁸⁵ American Cable Association Reply at 15-16.

¹⁸⁶ See *Northpoint Technology, Ltd. v. FCC*, 414 F.3d 61, 73 (D.C. Cir. 2005) (affirming the Commission’s decision to assign by competitive bidding new terrestrial licenses in the 12.2-12.7 GHz band on a shared basis with existing direct broadcast satellite services, finding that the Commission reasonably interpreted the language of section 647 not to prohibit assignment by competitive bidding of “spectrum that is to be used for provision of domestic, non-satellite-based communications services”).

¹⁸⁷ *NPRM*, 33 FCC Rcd at 6969-70, para. 163.

¹⁸⁸ 47 U.S.C. § 309(j)(4)(D). In addition, Section 309(j)(3)(B) of the Act provides that, in establishing eligibility criteria and bidding methodologies, the Commission shall seek to promote several objectives, including “economic opportunity and competition . . . by avoiding excessive concentration of licenses and by disseminating licenses among a wide variety of applicants, including small businesses, rural telephone companies, and businesses owned by members of minority groups and women.” *Id.* § 309(j)(3)(B).

¹⁸⁹ In the *Competitive Bidding Update Report and Order*, the Commission adopted a process for establishing a reasonable monetary limit or cap on the amount of bidding credits that an eligible small business or rural service provider may be awarded in any particular auction. *Updating Part 1 Competitive Bidding Rules*, WT Docket No. 14-170, Report and Order, 30 FCC Rcd 7493, 7539-44, paras. 110-21 (2015) (*Competitive Bidding Update Report and Order*). The Commission established the parameters to implement a bidding credit cap for future auctions on an auction-by-auction basis. *Id.* Consistent with the Commission’s longstanding approach, the Public Notice seeking comment on auction procedures solicits public input on the appropriate amount of the bidding credit caps.

particular service in establishing the appropriate threshold.¹⁹⁰ Further, in the *Part 1 Third Report and Order* and the more recent *Competitive Bidding Update Report and Order*, the Commission, while standardizing many auction rules, determined that it would continue a service-by-service approach to defining small businesses.¹⁹¹ In the *NPRM*, the Commission sought comment on whether to adopt bidding credits for the two larger designated entity business sizes provided in the part 1 rules.¹⁹²

66. In adopting competitive bidding rules for other spectrum bands that will be used as part of 5G services, the Commission included provisions for designated entities to promote opportunities for small businesses, rural telephone companies, and businesses owned by members of minority groups and women to participate in the provision of spectrum-based services.¹⁹³ For example, the Commission adopted two small business definitions for the auction of licenses in the Upper Microwave Flexible Use Service (39 GHz band).¹⁹⁴ These two small business definitions are the highest two of three thresholds in the Commission's standardized schedule of bidding credits.¹⁹⁵

67. We adopt our proposal to apply the two small business definitions with higher gross revenues thresholds to auctions of overlay licenses in the 3.7-3.98 GHz band.¹⁹⁶ Accordingly, an entity

¹⁹⁰ *Implementation of Section 309(j) of the Communications Act—Competitive Bidding*, PP Docket No. 93-253, Second Memorandum Opinion and Order, 9 FCC Rcd 7245, 7269, para. 145 (1994); *see also* 47 CFR § 1.2110(c)(1).

¹⁹¹ *Competitive Bidding Update Report and Order*, 30 FCC Rcd at 7521, para. 65; *Amendment of Part 1 of the Commission's Rules – Competitive Bidding Procedures*, WT Docket No. 97-82, Third Report and Order, 13 FCC Rcd 374, 388, para. 18 (1997); 47 CFR § 1.2110(c)(1).

¹⁹² *NPRM*, 33 FCC Rcd at 6969-6970, para. 163 (citing the 600 MHz service as an example for bidding credits for flexible-use licenses).

¹⁹³ *See 2016 Spectrum Frontiers Order and FNPRM*, 31 FCC Rcd at 8100-01, paras. 249-50 (defining a small business qualifying for a 15% bidding credit as one with no more than \$55 million in average annual gross revenues for the preceding three years and a very small businesses qualifying for a 25% bidding credit as one with no more than \$20 million in average annual gross revenues for the preceding three years); *see also* 47 U.S.C. § 309(j)(4)(D).

¹⁹⁴ *See Amendment of the Commission's Rules Regarding the 37.0-38.6 GHz and 38.6-40.0 GHz Bands*, ET Docket No. 95-183, Report and Order and Second Notice of Proposed Rulemaking, 12 FCC Rcd 18600, 18662, para. 150 (1997); 47 CFR § 30.302(b).

¹⁹⁵ *See* 47 CFR § 1.2110(f)(2)(i).

¹⁹⁶ Following adoption of the *NPRM*, the Commission sought consultation on July 23, 2018, regarding these proposed size standards with the U.S. Small Business Administration (SBA), as required by the Small Business Act, 15 U.S.C. § 632(a)(2)(c), and 13 C.F.R. §§ 121.901-903. The standardized schedule of bidding credits provided in section 1.2110(f)(2)(i) defines small businesses based on average gross revenues for the preceding three years. The SBA indicated that the proposed size standards appeared reasonable and that it had no specific comments. *See* Letter from Khem R. Sharma, Chief, Office of Size Standards, U.S. Small Business Administration, to Gary D. Michaels, Deputy Chief, Auctions and Spectrum Access Division, Wireless Telecommunications Bureau, FCC (Aug. 27, 2018). Subsequently, in December 2018, Congress revised the standard set out in the Small Business Act for categorizing a business concern as a "small business concern," by providing as a general matter that a Federal agency cannot propose to categorize a business concern as a "small business concern" for Small Business Act purposes unless the size of the concern is based on its annual average gross receipts "over a period of not less than 5 years." 15 U.S.C. § 632(a)(2)(C)(ii)(II), *as amended by* Small Business Runway Extension Act of 2018, Pub. L. 115-324 (Dec. 17, 2018). In December 2019, the SBA adopted new rules implementing the requirements of the Small Business Runway Extension Act and modifying its method for calculating average annual receipts used to prescribe size standards for small businesses from a 3-year to a 5-year average period. Small Business Administration, *Small Business Size Standards: Calculation of Annual Average Receipts*, 84 Fed. Reg. 66561 (Dec. 5, 2019). To implement the proposal in the *NPRM* consistent with this statutory requirement and with SBA's new rules, average annual gross revenues for purposes of small business bidding credits in this band will be based on the preceding five years.

with average annual gross revenues for the relevant preceding period not exceeding \$55 million will qualify as a “small business,” while an entity with average annual gross revenues for the relevant preceding period not exceeding \$20 million will qualify as a “very small business.” Since their adoption in 2015, we have used these gross revenue thresholds in auctions for licenses likely to be used to provide 5G services in a variety of bands.¹⁹⁷ The results in these auctions indicate that these gross revenue thresholds have provided an opportunity for bidders claiming eligibility as small businesses to win licenses to provide spectrum-based services at auction.¹⁹⁸ These thresholds do not appear to be overly inclusive as a substantial number of qualified bidders in these auctions do not come within the thresholds.¹⁹⁹ This helps preclude designated entity benefits from flowing to entities for which such credits are not necessary.

68. We also adopt our proposal to provide qualifying “small businesses” with a bidding credit of 15% and qualifying “very small businesses” with a bidding credit of 25%, consistent with the standardized schedule in Part 1 of our rules.²⁰⁰ This proposal was modeled on the small business size standards and associated bidding credits that the Commission adopted for a range of other services.²⁰¹ We believe that this two-tiered approach has been successful in the past, and we will employ it once again. We believe that use of the small business tiers and associated bidding credits set forth in the Part 1 bidding credit schedule will provide consistency and predictability for small businesses. No commenter provides any alternative or reason why the bidding credit thresholds or small business definitions that we adopt would not work in this service.

¹⁹⁷ See *Incentive Auction of Upper Microwave Flexible Use Service Licenses in the Upper 37 GHz, 39 GHz, and 47 GHz Bands for Next-Generation Wireless Services*, AU Docket No. 19-59, Public Notice, 34 FCC Rcd 2656, 2660-61, paras. 12-14 (2019) (*Auction 103 Comment Public Notice*); *Auctions of Upper Microwave Flexible Use Licenses for Next-Generation Wireless Services*, AU Docket No. 18-85, Public Notice, 33 FCC Rcd 4103, 4113-14, para. 30 (2018) (*Auctions 101 and 102 Comment Public Notice*); *Competitive Bidding Update Report and Order*, 30 FCC Rcd at 7523, para. 72 (noting the thresholds adopted in that Order would be used in the auction of 600 MHz licenses that was part of the broadcast incentive auction).

¹⁹⁸ See 47 U.S.C. § 309(j)(4)(D) (bidding preferences for small businesses used to create opportunities to participate in the provision of spectrum-based services). See also *Auction of 24 GHz Upper Microwave Flexible Use Service Licenses Closes*, AU Docket No. 18-85, Public Notice, 34 FCC Rcd 4294, Attach. A (WTB/OEA 2019) (six of 29 winning bidders claimed eligibility for small business bidding credits); *Winning Bidders Announced for Auction of 28 GHz Upper Microwave Flexible Use Service Licenses (Auction 101)*, AU Docket No. 18-85, Public Notice, 34 FCC Rcd 4279, Attach. A (WTB/OEA 2019) (six of 33 winning bidders claimed eligibility for small business bidding credits); *Incentive Auction Closing and Channel Reassignment Public Notice*, AU Docket No. 14-252, Public Notice, 32 FCC Rcd 2786, Attach. B (IATF/MB/WTB 2017) (15 of 50 winning bidders for 600 MHz licenses claimed eligibility for small business bidding credits).

¹⁹⁹ See *Incentive Auction of Upper Microwave Flexible Use Service Licenses in the Upper 37 GHz, 39 GHz, and 47 GHz Bands for Next-Generation Wireless Services*, AU Docket No. 19-59, Public Notice, 34 FCC Rcd 9626, Attach. A (WTB/OEA 2019) (20% of qualified bidders claimed eligibility for a small business bidding credit); *Auction of 24 GHz Upper Microwave Flexible Use Service Licenses for Next Generation Wireless Services*, AU Docket No. 18-85, Public Notice, 34 FCC Rcd 933, Attach. A (WTB/OEA 2019) (just under 20% of qualified bidders claimed eligibility for a small business credit); *Auction of 28 GHz Upper Microwave Flexible Use Service Licenses for Next Generation Wireless Services*, AU Docket No. 18-85, Public Notice, 33 FCC Rcd 10968, Attach. A (WTB/OEA 2018) (20% of qualified bidders claimed eligibility for a small business bidding credit).

²⁰⁰ See *NPRM*, 33 FCC Rcd at 6969-70, para. 163. See also 47 C.F.R. § 1.2110(f)(2)(i)(B), (C).

²⁰¹ *NPRM*, 33 FCC Rcd at 6969-70, para. 163. See, e.g., *Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands*, WT Docket No. 02-353, Report and Order, 18 FCC Rcd 25162, 25220, para. 149 (2003) (*AWS-1 Service Rules R&O*); *AWS-4 Service Rules R&O*, 27 FCC Rcd at 16185, para. 217 (adopting the AWS-1 size standards and associated bidding credits for small businesses for any AWS-4 licenses awarded through competitive bidding).

69. *Rural Service Providers.*—In the *NPRM*, the Commission also sought comment on a proposal to offer a bidding credit for rural service providers.²⁰² The rural service provider bidding credit awards a 15% bidding credit to those that service predominantly rural areas and that have fewer than 250,000 combined wireless, wireline, broadband and cable subscribers.²⁰³ As a general matter, the Commission “has made closing the digital divide between Americans with, and without, access to modern broadband networks its top priority . . . [and is] committed to ensuring that all Americans, including those in rural areas, Tribal lands, and disaster-affected areas, have the benefits of a high-speed broadband connection.”²⁰⁴ In this proceeding, a variety of organizations and associations that in turn represent the providers that serve the most rural and sparsely populated areas of the country have come together to stress that “rules [for bringing this spectrum to market] should balance the competing needs of interested parties and offer meaningful opportunities for providers of all kinds and sizes to offer spectrum-based services to rural consumers.”²⁰⁵

70. We find that a targeted bidding credit will better enable entities already providing rural service to compete for spectrum licenses at auction and in doing so, will increase the availability of 5G service in rural areas. Accordingly, we will apply the rural service provider bidding credit to auctioning new licenses in this band.

3. Licensing and Operating Rules

71. Building on the Commission’s previous experience introducing mobile service in bands shared with fixed terrestrial and FSS users, we adopt rules to license new mobile operations under our Part 27 rules, with modifications to tailor certain rules to the specific characteristics of C-band spectrum.²⁰⁶ We adopt licensing and operating rules that afford licensees the flexibility to align licenses in the 3.7-3.98 GHz band with licenses in other spectrum bands governed by Part 27 of the Commission’s rules and other flexible-use services.²⁰⁷ Specifically, finding no opposition in the record, we adopt rules requiring flexible-use licensees in the 3.7-3.98 GHz band to comply with licensing and operating rules that are applicable to all part 27 services, including flexible use,²⁰⁸ regulatory status,²⁰⁹ foreign ownership reporting,²¹⁰ compliance with construction requirements,²¹¹ renewal criteria,²¹² permanent discontinuance

²⁰² *NPRM*, 33 FCC Rcd at 6969-70, para. 163.

²⁰³ *Competitive Bidding Update Report and Order*, 30 FCC Rcd at 7530, para. 88.

²⁰⁴ *Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, GN Docket No. 18-238, 2019 Broadband Deployment Report, 34 FCC Rcd 3857, 3858, para. 1 (2019).

²⁰⁵ Letter from NTCA-The Rural Broadband Association et al., to The Honorable Roger Wicker, The Honorable Frank Pallone, Jr., and The Honorable Ajit Pai, Chairman, FCC, GN Docket No. 18-122, at 1 (filed Mar. 25, 2019).

²⁰⁶ See, e.g., *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 1695-1710 MHz, 1755-1780 MHz, and 2155-2180 MHz Bands*, GN Docket No. 13-185, Report and Order, 29 FCC Rcd 4610, 4650-51, para. 108, 4652, para.112 (2014) (licensing AWS-3 spectrum under Part 27 and providing AWS-3 licenses with the flexibility to provide any fixed or mobile service that is consistent with the allocations for the spectrum); *2015 3.5 GHz Band Report and Order*, 30 FCC Rcd at 3972, para. 34 (adding primary fixed and mobile, except aeronautical mobile, allocations to the 3.55-3.65 GHz band in the non-federal table).

²⁰⁷ *NPRM*, 33 FCC Rcd at 6962, para. 143.

²⁰⁸ See 47 U.S.C. § 303(y); 47 CFR §§ 1.2106, 27.2, 27.3.

²⁰⁹ 47 CFR § 27.10.

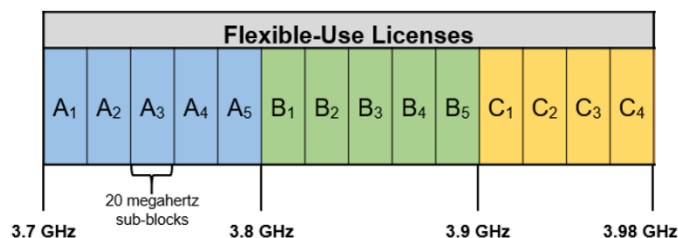
²¹⁰ 47 U.S.C. § 310; 47 CFR § 27.12.

²¹¹ 47 CFR § 27.14(k).

of operations,²¹³ partitioning and disaggregation,²¹⁴ and spectrum leasing.²¹⁵ In addition, we adopt service-specific rules for the 3.7-3.98 GHz band, including eligibility, mobile spectrum holdings policies, license term, performance requirements, renewal term construction obligations, and other licensing and operating rules to be included in Part 27.²¹⁶

a. Band Plan

72. *Block Size.*—We will designate the lower 280 megahertz of C-band spectrum in 100 megahertz increments as the A and B Blocks and in an 80-megahertz increment as C Block. We will issue licenses in the A, B, and C Blocks in 20 megahertz “sub-blocks.”²¹⁷ Specifically, the A Block (3.7-3.8 GHz), B Block: (3.8-3.9 GHz), and C Block (3.9-3.98 GHz) will be licensed according to the following channel plan:



73. In the *NPRM*, the Commission sought comment on whether 20 megahertz blocks would be appropriate for the wireless technologies that are likely to be deployed in this band.²¹⁸ The Commission sought comment on the appropriate block size that would accommodate a wide range of terrestrial wireless services, while also providing sufficient bandwidth to support 5G services.²¹⁹ Commenters supported 20 megahertz blocks with the potential to aggregate to larger sizes of 60 to 160 megahertz.²²⁰

74. We find that 100 megahertz blocks, with 20 megahertz sub-blocks, will provide sufficient flexibility for interested bidders to tailor their decisions based on the anticipated clearing costs and

(Continued from previous page)

²¹² 47 CFR § 1.949. We note the Commission amended several of the rules applicable to part 27 services. See *Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Services*, WT Docket No. 10-112, Second Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd 8874 (2017) (*Wireless Radio Services Renewal Reform 2nd R&O and FNPRM*).

²¹³ 47 CFR § 1.953.

²¹⁴ 47 CFR § 1.950.

²¹⁵ 47 CFR §§ 1.9001 *et seq.*

²¹⁶ *NPRM*, 33 FCC Rcd at 6962, para. 144.

²¹⁷ For example, the A Block will cover 100 megahertz from 3.7-3.8 GHz, with five 20-megahertz sub-blocks: 3700-3720 MHz (A1), 3720-3740 MHz (A2), 3740-3760 MHz (A3), 3760-3780 MHz (A4), and 3780-3800 MHz (A5). The C Block will cover 100 megahertz from 3.9-4.0 GHz, but only the first four 20-megahertz sub-blocks will be licensed for flexible use, with the final 20-megahertz sub-block from 3980-4000 MHz being reserved as a guard band.

²¹⁸ *NPRM*, 33 FCC Rcd at 6960, para. 135.

²¹⁹ *NPRM*, 33 FCC Rcd at 6960, para. 135.

²²⁰ AT&T Reply at 20; Broadband Access Coalition Comments at 23; Ericsson Comments at 18; Motorola Comments 5; Nokia Comments at 10-11; Qualcomm Comments at 5; T-Mobile Comments at 23-24; U.S. Cellular Comments at 14.

accelerated relocation payment obligations associated with a particular amount of spectrum or geographic license area. For carrier frequencies below 6 GHz, 3GPP has specified thirteen possible channel bandwidths for 5G deployments as follows: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, and 100 megahertz.²²¹ To facilitate operation of 100 megahertz bandwidth 5G channels, we implement and define the uniform block size of 100 megahertz that would run across the entire band from 3.7-4.0 GHz. By allowing new flexible-use licensees to acquire full 100-megahertz blocks, we will ensure that C-band spectrum is licensed in sufficiently wide bandwidths to enable 5G deployments. The inclusion of 20 megahertz sub-blocks provides sufficient flexibility for manufactures and licensees to tailor application of the band to suit future needs, especially when considering that LTE can be made to coexist within or adjacent to 5G operations. A number of commenters support a Commission auction of this spectrum in 20 megahertz blocks.²²²

75. *Spectrum Block Configuration.*—We adopt rules to license the A, B, and C 20 megahertz sub-blocks of C-band spectrum in an unpaired spectrum block configuration because there is wide support in the record for this approach, and it will enhance the flexible and efficient use of the band for next-generation services and other advance spectrum-based services.²²³ In contrast to a paired channel configuration that assumes frequency division duplex operations, an unpaired spectrum configuration is technology neutral, i.e., enables time division duplex operations, which has become increasingly prevalent in deployments of digital broadband networks.²²⁴ As Verizon points out, time division duplex technology “enables smart-antenna adaptive-beam technologies for highly directive antenna gain, and allows users to maximize flexibility to manage uplink and downlink traffic ratios.”²²⁵ In light of these considerations, we conclude that an unpaired spectrum block configuration will provide licensees the flexibility necessary to increase the capacity of their networks and make the most efficient use of C-band spectrum.

76. *Use of Geographic Licensing.*—Consistent with our approach in several other bands used to provide fixed and mobile services, we find that it is in the public interest to license the A, B, and C Blocks in 20 megahertz sub-blocks on an exclusive, geographic area basis. Geographic area licensing provides flexibility to licensees, promotes efficient spectrum use, and helps facilitate rapid assignment of licenses, using competitive bidding when necessary.²²⁶ There is wide support in the record for licensing C-band flexible-use spectrum on an exclusive, geographic basis,²²⁷ and we find that such an approach will

²²¹ 3GPP TS 38.104 v16.1.0 (2019-09) (Release 16), NR; Base Station (BS) Radio Transmission and Reception, at 31 (5.3.2 Transmission bandwidth configuration), <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3202> (last visited Feb. 4, 2020). See also 3GPP, *Release 16* (updated Oct. 2, 2019), International Telecommunication Union, *ITU towards “IMT for 2020 and beyond,”* <https://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5d/imt-2020/Pages/default.aspx> (last visited Feb. 4, 2020).

²²² CCA Dec. 19, 2019 *Ex Parte* at 2; Letter from Colleen King, Vice President, Regulatory Affairs, Charter Communications, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 2 (filed Dec. 19, 2019); T-Mobile Dec. 18, 2019 *Ex Parte* at 2-3; U.S. Cellular Dec. 18, 2019 *Ex Parte* at 2.

²²³ AT&T Reply at 20; Broadband Access Coalition Comments at 23 (stating that the existing microwave channel plan assumes frequency division duplex operations based on analog radios); Ericsson Comments at 17-18; Qualcomm Comments at 8; US Cellular Comments at 14; CTIA Comments at 21; T-Mobile Comments at 24; Verizon Comments at 18; Motorola Comments at 5.

²²⁴ See, e.g., Broadband Access Coalition Comments at 23; CTIA Comments at 21; Verizon Comments at 18.

²²⁵ Verizon Comments at 18.

²²⁶ See 47 CFR § 27.6.

²²⁷ See, e.g., AT&T Comments at 18-19; AT&T Reply at 20; Charter Reply at 10-11; CCA Reply at 9-10; CTIA Comments at 20; Motorola Comments at 5; Qualcomm Comments at 4; T-Mobile Comments at 25; U.S. Cellular Comments at 12; Verizon Comments at 18-19; NTCA July 19 PN Comments at 5. While some commenters support

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give certainty to licensees and provide the efficiencies of scale and scope that drive innovation, investment, and rapid deployment of next generation services.²²⁸

77. *Geographic License Area.*—We adopt PEAs as the geographic license area for new flexible-use licenses and divide those licenses into 20 megahertz sub-blocks within the A, B, and C Blocks; we find that this license-area size best optimizes and balances our statutory and regulatory objectives in licensing spectrum. In determining the appropriate geographic license area 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, including those in rural areas and Tribal lands; and (4) promoting investment in and rapid deployment of new technologies and services.²²⁹ In the *NPRM*, the Commission sought comment on using PEAs, as well as on licensing on a county, nationwide, or other basis.²³⁰

78. Qualcomm, T-Mobile, the C-Band Alliance, and Nokia support the use of PEAs, and observe that the size of a PEA is consistent with nationwide and wide-area deployments of 5G services.²³¹ AT&T and Verizon support the use of Economic Area (EA) license sizes; they argue that an EA provides the geographic scale to maximize investment in wide-area deployments of 5G and other advanced wireless services.²³² U.S. Cellular supports licensing on a Cellular Market Area (CMA) basis in order to preserve opportunities for small and regional carriers to compete with the dominant nationwide carriers and to ensure the deployment of rural networks in this spectrum.²³³ Motorola argues that license areas should be no larger than counties.²³⁴

79. We find that licensing on a PEA basis strikes the appropriate balance between being sufficiently large to facilitate wide-area deployments of 5G, while also being sufficiently small to ensure that small and regional carriers are able to compete for new flexible-use licenses. PEAs offer a compromise between EAs, on the one hand, and CMAs or counties, on the other hand, because they are smaller than EAs and serve to separate rural from urban markets to a greater degree than EAs do (given that EAs often include both rural and urban markets), yet PEAs are also subdivisions that “nest” within EAs and can easily be aggregated to larger areas such as EAs, Major Economic Areas, and Regional Economic Areas.²³⁵ As a result, licensing new flexible-use licenses on a PEA basis in the contiguous United States will encourage entry by providers that contemplate offering wireless broadband service on a localized basis, yet at the same time will not preclude carriers that plan to provide service on a much larger geographic scale.²³⁶ PEAs therefore will encourage auction participation by a diverse group of

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a reallocation of C-band spectrum that would allow for shared use between incumbent FSS operations and new flexible-use operations, no commenters support non-exclusive, shared operations between flexible-use licensees in the same geographic area.

²²⁸ See CTIA Comments at 20-21; Verizon Comments at 18-19; T-Mobile Comments at 25.

²²⁹ See, e.g., *AWS-1 Service Rules R&O*, 18 FCC Rcd at 25174, para. 31; see also 47 U.S.C. § 309(j).

²³⁰ *NPRM*, 33 FCC Rcd at 6961, para. 139.

²³¹ Qualcomm Comments at 5 (also supports EAs); T-Mobile Comments at 25-26; Nokia Comments at 10.

²³² AT&T Reply at 20; Verizon Comments at 19.

²³³ U.S. Cellular Comments at 12.

²³⁴ Motorola Comments at 5.

²³⁵ See 47 CFR § 27.6(a) (“Both MEAs and REAGs are based on the U.S. Department of Commerce’s EAs. See 60 FR 13114 (March 10, 1995).”).

²³⁶ See *Broadcast Incentive Auction R&O*, 29 FCC Rcd at 6595-6600, paras. 69-75.

buyers and will generate competition between large, regional, and small carriers across various geographic areas, while also minimizing the difficult coordination and border issues that might arise from smaller license areas. We agree with commenters that recommend excluding areas outside of the contiguous United States from the transition and will not issue licenses in those PEAs.²³⁷

80. In summary, for Blocks A, B, and C, we will issue flexible-use licenses on a PEA basis for 20 megahertz sub-blocks in the contiguous states and the District of Columbia (PEAs 1-41, 43-211, 213-263, 265-297, 299-359, and 361-411).²³⁸ We will not issue flexible-use licenses for Honolulu, Anchorage, Kodiak, Fairbanks, Juneau, Puerto Rico, Guam-Northern Mariana Islands, U.S. Virgin Islands, American Samoa, and the Gulf of Mexico (PEAs numbers 42, 212, 264, 298, 360, 412-416).

b. Application Requirements & Eligibility

81. Licensees in the A, B, and C blocks must comply with the Commission's general application requirements.²³⁹ Further, we adopt an open eligibility standard for licenses in the A, B, and C Blocks.²⁴⁰ The Commission has determined that eligibility restrictions on licenses may be imposed only when open eligibility would pose a significant likelihood of substantial harm to competition in specific markets and when an eligibility restriction would be effective in eliminating that harm.²⁴¹ AT&T, T-Mobile, and Verizon support an open eligibility standard.²⁴² Verizon states that "there is no basis to consider any eligibility restrictions" for C-band spectrum, arguing that open eligibility "maximizes the number of applicants for the spectrum, promotes competition that helps ensure the spectrum is put to its highest valued use, and encourages the development of different products and services."²⁴³

82. We agree that the record in this proceeding does not demonstrate a compelling need for regulatory intervention to exclude potential participants. We find that adopting an open eligibility standard appropriately relies on market forces and will encourage efforts to develop new technologies, products, and services, while helping to ensure efficient use of this spectrum.²⁴⁴ Generally applicable

²³⁷ See, e.g., SIA Reply at 8 (stating that ships at sea and offshore energy platforms rely on C-band satellite services "to connect exploration and drilling rigs in the Gulf of Mexico otherwise support energy sector participants using small C-band remote user terminals" (quoting Speedcast Comments at 2 and citing Global Eagle Entertainment Comments at 1 and ITC Global Comments at 2 (several entities rely on C-band FSS to serve cruise liners and yachts, which require reliable and high capacity connectivity services)). See also RigNet Reply at 5 (C-band spectrum provides important communications services for off-shore energy and commercial maritime applications).

²³⁸ See 47 CFR § 27.6; *Amendment of the Commission's Rules to Establish Part 27, the Wireless Communications Service*, GN Docket No. 96-228, Report and Order, 12 FCC Rcd 10785, 10816, para. 59 (1997).

²³⁹ See 47 CFR §§ 1.901-1.959. To grant a license application, the Commission must determine that the public convenience, interest, or necessity will be served thereby under section 307 of the Communications Act. See 47 U.S.C. § 307; see also *id.* §§ 309(a), 310(a), (b).

²⁴⁰ *NPRM*, 33 FCC Rcd at 6963, para. 145, note 256 (citing *AWS-4 Service Rules R&O*, 27 FCC Rcd at 16193, paras. 241-42; *Service Rules for the 746-764 and 776-794 MHz Bands et al.*, WT Docket No. 06-150 et al., 22 FCC Rcd 15289, 15381, 15383-84, paras. 253, 256 (2007) (*700 MHz Second Report and Order*); *Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands*, Report and Order, 18 FCC Rcd 23318, 23346-47, para. 70 (2003)). *NPRM*, 33 FCC Rcd at 6963, para. 145.

²⁴¹ See *NPRM*, 33 FCC Rcd at 6963, n.256 (citing *AWS-4 Service Rules R&O*, 27 FCC Rcd at 16193, paras. 241-42; *700 MHz Second Report and Order*, 22 FCC Rcd at 15381, 15383-84, paras. 253, 256; *Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands*, Report and Order, 18 FCC Rcd 23318, 23346-47, para. 70 (2003)).

²⁴² AT&T Comments at 19; T-Mobile Comments at 26; Verizon Comments at 20.

²⁴³ Verizon Comments at 20.

²⁴⁴ See 47 U.S.C. § 309(j)(3).

qualifications that may apply under our rules, including those relating to citizenship and character, apply to any and all licenses issued for flexible use of this spectrum, and any 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.²⁴⁵

c. Mobile Spectrum Holdings

83. We do not impose a pre-auction bright-line limit on acquisitions of the 3.7-3.98 GHz band. Instead, we will incorporate into the spectrum screen the 280 megahertz of spectrum that we make available in the 3.7-3.98 GHz band. We will also perform case-by-case review of the long-form license applications filed as a result of the auction.

84. In the *NPRM*, the Commission sought comment on whether and how to address mobile spectrum holdings issues to meet our statutory requirements and ensure competitive access in the 3.7-4.2 GHz band, including whether to include the 3.7-4.2 GHz band in the spectrum screen for secondary market transactions.²⁴⁶ The Commission proposed not to adopt a pre-auction bright-line limit on a party's ability to acquire spectrum in the 3.7-4.2 GHz band in a public auction.²⁴⁷ The Commission also asked whether to apply a post-auction case-by-case review of holdings when applications for initial licenses are filed and whether to limit the amount of spectrum one party can acquire through a market-based mechanism.²⁴⁸

85. Similar to the Commission's approach in the *2017 Spectrum Frontiers Order and FNPRM*²⁴⁹ and the *2018 Spectrum Frontiers Order and FNPRM*,²⁵⁰ we find that, "[g]enerally, bright-line, pre-auction limits may restrict unnecessarily the ability of entities to participate in and acquire spectrum in an auction, and we are not inclined to adopt such limits on auction participation absent a clear indication that they are necessary to address a specific competitive concern."²⁵¹

86. We agree with AT&T and Verizon that an in-band spectrum aggregation limit is unnecessary for this band.²⁵² Commenters requesting an in-band limit raise only general concerns regarding the need to prevent a few dominant carriers from obtaining an excessive concentration of this spectrum and to ensure smaller carriers have a fair opportunity to obtain the spectrum.²⁵³ But limiting the

²⁴⁵ Cf. 47 CFR § 27.12(b) (citing 47 U.S.C. § 1404(c)).

²⁴⁶ *NPRM*, 33 FCC Rcd at 6963-64, paras. 147-48.

²⁴⁷ *NPRM*, 33 FCC Rcd at 6963-64, para. 147.

²⁴⁸ *NPRM*, 33 FCC Rcd at 6964, para. 148.

²⁴⁹ *2017 Spectrum Frontiers Order and FNPRM*, 32 FCC Rcd at 11009-10, paras. 70, 73.

²⁵⁰ *2018 Spectrum Frontiers Order and FNPRM*, 33 FCC Rcd at 5589, para. 32.

²⁵¹ *2017 Spectrum Frontiers Order and FNPRM*, 32 FCC Rcd at 11010-11, para. 73.

²⁵² See Verizon Comments at 20; AT&T Comments at 17. Verizon opposes *ex ante* limits on the amount of spectrum a party can acquire through the secondary market or through an auction. See Verizon Comments at 20 and n.62.

²⁵³ See, e.g., U.S. Cellular Comments at 19-20 (asking the Commission to impose an one-third limit on the ability of any party to acquire the 3.7-4.2 GHz spectrum); CCA Reply at 11 (asking the Commission to adopt a screen that incorporates C-Band spectrum, such as a one-third aggregation limit that any provider can obtain at auction); Letter from Alexi Maltas, Senior Vice President and General Counsel, Competitive Carriers Association, to Marlene H. Dortch, Secretary, FCC at 2 (filed Dec. 20, 2018) (asking the Commission to explore policies to curb anti-competitive aggregation practices); NTCA July 19 PN Comments at 5, 7 (supporting a spectrum aggregation cap); ACA Connects Coalition Proposal at 8 (asking the Commission to impose restrictions to limit how much spectrum any one provider can acquire at auction); T-Mobile Dec. 18, 2019 *Ex Parte*, at 2-4 (asking the Commission to adopt a spectrum aggregation limit "because it will likely be able to provide a particularly robust mid-band wireless

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amount of 3.7-3.98 GHz band spectrum that one party can acquire, as these commenters request,²⁵⁴ could unnecessarily restrict providers' ability to participate in the auction and acquire spectrum in this band.²⁵⁵ This ultimately could "constrain providers in their paths towards 5G deployment," limit providers' "incentives to invest" in the band, and "delay the realization of related economic benefits."²⁵⁶ Further, "a variety of spectral paths to 5G deployment in the United States" exist,²⁵⁷ including the additional opportunities for access to spectrum through our recent actions to remove restrictions on the 2.5 GHz band,²⁵⁸ to make the 3.5 GHz band available for priority access licenses,²⁵⁹ and to make millimeter-wave spectrum available through auction.²⁶⁰ Because our "balancing of objectives" has "shift[ed] towards facilitating rapid 5G deployment in the United States," and because commenters have not pointed to "a clear indication" that in-band limits "are necessary to address a specific competitive concern," we find it unnecessary to impose an in-band limit on the 3.7-3.98 GHz band. Instead, we find that a case-by-case review of acquisitions of 3.7-3.98 GHz band spectrum will allow the Commission to review spectrum aggregation on market competition without unnecessarily restricting entities from acquiring spectrum to deploy 5G services.²⁶¹

87. We will include the A, B, and C Blocks of the 3.7-3.98 GHz band in the screen for secondary market transactions because the spectrum will become "suitable and available in the near term for the provision of mobile telephony/broadband services."²⁶² We disagree with Verizon's contention that there is no evidence that this spectrum will be used for Commercial Mobile Radio Services (CMRS) or

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broadband service."); Letter from Nicole Tupman, Assistant General Counsel, Midcontinent Communications, to Marlene H Dortch, Secretary, FCC, GN Docket No. 18, 122, et al., at 1 (filed Dec. 9, 2019).

²⁵⁴ See, e.g., U.S. Cellular Comments at 19-20; CCA Reply at 11.

²⁵⁵ See *2018 Spectrum Frontiers Order and FNPRM*, 33 FCC Rcd at 5589-90, para. 33.

²⁵⁶ See *2018 Spectrum Frontiers Order and FNPRM*, 33 FCC Rcd at 5589-90, para. 33.

²⁵⁷ See *2018 Spectrum Frontiers Order and FNPRM*, 33 FCC Rcd at 5589, para. 32.

²⁵⁸ *Transforming the 2.5 GHz Band*, 34 FCC Rcd 5446.

²⁵⁹ See, e.g., *2018 3.5 GHz Band Report and Order*, 33 FCC Rcd at 10599, para. 2.

²⁶⁰ See generally *2016 Spectrum Frontiers Order and FNPRM*, 31 FCC Rcd 8014 (2016).

²⁶¹ See Verizon Reply at 12 (supporting case-by-case review to address spectrum aggregation by entities); see also AT&T July 19 PN Comments at 12 (same).

²⁶² See, e.g., *Applications of AT&T Inc., Leap Wireless International, Inc., Cricket License Co., LLC and Leap LicenseCo, Inc. For Consent To transfer Control and Assign Licenses and Authorizations*, WT Docket. 13-193, Memorandum Opinion and Order, 29 FCC Rcd 2735, 2749-51, paras. 32, 34 (WTB 2014) (*AT&T-Leap Order*); *Applications of SoftBank Corp., Starburst II, Inc., Sprint Nextel Corp, and Clearwire Corp.*, IB Docket. No. 12-343, 28 FCC Rcd 9642, 9657, para. 39 (2013) (*SoftBank-Sprint Order*); *Policies Regarding Mobile Spectrum Holdings Expanding the Economic and Innovation Opportunities of Spectrum through Incentive Auctions*, WT Docket No. 12-269, Report and Order, 29 FCC Rcd at 6169, 6171-87, paras. 70, 76-125 (2014) (*Mobile Spectrum Holdings Report and Order*). Whether spectrum is "suitable," for purposes of the spectrum screen, "is determined by whether the spectrum is capable of supporting mobile service given its physical properties and the state of equipment technology, whether the spectrum is licensed with a mobile allocation and corresponding service rules, and whether the spectrum is committed to another use that effectively precludes its use for mobile telephony/broadband services." *Applications of AT&T Inc. and Centennial Communications Corp. For Consent to Transfer Control of Licenses, Authorizations, and Spectrum Leasing Arrangements*, WT Docket. No. 08-246, Memorandum Opinion and Order, 24 FCC Rcd 13915, 13935, para. 43 (2009) (*AT&T-Centennial Order*); *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6169, para. 71. Spectrum is "available" if it is "fairly certain that it will meet the criteria for suitable spectrum in the near term." *AT&T-Centennial Order*, 24 FCC Rcd at 13935, para. 43; *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6169, para. 71.

mobile telephony applications and that we should therefore exclude this spectrum from the screen.²⁶³ The relevant product market for the screen incorporates both mobile voice and data services, including service provided over advanced broadband wireless networks—particularly emerging, next generation wireless services.²⁶⁴ We adopt flexible-use rules here to enable terrestrial mobile use for 5G deployment.²⁶⁵ Accordingly, it is appropriate to incorporate this band into the screen for mobile telephony/broadband services.²⁶⁶

88. We will add the 280 megahertz to the spectrum screen once the auction closes. While winners of the auction must clear incumbents from the band following the auction, we find it is “fairly certain” that the auctioned spectrum “will meet the criteria for suitable spectrum in the near term” once the auction closes, given our transition plan.²⁶⁷ This is consistent with our approach for the 600 MHz band (where the Commission found that the spectrum was available following the Broadcast Incentive Auction, even though incumbents had to be moved) and the 700 MHz band (where the Commission found that the spectrum was available a year and a half before the spectrum would be cleared by incumbents).²⁶⁸

89. Finally, we will perform case-by-case review of the long form applications of the 3.7-3.98 GHz spectrum following the auction. We will use the same case-by-case review as we do for secondary market transactions, updated to account for the additional 3.7-3.98 GHz spectrum. As the Commission has explained, case-by-case review “permits bidders to participate fully” in acquiring the spectrum, “while still allowing the Commission to assess the impact on competition from the assignment of initial . . . licenses, and to take appropriate action to preserve or protect competition only where necessary.”²⁶⁹ As we have done in other bands we made available for flexible use, we will apply the standard articulated in the 2008 *Union Telephone Order*.²⁷⁰ This review will create sufficient bidder

²⁶³ See Verizon Comments at 20-21.

²⁶⁴ See *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6224, para. 234 (defining product market for “mobile telephony/broadband services”) (citing *Sprint-Clearwire Order*, 23 FCC Rcd at 17586-87, paras 38-40).

²⁶⁵ Likewise, the record indicates that providers—including Verizon—seek to reallocate this spectrum for 5G fixed and mobile services. See, e.g., AT&T Comments at 3-6 (noting importance of reallocation for 5G terrestrial mobile services); Verizon Comments at 17 (urging flexible-use licensing for fixed and mobile services).

²⁶⁶ See, e.g., U.S. Cellular Comments at 20 (supporting adding the 3.7-4.2 GHz band in the spectrum screen for secondary market transactions); AT&T July 19 PN Comments at 12 (supporting adding the 3.7-4.2 GHz band in the spectrum screen for case-by-case review of acquisitions in the band).

²⁶⁷ See *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6169, para. 71.

²⁶⁸ See *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6172, para 81 (adding 600 MHz to the screen) (citing *700 MHz Second Report and Order*, 22 FCC Rcd at 20314, para. 31 (adding 700 MHz to the screen)).

²⁶⁹ *2018 Spectrum Frontiers Order and FNPRM*, 33 FCC Rcd at 5591, para. 35 (adopting case-by-case review for millimeter-wave spectrum bands). For example, similar to the Commission’s approach in the *2018 Spectrum Frontiers Order and FNPRM*, the Commission may allow a license applicant following the private agreement or auction of overlay licenses stage “to exceed the threshold if it finds that this would not foreclose other competitors from acquiring similar” spectrum. *2018 Spectrum Frontiers Order and FNPRM*, 33 FCC Rcd at 5591, para. 35. Further, “in the event that a divestiture is required before issuing any new licenses,” an applicant “would have greater flexibility to choose which spectrum to divest among its existing” spectrum holdings already in the screen, “in a manner that nevertheless would address competitive concerns.” *Id.*

²⁷⁰ *Union Tel. Co. Celco P’ship d/b/a Verizon Wireless, Applications for 700 MHz Band Licenses, Auction No. 73*, Memorandum Opinion and Order, 23 FCC Rcd 16787, 16791-92, 16796, paras. 9, 18 (2008) (*Union Telephone Order*); see, e.g., *2018 Spectrum Frontiers Order and FNPRM*, 33 FCC Rcd at 5591, para. 36. As the Commission explained in the *2018 Spectrum Frontiers Order and FNPRM*, “such a case-by-case review provides parties with a clear and familiar standard that the Commission and Bureau have used, and continue to use, in reviewing proposed secondary market transactions currently.” *2018 Spectrum Frontiers Order and FNPRM*, 33 FCC Rcd at 5591, para. 36.

certainty for the auction, consistent with section 309(j)(3)(E).²⁷¹

d. License Term

90. We find that a 15-year license term will provide sufficient time to encourage investment in the 3.7-3.98 GHz band given the clearing, relocation, and repacking that must occur prior to mobile operations. In the *NPRM*, the Commission proposed a 15-year license term for this very reason,²⁷² suggesting that that 15 years would afford licensees sufficient time to achieve significant buildout obligations post-transition.²⁷³ Many commenters agree that a longer term is warranted where time-consuming activities are needed to ready the spectrum for mobile use,²⁷⁴ and several argue that 15 years will promote the provision of innovative services and applications.²⁷⁵

91. We agree and conclude that a 15-year license term for the A, B, and C Blocks best serves the public interest by providing the time needed for significant investment that ultimately will usher in valuable services to consumers.

e. Performance Requirements; Renewal

92. The Commission recognizes the critical role that performance requirements play in ensuring that licensed spectrum does not lie fallow. The performance requirements we adopt for the 3.7-3.98 GHz band take into account the unique characteristics of this band, but also will ensure that licensees begin providing service to consumers in a timely manner by relying on specific quantifiable benchmarks. To support a variety of different use cases in this spectrum, we adopt below specific metrics for mobile/point-to-multipoint, fixed, and IoT services in the A, B, and C Blocks, consistent with our proposal in the *NPRM*.²⁷⁶

93. *Mobile or Point-to-Multipoint Performance Requirements.*—We conclude that licensees in the A, B, and C Blocks offering mobile or point-to-multipoint services must provide reliable signal coverage and offer service to at least 45% of the population in each of their license areas within eight years of the license issue date (first performance benchmark), and to at least 80% of the population in each of their license areas within 12 years from the license issue date (second performance benchmark). These population benchmarks are slightly more aggressive than those for other flexible-use services under part 27.²⁷⁷ Given the critical role of mid-band spectrum in today's spectral environment, we find that this

²⁷¹ 2018 *Spectrum Frontiers Order and FNPRM*, 33 FCC Rcd at 5591, para. 36.

²⁷² *NPRM*, 33 FCC Rcd at 6964, para. 149. 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).

²⁷³ *NPRM*, 33 FCC Rcd at 6964, para. 149.

²⁷⁴ See, e.g., AT&T Reply at 21; Nokia Comments at 8.

²⁷⁵ AT&T Comments at 19; AT&T Reply at 21; CTIA Comments at 21; Nokia Comments at 11; Verizon Comments at 21; U.S. Cellular Comments at 15-16; Qualcomm Comments at 8; see also T-Mobile Comments at 26 (supporting 10-year license terms); Charter Reply at 10-11 (supporting 10-year license terms).

²⁷⁶ *NPRM*, 33 FCC Rcd at 6964-65, para. 151. We note that, as holders of flexible use licenses, the new licensees in the 3.7-3.98 GHz band will be authorized to provide any services for which the band is allocated. See 47 C.F.R. § 27.2(a). Accordingly, it is possible that some of these licensees might opt to use their licensed spectrum to operate a service for which the performance requirements we are establishing here do not readily fit (e.g., to operate a private land mobile radio service). We will address such cases on an ad hoc basis, however, pursuant to our waiver processes, as we anticipate that the predominant use of spectrum in this band will be for the type of services for which we have tailored these performance requirements.

²⁷⁷ The AWS-4 and H Block rules require coverage of 40% of the population within four years and 70% and 75%, respectively, within seven and ten years, respectively. See 47 CFR § 27.14(q), (r). Because spectrum availability

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approach is warranted.²⁷⁸

94. Commenters generally support performance requirements to prevent warehousing of this valuable spectrum,²⁷⁹ but some object that these benchmarks are more stringent than for other part 27 services in lower frequency bands that have better propagation characteristics, e.g., BRS, H Block, AWS-3, AWS-4, 600 MHz, and 700 MHz Upper C Band, that have better propagation characteristics than the 3.7-3.98 GHz band.²⁸⁰ U.S. Cellular argues for interim and final construction benchmarks of 35% and 60% population coverage, respectively, for licenses relying on mobile or point-to-multipoint service based on the existing requirements for these other bands but “tailored to account for the inferior propagation characteristics of the 3.7-3.98 GHz band.”²⁸¹ T-Mobile supports a 40% population-based performance benchmark at the four-year mark, and a 75% benchmark at the end of a 10-year license term, arguing that this would be consistent with benchmarks “adopted in the H Block, AWS-3, AWS-4, and millimeter wave bands.”²⁸² AT&T and CTIA also support an interim performance requirement of at least 40% of the population in each license area and a final performance requirement of at least 75% of the population in each license area.²⁸³ AT&T argues that because spectrum availability will not be immediate in many areas, it would be appropriate to delay the interim benchmark, applying that benchmark in year eight instead of year six.²⁸⁴

95. In the *NPRM*, we proposed that the deadline for the first performance benchmark would be six years from the license issue date. However, consistent with the rules we adopt for the transition of existing space station and earth station operations to the upper 200 megahertz of the band, new flexible-use licensees may not commence operations until the necessary clearing has been completed and the flexible-use licensee has complied with all obligations to provide reimbursement for relocation costs and any additional accelerated relocation payments have been made. We anticipate that flexible-use licensees will begin deploying their systems and constructing their networks while incumbents are still transitioning out of the 3.7-3.98 GHz band so that flexible-use licensees are able to commence operations soon after incumbent clearing is complete. Nevertheless, given the potential length of that transition, we find that a six-year initial benchmark may not be reasonable. We therefore find it appropriate to adjust our proposed deadline for the first performance benchmark to eight years from the license issue date, in order to provide licensees additional time to deploy once the license area has been cleared of FSS use.²⁸⁵

96. We believe that 12 years will provide sufficient time for A, B, and C Block licensees, relying on mobile or point-to-multipoint service in accordance with our Part 27 rules, to meet the proposed coverage requirements. Given the expected desirability of mid-band spectrum for the provision

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was not immediate in many areas, the AWS-3 and 600 MHz rules allow six and 12 years to cover 40% and 75%, respectively. See 47 CFR § 27.14(s), (t).

²⁷⁸ See Comcast Reply at 19; Verizon Comments at 21; U.S. Cellular Comments at 16-17; CTIA Comments at 22.

²⁷⁹ See, e.g., U.S. Cellular Reply at 38.

²⁸⁰ CTIA Comments at 22; Verizon Comments at 21-22; U.S. Cellular Comments at 17.

²⁸¹ U.S. Cellular Reply at 38; U.S. Cellular Comments at 18-19 (U.S. Cellular notes that overly stringent performance requirements have a disproportionate negative impact on licensees seeking to serve rural areas because it costs more and takes more time to build out a network that satisfies a population-based coverage requirement in areas with low population densities).

²⁸² T-Mobile Comments at 27-28 (footnotes omitted).

²⁸³ CTIA Comments at 23; AT&T Reply at 21.

²⁸⁴ AT&T Reply at 21.

²⁸⁵ See AT&T Reply at 21 (arguing that because spectrum availability will not be immediate in many areas, it would be appropriate to delay the interim benchmark).

of innovative 5G services that promote American competitiveness, the performance benchmarks we adopt today are not unduly burdensome because we expect that the market will drive deployment beyond these Commission's benchmarks. We anticipate 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 15-year license term prior to renewal.²⁸⁶ We, therefore, decline to set the second performance benchmark at the end of the license term, as some commenters proposed.²⁸⁷ Establishing benchmarks before the end of the license term will ensure continuity of service over the license term, which is essential to our evaluation under the Commission's renewal standards. T-Mobile argues that licensees should only be required to submit coverage maps twice during the license term as part of licensees' interim and final build-out reports. We note, however, that our Wireless Radio Services Renewal requirements include safe harbor certifications, in lieu of a detailed renewal showing, for qualified licensees.²⁸⁸

97. *Alternate IoT Performance Requirements.*—The Commission recognized in the *NPRM* that 3.7-3.98 GHz licenses have flexibility to provide services potentially less suited to a population coverage metric.²⁸⁹ Therefore, the Commission sought comment on an alternative performance benchmark metric for licensees providing IoT-type fixed and mobile services.²⁹⁰ Based on the record evidence,²⁹¹ we will provide licensees in the A, B, and C Blocks the flexibility to demonstrate that they offer geographic area coverage of 35% of the license area at the first (eight-year) performance benchmark, and geographic area coverage of 65% of the license area at the second (12-year) performance benchmark. We find that the aforementioned levels of geographic coverage maintain reasonable parity between the requirements in these IoT-focused metrics and the requirements for mobile providers relying on population-based coverage metrics.²⁹² This framework is intended to provide enough certainty to licensees to encourage investment and deployment in these bands as soon as possible, while retaining enough flexibility to accommodate both traditional services and innovative services or deployment patterns.²⁹³

98. A performance metric based on geographic area coverage (or presence) will allow for networks that provide meaningful service but deploy along lines other than residential population. This definition separates “traditional” point-to-point links from the sensor and device connections that likely will be part of new IoT networks in these bands and applies to a network of fixed sensors or smart devices operating at low power over short distances.²⁹⁴ Although we adopt an additional metric in order to

²⁸⁶ See *Wireless Radio Services Renewal Reform 2nd R&O and FNPRM*, 32 FCC Rcd at 8886-89, paras. 27-34 (adopting continuity of service and other renewal showing requirements for Wireless Radio Services licensees).

²⁸⁷ See, e.g., T-Mobile Comments at 27; Verizon Comments at 21-22; AT&T Comments at 19.

²⁸⁸ See, e.g., 47 CFR § 1.949(e)(2) (safe harbor for geographic licenses—commercial service).

²⁸⁹ *NPRM*, 33 FCC Rcd at 6965-66, para. 154.

²⁹⁰ *NPRM*, 33 FCC Rcd at 6965-66, para. 154.

²⁹¹ T-Mobile Comments at 28-29; Verizon Comments at 22 (arguing the Commission should adopt an alternative geographic coverage requirement that may be more suitable for some Internet of Things or low-power services that are not designed to cover residential populations).

²⁹² 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.

²⁹³ See generally *2018 Spectrum Frontiers Order and FNPRM*, 33 FCC Rcd at 5580, paras. 8-9.

²⁹⁴ See *2017 Spectrum Frontiers Order and FNPRM*, 32 FCC Rcd at 11008, para. 66; see also Verizon Comments at 22 (noting that the Commission adopted this same approach for the UMFUS bands, finding that alternative geographic coverage requirements provide licensees with flexibility that will encourage them to offer innovative

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facilitate the deployment of IoT and other innovative services, there is no requirement that a licensee build a particular type of network or provide a particular type of service in order to use whatever metric it selects to demonstrate that it met its performance requirement.²⁹⁵

99. *Fixed Point-to-Point under Flexible Use.*—Recognizing that our Part 27 flexible-use policies enable licensees to potentially offer a variety of different services in the 3.7-3.98 GHz band, the Commission sought comment in the *NPRM* on performance metrics for licensees offering point-to-point service in the band.²⁹⁶ For licensees providing fixed, point-to-point links, the Commission generally has evaluated buildout by comparing the number of links in operation to the population of the license area.²⁹⁷

100. Today, we adopt performance metrics using this framework, as proposed in the *NPRM*.²⁹⁸ Specifically, we adopt a requirement that Part 27 geographic area licensees providing Fixed Service in the A, B, and C Blocks band must demonstrate within eight 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, we require a licensee relying on point-to-point service to demonstrate it has at least one link in operation and providing service, either to customers or for internal use, per every 67,000 persons within a license area. We require 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, we require 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.

101. These standards are generally similar to the standards the Commission established for fixed point-to-point services in the 2.3 GHz band and several *Spectrum Frontiers* bands.²⁹⁹ In the *NPRM*, the Commission also asked whether to require point-to-point links to operate with a transmit power greater than +43 dBm in order to be eligible to be counted under the point-to-point buildout standard. The Commission observed that for the UMFUS bands, the 43 dBm minimum power requirement is

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services while achieving the objective that spectrum is put to use). See generally 47 CFR § 101.143(a) (traditional point-to-point links between 1850-7125 MHz must meet minimum path length of 17 km or the EIRP must be reduced).

²⁹⁵ 47 CFR part 30; 2017 *Spectrum Frontiers Order and FNPRM*, 32 FCC Rcd at 11008, para. 66 (modifying 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 based on power level).

²⁹⁶ *NPRM*, 33 FCC Rcd at 6964-65, para. 151.

²⁹⁷ See, e.g., 47 CFR §§ 27.14 (o)(1)(i) (for BRS and EBS, constructing six permanent links per one million people constitutes substantial service), (p)(2) (for 2.3 GHz WCS, “For point-to-point fixed systems, except those deployed in the Gulf of Mexico license area, a licensee must construct and operate a minimum of 15 point-to-point links per million persons (one link per 67,000 persons) in a license area by March 13, 2017, and 30 point-to-point links per million persons (one link per 33,500 persons) in a licensed area by September 13, 2019”); 2016 *Spectrum Frontiers Order and FNPRM*, 31 FCC Rcd at 8089, para. 208 (adopting the requirements for geographic area licensees relying on fixed point-to-point service to meet performance requirements in the 28 GHz, 39 GHz, or 37 GHz band. See also 47 CFR § 30.104(a) (UMFUS licensees relying on point-to-point service must demonstrate that they have four links operating and providing service 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, a licensee relying on point-to-point service must demonstrate it has at least one link in operation and is providing service for each 67,000 population within the license area).

²⁹⁸ See *NPRM*, 33 FCC Rcd at 6964-65, para. 151.

²⁹⁹ See 47 CFR § 27.14(p)(2).

intended to separate traditional point-to-point links from the sensor and device connections anticipated to be part of new Internet of Things networks in those bands.³⁰⁰ We received no comment on this issue. Based on the record before us, including the different propagation characteristics of the 3.7-3.98 GHz band, we find that the Commission's approach in the *Spectrum Frontiers* proceeding does not support adoption of a similar rule for the 3.7-3.98 GHz band. Links in the 3.7-3.98 GHz band, however, must be part of a network that is actually providing service, whether to unaffiliated customers or for private, internal uses, and all links must be present and operational in accordance with our discontinuance and renewal rules. As with the mobile performance milestone, the size of the population will be calculated over the entire license area.

102. *Penalty for Failure to Meet Performance Requirements.*—Along with performance benchmarks, we adopt meaningful and enforceable penalties for failing to ensure timely build-out. Specifically, as proposed in the *NPRM*, we adopt a rule requiring that, in the event a licensee in the A, B, or C Block 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.³⁰¹ Consistent with the approach in many other bands, we conclude that, if a 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.³⁰²

103. This approach will promote prompt buildout and appropriately penalize a licensee for not meeting its performance obligations for a particular license area.³⁰³ We decline to adopt a "use-or-lose" regime, as suggested by some commenters, under which a licensee would lose only those areas within a license area that are not developed. We find that such an approach, which has been adopted rarely for other bands, likely would reduce incentives for licensees to build out to the less populated areas covered by their license, and would be less effective in ensuring use of the spectrum.³⁰⁴ In addition, 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 section 309(j) and any licensee who forfeits its license for failure to meet its performance requirements would be precluded from regaining the license.³⁰⁵

104. *Compliance Procedures.*—In addition to compliance procedures applicable to all part 27 licensees, including the filing of electronic coverage maps and supporting documentation,³⁰⁶ we adopt a rule requiring that such electronic coverage maps must accurately depict both the boundaries of each licensed area and the coverage boundaries of the actual areas to which the licensee provides service. Although the Commission sought comment on additional compliance procedures in the *NPRM*, only a

³⁰⁰ See *NPRM*, 33 FCC Rcd at 6965 -6966, para. 154 citing *2017 Spectrum Frontiers Order and FNPRM*, 32 FCC Rcd at 11008, para. 66.

³⁰¹ *NPRM*, 33 FCC Rcd at 6967, para. 157.

³⁰² See, e.g., *2018 3.5 GHz Band Report and Order*, 33 FCC Rcd at 10638, para 73; *Service Rules for Advances Wireless Services H Block—Implementing Section 6401 of the Middle Class Tax Relief and Job Creation Act of 2012 Related to the 1915-1920 MHz and 1995-2000 MHz Bands*, Report and Order, 28 FCC Rcd 9483, 9564, para. 212 (2013) (*H Block Report and Order*); *Wireless Telecommunications Bureau Reminds Wireless Licensees of Construction Obligations*, Public Notice, 32 FCC Rcd 4802, 4802-03 (WTB 2017).

³⁰³ See *H Block Report and Order*, 28 FCC Rcd at 9564, para. 213.

³⁰⁴ A&T Comments at 20-21; T-Mobile Comments at 30; U.S. Cellular Comments at 19; Verizon Comments at 22.

³⁰⁵ Our decision comports with actions taken for other licenses, including AWS-1, AWS-3, AWS-4 and H Block. See, e.g., 47 CFR § 27.14(a), (q)(6), (r)(4).

³⁰⁶ See 47 CFR §§ 1.946(d); 27.14(k).

small number of commenters addressed this issue.³⁰⁷ AT&T supports the Commission's proposal regarding the documentation of build-out requirements and renewal term performance.³⁰⁸ T-Mobile supports the proposed procedures so long as they accommodate small-cell or other deployments used to enhance capacity rather than coverage.³⁰⁹

105. As proposed in the *NPRM*, the rule we are adopting requires measurements of populations served on areas no larger than the Census Tract level so a licensee deploying small cells has the option to measure its coverage using a smaller acceptable identifier such as a Census Block.³¹⁰ We find that such procedures will confirm that the spectrum is being used consistent with the performance requirements. If a licensee does not provide reliable signal coverage to an entire license area, the licensee must provide a map that accurately depicts the boundaries of the area or areas within each license area not being served. 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. We will adopt conforming amendments to part 27 to include these requirements. We direct the Wireless Telecommunications Bureau to specify the format of submissions, consistent with these determinations.

106. *License Renewal*.—As proposed in the *NPRM*, we will apply the general renewal requirements applicable to all Wireless Radio Services licensees to 3.7-3.98 GHz band licensees in the A, B, and C Blocks.³¹¹ This approach will promote consistency across services.³¹²

107. *Renewal Term Construction Obligation*.—In addition to, and independent of, these general renewal provisions, we find that any additional renewal term construction obligations adopted in the *Wireless Radio Services Renewal Reform* proceeding would apply to licenses in the A, B, and C Blocks of the 3.7-3.98 GHz band.³¹³

108. In the *NPRM*, the Commission noted that the *Wireless Radio Services Renewal Reform FNPRM* sought comment on various renewal term construction obligations such as incremental increases in the construction metric in each subsequent renewal term.³¹⁴ The Commission also noted that the *Wireless Radio Services Renewal Reform FNPRM* proposed to apply any rules adopted in that proceeding to all flexible geographic licenses.³¹⁵ Commenters generally support our adopting renewal term

³⁰⁷ *NPRM*, 33 FCC Rcd at 6967, para. 159; AT&T Comments at 19; AT&T Reply at 20-21; T-Mobile Comments at 30.

³⁰⁸ AT&T Comments at 19; AT&T Reply at 20-21.

³⁰⁹ See T-Mobile Comments at 30.

³¹⁰ See *NPRM*, 33 FCC Rcd at 6979, Appx. A, Proposed Rules, 47 CFR § 27.14(u)(5).

³¹¹ See *NPRM*, 33 FCC Rcd at 6967-68, para. 160 (citing 47 CFR § 1.949 (Application for renewal of authorization)) and Appx. A, Proposed Rules, 47 CFR § 1.907 (proposing to add 3.7-4.2 GHz band to definition of "Covered Geographic Licenses"). See also 47 CFR § 1.949(d) (renewal standard for covered geographic license).

³¹² The Commission, for example, applied the same principles in the *2016 Spectrum Frontiers Order and FNPRM*, concluding that UMFUS licensees would meet the renewal standard in their initial license terms if they met certain performance benchmarks and were "using [their] facilities to provide service." *2016 Spectrum Frontiers Order and FNPRM*, 31 FCC Rcd at 8088, para. 206. See also T-Mobile Comments at 31; AT&T Reply at 22.

³¹³ See *Wireless Radio Services Renewal Reform 2nd R&O and FNPRM*, 32 FCC Rcd at 8911-18, paras. 100-23.

³¹⁴ *NPRM*, 33 FCC Rcd at 6967-68, para. 160, citing *Wireless Radio Services Renewal Reform 2nd R&O and FNPRM*, 32 FCC Rcd at 8911-18, paras. 100-23.

³¹⁵ *Wireless Radio Services Renewal Reform 2nd R&O and FNPRM*, 32 FCC Rcd at 8915, paras. 111-112.

construction obligations for the 3.7-3.98 GHz band in the context of the *Wireless Radio Services Renewal Reform* proceeding, as our decision ensures consistency across services.³¹⁶ AT&T agrees, in particular, that documentation of build-out requirements and renewal term performance requirements should be consistent with the *Wireless Radio Services Renewal Reform* proceeding.³¹⁷

109. We find that applying any additional renewal term construction obligations adopted in the *Wireless Radio Services Renewal Reform* proceeding to licenses in the A, B, and C Blocks will encourage robust deployment and maintain consistency across flexible geographic licensees.

B. The Transition of FSS Operations

110. For a successful public auction of overlay licenses in the 3.7-3.98 GHz band, bidders need to know before an auction commences when they will get access to that currently occupied spectrum as well as the costs they will incur as a condition of their overlay license. In this section, we address precisely those questions while also setting forth a transition path that ensures that incumbent FSS users will continue to receive the content they do today both during and after the transition.

111. That transition of FSS operations relies on the Commission's *Emerging Technologies* framework, a framework the Commission has relied on since the early 1990s to facilitate the swift transition of spectrum from one use to another.³¹⁸ In short, the framework allows for new licensees to incentivize a swift transition while requiring those licensees to hold incumbents harmless during the transition. Specifically, we require overlay licensees to pay for the reasonable relocation costs of incumbent space station and incumbent earth station operators who are required to clear the lower 300 megahertz of the C-band spectrum in the contiguous United States.

112. To effectuate that process, we take several steps. *First*, we define the class of incumbent earth stations and incumbent space stations to make clear what FSS entities we expect to take part in the transition (and what entities may be eligible for relocation payments). *Second*, we lay out our legal authority to carry out the transition as well as the effect of that transition on future operations in the C-band. *Third*, we set a deadline for clearing the band by 2025 while offering incumbent space station operators the option to accelerate that process to 2021 for the lower 120 megahertz and 2023 for the upper 180 megahertz. *Fourth*, we set forth the relocation payments we expect incumbent operators to receive and how to apportion such payments among overlay licensees. *Fifth*, we establish a neutral, third-party clearinghouse to manage collection and distribution of relocation payments. *Sixth*, we describe the logistics of transitioning FSS operations out of the lower 300 megahertz of the C-band spectrum. *Finally*, we address additional issues related to the FSS transition, including the maintenance of IBFS data and revisions to the coordination policy for FSS and Fixed Services. We find that these rules will best promote the rapid and effective transition of incumbent FSS operations out of the portion of C-band spectrum to be made available for public auction.

1. Incumbent FSS Operations

113. In this section, we define the class of incumbent FSS space stations and earth stations that must be accommodated during the transition and reimbursed for their relocation costs. We find that our definition of incumbents effectively captures existing C-band FSS users that will need to be transitioned and protected in order to ensure that they are able to continue providing and receiving their existing services during and after the transition.

114. Commenters generally agree that we should define incumbent FSS operations for these

³¹⁶ T-Mobile Comments at 30-31; AT&T Reply at 21-22; Verizon Comments at 23; *see also* AT&T Comments at 19.

³¹⁷ AT&T Reply at 21-22.

³¹⁸ *See Emerging Technologies Order*.

purposes.³¹⁹ CTIA asserts a stable regulatory environment and understanding of who is to be protected is needed to promote investment in 5G services.³²⁰ And Verizon argues that identifying stations to be protected is a critical step to repurposing this band.³²¹

115. *Incumbent Space Station Operators.*—We define “incumbent space station operators” to include all C-band satellite operators authorized to provide service to any part of the contiguous United States pursuant to an FCC-issued license or grant of market access as of the effective date of this *Report and Order*. There are eight such operators: ABS, Empresa, Eutelsat, Hispamar, Intelsat, SES, Star One, and Telesat.

116. *Incumbent Earth Stations.*—We define “incumbent earth stations” to be protected from interference from flexible-use licensees to include FSS 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 November 7, 2018; and (3) have timely certified, to the extent required by the *Order* adopted in FCC 18-91 (as we clarify below to include certain renewal applications and license and registration applications filed through November 7, 2018), the accuracy of information on file with the Commission.³²²

117. This definition largely parallels the definition we proposed in the *NPRM*,³²³ with a few minor changes. For one, we affirm the finding of the International Bureau that registrants and licensees that filed applications, modifications, or renewals during the processing window, which effectively updated or confirmed their earth station details, are exempt from the separate certification requirement.³²⁴ In addition, we find that renewal applications filed by the end of the C-band certification window effectively updated or confirmed their earth station details. For another, we include all license and registration applications that were filed through November 7, 2018, rather than the initial filing window deadline (October 17, 2018) or the extended filing deadline (October 31, 2018) due to outages in the IBFS filing system around that deadline. Under the approach we adopt, the fact that an earth station has not filed an exhibit demonstrating coordination with terrestrial Fixed Service stations will not disqualify it as an incumbent earth station.³²⁵ And finally, we make clear that the definition does not include those whose authorization terminated by law because the earth station was not operational for more than 90 days.³²⁶

118. Several commenters, including CCA, Microsoft, Motorola, and Verizon, support our proposed definition of incumbent earth stations.³²⁷ CCA argues that using this registration/certification

³¹⁹ CCA Comments at 4; Microsoft Comments at 6; Motorola Comments at 3.

³²⁰ CITA Comments at 10-11.

³²¹ Verizon Comments at 10.

³²² See Appx. A (adding a definition of incumbent earth stations to section 25.203 of the Commission’s rules, 47 CFR § 25.203).

³²³ See *NPRM*, 33 FCC Rcd at 6983-84, Appx. A (proposing to add a definition of incumbent earth stations to section 25.203 of the Commission’s rules, 47 CFR § 25.203).

³²⁴ See *Order* at 6923-24, para. 19.

³²⁵ See *Freeze and 90-Day Earth Station Filing Window Public Notice*, 33 FCC Rcd at 3844-45. The International Bureau waived the coordination requirement for the duration of the freeze for applications filed during the filing window. See *id.* at 3844-45. We note that this public notice was published in the Federal Register. See 83 FR 21746 (May 10, 2018).

³²⁶ See 47 CFR § 25.161(c) (a station authorization shall be automatically terminated upon the removal or modification of the facilities which renders the station not operational for more than 90 days, unless specific authority is requested).

³²⁷ CCA Comments at 4; Microsoft Comments at 6; Motorola Comments at 3; Verizon Comments at 10.

standard will help to identify database errors and duplicate registrations, which will provide a more accurate understanding of actual use in the band and allow the Commission to determine the optimal approach for introducing flexible use of the band.³²⁸

119. Some commenters assert our definition is too restrictive. For example, the C-Band Alliance asserts that a substantial number of small rural radio and television stations and private networks that rely on C-band programming failed to submit registration filings.³²⁹ Cumulus Media/Westwood One claim that many earth stations may remain unregistered because the application fee and burdens of registration were cost prohibitive for some providers.³³⁰

120. We disagree. Earth station operators have been provided ample opportunity to register their earth stations with the Commission. In addition to waiving the coordination requirement during the freeze filing window, the International Bureau took numerous other steps to ease the filing process, including conducting tutorials and providing step-by-step filing instructions on the Commission's website to assist those unfamiliar with the International Bureau's filing system.³³¹ Moreover, the filing deadline was extended numerous times to accommodate filers.³³² Therefore, contrary to the arguments of some commenters, we decide not to open another window for the registration of earth stations that existed as of April 19, 2018.

121. We also decline to adopt the C-Band Alliance's suggestion that incumbent earth stations should encompass all earth stations identified by the C-Band Alliance.³³³ We find that there is a significant public interest in providing a stable, comprehensive list of incumbent earth stations that meet the criteria described above. The members of the C-Band Alliance and other space station operators may, of course, treat unregistered earth stations like incumbent earth stations for their own commercial purposes. But any such commercial decisions are outside the scope of this proceeding.

122. We also adopt the proposal in the *NPRM* that the classes of earth stations entitled to protection and transition are those registered as fixed³³⁴ or temporary fixed (i.e., transportable)³³⁵ earth stations in IBFS. That proposal was supported by the record.³³⁶ The Commission did not propose to

³²⁸ CCA Comments at 4.

³²⁹ C-Band Alliance Comments at 23-24.

³³⁰ Cumulus Media/Westwood One Comments at 9-10.

³³¹ The industry also took numerous steps to assist earth-station operators. See, e.g., C-Band Alliance, *Registering C-Band Receive-Only Earth Stations by October 17, 2018 FCC Deadline*, <https://c-bandalliance.com/wp-content/uploads/2019/04/FCC-Registration-of-C-band-Rx-only-Earth-Stations.pdf> (last visited Feb. 5, 2019); SES, *FCC Registration or Licensing of C-Band Antenna* (Apr. 26, 2018), <https://www.ses.com/fccregistration>; National Association of Broadcasters, *Understanding the C-Band Proceeding*, <https://www.nab.org/documents/resources/cband/default.asp> (last visited Feb. 5, 2019).

³³² See *Freeze and 90-Day Earth Station Filing Window Public Notice*, 33 FCC Rcd at 3841; *Earth Station Filing Window Public Notices*; see also *International Bureau Reminds Earth Station Operators in 3.7-4.2 GHz Band that Application Filing Window Closes October 17, 2018*, Public Notice, DA 18-919 (IB Sept. 7, 2018); *International Bureau Announces Two-Week Extension of Filing Window for Earth Stations Currently Operating in 3.7-4.2 GHz Band*, GN Docket No. 18-122, Public Notice, 33 FCC Rcd 8591 (IB 2018). As previously noted, because of technical issues with the IBFS portal around the filing deadline that significantly limited applicants' ability to file, the International Bureau has accepted as timely filed any application filed by November 7, 2018.

³³³ C-Band Alliance Comments at 24.

³³⁴ 47 CFR § 25.103 (Definitions) (defining a fixed earth station as an earth station intended to be used at a fixed position and explaining that the position may be a specified fixed point or any fixed point within a specified area).

³³⁵ 47 CFR § 25.277.

³³⁶ See, e.g., PSSI Global Comments at 2-5, 6-9, Exhibits 1, 2, and 5.

include other classes of earth stations registered in IBFS, such as earth stations on vessels³³⁷ and other licensees operating under blanket earth stations,³³⁸ and the record does not support the inclusion of any additional classes of earth stations. We direct the International Bureau to complete the processing of earth station license and registration applications filed during the limited freeze filing window.

123. As the Commission proposed in the *NPRM*, any earth stations that failed to meet the requirements to be incumbent earth stations will be removed from IBFS. In the *NPRM*, the Commission proposed to update IBFS to terminate 3.7-4.2 GHz band earth stations licenses or registrations for which the licensee or registrant had not timely filed the certification required by the *July 2018 Order* (to the extent it held or applied for a license or registration before April 19, 2018).³³⁹ Several commenters support such termination, as well as eliminating an obligation to protect those stations from harmful interference.³⁴⁰ For the same reasons that we limit incumbent earth stations to those that timely filed the required certifications, we now direct the International Bureau to terminate automatically those uncertified earth stations in IBFS, consistent with our treatment of surrendered licenses and registrations that no longer authorize operations.

2. Clearing the 3.7-4.0 GHz Band of FSS Operations

124. We next adopt rules to limit FSS operations to the 4.0-4.2 GHz band in the contiguous United States. To accomplish this goal and make the 3.7-4.0 GHz band available for terrestrial wireless use, we use our authority under section 316 of the Communications Act to modify the existing FSS licenses and market access authorizations held by satellite operators in the band.³⁴¹ We find that such modifications are consistent with our statutory authority, supported by judicial and Commission precedent, and will serve the public interest. We also revise our rules to prohibit new applications for space station licenses and new petitions for market access concerning space-to-Earth operations in the 3.7-4.0 GHz band in the contiguous United States.

125. *Clearing Space Station Operations.*—Section 316 of the Communications Act vests the Commission with broad authority to modify licenses “if in the judgment of the Commission such action will promote the public interest, convenience, and necessity.”³⁴² We find that modifying the authorizations of incumbent space station operators to clear use of the 3.7-4.0 GHz band (and confine their operations in the contiguous United States to the 4.0-4.2 GHz band) is within the Commission’s statutory authority, consistent with prior Commission practice, and will promote the public interest convenience, and necessity. We accordingly propose to modify the authorizations of the incumbent space station operations to carry out the clearing of this band.

126. The Commission has long relied on section 316 to change or reduce the frequencies used by a licensed service where it has found that doing so would serve the public interest. For example, in the *2002 MSS Order*, the Commission relied on our section 316 authority to relocate the Motient Services, Inc. (Motient) spectrum assignment from solely upper L-band frequencies to mostly lower, internationally coordinated L-band frequencies and reduce it from 28 to 20 megahertz, to enable Motient to construct and

³³⁷ See 47 § CFR 25.228(h)(3) and (4).

³³⁸ 47 CFR § 25.103 (Definitions) (defining a blanket license as a license for “multiple earth stations in the FSS or MSS ... that may be operated anywhere within a geographic area specified in the license....”).

³³⁹ *NPRM*, 33 FCC Rcd at 6922, para. 34.

³⁴⁰ See CTIA Comments at 12-13; Microsoft Comments at 6; Sherrod Munday Comments at 46; Starry Comments at 4; T-Mobile Comments at 19; Verizon Comments at 11.

³⁴¹ See 47 U.S.C. § 316.

³⁴² 47 U.S.C. § 316. See also *California Metro Mobile Commc’ns, Inc. v. FCC*, 365 F.3d 38, 45 (D.C. Cir. 2004) (“Section 316 grants the Commission broad power to modify licenses.”).

operate an economically viable MSS system without interfering with maritime distress and safety communications.³⁴³ In the *DEMS Relocation Order*, the Commission, pursuant to Section 316, modified licenses to relocate the operations of certain Digital Electronic Message Service (DEMS) licensees from the 18 GHz band to the 24 GHz band, in order to accommodate Department of Defense military systems.³⁴⁴ Similarly, in the *2004 800 MHz Order*, the Commission relied on section 316 to relocate the public safety and other land mobile communications systems operating in the 800 MHz band to new spectral locations both within and outside the band (including the relocation of a large set of licenses then held by Nextel Communications, Inc., to the 1.9 GHz band), in order to eliminate the interference to the public safety and other high site, non-cellular systems caused by the inherently incompatible operations of the band's cellular-architecture multi-cell systems.³⁴⁵ The Commission has also relied on its section 316 authority to "rearrang[e] licensees within a spectrum band."³⁴⁶ And as part of the recent *Spectrum Frontiers* incentive auction, the Commission modified the authorizations of incumbent licensees by altering their assigned frequencies and, in many cases, their geographic service areas, in a way that ensured that the spectrum usage rights under the modified licenses were comparable to those under the originally configured licenses.³⁴⁷

127. Notably, the Commission's modification authority under section 316 does not require the consent of licensees.³⁴⁸ As the United States Court of Appeals for the District of Columbia Circuit has stressed, "if modification of licenses were entirely dependent upon the wishes of existing licensees, a large part of the regulatory power of the Commission would be nullified."³⁴⁹ Indeed, that court has reiterated that Congress broadened the Commission's discretion by adding section 316, which "provides the FCC with the authority to modify licenses without the approval of their holders."³⁵⁰ Rather, the Commission need only find, as we do here, that the modification "serves the public interest, convenience and necessity."³⁵¹ Further, the courts have consistently held that the Commission may exercise its license modification authority as part of a rulemaking proceeding, as we do here.³⁵²

³⁴³ *Establishing Rules and Policies for the use of Spectrum for Mobile Satellite Services in the Upper and Lower L-band*, IB Docket No. 96-132, Report and Order, 17 FCC Rcd 2704, 2704, 2712-13, paras. 1, 21 (2002) (2002 MSS Order).

³⁴⁴ *Amendment of the Commission's Rules to Relocate the Digital Electronic Message Service from the 18 GHz Band to the 24 GHz band and to Allocate the 24 GHz Band for Fixed Service*, ET Docket No. 97-99, Order, 12 FCC Rcd 3471 (1997).

³⁴⁵ *Improving Public Safety Communications in the 800 MHz Band*, WT Docket No. 02-55, Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order, and Order, 19 FCC Rcd 14969, 14976, para. 8 (2004).

³⁴⁶ *AWS-4 Service Rules R&O*, 27 FCC Rcd at 16178, para. 175 (proposing modification of incumbent 2 GHz MSS authorization holders to add AWS-4 terrestrial spectrum rights pursuant to section 316).

³⁴⁷ *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, GN Docket No. 14-177, Fourth Report and Order, 33 FCC Rcd 12168, 12174-75, paras. 15-18 (2018) (modifying the licenses of all existing licenses in the 39 GHz band pursuant to the Commission's section 316 authority, regardless of whether or not the incumbent chose to participate in the Commission's incentive auction of that spectrum).

³⁴⁸ See *Rainbow Broadcasting v. FCC*, 949 F.2d 405, 410 (D.C. Cir. 1991); *Peoples Broadcasting Co. v. United States*, 209 F.2d 286, 288 (D.C. Cir. 1953); see also Letter from Steve Sharkey, Vice President, Government Affairs, T-Mobile, to Marlene Dortch, Secretary, FCC, GN Docket No. 18-122, at 7 (filed Jan. 24, 2020) (T-Mobile Jan. 24, 2020 *Ex Parte*).

³⁴⁹ *Peoples Broadcasting Co. v. United States*, 209 F.2d 286, 288 (D.C. Cir. 1953).

³⁵⁰ *Rainbow Broadcasting v. FCC*, 949 F.2d 405, 410 (D.C. Cir. 1991).

³⁵¹ *California Metro Mobile Commc'ns, Inc. v. FCC*, 365 F.3d at 45.

³⁵² See *Celtronix Telemetry, Inc. v. FCC*, 272 F.3d 585, 589 (D.C. Cir. 2001) (citing cases and noting that the Commission retains the power "to alter the term[s] of existing licenses by rulemaking").

128. The International and Wireless Telecommunications Bureaus sought comment on the scope of our section 316 authority to modify licenses in this proceeding in the *May 3 Public Notice*.³⁵³ The record confirms that modifying the licenses of the incumbent space station operators falls within the scope of our authority and would serve the public interest.³⁵⁴ The Dynamic Spectrum Alliance points out that “[g]rossly underutilized bands can be consolidated to clear spectrum for auction, and the frequency assignments of incumbents shifted as necessary, without resorting to a private auction or an unnecessarily generous windfall at public expense.”³⁵⁵ OTI points out that “courts have repeatedly upheld the Commission’s broad authority under section 316 to modify FSS space station licenses at any time provided the agency makes a public interest finding and does not fundamentally change the license.”³⁵⁶ OTI supports the Commission’s use of section 316 to modify FSS licenses, arguing “[t]he Commission can therefore modify space station licenses to require [consolidation of spectrum into the upper portion of the C-band] subject to certain conditions (e.g., cost reimbursement for ‘comparable facilities’).”³⁵⁷ As these commenters and others argue, modifying the authorizations of the incumbent space station operators is in the public interest because it will enable the clearing of 280 megahertz for public auction while preserving the content distribution system currently offered over the C-band spectrum by reserving for incumbent space station operators the upper 200 megahertz of the band.³⁵⁸

129. One constraint, however, is that Congress limited the Commission’s authority to only “modify” a license under section 316, which the courts have construed to mean we may not effect a “fundamental change” to a license under this authority.³⁵⁹ Although effectively revoking a license or substantially disrupting a licensee’s ability to provide service may amount to a fundamental change, courts have repeatedly found that if a licensee can continue to provide substantially the same service, a modification to that license is not a fundamental change.³⁶⁰

³⁵³ *May 3 Public Notice*, 34 FCC Rcd at 2906-07, 2909; see also *NPRM*, 33 FCC Rcd at 6950, para. 111 (seeking comment on various auction proposals and “other mechanisms for transitioning all or part of the 3.7-4.2 GHz band for wireless broadband use”).

³⁵⁴ See AT&T May 3 PN Comments at 4; BYU Broadcasting May 3 PN Comments at 9; Google May 3 PN Comments at 12-13; SIA May 3 PN Comments at 10-11; T-Mobile May 3 PN Comments at 6-8.

³⁵⁵ Dynamic Spectrum Alliance Comments at 5.

³⁵⁶ OTI May 3 PN Comments at 21.

³⁵⁷ OTI May 3 PN Comments at 22; See also, *ACA Connects* Dec. 11, 2019 *Ex Parte* at 8-9.

³⁵⁸ Comcast Nov. 19, 2019 *Ex Parte* at 4 (“At the same time, by maintaining the current satellite allocation for 200 megahertz without qualification, and by ensuring that all necessary technical, transition-related, and cost-recovery issues are addressed, the Commission would keep the country’s video distribution system on firm footing.”); T-Mobile Jan. 24, 2020 *Ex Parte* at 6 (“There can be no fundamental change if satellite companies can continue to serve their customers using a reduced amount of spectrum. But by the CBA’s own admission, incumbents, ‘if fairly and properly incentivized,’ satellite operations can be repacked into the upper 200 megahertz portion of the C-band ‘to enable the FCC to authorize terrestrial mobile operations without causing intolerable interference.’ The CBA’s statement suggests that the heart of its concern is about receiving payment – not whether its members can operate as they do today using a reduced amount of spectrum.”).

³⁵⁹ See, e.g., *MCI Telecommunications Corp. v. AT&T*, 512 U.S. 218, 228 (1994) (holding that statutory “authority to ‘modify’ does not contemplate fundamental changes”); *Cnty Television, Inc. v. FCC*, 216 F.3d 1133, 1140-41 (D.C. Cir. 2000) (applying that reasoning to section 316 and suggesting that impairing the ability of a licensee to provide the same services as those enabled by the original license might be considered a fundamental change), *cert. denied*, 531 U.S. 1071 (2001).

³⁶⁰ See, e.g., *Cnty Television, Inc. v. FCC*, 216 F.3d at 1136, 1140-41 (D.C. Cir. 2000) (finding that the Commission’s actions will not effect a “fundamental change” where affected licensees could “begin and end the transition period broadcasting television programming to the public under very similar terms” and could “provide

(continued....)

130. We find that the upper 200 megahertz of spectrum we are reserving for future FSS operations is sufficient to continue the services that are provided today over the whole 500 megahertz of the C-band. Indeed, all incumbent space station operators that responded to the space-station data collection have agreed that the upper 200 megahertz portion of the band provides a sufficient amount of spectrum to support their services.³⁶¹ Users of FSS services, including Viacom, Disney, CBS, NBCUniversal, A&E Television Networks, Univision, Fox, and Discovery, in addition to the National Association of Broadcasters, the ABC Television Affiliates Association, CBS Television Network Affiliates Association, FBC Television Affiliates Association, and NBC Television Affiliates, agree that 200 megahertz is a sufficient amount of spectrum for satellite operators to continue their services uninterrupted.³⁶² And as T-Mobile explains, “the Commission has ample authority under Section 316 of the Act to modify incumbents’ C-band authorizations because their ability to provide the services they do today will be unaffected by a reduction in the amount of spectrum they can use pursuant to their modified authorizations.”³⁶³ Indeed, by adopting the clearing plan proposed by incumbent space station operators themselves and that they themselves have claimed allows for the full range of C-band services to continue in the contiguous United States, we are confident that incumbent space station operators can continue to offer the services they do today after they clear their operations out of the 3.7-4.0 GHz band (and thus that this license modification does not constitute a fundamental change).

131. In sum, we find that a section 316 modification would serve the public interest, as it will spur the investment in and deployment of next generation wireless services, while ensuring that incumbent space station services will be able to maintain the same services as they are currently providing. We also note that we agree with SIA and the Small Satellite Operators that any section 316 argument applies equally to Commission licenses and grants of market access.³⁶⁴

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essentially the same services, with some flexibility to provide ancillary services as well, under their licenses during the transition”).

³⁶¹ See C-Band Alliance Revised Transition Implementation Process at 1, 4 (proposing that 300 megahertz (inclusive of a 20 megahertz guard band) of C-band spectrum be cleared for terrestrial 5G use); Eutelsat Dec. 19, 2019, *Ex Parte* at 1 (“Eutelsat agrees that, with diligent effort from all interested parties, the auction could commence in 2020, with transition milestones for the release of 100 MHz and 300 MHz of spectrum in mid-2021 and mid-2023, respectively.”); Small Satellite Operators Sept. 13, 2019 *Ex Parte* (“300 megahertz of C-band spectrum could be made available for 5G within 18 to 36 months through the use of non-proprietary, readily available compression technology”); See Letter from Scott Blake Harris, Counsel to the Small Satellite Operators, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 1 (filed Oct. 9, 2019) (Small Satellite Operators Oct. 9, 2019 *Ex Parte*) (“We expressed support for repurposing 300 megahertz of C-band spectrum, suggesting it could be done quickly through the use of compression technology . . .”).

³⁶² Letter from John Feore et al. Counsel to CBS Television Network Affiliates, FBC Television Affiliates Association, ABC Television Affiliates Association, and NBC Television Affiliates, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 1 (filed Nov. 22, 2019) ABC et al., Nov. 22, 2019 *Ex Parte* at 1 (citing Letter from Rick Kaplan, General Counsel and Executive Vice President, Legal and Regulatory Affairs, National Association of Broadcasters, et al., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 1 (NAB Nov. 19, 2019 *Ex Parte*)).

³⁶³ T-Mobile Jan. 24, 2020 *Ex Parte* at 2.

³⁶⁴ See SIA May 3 PN Comments at 13-14; Small Satellite Operators May 3 PN Comments at 7-9; see also *Use of Returned Spectrum in the 2 GHz Mobile Satellite Service Frequency Bands*, IB Docket Nos. 05-220 and 05-221, Order, 20 FCC Rcd 19696, 19697, n.3 (2005) (“[W]hile we are not taking action directly under Section 316 [in modifying the spectrum reservations of two non-U.S. licensed satellite operators], since [the non-U.S. licensed satellite operators] do not hold Commission licenses, we are applying the procedural framework of Section 316, bearing in mind our [WTO] commitments to treat satellite operators licensed in [WTO member countries] . . . no less favorably than we treat U.S.-licensed satellite operators.”).

132. We note that, consistent with the scope of the public auction we adopt, the section 316 license modification that we adopt applies only to licenses and grants of market access held within the contiguous United States; authorizations for FSS operations outside of the contiguous United States may continue to operate in the entire 3.7-4.2 GHz band. Commenters argue, and we agree, that the Commission should exclude locations outside of the contiguous United States from the license modification.³⁶⁵ Locations outside of the contiguous United States, many of which are remote, have a greater need for a wide variety of C-band services, particularly for the provision of services necessary for the protection of life and property—including telehealth, E911, and education services. Alaska-based operators support excluding Alaska from any reallocation and repurposing to terrestrial use because C-band service is often the only option available to reach remote villages to provide basic telephone service, E911, and broadband service used to support applications such as telehealth and distance learning.³⁶⁶ Hawaii Pacific Teleport shares similar concerns about its provision of vital public safety services to remote locations in the Pacific, and it asks the Commission to ensure that sufficient C-band spectrum remains available for FSS use in the Pacific.³⁶⁷ Indeed, the C-Band Alliance’s clearing proposal explicitly excludes Alaska, Hawaii, and the U.S. territories from being repurposed for terrestrial wireless use.³⁶⁸

133. We find that retaining C-band operation is important for the time being in areas outside of the contiguous United States. As a result, we believe it is appropriate to exclude PEAs outside of the contiguous United States from the proposed license modification, notably in the Honolulu, Anchorage, Kodiak, Fairbanks, Juneau, Puerto Rico, Guam-Northern Mariana Islands, U.S. Virgin Islands, American Samoa, and the Gulf of Mexico PEAs (PEA numbers 42, 212, 264, 298, 360, 412-416) and FSS operations in those PEAs may continue to use the entire 3.7-4.2 GHz band.

134. We also note that, due to the nature of space-to-earth transmissions and the practicalities of space-to-earth communications, we do not modify the authorizations of incumbent space station operators to prohibit transmissions in the 3.7-4.0 GHz band entirely. As NPR and other entities have pointed out, transmissions from satellite operators can reach many countries at the same time.³⁶⁹ As a result of this, many transmissions from satellite operators sent to locations outside of the contiguous United States and other countries may incidentally transmit to earth stations within the contiguous United States. Since space-to-Earth transmissions pose no risk of harmful interference to terrestrial wireless operations, the Commission will allow such incidental transmissions without penalty, if the transmissions are duly authorized by a foreign government or the Federal Communications Commission. In other words, we allow those transmissions that incidentally occur within the contiguous United States but are directed at earth stations outside that area.

135. The C-Band Alliance and the Small Satellite Operators have argued that eliminating their right to operate and be protected from harmful interference over the lower 300 megahertz of the C-band

³⁶⁵ North American Broadcasters Association Reply at 4; Alaska Telecom Assoc. Reply at 3; Alaska Telecom July 19 PN Comments at 1-4; Alaska Comm. Comments at 17-22; Alaska Comm. June 21, 2019 *Ex Parte*; Alaska Comm. July 19 PN Comments at 3-8; C-Band Alliance Oct. 17, 2018 *Ex Parte*; CCA Reply at 4-5; Letter from Jason E. Rademacher, Counsel, Church of Jesus Christ of Latter-day Saints, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 5 (filed Dec. 19, 2019).

³⁶⁶ See Alaska Communications Internet Comments at 1-5; Alaska Telecommunications Association Comments at 2-3; GCI Comments at 18-19 (supporting a transition of at least five years for rural areas to the extent any spectrum is cleared); GCI Dec. 4, 2019 *Ex Parte*.

³⁶⁷ Hawaii Pacific Teleport Nov. 4, 2019 *Ex Parte*; see also RigNet Satcom, Inc. Reply.

³⁶⁸ C-Band Alliance Comments at 22, n.50.

³⁶⁹ NPR Oct. 3 *Ex Parte* at 7.

without their consent would constitute a fundamental change to their license.³⁷⁰ The C-Band Alliance and the Small Satellite Operators also argue that, even if their existing services could continue after the transition, modifying their licensees would impermissibly alter their ability to expand their services to additional customers. We disagree. The D.C. Circuit has consistently upheld the Commission's authority to modify licenses where the affected licensee is able to continue providing substantially the same service following the modification.³⁷¹ Thus, regardless of the amount of spectrum being repurposed or the licensees' ability to expand its operations after its license is modified, the primary consideration in determining whether a 316 modification is valid is whether the licensee will be able to provide substantially the same service after the modification as it was able to provide before. In the case of the C-Band Alliance and Eutelsat, the record clearly demonstrates that C-Band Alliance members will—by their own admission—be able to continue to provide service to their existing customers after the transition.³⁷² For the Small Satellite Operators, the record clearly demonstrates that their members provide little to no service in the contiguous United States today and, as such, the remaining 200 megahertz of spectrum available after the transition period exceeds any reasonable estimate of their needs.³⁷³

136. *First*, the amount of spectrum repurposed under a 316 modification is not the controlling factor in determining whether such a modification is valid. The C-Band Alliance and the Small Satellite Operators in particular contend that removing a licensee's rights to operate in 60% of the spectrum covered by its license constitutes a fundamental change to the license on its face.³⁷⁴ They argue that a reduction in the spectrum use rights afforded a licensee constitutes a fundamental change, regardless of

³⁷⁰ See C-Band Alliance May 3 PN Reply at 4-5 (arguing that eliminating interference protection in the lower 200 megahertz of the C-band would be "much too extensive to be considered a mere 'modification'"); C-Band Alliance January 16, 2020 Legal Filing at 7 (arguing that eliminating interference protection in 300 megahertz of the band would be much too extensive to be considered a "modification" for C-Band Alliance members); Small Satellite Operators May 3 PN Comments at 3, 13 (stating that Commission-authorized satellite operators have "enforceable rights to protection from impermissible interference . . . anywhere that an earth station exists or would be located in the future," and that this right would be fundamentally and impermissibly changed by a section 316 modification that "altogether eliminates the possibility of operating in the spectrum for which the satellite operator is licensed.").

³⁷¹ See *Cnty Television Inc.*, 216 F.3d at 1136, 1140-41 (holding transitory additional channel for broadcasters was not a "fundamental" change, given that "[b]roadcasters will begin and end the transition period broadcasting television programming to the public under very similar terms"). See also *Cellco P'ship v. FCC*, 700 F.3d 534, 543-44 (D.C. Cir. 2012) (rejecting the argument that imposing an obligation to offer data roaming agreements to other mobile data providers on "commercially reasonable" grounds is a "fundamental change").

³⁷² See C-Band Alliance Revised Transition Implementation Process at 1, 4 (proposing that 300 megahertz (inclusive of a 20 megahertz guard band) of C-band spectrum be cleared for terrestrial 5G use); Eutelsat Dec. 19, 2019, *Ex Parte* at 1 ("Eutelsat agrees that, with diligent effort from all interested parties, the auction could commence in 2020, with transition milestones for the release of 100 MHz and 300 MHz of spectrum in mid-2021 and mid-2023, respectively."); Small Satellite Operators Sept. 13, 2019 *Ex Parte* ("300 megahertz of C-band spectrum could be made available for 5G within 18 to 36 months through the use of non-proprietary, readily available compression technology"); Small Satellite Operators Oct. 9, 2019 *Ex Parte* ("We expressed support for repurposing 300 megahertz of C-band spectrum, suggesting it could be done quickly through the use of compression technology . . .").

³⁷³ Likewise, there is no evidence that Empresa, the remaining satellite incumbent, provides any service to the contiguous United States.

³⁷⁴ See Small Satellite Operators Oct. 9, 2019 *Ex Parte* at 1-2 ("A revocation of 60% of a licensee's spectrum in a band would effect a fundamental change to the terms of the license to operate in that band." (citing *MCI*, 512 U.S. at 228-29 (1994))); Letter from Bill Topelgin, Chief Executive Officer, C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 11 (filed Jan. 14, 2020) (C-Band Alliance Jan. 14, 2020 *Ex Parte*) (same).

whether the licensee is actually using the spectrum at the time.³⁷⁵ Both the C-Band Alliance and the Small Satellite Operators point to a decision by the Supreme Court, *MCI Telecommunications Corp. v. FCC*, which they assert supports their argument that the reduction of a certain percentage of a licensee's spectrum usage rights has been found to exceed the Commission's "modification authority."³⁷⁶ However, the Court in *MCI* was addressing a statutory interpretation question under Title II of the Act: whether "the statutory phrase 'modify any requirement' gave it authority to eliminate rate-filing requirements, 'the essential characteristic of a rate regulated industry,' for long-distance telephone carriers."³⁷⁷ It was not examining the scope of the Commission's ability to modify a license pursuant to its "broad authority to manage spectrum under Title III"³⁷⁸ including its specific authority under Section 316 to modify the terms of licenses if—"in the judgment of the Commission"—such action "will promote the public interest, convenience, and necessity."³⁷⁹ Ultimately, the Court concluded that rather than a legitimate exercise of the Commission's authority to make modifications in the tariffing requirement established by the Act, "[w]hat we have here, in reality, is a fundamental revision of the statute, changing it from a scheme of rate regulation in long-distance common-carrier communications to a scheme of rate regulation only where effective competition does not exist. That may be a good idea, but it was not the idea Congress enacted into law in 1934."³⁸⁰

137. Rather than standing, as the C-Band Alliance and the Small Satellite Operators would have it, for the proposition that a 60% change of anything, under any circumstances, cannot be regarded as a modification, *MCI* represents the Court's view that eliminating a requirement entirely is not a "modification" of that requirement. In this context, we agree that eliminating an incumbent space station operator's right to transmit entirely would not be a modification—but that is not what we do here. Instead, we find that where an incumbent will be fully reimbursed to upgrade its facilities so that it can provide the same level of service more efficiently using less spectrum, requiring the incumbent to do so falls within the Commission's Title III authority to modify a license. In other words, a 60% reduction in spectrum available to an incumbent space station licensee—under the terms and conditions we have specified herein that provide the continuation of service throughout and after a transition—would not fundamentally change the overall nature of the rights and privileges originally granted under its license, and that the action therefore falls within the modification authority that Congress intended to bestow upon the Commission in granting this agency its broad section 316 authority.

138. Indeed, since *MCI*, courts have examined various license modifications that the Commission has ordered under its section 316 authority under the same basic standard we are applying here—asking whether the modifications have worked a fundamental change in the nature of the license, using as a touchstone whether the licensee can still provide the same basic service under the modified license that it could prior to the modification.³⁸¹ This functional test does not apply an arbitrary numerical

³⁷⁵ See Small Satellite Operators Oct. 9, 2019 *Ex Parte* at 2 ("Because the Commission may not make fundamental changes to licenses, the way the rights are being used at a particular point in time is not relevant. Whether a licensee is using its spectrum rights now or has invested to do so in the future (as long as its FCC authorization is in good standing), its rights are no less changed if they are confiscated.").

³⁷⁶ *MCI*, 512 U.S. at 228-29 (1994).

³⁷⁷ *City of Arlington v. FCC*, 569 U.S. 290, 304 (2013).

³⁷⁸ *Cellco P'ship*, 700 F.3d at 541-42 (D.C. Cir. 2012) ("expansive powers"), quoting *NBC v. United States*, 319 U.S. 190, 216 (1943).

³⁷⁹ 47 U.S.C. § 316(a)(1).

³⁸⁰ *MCI*, 512 U.S. at 231-32.

³⁸¹ See, e.g., *Cnty Television Inc.*, 216 F.3d at 1136, 1140-41; *Cellco P'ship*, 700 F.3d at 543-544 (distinguishing *MCI* and finding no fundamental change where the Commission imposed a limited obligation to offer data-roaming agreements to other mobile-data providers, where it found that such rule "require[d] nothing more than the offering

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limit on the amount of spectrum that must be preserved under a license. Thus, the C-Band Alliance and Small Satellite Operators' argument for applying such a test is contrary to both case law and Commission precedent.

139. *Second*, we reject C-Band Alliance and the Small Satellite Operators' contention that, since they will be foreclosed from transmitting to earth stations below 4.0 GHz, their licenses will be fundamentally altered.³⁸² To the extent their argument rests on the potential foreclosure of the future reception of their signals by registered earth stations in the 3.7-4.0 GHz band, we find that any harm is, at best, speculative. The incumbent space station licensees will retain flexibility to expand their business within the 4.0-4.2 GHz band after the transition. With the deployment of compression and other technologies, this block is sufficient to at least serve the licensees' existing customers—which is the relevant standard governing the legality of a 316 modification—and may provide flexibility to obtain additional customers.³⁸³ We note that the failure of the Small Satellite Operators to demonstrate any significant past, present, or future base of earth station customers makes it reasonable to assume that any opportunities they might be losing as a result of the Commission's actions are, on a practical level, *de minimis*. Moreover, the opportunities they will have to continue to serve existing customers and to obtain new customers are sufficient to support our determination that the modification we make to their authorizations does not constitute a fundamental change. The Small Satellite Operators have failed to demonstrate their ability to lure existing customers away from their contracts with other providers or to explain how they had planned to obtain new customers, including how they planned to compete against the growing reliance on fiber delivery services as a high-quality substitute for satellite delivery.³⁸⁴

140. *Third*, space station incumbents will not incur any unreimbursed reasonable expenses as a result of this license modification. Under the rules adopted here, the new C-band entrants would pay for the cost of the reconfiguration of all incumbent earth stations, as well as reasonable relocation costs associated with repacking FSS operations into the upper portion of the band. In sum, because the record indicates that space station operators will continue to be able to serve their customers with essentially the same services under very similar terms following the license modification we adopt today, and should not suffer any interruption of service during the repacking process, we conclude that any reduction in

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of 'commercially reasonable' roaming agreements"). *See also California Metro Mobile Commc'ns, Inc.*, 365 F.3d at 46 (affirming Commission decision finding that "the modification would leave CMMC's other frequencies intact and that, to the extent it caused a 'minor' disruption in CMMC's operations, it was 'nonetheless in the public interest, as required by [s]ection 316.'").

³⁸² Small Satellite Operators May 3 PN Reply at 13 (arguing that the Commission issuance of a satellite license provides authorization for both current and future right to transmit to an earth station and that right "would be fundamentally changed by a Section 316 modification that altogether eliminates the possibility of operating in spectrum for which the satellite operator is licensed—and such a modification would therefore be impermissible"); C-Band Alliance May 3 PN Reply at 4-5 (arguing that eliminating interference protection for FSS operations in 40% of the C-band constitutes a fundamental change); C-Band Alliance July 19 PN Reply ("Because such interference would render meaningless the essential purpose of the licenses and market access authorizations held by the members of the C-Band Alliance, the FCC's authorization of that interference in any significant portion of the band would constitute an unlawful fundamental change.").

³⁸³ T-Mobile Jan. 24, 2020 *Ex Parte* at 6-7 ("The Commission has not required new licensees to ensure that incumbents can *expand* the use of their current authorizations to pursue future opportunities").

³⁸⁴ *See* CTIA Comments at 17; Letter from Gregory M. Romano, Vice President, Federal Regulatory and Legal Affairs, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 3 (Verizon Oct. 9, 2019 *Ex Parte*) ("reliance on fiber delivery for video services is growing", and "content providers are increasingly using fiber to distribute content."); *id.* ("the transition away from satellite service for content delivery is already underway . . ."); *see also*, ACA Connects Coalition July 9, 2019 *Ex Parte* (explaining the importance fiber deployment to the future of MVPD services).

spectrum access rights here will not effect a “fundamental change” for these companies under section 316 precedent.³⁸⁵

141. The record in this proceeding, which sought comment on this question,³⁸⁶ supports this conclusion.³⁸⁷ For example, T-Mobile explains “[t]here can be no fundamental change if satellite companies can continue to serve their customers using a reduced amount of spectrum. But by the CBA’s own admission, incumbents, ‘if fairly and properly incentivized,’ satellite operations can be repacked into the upper 200 megahertz portion of the C-band ‘to enable the FCC to authorize terrestrial mobile operations without causing intolerable interference.’ The C-Band Alliance’s statement suggests that the heart of its concern is about receiving payment – not whether its members can operate as they do today using a reduced amount of spectrum.”³⁸⁸ Additionally, the Dynamic Spectrum Alliance argues that “[t]he Commission has ample authority under Section 316 to modify FSS space station licenses in the band to require that subject to certain conditions (e.g., cost reimbursement), after a reasonable transition period their authorization to transmit to earth stations with interference protection will be limited to the upper portion of the band.”³⁸⁹ And Charter agrees, stating “[t]o the extent the Commission must modify existing satellite or earth station licenses to effectuate the repurposing of the C-band, it has clear authority to do so under a statutorily-prescribed procedure.”

142. We also reject the argument that, by modifying FSS space station licenses to remove their authorization in the lower 300 megahertz, we will establish a “dangerous precedent about the FCC’s ability to unilaterally devalue existing licenses.”³⁹⁰ First, it is unlikely that our decision to modify incumbent licenses in a manner that will allow them to continue to provide service to their customers and reimburse them for all of the relocation costs associated with the transition will appreciably devalue other,

³⁸⁵ See *Mobile Relay Assocs. v. FCC*, 457 F.3d 1, 12 (D.C. Cir. 2006) (upholding the Commission’s decision not to compensate a licensee for hypothetical customer loss it might suffer as a result of rebanding).

³⁸⁶ See *NPRM*, 33 FCC Rcd at 6950, para. 111 (seeking comment on various auction proposals and “other mechanisms for transitioning all or part of the 3.7-4.2 GHz band for wireless broadband use”); *May 3 Public Notice*, 34 FCC Rcd at 2904-2907.

³⁸⁷ AT&T May 19 PN Comments at 3-4 (arguing, in the context of a private auction, that “the Commission has ample authority under Section 316 to modify the space station operators’ existing licenses to carve out portions of the C-band”); Dynamic Spectrum Alliance May 3 PN Comments at 18 (observing that “[c]hanging or reducing the frequencies used by a licensed service is a type of modification the Commission has ordered multiple times in the past and reducing the range of C-band frequencies in which space stations are guaranteed interference protection would not represent a ‘fundamental change’ in their rights, provided that satellite operators are able to continue operating essentially the same service, as the D.C. Circuit has consistently held.”); NTCA May 3 PN Comments at 4 (“The Commission has clear statutory authority to reallocate the C-band for terrestrial use and then award the resulting terrestrial licenses through a system of competitive bidding that satisfies the requirements of the Communications Act. The Commission has utilized this approach for decades to successfully repurpose a wide array of spectrum bands”); PISC May 3 PN Comments at 4-5 (“The speediest, fairest and most straightforward option consistent with the Commission’s statutory authority is a traditional forward auction that consolidates FSS incumbents into the upper portions of the band and requires auction winners to reimburse incumbents for any eligible and reasonable costs.”).

³⁸⁸ T-Mobile Jan. 24, 2020 *Ex Parte* at 6.

³⁸⁹ Dynamic Spectrum Alliance May 3 PN Comments at 17.

³⁹⁰ Letter from Elizabeth Andrion, Senior Vice President, Regulatory Affairs, Charter Communications, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 5, n.13 (filed Feb. 22, 2019) (Charter Feb. 22, 2019 *Ex Parte*). See C-Band Alliance Jan. 16 *Ex Parte* at 2; see also Small Satellite Operators Oct. 9, 2019 *Ex Parte* at 3 (“If the FCC decides that Section 316 allows it to take away licensed spectrum, without any compensation, even after significant amounts of network investment already have taken place, it will fundamentally change not just the terms of the authorizations affected—but what it means to hold an FCC license.”).

similarly situated non-exclusive licenses. According to SIA, the C-band satellite industry has been able to realize a return on their investments in the band amounting to an estimated \$340 million in revenue per year.³⁹¹ Given that incumbent space station operators will be fully reimbursed for the transition, we find that they will be able to continue to realize such returns after they transition to the upper 200 megahertz of the band, and that the actions we take here will not have a chilling effect on potential licensees going forward.

143. *Second*, by their very nature, these incumbent space station licenses are fundamentally distinct, and easily distinguishable, from the exclusive geographic terrestrial licenses that the Commission issues through competitive bidding both in the rights conferred to the licensees and the method by which they are issued. Incumbent space station licensees have non-exclusive access to the band and did not obtain their current licenses through competitive bidding. Indeed, satellite operators with grants of market access did not even have to pay an application fee to receive their license and have not obligated to pay any regulatory fees as a condition of the authorization.³⁹² Thus, unlike terrestrial licensees, incumbent space station operators have no expectation of exclusive access to a particular spectrum band and incurred no appreciable costs for use of this valuable public resource beyond investment in their own network. These clear differences are more than sufficient to distinguish incumbent space station licenses from exclusive terrestrial licenses and should reassure terrestrial licensees that their license rights will not be appreciably devalued by our actions in this order.

144. What is more, satellite licensees in this band can effectively reuse spectrum at the same terrestrial location without causing interference to overlapping transmissions. This effectively gives them more capacity than the spectrum in their licenses would provide without these techniques, and this will continue to be the case when they transition to the upper 200 megahertz of the band. Space station operators in the 3.7-4.2 GHz band are authorized to use the entire band exclusively at any orbital slot, but non-exclusively in terms of geographic coverage. Satellites operating in the C-band typically have 24 transponders, each with a bandwidth of 36 megahertz. Thus, the 24 transponders on a given satellite provide capacity that is equivalent to 864 megahertz of spectrum, or 364 megahertz more than the 500 megahertz currently available. This is the result of spectrum reuse—adjacent transponders overlap, and self-interference is avoided by using opposite polarizations. Today, multiple FSS incumbents using satellites deployed at different locations in the geostationary orbit can transmit within the same geographic boundaries over different frequencies or polarizations. After the transition, satellite operators will still be able to use the same mechanisms to effectively achieve more capacity than the spectrum in their licenses will provide. In addition, they will be able to take advantage of new technologies to improve spectral efficiency (that will be implemented and funded by the transition), such as improved data compression and modulation techniques to further improve their spectral efficiency.

145. We likewise reject the argument that a section 316 modification of FSS space station licenses to remove authorization in the lower 300 megahertz would constitute an unlawful “taking” under the Takings Clause of the U.S. Constitution.³⁹³ Commission licenses do not constitute a property right.

³⁹¹ SIA Comments at 21; *see also* Trinity Broadcasting May 16, 2019 *Ex Parte* at 5, Attach. at 9 (the current enterprise value for 500 megahertz of C-band spectrum for satellite use equals around \$1.99 billion).

³⁹² The Commission has previously declined to assess regulatory fees on non-U.S. licensed space stations, observing that the Act at the time only authorized the Commission to assess space stations “licensees,” i.e., those licensed under Title III—which does not include non-U.S.-licensed space stations. *See Assessment and Collection of Regulatory Fees for Fiscal Year 1999*, Report and Order, 14 FCC Rcd 9896, 9882, para. 39 (1999) (FY 1999 Report and Order). In 2019, however, the Commission sought comment on whether assessing non-U.S. licensed space stations would promote regulatory parity among space station operators. *See Assessment and Collection of Regulatory Fees for Fiscal Year 2019*, Report and Order and Further Notice of Proposed Rulemaking, 34 FCC Rcd 8189, 8212-14, paras. 62-66 (2019).

³⁹³ *See, e.g.*, C-Band Alliance Jan. 14 *Ex Parte* at 12. C-Band Alliance Comments at 21.

Section 301 of the Act states that Commission licenses “provide for the use of [radio] channels, but *not the ownership of*, by persons for limited periods of time.”³⁹⁴ Section 304 of the Act requires licensees to waive “any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise.”³⁹⁵ Courts have affirmed that spectrum rights are not property rights subject to the Takings Clause.³⁹⁶ The plain language of the Act makes clear that a spectrum license is just that—a license to use spectrum—not a deed of ownership.³⁹⁷ The mere existence of Section 316 authority to modify licenses, including by removing authorization to operate on certain frequencies, makes clear that a Commission license is not an absolute property right to which the Takings Clause might apply.

146. Furthermore, even if FSS space station authorizations conferred cognizable property rights, which they do not, the license modification we adopt in this *Report and Order* would not amount to a taking. A regulatory taking occurs “where a regulation denies all economically beneficial or productive use” of the property.³⁹⁸ We agree with Eutelsat, who argues that, “because C-band satellites will still have significant economic benefit for the duration of their authorizations despite the C-band transition, the potential for a regulatory taking is significantly diminished.”³⁹⁹ The U.S. Supreme Court has explained that a taking is not readily found where “interference arises from some public program adjusting the benefits and burdens of economic life to promote the common good.”⁴⁰⁰ Here, by the satellite operators’ own admission, they will be able to continue to provide service to their existing customers after the transition, and we adopt rules ensuring that incumbent FSS licensees are made whole

³⁹⁴ 47 U.S.C. § 301 (emphasis added).

³⁹⁵ 47 U.S.C. § 304; 47 CFR § 25.114(b) (requiring each application for a new or modified space station authorization to contain the formal waiver required by section 304 of the Act); *id.* § 25.137(b) (requiring all requests for U.S. market access for non-U.S.-licensed space stations to provide all the legal and technical information that § 25.114 would require in a license application for that space-station).

³⁹⁶ See, e.g., *NextWave Pers. Commc’ns, Inc.*, 200 F.3d 43, 51 (2d Cir. 1999), cert. denied, 531 U.S. 924 (2000) (citing 47 U.S.C. § 301 (the purpose of the Communications Act is to “to provide for the use of [radio] channels, but not the ownership thereof”)); *FCC v. Sanders Bros. Radio Station*, 309 U.S. 470, 475 (1940) (“[N]o person is to have anything in the nature of a property right as a result of the granting of a license [under 47 U.S.C. § 301]”); *Celtronix Telemetry, Inc. v. FCC*, 272 F.3d 585, 589 (D.C. Cir. 2001) (noting that a license does not offer a vested right and that “it is undisputed that the Commission always retained the power to alter the term of existing licenses by rulemaking.”); *Mobile Relay Assocs.*, 457 F.3d at 12 (“The Commission grants a licensee the right to ‘the use of’ the spectrum for a set period of time ‘but not the ownership thereof.’”).

³⁹⁷ The C-Band Alliance claims the Commission acknowledged that FSS operators have property rights in their licensed spectrum, by pointing to a single use of the term “property rights” in the *NPRM*. See C-Band Alliance Jan. 16, 2020 *Ex Parte* (citing *NPRM*, 33 FCC Rcd at 6936, para. 61). The C-Band Alliance is referring to the solitary use of the term “property rights” in the *NPRM*, which appears in a paragraph that describes the “public goods problem” that arises from FSS licensees’ non-exclusive, non-rivalrous use of the 500 megahertz of spectrum. The proposition that, in a single illustrative paragraph of a Notice of Proposed Rulemaking, the Commission sought to confer or recognize property rights attributable to FSS licenses—a legal right that has been carefully interpreted through years of legal precedent—is absurd. See Eutelsat Jan. 27, 2020 *Ex Parte* at 17.

³⁹⁸ See *Lucas v. South Carolina Coastal Council*, 505 U.S. 1003, 1015 (1992); *Agins v. City of Tiburon*, 447 U.S. 255, 260-61 (1980) (balancing the property owner’s economic losses and lost reasonable investment-backed expectations against the character of the government action).

³⁹⁹ Eutelsat Jan. 27, 2020 *Ex Parte* at 18.

⁴⁰⁰ *Penn Central Transportation Co. v. New York City*, 438 U.S. 104, 124 (1978) (citing *Pennsylvania Coal Co. v. Mahon*, 260 U.S. 393, 413 (1991) (“[g]overnment hardly could go on if to some extent values incident to property could not be diminished without paying for every such change in the general law”)).

for any costs they incur as a result of the transition.⁴⁰¹ Our modification of incumbent FSS licenses therefore does not amount to a taking under the U.S. Constitution.

147. *Clearing Earth Station Operations.*—Finally, the Commission’s public interest analysis for transitioning the 3.7-3.98 GHz band to flexible use and reserving the 3.98-4.0 GHz band as a guard band extends to incumbent earth stations.⁴⁰² We reiterate our finding above that earth station registrants are not licensees. The Commission issues licenses pursuant to its authority under Title III of the Act, which requires a license for “the *transmission* of energy, or communications or signals by radio.”⁴⁰³ The Commission has long concluded that, because receive-only earth stations do not transmit, they do not require a license under Section 301 of the Act. In adopting rules providing for earth station registrants to receive interference protection through voluntary coordination, the Commission has done so under its Title I ancillary authority to its “other regulatory responsibilities to maximize effective use of satellite communications” over which the Commission has express Title III authority, including its Section 301 licensing and conditioning authority and its Section 303 authority to regulate radio transmissions in various specified ways, and made clear that a receive-only earth station registration does not confer a license.⁴⁰⁴ While Section 316 governs the Commission’s modification of licenses, the Commission is not required by the Act to license receive-only earth stations and has found that it is not in the public interest to do so. We have therefore relied on our ancillary authority to administer a registration regime for these stations, which we have an ongoing responsibility to modify as appropriate to ensure that it remains consistent with our regulation in the public interest of the licensed satellite stations. As an exercise of that responsibility, we are thus modifying the earth station registrations to comport with the C-band reconfiguration we are ordering herein, by limiting the frequencies on which these earth stations may receive interference protection to the upper 200 megahertz of C-band spectrum.⁴⁰⁵

148. A relatively small number of earth stations that receive in the 3.7-4.2 GHz band are licensed to transmit in another band (i.e., licensed transmit-receive earth stations). That license to transmit does not provide the earth station operator with the right to transmit in the C-band, where they hold no “licensed spectrum usage rights.” To the extent earth stations have licenses to transmit in another band, we find that we have ample authority to propose to modify their authorizations to eliminate their interference protection rights in the lower 300 megahertz of the band, once cleared of satellite operations under our Section 316 authority.⁴⁰⁶ Like the satellite operators, this proposed modification does not effect

⁴⁰¹ C-Band Alliance Revised Transition Implementation Process at 1, 4; Eutelsat Dec. 19, 2019, *Ex Parte* at 1 (“Eutelsat agrees that, with diligent effort from all interested parties, the auction could commence in 2020, with transition milestones for the release of 100 MHz and 300 MHz of spectrum in mid-2021 and mid-2023, respectively.”); Small Satellite Operators Sept. 13, 2019 *Ex Parte*.

⁴⁰² Although the majority of C-Band earth stations in the 3.7-4.2 GHz band are receive-only registered earth stations, there are C-Band earth stations licensed to transmit in 5925-6425 MHz and receive in 3.7-4.2 GHz. *See* 47 C.F.R. 25.103 (definition of “Conventional C-band”).

⁴⁰³ 47 U.S.C. § 301 (emphasis added).

⁴⁰⁴ *Regulation of Domestic Receive-Only Satellite Earth Stations*, 74 F.C.C.2d 205, 217, para. 32 (1979); *see also* *Amendment of Part 25 of the Commission’s Rules and Regulations to Reduce Alien Carrier Interference Between Fixed-Satellites at Reduced Orbital Spacings and to Revise Application Processing Procedures For Satellite Communications Services*, Report and Order, 6 FCC Rcd 2806 (1991); *Deregulation of Domestic Receive-Only Satellite Earth Stations*, Second Report and Order, 104 F.C.C.2d 348 (1986).

⁴⁰⁵ *See, e.g.*, Dynamic Spectrum Alliance May 3 PN Comments at 11; ACA Connects Dec. 11 *Ex Parte* at 9.

⁴⁰⁶ 47 U.S.C. § 316; *see also* Dynamic Spectrum Alliance May 3 PN Comments at 11; Google May 3 PN Comments at 13; OTI May 3 PN Comments at 23-26. We agree with commenters and find—for the same basic reasons that apply to our modification of the C-band satellite operator licenses—that even if these earth stations are deemed to hold Title III licenses, the Commission’s modification of such licenses is authorized under section 316 of the Communications Act, as amended. While, for example, the Commission regulates mobile handsets owned by

(continued....)

a fundamental change because earth stations will continue to receive the same level of service (from satellite providers operating in the upper 200 megahertz of the band) and will remain able to provide the same services to their own customers as before their registration or license modification.

149. *New Earth Stations.*—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.⁴⁰⁷ Given our decision to limit FSS operations in the 3.7-4.0 GHz band in the contiguous United States but not elsewhere, we convert the freeze for new FSS earth stations in the 3.7-4.0 GHz band in the contiguous United States into an elimination of the application process for registrations and licenses for those operations, and we lift the freeze for new FSS earth stations in the 3.7-4.2 GHz band outside of the contiguous United States.

150. We revise the part 25 rules such that applications for 3.7-4.0 GHz band earth station licenses or registrations in the contiguous United States will no longer be accepted. Several commenters support permanently limiting eligibility to file applications for earth station licenses or registrations to incumbent earth stations.⁴⁰⁸ We find that limiting, as described, the registration of new earth stations in spectrum being transitioned to primary terrestrial use will provide a stable spectral environment for more intensive terrestrial use of 3.7-3.98 GHz and facilitate the rapid transition to terrestrial use.

151. With respect to registered incumbent earth stations that are transitioned to the 4.0-4.2 GHz band, we will permit these earth stations to be renewed and/or modified to maintain their operations in the 4.0-4.2 GHz band. We will not, however, accept applications for new earth stations in the 4.0-4.2 GHz portion of the band for the time being, during this transition period.

152. *New Space Station Operations.*—Consistent with our decision to continue to permit satellite operations in the upper 200 megahertz of the C-band, we modify the Commission’s proposal to revise the rules to codify the International Bureau’s June 21, 2018, freeze.⁴⁰⁹ Specifically, we revise our rules to prohibit new applications for space station licenses and new petitions for market access concerning space-to-Earth operations in the 3.7-4.0 GHz band in the contiguous United States. Outside the contiguous United States for the 3.7-4.2 GHz band and nationwide for the 4.0-4.2 GHz band, these revisions do not apply. For the contiguous United States, allowing new satellite space station applicants to claim access to the 4.0-4.2 GHz FSS band could complicate the transition process. Accordingly, we will continue the freeze on new applicants until the transition is completed, which will allow incumbent space station operators the flexibility to launch additional satellites to achieve an efficient transition to the upper portion of the band.⁴¹⁰ Once the transition is completed, the International Bureau is directed to

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subscribers of mobile services, which do transmit as well as receive, the Commission requires no license for them but considers them “included in the authorization held by the licensee providing service to them.” 47 CFR § 1.903(c).

⁴⁰⁷ See *Freeze and 90-Day Earth Station Filing Window Public Notice* at 1.

⁴⁰⁸ See, e.g., Verizon July 19 PN Reply at 6; T-Mobile October 2, 2019 *Ex Parte* at 9.

⁴⁰⁹ See *NPRM*, 33 FCC Rcd at 6931-32, para. 46 (noting International Bureau’s June 21, 2018, temporary freeze on certain new space station applications in the 3.7-4.2 GHz band, the Commission proposed to revise the rules to similarly bar new applications for space station licenses and new petitions for market access concerning space-to-Earth operations; the proposal did not extend to barring applications for extension, cancellation, replacement or modification of existing authorizations or to 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); see also C-Band Alliance April 9, 2019 *Ex Parte* at 6.

⁴¹⁰ “Incumbent space station operators” are defined in Section III.B.1 (Incumbent FSS Operations).

release a public notice announcing that the freeze is lifted.⁴¹¹

153. Several terrestrial wireless operators support limiting new space station operations as proposed by the Commission.⁴¹² Boeing opposes the proposal, and the C-Band Alliance argues that the Commission should not arbitrarily limit the ability of the FSS ecosystem to grow and evolve in response to customer demands by making the current freezes on applications for new C-band earth stations and space stations permanent.⁴¹³ The C-Band Alliance argues that permitting FSS networks to fully use the downlink spectrum that will remain available to them following clearing is the best way to promote efficient use of that spectrum and accommodate the natural development of the businesses that depend on the unique benefits of C-band satellite coverage and reliability. The C-Band Alliance anticipates that new satellite capacity will be required to implement its plans to make spectrum available for terrestrial 5G services, and this new satellite capacity will be essential to ensure that the C-Band Alliance members can meet the ongoing requirements for C-band connectivity in a more limited amount of spectrum.⁴¹⁴ We find our approach here strikes the appropriate balance between not allowing new space station applicants to claim access to the band to complicate the transition process and providing incumbent space station operators the flexibility to launch additional satellites to achieve an efficient transition to the upper portion of the band.

3. Transition Schedule

154. Consistent with the *Emerging Technologies* framework,⁴¹⁵ we find a mix of carrots and sticks best accommodates the need to clear FSS operations out of the lower 300 megahertz as quickly as possible to facilitate new terrestrial, flexible-use operations and the need to preserve the content distribution ecosystem now contained in the C-band. Given the disagreements in the record on how long the transition will take, we find that a multi-stage transition that offers both positive incentives to operators for clearing early as well as negative incentives for operators that fail to clear by the end of the sunset period will best serve these goals.

155. We establish a Relocation Deadline of September 30, 2025 to ensure that all FSS operations are cleared in a timely manner, as well as two Accelerated Relocation Deadlines—a Phase I deadline of September 30, 2021 and a Phase II deadline of September 30, 2023—for incumbent space station operators that voluntarily relocate on an accelerated schedule (with additional obligations and incentives for such operators). And we set forth the consequences for meeting or failing to meet these deadlines.

156. In the *NPRM*, we sought comment on reasonable benchmarks for incumbent space station operators to clear and make C-band spectrum available for flexible use to ensure a timely transition process.⁴¹⁶ Recognizing that spectrum likely would be cleared incrementally over the course of the full clearing process, we sought comment on appropriate periodic reporting requirements, as well as any procedural safeguards or penalties that may be necessary if the transition facilitator is unable to clear the

⁴¹¹ See 5 U.S.C. § 553(b)(B), (d)(3).

⁴¹² CTIA Comments at 16; Verizon Comments at 12.

⁴¹³ Boeing Comments at 6-7; C-Band Alliance Comments at 54-55.

⁴¹⁴ C-Band Alliance Comments at 54.

⁴¹⁵ *Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies*, ET Docket No. 92-9, First Report and Order and Third Notice of Proposed Rulemaking, 7 FCC Rcd 6886 (1992) (*Emerging Technologies Order*), clarified by Third Report and Order, 8 FCC Rcd 6589 (1993), modified on reconsideration, Memorandum Report and Order, 9 FCC Rcd 1943 (1994)

⁴¹⁶ *NPRM*, 33 FCC Rcd at 6945-46, paras. 93-97.

spectrum within the designated clearing time period.⁴¹⁷

157. The record is divided on how long it will take to clear the lower 300 megahertz for terrestrial operations and relocate incumbent space station operators and incumbent earth stations to the upper 200 megahertz. In the context of proposing a private sale, the C-Band Alliance states that it could clear and repack enough satellite transponders to make 280 megahertz of spectrum available for 5G use in the contiguous United States within 36 months of such an auction in a two-step process. First, within 18 months of Commission action in this proceeding, the C-Band Alliance would be able to clear 120 megahertz in 46 of the top 50 PEAs.⁴¹⁸ The C-Band Alliance claims it could achieve this benchmark without the need to launch new satellites. To achieve this, the C-Band Alliance proposes to provide passband filters to all earth stations that potentially may be affected by wireless terrestrial operations anywhere within the PEA, including earth stations that are outside of, but near enough to, the PEA to experience harmful interference.⁴¹⁹ Second, within 36 months of its private sale, the C-Band Alliance would be able to clear the remaining PEAs for the first 120 megahertz, as well as an additional 180 megahertz throughout the contiguous United States.⁴²⁰ Satellite operators that are not members of the C-Band Alliance support a rapid transition of C-band spectrum and have put forth similar transition timelines to those proposed by the C-Band Alliance.⁴²¹ Eutelsat supports the 18- and 36-month timelines proposed by the C-Band Alliance, and states that, with diligent effort from all interested parties, an auction could commence in 2020, with transition milestones for the release of 100 megahertz and 300 megahertz of spectrum for flexible use in mid-2021 and mid-2023, respectively.⁴²² The Small Satellite Operators agree that 300 megahertz of C-band spectrum could be made available for 5G within 18 to 36 months through the use of non-proprietary, readily available compression technology.⁴²³ And other commenters agree that the proposed 18-month and 36-month timelines are attainable if all stakeholders' incentives are properly aligned.⁴²⁴

158. Some commenters express skepticism that a transition of FSS operations can be accomplished under the timelines proposed by the C-Band Alliance.⁴²⁵ ACA Connects and the

⁴¹⁷ *NPRM*, 33 FCC Rcd at 6945-46, paras. 96-97.

⁴¹⁸ See C-Band Alliance Oct. 28, 2019 *Ex Parte*; C-Band Alliance Revised Transition Implementation Process at 5. This tranche excludes the Baltimore-Washington, Atlanta, and Denver PEAs (PEAs 5, 11 and 20) due to the need to protect Telemetry, Tracking, and Command (TT&C) sites and the Honolulu PEA (PEA 42) because continued service will be provided in Hawaii across the 3700-4200 MHz band. See C-Band Alliance May 21 *Ex Parte*, attach. at 3.

⁴¹⁹ C-Band Alliance Revised Transition Implementation Process at 5; C-Band Alliance Apr. 9, 2019 *Ex Parte*, Attach. at 9-10.

⁴²⁰ See C-Band Alliance Revised Transition Implementation Process at 6; C-Band Alliance Apr. 9, 2019 *Ex Parte*, Attach. at 9-10.

⁴²¹ See, e.g., Eutelsat Nov. 7 *Ex Parte* at 1; Small Satellite Operators Sept. 13 *Ex Parte* at 1.

⁴²² Eutelsat Dec. 19 *Ex Parte* at 1; Eutelsat Nov. 7 *Ex Parte* at 1.

⁴²³ Small Satellite Operators Sept. 13 *Ex Parte* at 1.

⁴²⁴ Letter from William H. Johnson, Senior Vice President, Federal Regulatory and Legal Affairs, Verizon, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Nov. 18, 2019); AT&T et al. Oct. 29, 2019 *Ex Parte* at 2; Comcast Nov. 19 *Ex Parte* at 12-13 (a public auction “can proceed quickly enough to enable the deployment of 5G services in the repurposed portion of the C-Band on a timeframe commensurate with [the C-Band Alliance’s] projections”); Charter Feb. 22 *Ex Parte* at 2; Comcast Feb. 22 *Ex Parte* Attach. at 5; Verizon Dec. 19 *Ex Parte* at 1; Verizon Nov. 26 *Ex Parte* at 1.

⁴²⁵ See, e.g., Comcast Reply at 13-14; Paul Litchfield Reply at 46-52; NCTA Reply at 18; T-Mobile Reply at 22; Broadband Access Coalition Comments at 34; GCI Comments at 19; CB2.0 Reply at 5.

Broadband Access Coalition, for instance, argue that the timeframe advanced by the C-Band Alliance is unrealistic.⁴²⁶ ACA Connects argues that the “sheer complexity of the transition” entails “many considerable risks of delay at each stage” that could cause it to take as long as five years.⁴²⁷ Likewise, GCI contends that, although some parts of the contiguous United States may be transitioned in a shorter time, rural areas will need more time to relocate and should be given five years for the relocation period.⁴²⁸ Meanwhile, users of FSS services like broadcasters and NAB simply caution that the transition will be “enorm[ous] and complex[.]”⁴²⁹

159. Given that the members of the C-Band Alliance and Eutelsat manage most of the C-band satellite traffic today and are the most knowledgeable parties about their operations in the C-band, we are inclined to give the C-Band Alliance and Eutelsat the opportunity to make good on their claims that they can relocate existing C-band operations into the upper 200 megahertz quickly and to provide incentives for them to do so. We nonetheless recognize that the transition may take longer than the C-Band Alliance and Eutelsat claimed was necessary as a technical matter. Given the reasoned skepticism of many in the record and our own agreement with commenters that this transition will be an enormous and complex task, we adopt a somewhat longer Relocation Deadline of five years to ensure the protection of incumbent earth stations should the transition take longer than the C-Band Alliance has forecast.⁴³⁰

160. Specifically, we conclude that a Relocation Deadline of September 30, 2025 is in the public interest. In particular, we find that the September 30, 2025 transition date strikes a fair and appropriate balance between bringing C-band spectrum to market and ensuring satellite operators, earth station operators, and other stakeholders have the necessary time to complete this transition in a careful, fair, and cost-effective manner. This date ensures this spectrum will be made available for flexible use as, while guaranteeing that vital television and radio services currently provided using the C-band will continue operating without interruption, both during and after the transition.

161. FSS operations in the C-band are critical to the delivery of television and radio programming, as well as many other services, for tens of millions of Americans, and it is in the public interest to ensure that these services are not disrupted. Given this, it is in the public interest to avoid sunsetting FSS operations before all services can be transitioned fully out of this part of the band. And we find that, even with the uncertainties in the record, a transition period through September 30, 2025 will be sufficient to ensure continued operations throughout the contiguous United States and the relocation of stations to the upper 200 megahertz of the band.

162. In setting the Relocation Deadline, we must also account for the costs to the American public from delays in freeing up this important mid-band spectrum for terrestrial use, including for 5G. The C-Band Alliance itself has claimed that “[e]ach year of [delaying the deployment of C-band spectrum for flexible use] is value lost forever—here, about \$50 billion or more per year in consumer surplus.”⁴³¹ Whatever the merits of that particular valuation, we agree that delaying the transition of this spectrum longer than necessary will have significant negative effects for the American consumer and American leadership in 5G. We thus find that because a 2025 deadline is sufficient to relocate existing FSS

⁴²⁶ Letter from Brian Hurley, Vice President of Regulatory Affairs, ACA Connects, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 1-2, Attach. at 4-5 (filed Nov. 15, 2019) (ACA Connects Nov. 15, 2019 *Ex Parte*).; Broadband Access Coalition Comments at 34.

⁴²⁷ ACA Connects Nov. 15 *Ex Parte* Attach. at 5.

⁴²⁸ GCI Comments at 19; *see* CB2.0 Reply at 5.

⁴²⁹ ABC et al., Nov. 22 *Ex Parte* at 1-2 (*citing* NAB Nov. 19 *Ex Parte* at 1).

⁴³⁰ *See, e.g.*, Paul Litchfield Reply at 46-52; NCTA Reply at 18; T-Mobile Reply at 22; Broadband Access Coalition Comments at 34; GCI Comments at 19; CB2.0 Reply at 5.

⁴³¹ C-Band Alliance Jan. 14 *Ex Parte* at 1.

operations, it is imperative we set the Relocation Deadline no later than 2025 so that we do not delay the use of this valuable public resource any longer than necessary.

163. We note that a five-year Relocation Deadline is wholly consistent with our precedent and past spectrum transitions. The Commission has overseen several complex transitions in other bands, involving thousands of authorized entities with diverse operational needs, customer bases, and technical requirements.⁴³² Recent transition timelines have been as short as 39 months—such as in the Broadcast Incentive Auction⁴³³—or longer than fourteen years—as in the 800 MHz transition.⁴³⁴

164. In the *800 MHz Order*, the Commission repacked portions of the 800 MHz band to address a growing problem of harmful interference to 800 MHz public safety communication systems caused by the inherent incompatibility of those system with high-density commercial wireless systems when situated in an increasingly congested, interleaved spectral environment.⁴³⁵ The 800 MHz repack has taken over fourteen years to complete, due to the need to ensure public safety transmissions are not disrupted. In contrast, we expect the transition after the Broadcast Incentive Auction, which involves repacking full power and Class A television broadcast facilities, will take only 39 months. The Broadcast Incentive Auction, authorized by Congress,⁴³⁶ sought to reallocate spectrum used by TV broadcasters in order to provide new spectrum to be used for next generation wireless services.⁴³⁷ TV broadcasters, who previously used portions of spectrum above Channel 37, ranging from the 614 MHz to 698 MHz, were assigned to a channel ranging from Channel 2 to Channel 36, consisting of the VHF low band (between Channel 2 and Channel 6), the VHF high band (between Channel 7 and 13), and the UHF band (between Channel 14 and 36).⁴³⁸ Additionally, some TV broadcasters operating in channels below Channel 37 were relocated to other channels below Channel 37.

165. We see this transition as more analogous to the Broadcast Incentive Auction repacking than it is to the 800 MHz transition. Here, unlike the 800 MHz transition, public safety services are not at stake and—although incumbent operations will be protected throughout the transition—moving FSS transmissions will not require the careful incremental adjustments required in the 800 MHz repack.⁴³⁹ As

⁴³² See, e.g., *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Report and Order, 29 FCC Rcd 6567 (2014); *Improving Public Safety Communications in the 800 MHz Band et al.*, WT Docket 02-55 et al., Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order, and Order, 19 FCC Rcd 14969 (2004).

⁴³³ *Incentive Auction Task Force Media Bureau Report on the Status of the Post-Incentive Auction Transition & Reimbursement Program et al.*, GN Docket No. 12-268, Public Notice, 34 FCC Rcd 304, 304 (2019).

⁴³⁴ *Improving Public Safety Communications in the 800 MHz Band*, WT Docket No. 02-55, Order and Sixth Further Notice of Proposed Rulemaking, 19 FCC Rcd 108 at 12 (2019).

⁴³⁵ *Improving Public Safety Communications in the 800 MHz Band et al.*, WT Docket No. 02-55, Report and Order et al., 19 FCC Rcd 14969 (2004) (*800 MHz Order*).

⁴³⁶ See Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, §§ 6402, 6403, 125 Stat. 156 (2012) (Spectrum Act).

⁴³⁷ *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Docket No. 12-268, Notice of Proposed Rulemaking, 31 FCC Rcd 888 at 3 (2012).

⁴³⁸ FCC, *Wireless Microphones and the Post-Incentive Auction Transition*, <https://www.fcc.gov/about-fcc/fcc-initiatives/broadcast-incentive-auction/wireless-microphones-and-post-incentive> (last visited Feb. 2, 2020).

⁴³⁹ For example, the 800 MHz repack required the incremental movement of operations related to public safety. Because public safety operations generally cannot be disrupted without causing unacceptable risk to the public, and because the public safety licensees in that band had no alternative space where the transmissions could be simultaneously operated, the public safety transmissions in the 800 MHz band had to be carefully and incrementally moved to ensure there was no disruption to services vital to preserving life and property. *Improving Spectrum Efficiency Through Flexible Channel Spacing and Bandwidth Utilization for Economic Area-based 800 MHz*

(continued....)

a result, repacking FSS transmission will not need as much time as has been needed for the repack of the 800 MHz band. However, we also believe that the C-band transition may take longer than the Broadcast Incentive Auction, as this transition will involve a variety of different and complex elements that may require a longer transition timeline. For example, the transition here will likely require the design, construction, launch, and deployment of additional new satellites. Additionally, that transition involved only 987 TV licenses and not communications and coordination among and reimbursement to thousands of satellite and earth station stakeholders.

166. Despite having claimed it can complete the transition in three years, the C-Band Alliance has recently suggested that Commission precedent could require a 10-year (or greater) deadline for relocation under the *Emerging Technologies* precedent.⁴⁴⁰ We disagree. We acknowledge that the Commission can and has set a 10-year deadline before, for example, when it relied on the *Emerging Technologies* framework to transition terrestrial fixed service licensees relocating from the 18.58-18.8 GHz and 18.8-19.3 GHz bands, to the 17.7-18.3 GHz band, in addition to allowing operations in the 18.3-18.58 GHz and 19.3-19.7 GHz bands on a co-primary basis.⁴⁴¹ But in doing so, the Commission expressly found that, based on the circumstances before it, ten years was “an appropriate compromise that will allow these systems to continue to operate in these bands, while giving FSS interests the option to pay the cost of relocating such systems if FSS interests want to deploy operations in those areas.”⁴⁴² But we agree with T-Mobile: Just because the Commission determined a ten-year transition was appropriate under one set of facts “does not mean that a ten-year sunset period is appropriate or necessary for clearing the C-band.”⁴⁴³

167. *Accelerated Relocation.*—We also adopt two Accelerated Relocation Deadlines—a Phase I deadline of September 30, 2021 and a Phase II deadline of September 30, 2023—for incumbent space station operators that voluntarily relocate on an accelerated schedule (with additional obligations and incentives for such operators). The Commission will provide an opportunity for accelerated clearing by satellite operators by making them eligible for accelerated relocation payments, if those satellite operators are able to meet certain early clearance benchmarks for the band.⁴⁴⁴

168. We also find that adopting rules to provide for Accelerated Relocation Deadlines, with incentives for eligible space station operators that voluntarily relocate according to an accelerated schedule, will promote the rapid introduction of a significant tranche of C-band spectrum by leveraging the technical and operational knowledge of satellite operators, aligning their incentives to achieve a timely transition, and enabling that transition to begin as quickly as possible. It is undisputed in the record that eligible C-band space station operators are in a unique position to quickly clear a significant portion of this band spectrally by using satellite grooming to repack existing services into the upper portion of the band. Thus, under this scenario, the clearing process would begin much sooner and

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Specialized Mobile Radio Licensees et al., WT Docket No. 12-64, et al., Report and Order, 27 FCC Rcd 6489 (2012).

⁴⁴⁰ C-Band Alliance Jan. 16, 2020 *Ex Parte*, Attach. A at 7-8.

⁴⁴¹ *Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use*, Report and Order, 15 FCC Rcd 13430, paras. 4, 70 (2002).

⁴⁴² *Id.*

⁴⁴³ T-Mobile Jan. 24, 2020 *Ex Parte* at 3.

⁴⁴⁴ Eligible space station operators will have the option to clear according to the following accelerated clearing timeline: (1) clearing 120 megahertz (3.7-3.82 GHz) by September 30, 2021, and (2) clearing the remaining 180 megahertz (3.82-4.0 GHz) by September 30, 2023.

proceed at a more rapid pace in the years following release of this *Report and Order* than if we relied on the September 30, 2025 sunset date as the sole means of incentivizing satellite operators to make C-band spectrum available for flexible use.

169. Specifically, eligible space station operators will have the option to clear according to the following accelerated clearing timeline: (1) clearing 100 megahertz (3.7-3.8 GHz) by September 30, 2021, and (2) clearing the remaining 180 megahertz (3.8-3.98 GHz) by September 30, 2023.⁴⁴⁵ To satisfy the early clearing benchmarks, satellite operators would be required to clear an additional 20 megahertz by the end of the clearing period to be used as a guard band to protect FSS users that will continue to operate in the upper portion of the band.⁴⁴⁶

170. In order to satisfy the Phase I Accelerated Relocation Deadline, a satellite operator must repack any existing services and relocate associated incumbent earth stations throughout the contiguous United States into the upper 380 megahertz of the C-band (3820-4200 MHz) and must also provide passband filters to block signals from the 3700-3820 MHz band on associated incumbent earth stations in 46 of the top 50 PEAs by September 30, 2021.⁴⁴⁷ To satisfy the Phase II Accelerated Relocation Deadline, a satellite operator must repack any existing service and relocate associated incumbent earth stations throughout the contiguous United States into the upper 200 megahertz of the C-band (4.0-4.2 GHz), and provide passband filters to block signals from the 3700-4000 MHz band on all associated incumbent earth stations in the contiguous United States by September 30, 2023.

171. As discussed below, a satellite operator must coordinate with relevant earth station operators to perform any necessary system modifications, repointing, or retuning to receive transmissions that have been migrated to frequencies on new transponders or satellites, and must ensure that any incumbent earth stations currently receiving in the bottom 300 megahertz are able to continue receiving those services once they are transitioned to the upper portion of the band.

172. *Payments and Penalties Related to the Deadlines.*—Incumbent space station and earth station operators that clear their existing services from the lower 300 megahertz by the Relocation Deadline shall be eligible for reimbursement of their reasonable costs to transition.

173. In addition to reimbursement for their relocation costs, incumbent space station operators that satisfy the Accelerated Relocation Deadlines shall be eligible to receive an Accelerated Relocation Payment. A satellite operator that avails itself of the Accelerated Relocation Payment for satisfying the Phase I Accelerated Relocation Deadline must also complete the transition of the full 300 megahertz by the Phase II clearing deadline. If such a satellite operator fails to satisfy the Phase II deadline, in addition to being ineligible for the Phase II Accelerated Relocation Payment, it will be required to return the full sum of the Phase I Accelerated Relocation Payment it received at the September 30, 2021 deadline.

174. Space station operators that fail to clear their existing services from the lower 300 megahertz by the final Relocation Deadline will not receive reimbursement for their reasonable relocation costs or any additional Accelerated Relocation Payments, and will also be subject to penalties for their

⁴⁴⁵ These dates approximate the 18- and 36-month benchmarks in the record. The C-Band Alliance proposed that the 18-month benchmark should run from the date of this *Report and Order* and that the 36-month benchmark should run from the date of the auction of flexible-use licenses. In an effort to remove uncertainty about when the benchmarks will take effect, we have elected to set concrete dates that mirror the proposed timelines but are independent of other triggering events.

⁴⁴⁶ The relevant guard bands would be 3.8-3.82 GHz for the September 30, 2021 deadline, and 3.98-4.0 GHz for the September 30, 2023 deadline.

⁴⁴⁷ PEAs 1-50, except Washington-Baltimore (5), Atlanta (11), Denver (20), and Honolulu (42). See C-Band Alliance Oct. 28, 2019 throughout the contiguous United States into the upper 200 megahertz of the C-band (4.0-4.2 GHz) *Ex Parte*; C-Band Alliance Revised Transition Implementation Process at 5.

failure to timely clear. Radio transmissions must be authorized by the FCC pursuant to Section 301,⁴⁴⁸ and transmissions sent by satellite operators after the Relocation Deadline established above would be unauthorized and a violation of Section 301. Unauthorized transmissions by incumbent space station operators in violation of Section 301 can result in the imposition of sanctions by the FCC on such operators, including forfeiture penalties.⁴⁴⁹ Thus, after the Relocation Deadline, a satellite operator which continues to operate in the 3.7-4.0 GHz band with the willful purpose of transmitting to earth stations within the contiguous United States, both registered and unregistered, would be “operat[ing] without an instrument of authorization for the service” and potentially subject to forfeitures and other sanctions.⁴⁵⁰

175. While we will review any potential violations on a case-by-case basis, unauthorized satellite transmissions to earth stations could result in forfeitures based on each unauthorized satellite operation, each unauthorized earth station operation, or each day of unauthorized operation of such satellites and earth stations. There are approximately 20,000 registered earth stations in the contiguous U.S., and some satellite operators—some of who transmit from multiple satellites—transmit to thousands of earth stations in the contiguous U.S. A satellite operator operating in violation of its authorization could be assessed a separate violation on a daily basis for each earth station to which they willfully transmit and for each satellite from which the unauthorized transmission is sent. Alternatively, we may consider each discrete transmission between a satellite and earth station a violation, resulting in a penalty for each of those unauthorized transmissions. Operation without an instrument of authorization for the service carries a base forfeiture of \$10,000 per violation.⁴⁵¹

176. The Commission’s rules allow it to adjust forfeiture penalties upward according to a set of criteria.⁴⁵² Specifically, in exercising our forfeiture authority, we must consider the “nature, circumstances, extent, and gravity of the violation and, with respect to the violator, the degree of culpability, any history of prior offenses, ability to pay, and such other matters as justice may require.”⁴⁵³ In addition, the Commission has established forfeiture guidelines, under which we may adjust a forfeiture upward for violations that are egregious, intentional, or repeated, or that cause substantial harm or generate substantial economic gain for the violator.⁴⁵⁴ Thus, we could potentially upwardly adjust the forfeiture penalties for satellite operators if we found that a satellite operator’s misconduct merited an increase in penalties.

4. Relocation and Accelerated Relocation Payments

177. Under the framework we adopt to facilitate a public auction of 280 megahertz of C-band spectrum, new overlay licensees must pay their share of relocation and accelerated relocation payments to reimburse incumbents for the reasonable costs of transitioning out of the lower 300 megahertz of the C-band in the contiguous United States. In this section, we explain our authority to require such payments, explain what relocation costs are compensable, estimate the total relocation payments, establish the accelerated relocation payments available to incumbent space stations that elect for an accelerated transition and meet those deadlines, and explain what share of the costs each overlay licensee will bear.

178. *Authority to Require Payments.*—We find that incumbent space station operators and

⁴⁴⁸ 47 U.S.C. § 301

⁴⁴⁹ 47 U.S.C. § 503; 47 CFR § 1.80. The forfeiture penalties discussed here are separate from and in addition to any other penalties discussed herein, including without limitation any requirement to repay relocation funding.

⁴⁵⁰ 47 CFR § 1.80 Section I.

⁴⁵¹ 47 CFR § 1.80 Section I.

⁴⁵² 47 U.S.C. § 503(b)(2)(E); 47 CFR § 1.80 Section II.

⁴⁵³ 47 U.S.C. § 503(b)(2)(E).

⁴⁵⁴ *Id.*

incumbent earth station operators that must transition existing services to the upper portion of the band should be compensated for the costs of that transition. Because winning bidders will benefit from use of the spectrum, the Commission will condition their licenses on making all necessary relocation and accelerated relocation payments before they are allowed to deploy in the spectrum made available for flexible use.

179. The Commission's broad spectrum management and licensing authority under section 303 provides it with the ability to "[m]ake such rules and regulations and prescribe such restrictions and conditions, not inconsistent with law, as may be necessary to carry out the provisions of this [Act.]"⁴⁵⁵ The Commission has repeatedly used this authority to impose conditions on new licensees, including buildout conditions, public safety obligations, and obligations to facilitate the transition of incumbents out of the spectrum at issue before commencing operations.

180. The Commission's authority to require new licensees to make relocation payments to incumbents is well established. Starting in 1992, the Commission adopted a series of rules (known as the *Emerging Technologies* framework) to enable new licensees to enter into voluntary or mandatory negotiations with incumbent operators to clear a spectrum band after which, failing an agreement, the new entrant could involuntarily clear incumbent operations by expressing its intent to commence operations in that band and paying for all reasonable relocation costs.⁴⁵⁶ For example, in 2000, the Commission, recognizing that new licensees in a band might be unable to design their systems to avoid interference from incumbent stations, adopted a relocation reimbursement process to "afford[] reasonable flexibility" for those new licensees "to roll out their operations in a timely and economic manner."⁴⁵⁷ Similarly, in 2006, the Commission established procedures for the relocation of Broadband Radio Service and Fixed Microwave Service operation and further adopted cost-sharing rules to identify the reimbursement obligations for new entrants benefitting from the relocation of those incumbent services.⁴⁵⁸

181. Notably, the Commission has taken a flexible approach in applying the *Emerging Technology* framework, tailoring the particular obligations on incumbents and new licensees to suit the circumstances. And so, for example, the Commission has imposed cost-sharing obligations on incoming licensees to insure that relocation expenses would be borne by all new licensees that would benefit from such clearing—even if one such licensee were to take lead in working with incumbents to facilitate speedier clearing.⁴⁵⁹ Indeed, in 2013, the Commission adopted a cost-sharing mechanism for winning

⁴⁵⁵ 47 U.S.C. § 303(r). See also 47 U.S.C. § 154(i) (authorizing Commission to "perform any and all acts, make such rules and regulations, and issue such orders, not inconsistent with this chapter, as may be necessary in the execution of its functions").

⁴⁵⁶ See, e.g., *Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies*, ET Docket No. 92-9, First Report and Order and Third Notice of Proposed Rulemaking, 7 FCC Rcd 6886 (1992) (*Emerging Technologies Order*), clarified by Third Report and Order, 8 FCC Rcd 6589 (1993), modified on reconsideration, Memorandum Report and Order, 9 FCC Rcd 1943 (1994).

⁴⁵⁷ *Redesignation of the 17.7-19.7 GHz Frequency Band*, IB Docket No. 98-172, Report and Order, 15 FCC Rcd 13430, 13467, para. 76 (2000) (*18 GHz Order*).

⁴⁵⁸ *Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services*, ET Docket No. 00-258, Ninth Report and Order, 21 FCC Rcd 4473, 4478, para. 8 & n.24 (2006) (*3 GHz R&O*).

⁴⁵⁹ See, e.g., *3 GHz R&O*, 21 FCC Rcd at 4513-14, para. 74 (requiring new licensees to reimburse incumbents for voluntarily relocating from a band and providing that new licensees will be entitled to *pro rata* cost sharing from other new licensees that also benefitted from the incumbents' self-relocation).

bidders to reimburse the entities that had previously cleared incumbents from the band.⁴⁶⁰

182. Courts have upheld the Commission's use of this authority. In 1996, the D.C. Circuit Court of Appeals upheld the Commission's repeal of an exemption, which had previously shielded public safety licensees from a relocation regime in which new licensees would pay all costs associated with relocating incumbents to comparable facilities.⁴⁶¹ The court found that the Commission had "adequately articulated a *reasoned* analysis based on studies and comments submitted during the rulemaking process" that justified its decision to require all incumbent licensees, including public safety licensees, to mandatory relocation.⁴⁶² In the 2001 *Teledesic* case, the D.C. Circuit, in affirming the Commission's authority to adopt such relocation compensation mechanisms, noted that the Commission's "consistent policy has been to prevent new spectrum users from leaving displaced incumbents with a sum of money too small to allow them to resume their operations at a new location."⁴⁶³ The court observed that it previously had approved aspects of a similar relocation scheme, in a decision upholding the elimination of an exemption for public safety incumbents from a relocation regime in which new licensees would pay all costs associated with relocating incumbents to comparable facilities.⁴⁶⁴

183. That same authority also allows the Commission to require overlay licensees to make accelerated relocation payments—payments designed to expedite a relocation of incumbents from a band. We start again with the *Emerging Technologies* framework, in which the Commission expressly allowed new licensees to make relocation payments separate and above relocation expenses "as an incentive to the incumbent to locate quickly."⁴⁶⁵ For example, in reallocating certain bands for PCS operations in the 1990s, the Commission provided that incoming licensees could offer "premium payments or superior facilities, as an incentive to the incumbent to relocate quickly."⁴⁶⁶ Ten years later, the Commission expressly authorized incentive payments to incumbent operators to expedite clearing.⁴⁶⁷ In those transitions, the Commission found that such acceleration agreements not only benefitted both entrants and incumbents, but, more importantly, served the public interest by significantly expediting transitions to flexible use.

184. Given the significant public interest benefits of clearing terrestrial, mid-band spectrum more quickly, which would bring next-generation services like 5G to the American public years earlier and help assure American leadership in the 5G ecosystem, we find that requiring overlay licensees to make accelerated relocations is in the public interest. We start by noting the significant benefits of accelerating a transition of this spectrum. Studies in the record indicate that licensing mid-band spectrum will lead to substantial economic gains.⁴⁶⁸ Economist Jeffrey Eisenach points to "consumer welfare gains

⁴⁶⁰ *Service Rules for Advanced Wireless Services H Block—Implementing Section 6401 of the Middle Class Tax Relief and Job Creation Act of 2012 Related to the 1915-1920 MHz and 1995-2000 MHz Bands*, WT Docket No. 12-357, Report and Order, 28 FCC Rcd 9483, 9548, para. 167 (2013) (*H Block Report and Order*).

⁴⁶¹ *Ass'n of Public Safety Communications Officials-Int'l, Inc. v. FCC*, 76 F.3d 395, 397, 400 (D.C. Cir. 1996).

⁴⁶² *Ass'n of Public Safety Communications Officials-Int'l, Inc. v. FCC*, 76 F.3d at 400.

⁴⁶³ *Teledesic LLC v. FCC*, 275 F.3d 75, 84-86 (D.C. Cir. 2001).

⁴⁶⁴ *Teledesic*, 275 F.3d at 86.

⁴⁶⁵ *See, e.g., Amendment of Part 90*, 11 FCC Rcd 1463 at para. 77 (1995).

⁴⁶⁶ *Amendment to the Commission's Rules Regarding a Plan for Sharing the Costs of Microwave Relocation*, WT Docket No. 95-157, Notice of Proposed Rulemaking, 11 FCC Rcd 1923, 1927-28, para. 7 (1995) (citing *Emerging Technologies Third R&O*, 8 FCC Rcd 6589 (1994)).

⁴⁶⁷ *See 3 GHz R&O*, 21 FCC Rcd 4473 (2006) (following PCS model and allowing premium payments to expedite incumbent clearing).

⁴⁶⁸ *See, e.g., Letter from Gregory M. Romano, Vice President, Federal Regulatory and Legal Affairs, Verizon, to Marlene H. Dortch, Secretary, FCC*, at 1 (filed Oct. 9, 2019) ("One recent report concluded that licensing 400

(continued....)

from rapid allocation of C-band spectrum to mobile broadband carriers,” and he estimates that the “annual increase in consumer surplus is approximately equal to the total amount paid by the purchasers.”⁴⁶⁹ Eisenach also notes that “for every year of delay” in making the C-band spectrum available, “consumer welfare is reduced by \$15 billion.”⁴⁷⁰ Similarly, Coleman Bazelon estimates that just one year of delay in transitioning the spectrum would reduce the value of repurposing the C-band by between 7% and 11%.⁴⁷¹ Noting that the “economic value of spectrum is only a fraction of its total social value, the Brattle Group notes that “every \$1 billion in delay costs would create total social costs of \$10 billion to \$20 billion.”⁴⁷² These studies underscore the importance of incentivizing incumbents to clear the band for 5G use as quickly as possible.

185. Next, we find that simply allowing overlay licensees to negotiate with incumbent space station operators and incumbent earth station operators for an expedited departure from the band likely would prove ineffective in ensuring a speedy transition. *First*, incumbent space station operators face holdout problems. The complex nature of spectrum-sharing in the band (including the non-exclusive, non-terrestrially-bound, full-band, full-arc transmission rights held by each incumbent space station operator) poses one hurdle, since persuading a single operator to accelerate relocation may have no impact on expedited clearing of the band because other operators have not relocated (for example, a single incumbent earth station operator may have multiple earth stations clustered together, each pointing at a different satellite owned by a different incumbent space station operator). Because of this regulatory structure, each incumbent space station operator has strong incentives to holdout to extract a disproportionate premium for its participation.⁴⁷³ *Second*, overlay licensees face free rider problems. If one flexible-use licensee pays to clear a single PEA (let alone the contiguous United States), other licensees could benefit significantly from the clearing without paying their fair share. *Third*, numerous coordination problems exist. Transitioning the C-band satellite ecosystem to the upper part of the band will require communication and coordination with a large and diverse group of entities with different interests, including multiple incumbent space station operators and thousands of incumbent earth stations. *Fourth*, to meet the clearing deadlines set by the Commission and, in so doing, maximize the economic and social benefits of providing spectrum for next generation wireless services, satellite operators will need to begin the clearing process immediately. To accomplish an early transition via negotiation, however, the satellite licensees would need to know the identities of each of the overlay licensees in the band and those will not be known until after the completion of the auction, sometime in 2021. Thus,

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megahertz of new mid-band spectrum would lead to more than \$154 billion on infrastructure spending, 1.3 million new jobs, and \$274 billion added to America’s GDP.”) (citing David Sosa and Greg Rafert, *The Economic Impacts of Reallocating Mid-Band Spectrum to 5G in the United States*, Analysis Group, at 1 (Feb. 2019), https://www.analysisgroup.com/globalassets/uploadedfiles/content/news_and_events/news/sosa-rafert-economicimpacts-of-reallocating-mid-band-spectrum-to-5g-1.pdf).

⁴⁶⁹ C-Band Alliance Reply, Attach., Jeffrey Eisenach Decl. at 15, para. 29 (filed Dec. 7, 2018) (emphasis in original) (Eisenach Decl.) (citing Thomas W. Hazlett and Roberto E. Muñoz, “A Welfare Analysis of Spectrum Allocation Policies,” RAND Journal of Economics 40;3 (2009) 424-454).

⁴⁷⁰ Eisenach Decl. at 16, para. 15.

⁴⁷¹ Intel Corp., Intelsat License LLC and SES Americom, Inc. Comments, App. A, Coleman Bazelon, *Maximizing the Value of the C-Band: Comments on the FCC’s NPRM to Transition C-Band Spectrum to Terrestrial Uses*, Brattle Group, at 27 (filed Oct. 29, 2018) (Brattle Group Report).

⁴⁷² Brattle Group Report at 27 & n.72

⁴⁷³ See, e.g., 47 CFR § 101.73(b) (in evaluating claims that a party has not negotiated in good faith, the FCC will consider, *inter alia*, whether the incumbent “has demanded a premium, the type of premium requested (e.g., whether the premium is directly related to relocation, such as system-wide relocations and analog-to-digital conversions, versus other types of premiums), and whether the value of the premium as compared to the cost of providing comparable facilities is disproportionate (i.e., whether there is a lack of proportion or relation between the two)).

individual negotiations between licensees are incompatible with the clearing deadlines established by the Commission.

186. Based on the unique circumstances of the band, we therefore find it necessary, consistent with the *Emerging Technologies* framework, to condition new licenses on making acceleration payments to satellite incumbents that voluntarily choose to clear the band on an expedited schedule. Like relocation payments, we find that requiring such mandatory payments is both in the public interest and within our Title III authority.

187. We find our decision to require new terrestrial licensees to pay relocation costs is broadly supported by the record. Commenters overwhelmingly urge us to require new licensees to reimburse incumbents' costs to clear the band for flexible use.⁴⁷⁴ OTI argues that such an approach would provide for a "speedy and straightforward reorganization of the band within [the Commission's] existing legal authority."⁴⁷⁵ The Public Interest Spectrum Coalition points out that there is "is strong precedent to support license conditions that require winning bidders to share the costs of relocating FSS incumbents."⁴⁷⁶ Charter argues that the Commission "has ample authority to ensure that this process adequately compensates incumbent space station providers and earth station licensees in order to allow for the efficient repurposing and repacking of the C-Band."⁴⁷⁷

188. Commenters also agree that it is appropriate to require new terrestrial licensees to make additional payments above relocation costs to incumbents that clear on accelerated timelines. Eutelsat argues that accelerated relocation payments are appropriate "given the Commission's desire for the transition to unfold quickly and the associated need to incentivize the incumbent users rapidly to overcome inevitable challenges that will emerge during the process."⁴⁷⁸ ACA Connects claims that additional payments above relocation costs would be "a lawful and valuable tool in achieving the transition in a prompt and timely manner."⁴⁷⁹ U.S. Cellular agrees that the Commission "should provide financial incentives to C-Band license holders to induce participation in a rapid clearing process."⁴⁸⁰ Verizon supports payments in exchange for accelerated relocation, stating that "expedited clearing and early 5G deployments in the C-band will unlock massive value, generate welfare, and advance the U.S. economy, while furthering U.S. national security interests as well."⁴⁸¹

⁴⁷⁴ See, e.g., OTI May 3 PN Comments at 15 ("In the past, when the Commission addressed similar opportunities to consolidate or relocate incumbents in an underutilized band, it relied on a traditional auction (where needed) and required winning bidders or other entrants to assume the cost of relocating incumbents whose licenses are modified to ensure 'comparable facilities' on different frequencies."); PISC July 19 PN Comments at 21; ACA Connects Coalition July 19 PN Reply at 21 ("Since the earliest auctions, the Commission has required winning bidders of new licenses in the affected bands to either negotiate a voluntary relocation of incumbent users or an involuntary relocation, and to reimburse incumbents for their costs to relocate to another band."); Charter Feb. 22, 2019 *Ex Parte* at 5-6; Comcast May 3 PN Reply at 15 ("[T]he Commission has repeatedly relied on ancillary authority, together with its Title III authority, to require winning bidders in spectrum auctions to support cost recovery for incumbent services that have been disrupted . . ."); Letter from Kathryn A. Zachem and Francis M. Buono, Comcast, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 15 & n.50 (filed Nov. 19, 2019) (discussing the Commission's authority to impose reimbursement obligations).

⁴⁷⁵ OTI May 3 PN Comments at 15.

⁴⁷⁶ PISC July 19 PN Comments at 21.

⁴⁷⁷ Charter Feb. 22 *Ex Parte* at 5-6.

⁴⁷⁸ Eutelsat Dec. 19 *Ex Parte* at 3.

⁴⁷⁹ ACA Connects Dec. 26 *Ex Parte* at 4.

⁴⁸⁰ U.S. Cellular Dec. 18 *Ex Parte* at 3.

⁴⁸¹ Verizon Jan. 24, 2020 *Ex Parte* at 7.

189. The vast majority of stakeholders that have submitted filings in the record on this issue agree that the Commission has the authority to require the new flexible use licensees both to pay the relocation costs of the incumbent space station operators and to make an accelerated relocation payment when certain conditions are met. For example, Eutelsat argues that “[i]ncluding payments for FSS incumbent relocation to comparable facilities . . . [is] fully consistent with these goals, the *Emerging Technologies* framework, the Communications Act, and the public interest.” Additionally, T-Mobile explains that the Commission has “ample legal authority to require relocation payments,” and the Commission “may require auction winners to provide payments to incumbent licensees at the close of the auction and as a condition to receiving their licenses.”⁴⁸² Charter points out that “[t]he Commission could require winning bidders to compensate incumbents beyond their relocation costs pursuant to its Title III authority.”⁴⁸³ ACA notes that the Commission’s long practice of permitting voluntary relocation payments was affirmed by the D.C. Circuit in *Teledesic*.⁴⁸⁴ In the proceeding underlying that decision, the Commission followed its *Emerging Technologies* precedent and adopted rules that allowed new licensees to compel incumbents to relocate from the 18 GHz band and required such licensees to negotiate with incumbents prior to requiring them to leave the band and to pay reasonable relocation expenses.⁴⁸⁵ The SSOs similarly agree that the Commission’s exercise of its general Title III authority to condition wireless licenses would include the mandatory acceleration payment adopted here and would constitute a reasonable extension of the Commission’s *Emerging Technologies* precedent.⁴⁸⁶ Still other reports focus on the value of accelerating the clearing of this band. Coleman Bazelon estimates that a one year of delay in transitioning the spectrum would reduce the economic value of repurposing this band by between 7% and 11%. Additionally, Bazelon highlights the importance of consumer surplus, or social value, associated with accelerated clearing. He notes that “every \$1 billion in delay costs would create total social costs of \$10 billion to \$20 billion.”⁴⁸⁷ Similarly, Dr. Eisenach, citing a study by Hazlett and Munoz, states that the “annual increase in consumer surplus is approximately equal to the total amount paid by the purchasers.”⁴⁸⁸

190. OTI argues the Communications Act prohibits us from requiring overlay licensees to make accelerated relocation payments because section 309(j) of the Act requires that “all proceeds from the use of a competitive bidding system under this subsection shall be deposited in the Treasury.”⁴⁸⁹ We

⁴⁸² T-Mobile Jan. 29, 2020 *Ex Parte* at 1; T-Mobile Dec. 18 *Ex Parte* at 5-6.

⁴⁸³ Charter Feb. 22, 2019 *Ex Parte* 5-6. *See also*, AT&T Nov. 26, 2019 *Ex Parte* at 2 (“The Commission may be able to impose a requirement that winning bidders pay a portion of the transition costs as a condition of a license grant.”); Comcast Nov. 19, 2019 *Ex Parte* (discussing various options for compensating satellite operators for the relinquishment of their spectrum usage rights, including payments from winning bidders); Verizon December 19, 2019 *Ex Parte* at 1 (urging the Commission to draw on long-standing *Emerging Technologies* principles “that include winning bidder payments to incumbents to clear repurposed spectrum in an expedited manner”); Eutelsat Dec. 19, 2019 *Ex Parte* at 2-3 (discussing compensation mechanisms for incumbent space station operators); ACA Dec. 26, 2019 *Ex Parte* at 4 (citing Commission precedent for non-auction, non-cost related payments); SSO Jan 3, 2020 *Ex Parte* at 1-2 (discussing the Commission’s Title III authority to “lawfully provide fair compensation to the satellite operators”).

⁴⁸⁴ ACA Dec. 11, 2019 *Ex Parte* at 5-6 (citing *Teledesic*, 275 F.3d at 86-87 (“[T]he Commission’s consistent policy has been to prevent new spectrum users from leaving displaced incumbents with a sum of money too small to allow them to resume their operations at a new location.”)); *see also* ACA Dec. 26, 2019 *Ex Parte* at 4.

⁴⁸⁵ *Redesignation of 17.7-17.9 GHz Frequency Band*, 15 FCC Rcd 13430, 13469-70, paras. 81-84 (2000).

⁴⁸⁶ SSO Jan. 3 *Ex Parte* at 2.

⁴⁸⁷ Brattle Group Report at 27 & n.72

⁴⁸⁸ Eisenach Declaration at para. 29.

⁴⁸⁹ *See, e.g.*, OTI Dec. 13, 2019 *Ex Parte* at 1-2. 47 U.S.C. § 309(j)(8)(A). OTI argues that in adopting the Auction Reform Act of 2002, Congress explicitly limited the Commission’s authority to adopt an auction featuring

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disagree that this statutory provision would preclude such relocation payments. Under the rules we adopt, all proceeds from the public auction will indeed be deposited in the Treasury in accordance with the requirements of the Act. By contrast, accelerated relocation payments are not “proceeds” of the auction. Instead, they will flow from the new licensees to the incumbents. This is precisely the arrangement that courts have upheld in the *Emerging Technologies* framework, and precisely the framework that allows us to require incumbents to make *any* relocation payments. We do not read OTI as arguing that *all* relocation payments are prohibited—doing so would significantly hinder the Commission’s work to manage spectrum in the public interest in a variety of bands and contexts (and would contradict the clear line of judicial precedent that has affirmed the Commission’s authority to require such payments). And we cannot see why the plain language of section 309(j) should treat one form of relocation payment as proceeds but not another, so long as all are tied to facilitating the swift and efficient transition of incumbents out of the band.

191. Some parties argue that earth station operators should receive accelerated relocation payments in exchange for expedited clearing as well.⁴⁹⁰ We find such arguments unavailing. Based on the record, we anticipate that clearing any given incumbent earth station will be a relative quick process—and will take far less time than the deadlines we establish for the transition. Instead, it is the fact that incumbent space station operators must account for the operational logistics of hundreds if not thousands of incumbent earth stations that make the overall transition significantly longer than it would take to transition a single earth station. And indeed, we already require incumbent space station operators that elect Accelerated Relocation to take upon themselves responsibility for transitioning all incumbent earth station operators that receive their services—they must coordinate with incumbent earth station registrants to perform any necessary system modifications, repointing, or retuning to receive transmissions that have been migrated to the upper portion of the band. We thus find that incumbent earth station operators can and will transition in a timely manner without the need for accelerated relocation payments.

192. *Compensable Relocation Costs.* We next set forth guidelines for compensable costs, i.e., those reasonable relocation costs for which incumbent space station operators and incumbent earth station operators can seek reimbursement. Consistent with Commission precedent, compensable costs will include all reasonable engineering, equipment, site and FCC fees, as well as any reasonable, additional costs that the incumbent space station operators and incumbent earth station operators may incur as a result of relocation.⁴⁹¹

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mandatory “incentive payments” to incumbents. See OTI Feb. 4, 2020 ex parte at 8-9, citing Pub. L. 107-195 (2002). We disagree. Congress adopted the Auction Reform Act to serve as a limited withdrawal of the Commission’s authority to conduct parts of two auctions for wireless services in the Upper 700 MHz band in response to specific concerns regarding the Commission’s ability to hold a successful auction. Because a prior Congress had set a deadline for the auction of certain spectrum but had given incumbents in the band a far-off and potentially open-ended timeframe within which to vacate the spectrum, the Commission was forced to design Auctions 31 and 44 to allow new licensees to compensate incumbents in exchange for voluntarily clearing the bands. In these unique circumstances, the Auction Reform Act narrowly amended Section 309 to terminate the Commission’s authority to conduct portions of those specific auctions as planned. Significantly, the amendments the Auction Reform Act made to Section 309 did not bar the Commission from future consideration of voluntary clearing mechanisms that included acceleration payments to incumbent operators.

⁴⁹⁰ See, e.g., Letter from Pantelis Michalopoulos, Counsel, ACA Connects, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 18-122, at 4 (filed Dec. 26, 2019) (noting that earth station operators should be encouraged to meet milestones with incentives).

⁴⁹¹ *Emerging Technologies Order*, 7 FCC Rcd at 6890, para. 24 (“The emerging technology service provider must guarantee payment of all relocation costs. This includes all engineering, equipment, site and FCC fees, as well as any reasonable, additional costs that the relocated fixed microwave licensee may incur as a result of operation in a different fixed microwave band or migration to other media.”); *Amendment of Section 2.106 of the Commission’s Rules to Allocate Spectrum at 2 GHz for Use by the Mobile-Satellite Service*, 15 FCC Rcd 12315, 12351, para. 108

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193. We expect incumbents to obtain the lowest-cost equipment that most closely replaces their existing equipment or, as needed, provides the targeted technology upgrades necessary for clearing the lower 300 megahertz. For example, parties have indicated that upgrades such as video compression, modulation/coding, and HD to SD down-conversion at downlink locations, may be necessary to accomplish efficient clearing—particularly in an accelerated timeframe.⁴⁹² So long as the costs for which incumbents are seeking reimbursement are reasonably necessary to complete the transition in a timely manner (and reasonable in cost), such expenses would be compensable. Similarly, we expect that some incumbents will not be able to replace older, legacy equipment with equipment that is exactly comparable in terms of functionality and cost because of advances in technology and because manufacturers often cease supporting older equipment.⁴⁹³ Incumbents may receive the reasonable replacement cost for such newer equipment to the extent it is needed to carry out the transition—and we intend to allow reimbursement for the cost of that equipment and recognize that this equipment necessarily may include improved functionality beyond what is necessary to clear the band.⁴⁹⁴ In contrast, we do not anticipate allowing reimbursement for equipment upgrades beyond what is necessary to clear the band. For example, if an incumbent builds additional functionalities into replacement equipment that are not needed to facilitate the swift transition of the band, it must reasonably allocate the incremental costs of such additional functionalities to itself and only seek reimbursement for the costs reasonably allocated to the needed relocation.

194. We recognize that incumbents may attempt to gold-plate their systems in a transition like this. Let us be clear: Incumbents will not receive more reimbursement than necessary, and we require that, to qualify for reimbursement, all relocation costs must be reasonable. This requirement should give incumbents sufficient incentive to be prudent and efficient in their expenditures.⁴⁹⁵ If a particular expenditure is unreasonable, the incumbent will only receive compensation for the reasonable costs that the incumbent would have occurred had it made a more prudent decision.

195. Similarly, we will not reimburse incumbent licensees for the speculative value of any business opportunities that they claim they would lose as a result of the transition. Both the C-Band Alliance and the Small Satellite Operators have claimed that moving their operations to the upper 200 megahertz of the band would substantially impact or eliminate their ability to expand their businesses in the band.⁴⁹⁶ Since, however, the incumbent space station operators will be able not only to maintain their

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(2000) (same); *see also* 18 GHz Order, 15 FCC Rcd at 13469, para. 82 n.165 (relocation costs included “all engineering, equipment, site and FCC fees, and any legitimate and prudent transaction expenses incurred by the terrestrial licensee that are directly attributable to an involuntary relocation (subject to a cap of 2% of the hard costs involved)”).

⁴⁹² See C-Band Alliance Revised Transition Implementation Process at 3.

⁴⁹³ See *Incentive Auction Report and Order*, 29 FCC Rcd at 6822, para. 624.

⁴⁹⁴ See *Incentive Auction Report and Order*, 29 FCC Rcd at 6822, para. 624.

⁴⁹⁵ Cf. *Connect America Fund*, WC Docket No. 10-90, Report and Order, Third Order on Reconsideration, and Notice of Proposed Rulemaking, 33 FCC Rcd 2990, 2995, para. 13 (2018) (“Our rules reflect the Commission’s longstanding concern that carriers not receive more universal service support than necessary and that they have sufficient incentive to be prudent and efficient in their expenditures, including operating as well as capital expenses.”).

⁴⁹⁶ See C-Band Alliance January 16, 2020 ex parte at 6 (“reducing the amount of spectrum available by 60% for C-Band Alliance members will substantially impact—and perhaps eliminate entirely—any ability to use these licenses to expand the services they currently provide”); Small Satellite Operators Jan. 28, 2020 *Ex Parte* at 4 (responding to C-Band Alliance’s claims regarding “opportunity costs” by stating that any such costs will be borne by all satellite operators in the band and that they “are costs that satellite operators incur only because they will face greater risk in expanding their C-band business, and will be much more limited in their ability to do business generally, with only a fraction of the capacity presently available.”)

current level of service after the transition, but to potentially serve new clients by employing compression technology and adopting other network efficiencies, we find that there will be no compensable loss of business opportunity over and above their actual costs associated with the transition. Compensating licensees for such speculative claims of future loss would be inconsistent with established Commission precedent and would not serve the public interest.⁴⁹⁷

196. As in prior cases, the Commission will allow reimbursement of some “soft costs”—“legitimate and prudent transaction expenses” incurred by incumbents “that are directly attributable” to relocation.⁴⁹⁸ We define soft costs as transactional expenses directly attributable to relocation, to include engineering, consulting, and attorney fees. This is consistent with suggestions from some commenters that the Commission should allow recovery of soft costs for relocation expenses.⁴⁹⁹

197. In some prior proceedings, the Commission has subjected “soft” costs to a cap of 2% of the hard costs involved.⁵⁰⁰ Without a limit, “soft cost” transaction expenses such as engineering and attorney fees, could easily eclipse the “hard costs” of relocation, particularly for the thousands of incumbent earth stations that must be filtered, retuned, or repointed. A limit on transaction expenses can encourage transition efficiency, as many incumbent earth station operators own or manage multiple incumbent earth stations and thus have the ability to identify and implement economies of scale. Rather than a hard cap, we find it reasonable to establish a rebuttable presumption that soft costs should not exceed 2% of the relocation hard costs. This way, an incumbent may demonstrate that any fees in excess of 2% were reasonably and unavoidably incurred—and thus properly compensable.⁵⁰¹ Establishing a rebuttable presumption is consistent with the Commission’s approach in the 800 MHz Rebanding proceeding, in which the Commission used 2% of the hard costs as a “useful guideline for determining when transactional costs are excessive or unreasonable and charge[d] the Transition Administrator to give

⁴⁹⁷ In determining compensable relocation costs, the Commission has consistently limited reimbursement to those costs directly tied to relocation. See e.g., *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Report and Order, 29 FCC Rcd 6567, 6824-25, para. 630 (2012) (stating that the Spectrum Act prohibits reimbursement for “lost revenues” and declining to provide for compensation such losses that a station or MVPD might claim, such as lost ad revenue while a station is off air during a channel relocation); *Amendment to the Commission’s Rules Regarding a Plan for Sharing the Costs of Microwave Relocation*, WT Docket No. 95-157, First Report and Order and Further Notice of Proposed Rulemaking, 11 FCC Rcd. 8825, 8848, para. 43 (1996) (*Microwave Relocation Cost Sharing Order*) (setting a limit on certain compensable soft costs associated with the relocation, finding that failing to adopt such restrictions “would encourage incumbents to view the relocation process as a business opportunity”).

⁴⁹⁸ *Microwave Relocation Cost Sharing Order*, 11 FCC Rcd at 8848, para. 42; *H-Block Report and Order*, 15 FCC Rcd at 13469, para. 82 & n.165; see also *Incentive Auction Report and Order*, 29 FCC Rcd at 6822, para. 623 (allowing recovery for soft expenses, including legal and engineering services).

⁴⁹⁹ See, e.g., Letter from Pantelis Michalopoulos, Counsel to ACA Connects, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 18-122, at 5-6 (filed Dec. 11, 2019) (noting the Commission’s authority to allow reimbursement for soft costs) (ACA Connects Dec. 11 *Ex Parte*); Letter from Jason E. Rademacher, Counsel, The Church of Jesus Christ of Latter-day Saints, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 18-122, at 8-9 (filed Nov. 19, 2019) (noting examples of soft costs that it could incur with the transition).

⁵⁰⁰ *18 GHz Order*, 15 FCC Rcd at 13469, para. 82 & n.165 (capping transaction expenses to 2% of hard costs); *Microwave Relocation Cost Sharing Order*, 11 FCC Rcd at 8848, para. 42 (same). But see *Service Rules for the 746-764 MHz Bands, and Revisions to Part 27 of the Commission’s Rules*, WT Docket No. 99-168, Third Report and Order, 16 FCC Rcd 2703, 2724, paras. 49-50 (2001) (declining to cap hard or soft relocation costs).

⁵⁰¹ *800 MHz Rebanding Order on Reconsideration*, 19 FCC Rcd at 25151, para. 70 (“[O]utside expertise may be required in the negotiation of agreements and in analysis of ‘comparable facilities’ proposals. We can foresee that such outside costs could raise the transactional cost above 2% of the ‘hard costs.’”). See also ACA Connects Dec. 11 *Ex Parte* at 6 (noting that the Commission has declined to set a cap on soft caps in some instances).

a particularly hard look at any request involving transactional costs that exceed two percent.”⁵⁰² As discussed below, we will establish a Relocation Payment Clearinghouse that can serve “as a watchdog over excess transactional costs.”⁵⁰³ Parties seeking reimbursement for soft costs that exceed 2% shall bear the burden of justifying these expenses.⁵⁰⁴

198. For incumbent space station operators, flexible-use licensees will be required to reimburse eligible space station operators for their actual relocation costs, as long as they are not unreasonable, associated with clearing the lower 300 megahertz of the band while ensuring continued operations for their customers. First, we expect that procuring and launching new satellites may be reasonably necessary to complete the transition.⁵⁰⁵ These new satellites will support more intensive use of the 4.0-4.2 GHz band after the transition. Second, incumbent space station operators will also need to consolidate their TT&C sites—to a maximum of four facilities in the contiguous United States—and reduce the number of gateway facilities. The costs involved with this consolidation process may include the installation of additional antennas at these facilities, procurement of new real estate, and support for customer migration to the relocated facilities.⁵⁰⁶ Third, we expect that incumbent space station operators will need to install compression and modulation equipment at their terrestrial facilities to make more efficient use of spectrum resources and ensure that they are able to provide a consistent level of service after the transition.⁵⁰⁷ All of these migration tasks must be coordinated with the earth station transition process to ensure that earth stations are able to receive existing C-band services during and after the transition.

199. We reiterate that compensable relocation costs are only those that are reasonable and needed to transition *existing* operations in the contiguous United States out of the lower 300 megahertz of the C-band. In order to meet this standard and qualify as eligible for relocation cost reimbursements, an incumbent space station operator must have demonstrated, no later than February 1, 2020, that it has an existing relationship to provide service via C-band satellite transmission to one or more incumbent earth stations in the contiguous United States. These existing relationships could include, for example, contractual obligations to provide C-band service to be received at a specific earth station location. And these existing relationships need not be direct but could include indirect relationships through content distributors or other entities, so long as the relationship requires the provision of C-band satellite services

⁵⁰² *Improving Public Safety Communications in the 800 MHz Band*, Supplemental Order and Order on Reconsideration, 19 FCC Rcd 25120, 25151, para. 70 (2004) (*800 MHz Rebanding Order on Reconsideration*); “), *aff’d sub nom. Mobile Relay Assocs. v. FCC*, 457 F.3d 1 (D.C. Cir. 2006) (resolving a conflict between the *800 MHz Rebanding Order*, which required Nextel to absorb all reconfiguration costs, including transactional costs, and the rule provision incorporated by reference that limited transaction costs to no more than 2% of the hard costs involved).

⁵⁰³ *800 MHz Rebanding Order on Reconsideration*, 19 FCC Rcd at 25151, para. 70.

⁵⁰⁴ *800 MHz Rebanding Order on Reconsideration*, 19 FCC Rcd at 25151, para. 70 (confirming that parties must submit disputes involving cost allocations to the Transition Administrator for resolution, and, if the Transition Administrator was unable to resolve the dispute, that the matter would be referred to the Wireless Telecommunications Bureau for *de novo* review); *cf. Incentive Auction Report and Order*, 29 FCC Rcd at 6822, para. 623 n.1747 (giving discretion to the Media Bureau to determine the reasonableness of legal and other professional fees).

⁵⁰⁵ See C-Band Alliance Revised Transition Implementation Process at 4; C-Band Alliance Jan. 27, 2020 *Ex Parte*, Attach. A at 1 (asserting that as many as 10 new satellites may be needed to support the transition plan). We express no opinion regarding the number of such new satellites that may be reasonably necessary to complete the transition.

⁵⁰⁶ See C-Band Alliance Revised Transition Implementation Process at 7; C-Band Alliance Jan. 27, 2020 *Ex Parte*, Attach. A at 1.

⁵⁰⁷ See C-Band Alliance Revised Transition Implementation Process at 4-5; C-Band Alliance Jan. 27, 2020 *Ex Parte*, Attach. A at 1.

to one or more specific incumbent earth stations in the contiguous United States. Based on the record, only five incumbent space station operators have such operations: Eutelsat, Intelsat, SES, Star One, and Telesat.⁵⁰⁸ We do not expect any other incumbent space station operators to need to incur any relocation costs, and thus we do not expect them to be eligible for relocation payments. Nonetheless, such operators may be compensated for reasonable relocation costs should they demonstrate that those costs were truly required as a direct result of the transition of existing C-band services provided to one or more incumbent earth stations in the contiguous United States.

200. For incumbent earth station operators, we expect the transition will require two types of system changes that may occur separately or simultaneously: earth station migration and earth station filtering. First, earth station migration includes any necessary changes that will allow the earth stations to receive C-band services on new frequencies or from new satellites once satellite operators have relocated their services into the upper portion of the band. For example, in instances where satellite transmissions need to be moved to a new frequency or to a new satellite, earth stations currently receiving those transmissions may need to be retuned or repointed in order to receive on the new frequencies or from the new satellite. Such a transition requires a “dual illumination” period, during which the same programming is simultaneously downlinked over the original frequency or satellite and over the new frequency or satellite so that the receiving earth station can continue receiving transmissions from the original frequency or satellite until it retunes or repoints the antenna to receive on the new frequency or satellite. Earth station migration may also require the installation of new equipment or software at earth station uplink and/or downlink locations for customers identified for technology upgrades necessary to facilitate the repack, such as compression technology or modulation.⁵⁰⁹ Second, passband filters must be installed on all existing earth stations to block signals from adjacent channels and to prevent harmful interference from new flexible-use operations. Earth station filtering can occur either simultaneously with, or after, the earth station migration. All of these earth station migration actions must be coordinated with satellite transponder clearing in order for earth stations to continue receiving existing C-band services during and after the transition. As such, we expect relocation costs to include the cost to migrate and filter earth stations, including costs to retune, repoint, and install new antennas and install filters and compression software and hardware.⁵¹⁰

201. Some commenters request that the Commission give incumbent earth station operators flexibility to replace existing earth stations with fiber in their transition planning.⁵¹¹ We agree that

⁵⁰⁸ ABS and Hispamar have made no demonstrations of existing U.S. customers that they serve. ABS cites uncertainty about the outcome of this proceeding for as the reason it failed to construct an earth station in Hudson, NY. See ABS Global Request for Extension of Time, Call Sign E180019, IBFS File No. SES-LIC20180213-00118 (filed Mar. 7, 2019) (seeking an extension of a March 29, 2019 deadline by which ABS was required to complete construction and commence operations on the Hudson, NY earth station). We find this argument both unconvincing and irrelevant. The only ABS satellite capable of serving the United States has been operational since 2015; ABS did not seek market access in the United States until March 2017, and only after the Commission released the *NOI* in this proceeding in August 2017 did ABS seek Commission authorization to construct the Hudson, NY earth station in February 2018. See Small Satellite Operators Reply at 13; Small Satellite Operators May 3 PN Reply at 9; ABS Global, Application for Earth Station Authorization, Call Sign E180019, IBFS File No. SES-LIC20180213-00118 (granted Mar. 29, 2018). In any event, as noted above, accelerated relocation payments are designed to incentivize accelerated relocation of customers, and ABS has failed to demonstrate that it has any such customers. In contrast to ABS and Hispamar, Star One made filings in response to the *May 2019 Information Collection* demonstrating the provision of service to registered earth stations in the United States in the 3.7-4.2 GHz band.

⁵⁰⁹ See, e.g., C-Band Alliance Revised Transition Implementation Process at 4.

⁵¹⁰ See, e.g., C-Band Alliance Revised Transition Implementation Process at 1.

⁵¹¹ See, e.g., ACA Connects *Ex Parte* at 2 (filed Nov. 19, 2019) (“ACA Connects representatives urged the Commission to ensure that, as part of any plan to repurpose a significant amount of C-Band spectrum for 5G use, MVPD earth station operators are given the flexibility—and the funds—to elect fiber-based video solutions that best

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providing incumbent earth station operators flexibility may allow them to make efficient decisions that better accommodate their needs. But we also recognize that replacing existing C-band operations with fiber or other terrestrial services may be, for some earth stations, more expensive by an order of magnitude. As such, incumbent earth stations operators will have a choice: They may either accept reimbursement for the reasonable relocation costs by maintaining satellite reception or they may accept a lump sum reimbursement for *all* of their incumbent earth stations based on the average, estimated costs of relocating all of their incumbent earth stations.⁵¹² We require incumbent earth station operators (including any affiliates) to elect one of these two options, which must apply to all of each earth station operator's earth stations, in order to prevent any improper cost shifting. And we require the decision to accept a lump sum reimbursement to be irrevocable—by accepting the lump sum, the incumbent takes on the risk that the lump sum will be insufficient to cover all its relocation costs—to ensure that incumbents have the appropriate incentive to accept the lump sum only if doing so is truly the more efficient option. We direct the Wireless Telecommunications Bureau to release a Public Notice announcing the lump sum that will be available per incumbent earth station as well as the process for electing lump sum payments by September 30, 2020.

202. We reiterate that compensable relocation costs are only those that are reasonable and needed to transition *existing* operations in the contiguous United States out of the lower 300 megahertz of the C-band. Despite being situated in Alaska, outside of the contiguous United States, GCI argues that it will nonetheless incur costs due to its contracts with both programmers and satellite operators.⁵¹³ We stress that, should GCI seek cost reimbursement, it must demonstrate that it was required to make the system modifications for which it seeks reimbursement as a direct result of the transition in the contiguous United States to make spectrum available for flexible use.

203. *Estimated Relocation Costs of the FSS Transition.*—We find it appropriate to provide potential bidders in our public auction with an estimate of the relocation costs that they may incur should they become overlay licensees. We caution that our estimates are estimates only, and we make clear that overlay licensees will be responsible for the entire allowed costs of relocation—even to the extent that those costs exceed the estimated range of costs.

204. The record contains estimates of the total clearing cost ranging from about \$3 billion to about \$6 billion. The C-Band Alliance estimates that the total cost to clear 300 megahertz in the lower 48 contiguous United States is \$2.8 billion, which it further divides into specific categories of costs, including satellite procurement and launch; TT&C/Gateway sites and teleport ground equipment; earth station filter installation and antenna seeding; specific customer equipment; and compression and modulation equipment.⁵¹⁴ With respect to new satellites, the C-Band Alliance claims that SES and Intelsat need to procure and launch between eight to ten.⁵¹⁵ For each satellite, it estimates a cost of about

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meet their needs.”); Letter from Jason E. Rademacher and Christina H. Burrow, Counsel to The Church of Jesus Christ of Latter-day Saints, to Marlene H. Dortch, Secretary, FCC, at 1, 2-4 (filed Nov. 19, 2019) (asking the Commission to give C-band users flexibility to choose their transmission method).

⁵¹² In other words, if the average costs of relocating an incumbent earth station is \$10,000, an incumbent earth station operator with three stations could elect to receive \$30,000 or they may accept reimbursement for the reasonable relocation costs incurred to maintain satellite reception.

⁵¹³ See Letter from Jessica DeSimone Gyllstrom, Counsel to GCI, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Jan. 8, 2020).

⁵¹⁴ See C-Band Alliance Jan. 27, 2020 *Ex Parte* at 1. In their total costs, the C-Band Alliance also included \$500 million in lost revenue attributable to capacity compression. *Id.* at 2.

⁵¹⁵ The C-Band Alliance states that it documented the need to procure and launch 8 satellites and accelerate the procurement of a ninth assuming a June 2020 auction. For a later 2020 auction, it claims that SES and Intelsat will

(continued....)

\$160 million, including the spacecraft, launcher, and ground equipment for each, for a total of \$1.6 billion assuming 10 satellites.⁵¹⁶ SES estimates that capital costs of each satellite will be between \$150 and \$250 million.⁵¹⁷ With respect to TT&C sites, C-Band Alliance argues that its members will consolidate into four sites, requiring the purchase and installation of three to four dozen new large antennas and possible procurement/lease of real state.⁵¹⁸ It estimates that the cost of this consolidation will be \$300 million.⁵¹⁹

205. The C-Band Alliance also estimates that about 100,000 filters will need to be installed on earth stations in the contiguous United States to vacate 300 megahertz of spectrum. Additionally, hundreds of new antennas will need to be installed at customers' or MVPDs' premises where service is migrated from one satellite to another satellite for premises that do not currently point to that other satellite. It estimates that the overall cost of filter manufacturing, installation, and customer antenna seeding will be about \$300 million.⁵²⁰ The C-Band Alliance argues that some satellite customers will require more specific equipment, such as highly integrated filters, to continue to operate in the upper 200 megahertz; it estimated the cost of these upgrades at about \$100 million.⁵²¹ It also argues that its migration plan requires the use of compression and modulation equipment to decrease by 30 units the total number of transponders to be used for continued Fixed Satellite Service, and estimates these equipment costs at about \$500 million. However, such "lost revenue" is not a compensable cost, since we find that satellite operators will remain able to continue providing the same services they provide today throughout and after the transition.

206. Eutelsat estimates that the maximum total cost of relocating all C-band satellite operators with contiguous United States coverage to comparable facilities transmitting on the upper 200 megahertz to be \$3.5 billion.⁵²² Eutelsat also estimates the direct costs of relocating protected earth station operations to comparable facilities to be approximately \$1 billion (as a maximum value).⁵²³ For purposes of this estimate, Eutelsat accepted the C-Band Alliance's assertion that as many as 35,000 C-band antennae may need to be included, with a cost of \$30,000 per antenna.⁵²⁴

207. ACA Connects argues that the C-Band Alliance's estimate of costs is insufficient and fails to accurately take into accounts MVPD out-of-pocket expenses. It estimates the total transition costs

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need to redesign their fleet plan and the required number of satellites will range from 8 to 10. See C-Band Alliance Jan. 27, 2020 *Ex Parte* at 1

⁵¹⁶ See C-Band Alliance Jan. 27, 2020 *Ex Parte*, Attach. at 1

⁵¹⁷ See SES *NOI* Reply at 25.

⁵¹⁸ See C-Band Alliance Jan. 27, 2020 *Ex Parte*, Attach. at 1.

⁵¹⁹ See C-Band Alliance Jan. 27, 2020 *Ex Parte*, Attach. at 1.

⁵²⁰ See C-Band Alliance Jan. 27, 2020 *Ex Parte*, Attach. at 1.

⁵²¹ See C-Band Alliance Jan. 27, 2020 *Ex Parte*, Attach. at 1.

⁵²² This estimate includes lost revenue opportunity calculated for each of eight potentially eligible space station operators. See Eutelsat Jan. 30, 2020 *Ex Parte*. We do not credit "lost revenues" as a compensable cost, because we find that satellite operators will remain capable of providing the same services they provide today throughout and after the transition. See also Eutelsat Jan. 27, 2020 *Ex Parte*, Attachment at 9 ("Based on Eutelsat's understanding and publicly available data on the cost to manufacture and deliver new FSS satellites in orbit, the estimate of \$3.5 billion in total satellite operator relocation costs (allocated among all eligible C-band satellite operators) would be sufficient to acquire comparable facilities to replace stranded C-band capacity.").

⁵²³ See Eutelsat Jan. 30, 2020 *Ex Parte*; see also Eutelsat Jan. 23, 2020 *Ex Parte* at 5 ("Eutelsat offered an estimate of approximately \$1 billion for earth station relocation costs, while acknowledging that the record in this proceeding is not extensive on this point.").

⁵²⁴ See Eutelsat Jan. 23, 2020 *Ex Parte* at 5.

at closer to \$6.1 billion, to account for MVPD headend upgrades, transcoded HEVC feeds to MPEG2/MPEG4, and additional power consumption during dual illumination.⁵²⁵ The Cartesian cost study for the ACA Connects Coalition estimates that the transition to higher compression will cost MVPDs alone at least \$3 billion of out-of-pocket expenses. With respect to transcoder costs, ACA Connects estimates that MVPDs will need 20 transcoders to cover current and future encoding needs, at a cost of \$10,000 per transcoder.⁵²⁶ It also estimates that the cost for repacking transponder, filter installation, and repointing earth station dishes will be about \$2.16 billion.⁵²⁷

208. Based on the current record, we believe that reasonable estimated costs will include the following ranges, subject to further reevaluation when we create and release a cost category schedule. With respect to satellite procurement and launch costs, we believe that \$1.28 billion to 2.5 billion is a reasonable estimated range. This accounts for \$160-\$250 million in capital costs for each satellite, the high and low ranges provided by the C-Band Alliance and SES, respectively, and the estimated range of eight to 10 additional satellites. With respect to earth station costs, we find that a range of \$1 billion to \$2 billion is a reasonable estimate for repacking transponders, filter installing, re-pointing earth station dishes, and antenna feeding. This would account for the lower-end estimates provided by the C-Band Alliance and the upper-end estimates provided by ACA Connects. With respect to MVPD compression hardware, we find \$500-\$520 million to be a reasonable estimated range. This is consistent with ACA Connects' estimate of about \$10,000 per transcoder and its claim that about 20 transcoders will be needed at each of 2,600 MVPD locations. It is also consistent with the C-Band Alliance's estimate of \$500 million for compression costs.⁵²⁸ This leads to a total clearing cost estimate ranging from about \$3.3 billion to \$5.2 billion.

209. *Accelerated Relocation Payments.*—We next address the amount of accelerated relocation payments that each eligible incumbent space station operator would receive if the Accelerated Relocation Deadlines are met.

210. We start by noting that predictions of the prices that will be paid for licenses to operate on this spectrum vary widely both in the record and in publicly available reports. On the low side, the Public Interest Spectrum Coalition estimates a range of \$0.065 to \$0.196 per MHz-pop⁵²⁹ and the Brattle Group suggests a range of \$0.003 to \$0.415 per MHz-pop from recent international C-band auctions.⁵³⁰ On the high side, the C-Band Alliance recently submitted a report by NERA Economic Consulting that

⁵²⁵ ACA Connects Nov. 19, 2019 *Ex Parte*, Cartesian Study Attachment at 7.

⁵²⁶ See ACA Connects Jul. 15, 2019 *Ex Parte*, Cartesian Study Attachment at 27. In subsequent *ex parte* filings, ACA Connects seems to argue that most headends do not have the space to have separate transcoders, and therefore, all of the Integrated Receiver Decoders (IRDs) in the headends will need to be replaced with IRDs that have built-in transcoders. See ACA Connects Nov. 19, 2019 *Ex Parte*, Cartesian Attachment at Study at 7. However, ACA Connects' July 2019 transition proposal stated that each headend would need to have an average of 20 transcoders installed, and made no mention of the space limitation issue. Compare *id.* with ACA Connects July 15, 2019 *Ex Parte*, Cartesian Study Attachment.

⁵²⁷ See ACA Connects Jul. 15, 2019 *Ex Parte*, Cartesian Study Attachment at 12.

⁵²⁸ See C-Band Alliance Jan. 27, 2020 *Ex Parte*, Attachment at 1 ("CBA estimates that the total cost to procure and install compression and modulation equipment will be approximately \$500 million.").

⁵²⁹ Without reference to previous auctions, the Public Interest Spectrum Coalition estimates the entire 500 MHz of the C-Band is worth \$10-30 billion. PISC Comments at 3, 22, 25, and 33.

⁵³⁰ Brattle Group Report at 12-14. The joint comment of Trinity Broadcast Network and LPN refer a subset of the auctions cited in the Brattle Group Report to settle on their high estimate of \$0.40 per MHz-pop. Trinity Broadcasting Network May 16, 2019 *Ex Parte* at 5, Addendum, Section B, at 10-11.

estimates a \$0.50 to \$0.90 per MHz-pop.⁵³¹ In the middle, Kerrisdale Capital Management analyzed C-band auction revenues in three other advanced industrial economies to estimate \$0.50 per MHz-pop⁵³² and the American Action Forum estimate a range topping out at \$0.597 per MHz-pop based on an econometric analysis of previous auctions.⁵³³

211. It is thus no surprise that the commenters have proposed a wide range of values for accelerated relocation payments. On the low side, Eutelsat proposes making \$2.75 billion available for “premium” payments for accelerated relocation.⁵³⁴ On the high side, the C-Band Alliance essentially argues that incumbent space station operators should receive a 50-50 split of auction revenues, or a \$21.5 to \$38.5 billion accelerated relocation payment, on the theory that incumbent space station operators should receive an equal part given the sale of their “asset.”⁵³⁵ We note, however, that the C-Band Alliance’s analysis is based on the assumption that the Commission otherwise set a relocation deadline for FSS operations of 10 years.

212. We note, as a preliminary matter, that the C-Band Alliance’s proposal seems to misunderstand the purpose of accelerated relocation payments. Incumbent space stations operators are not “selling” their spectrum usage rights—instead they have the right to provide the services they currently offer going forward. Furthermore, the transition we adopt, including relocation payments, will make them whole during and after that transition. Indeed, they have no terrestrial spectrum usage rights to “sell.” Instead, our responsibility is to set an accelerated relocation payment that fairly incentivizes incumbent space station operators to expedite the transition while increasing the value of the entire transition effort for the American public.

213. We start by examining the value to the American public of an accelerated transition. Specifically, if all eligible space station operators are able to hit the Phase I Accelerated Relocation Deadline, then terrestrial operations by overlay licensees can commence in the lower 100 megahertz of the band in 46 PEAs (covering 58% of the population of the contiguous United States) by September 30, 2021 rather than September 30, 2023 (the Phase II deadline). And if all eligible space station operators

⁵³¹ Letter from Bill Tolpegin, Chief Executive Office, C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 18-122, Attachment A, at 3-5 (filed January 27, 2020).

⁵³² Kerrisdale Capital Management looks at auctions in the United Kingdom, Australia, and South Korea. Kerrisdale Capital Management, Intelsat S.A. & SES S.A.: To the Moon, at 21, 24 (June 15, 2018), <https://www.kerrisdalecap.com/wp-content/uploads/2018/06/Intelsat-and-SES.pdf>. Northern Sky Research refer to this Kerrisdale Report and decide on a range of \$0.50 to \$0.60 per MHz-pop for their analysis. Gagan Agrawal, *C-Band Spectrum Reallocation: Too Lucrative to Ignore?* (October 18, 2018), <https://www.nsr.com/c-band-spectrum-reallocation-too-lucrative-to-ignore/>.

⁵³³ A report by the American Action Forum estimated a range of \$0.011 - \$0.597 per MHz-pop based on an econometric analysis of previous auctions. Will Rinehart, American Action Forum, Insight, *Analyzing Plans to Reallocate C-Band for 5G Deployment* (Oct. 7, 2019), <https://www.americanactionforum.org/insight/analyzing-plans-reallocate-c-band-5g-deployment/>.

⁵³⁴ See Letter from Carlos M. Nalda, LMI Advisors, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 7 (filed Jan. 23, 2020).

⁵³⁵ Letter from Bill Tolpegin, Chief Executive Officer, C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, Attach. A at 2 (filed Jan. 27, 2020). The C-Band Alliance argues that, in exchange for accelerated relocation, satellite operators should receive a payment equal to the total proceeds from an auction of 280 megahertz of C-band spectrum, which it estimates will generate between \$43 and \$77 billion. However, under the C-Band Alliance’s approach, bidders would enter the auction with the knowledge that, for each dollar they bid on the spectrum, they would also be required to pay a dollar in an accelerated relocation payment. Assuming rational bidder behavior, this would reduce the amount that bidders are willing to spend in the auction by 50%, which would result in estimated auction revenues (and estimated accelerated relocation payments) of between \$21.5 and \$38.5 billion.

are able to hit the Phase II Accelerated Relocation Deadline, then terrestrial operations by overlay licensees can commence throughout the contiguous United States by September 30, 2023 rather than by September 30, 2025 (the Relocation Deadline).

214. One useful exercise to frame an appropriate accelerated relocation payment would be to estimate the price that overlay licensees would willingly pay for earlier transition, assuming that the free-rider and holdout problems could be overcome. Making the spectrum available to a licensee earlier increases the potential producer surplus earned by the licensee because it can begin to provide services to consumers on that spectrum sooner, thereby granting a specific commercial benefit to a new overlay licensee. So long as we set the accelerated relocation payment as a fraction of the bidder's expected incremental profits from deploying spectrum earlier, overlay licensees will themselves benefit even after making the accelerated relocation payment. In other words, if we treat an estimated willingness to pay as an upper bound, allowing for an accelerated relocation payment in the amount specified would make overlay licensees no worse off and would likely make them better off for each year they received their new licenses earlier.

215. To establish a reasonable estimate of the price that overlay licensees would willingly pay to accelerate relocation, we extrapolate the increase in expected profits from having access to the spectrum and the ability to deploy, earlier than the Relocation Deadline. To do this, we observe that the difference between an amount of money received at date T_2 and the same amount received at an earlier date T_1 is simply the accumulated interest that can be earned by investing the amount at date T_1 , and holding it until date T_2 .⁵³⁶ If S is the present value of an infinite stream of profits associated with deploying a spectrum license, then the additional value, A , of accelerating the date when spectrum license is available to T_1 , as opposed to T_2 , is the accumulated interest earned from the stream S between those two periods. Mathematically, the additional value of accelerating an income stream, S , by m months, where the industry annual weighted average cost of capital is r with interest compounded monthly is given by: $A = [(1+r/12)^m - 1]S$.⁵³⁷

216. To apply these observations in this context, we use a weighted average cost of capital of 8.5%, consistent with our precedent.⁵³⁸ We also use the index of PEA weights adopted by the Commission in the 39 GHz reconfiguration proceeding that were based on the 600 MHz, 700 MHz, and AWS-3 auctions to estimate that the 46 PEAs that are cleared by the Phase I Accelerated Relocation Deadline account for 77% of the total value of the first 100 megahertz cleared.⁵³⁹ Finally, we estimate the

⁵³⁶ For example, the additional benefit of receiving \$100 at the beginning of year 4 instead of year 5 if the interest rate were, say, 3% compounded annually, is simply $.03 \times \$100 = \3 , and the total value of receiving that amount at the start of year 4 is simply $(1 + .03) \times \$100 = \103 . Similarly, the total value of receiving \$100 in year 3 instead of year 5 would be $(1 + .03)^2 \times \$100 = \106.10 , and the incremental value of receiving the \$100 two years early would be $[(1 + .03)^2 - 1] \times \$100 = \$6.10$.

⁵³⁷ As an example, if a portion of a profit stream that was worth say \$15 was accelerated by 42 months, and the weighted cost of capital was 7%, then the benefit from accelerating that payment is given by: $A = [(1+.07/12)^{42} - 1] \times \$15 = \$4.15$. For ease of calculation, we assume monthly compounding.

⁵³⁸ *Connect America Fund, High-Cost Universal Service Support*, Report and Order, 29 FCC Rcd 3964, 4011-12, paras. 104-09 (2014). We note that the Commission there examined the appropriate cost of capital for fixed service providers, large and small. Because we expect potential bidders to face somewhat similar range of financial circumstances (indeed, to sometimes be the exact carriers studied by the Commission), we find using the same weighted average cost of capital to be reasonable for these purposes.

⁵³⁹ Notice of Updated 39 GHz Reconfiguration Procedures; Preparation for Incentive Auction of Upper Microwave Flexible Use Service Licenses in the 37 GHz, 39 GHz, and 47 GHz Bands (Auction 103), Public Notice, 34 FCC Rcd 2952, Appx. C (2019), https://www.fcc.gov/file/15917/download/103appendix_c_index_of_pea_weights_for_39_ghz.xlsx. The numerator is the total weighted MHz-pops in the top 50 PEAs excluding PEAs 5, 11, 20 and 42. The denominator is the total

(continued....)

present value of future profits that licensees expect to receive from their overlay licenses in 2025 (the Relocation Deadline) to be \$0.50 per MHz-pop. We find this to be a reasonable estimate given the wide range of valuations in the record—which notably do not account for the spectrum potentially not becoming available until the Relocation Deadline nor for the additional costs of clearing this spectrum in the contiguous United States. Applying the general formula to the facts at hand then yields an estimated increase in economic profits for an accelerated relocation of approximately \$10.52 billion.

217. Given the record, we find that a \$9.7 billion accelerated relocation payment is reasonable and will serve the public interest. We recognize that the Commission could find reasonable any number of calculation methods advocated in the record, and in doing so would need to rely on estimates on several variables such as potential future industry profits, spectrum valuation, the costs of transitioning, and consumer surplus. Ultimately, we recognize that this determination is a line-drawing exercise, in which we must attempt to capture the value to new entrants of accelerated clearing and the amount that will effectively incentivize incumbent space station operators to complete such accelerated clearing. We find that a \$9.7 billion accelerated relocation payment strikes the appropriate balance between these considerations and the amounts advocated in the record. Although some incumbent space station operators have argued for significantly more, we find \$9.7 billion is a substantial margin lower than the total amount we estimate that overlay licensees themselves would be willing to spend to clear this spectrum early. This helps ensure that we do not impose an obligation on overlay licensees that we are not comfortable they would have assumed on their own, in the typical *Emerging Technologies* scenario in which voluntary acceleration payments would be feasible.

218. We also find it necessary to specify the specific accelerated relocation payments that will be offered to each of the eligible space station operators so they can make an intelligent decision to elect or not elect to participate in the accelerated relocation process. We note that current FSS 3.7-4.2 GHz authorizations provide each satellite licensee equal access to the 280 megahertz of spectrum designated to transition to flexible use and an equal ability to serve customers in this band. Due to this shared licensing structure, all incumbent space station operators serving incumbent earth stations in the contiguous United States may play a role in the transition and may need to cooperate to successfully transition the spectrum. Taking that into account, we find the most appropriate basis for the offer is the contribution that each eligible space station operator makes towards transitioning the 3.7–3.98 GHz band to flexible use, assuming all other operators accelerate their clearing. Specifically, we find that the operators with more customers will have a proportionately larger effect on the success of the transition process due to the amount of spectrum they encumber and the scope of incumbent earth stations they serve, and therefore the value that is being created for prospective wireless licensees than those with fewer customers. If an operator with more customers fails to clear in a timely manner, this will have a significantly more serious impact on the value of the other incumbents clearing early compared to a satellite operator with fewer customers.

219. Taking these factors into account, the Table below defines the accelerated relocation payments that we make available for each of the five eligible operators. These payments reflect a variety of inputs, including content-distribution revenues, population coverage in the contiguous United States, and traffic. The Clearinghouse will distribute the accelerated relocation payments to each eligible space station operator according to the amounts provided in the table.

Accelerated Relocation Payment by Satellite Operator

Operator	Phase I Payment	Phase II Payment
Intelsat	\$1,194,498,000	\$3,657,286,800

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weighted MHz-pops in all PEAs in the lower contiguous 48 states, which excludes Hawaii, Alaska, Puerto Rico, Guam, US Virgin Islands, American Samoa, and the Gulf of Mexico.

SES	\$982,777,000	\$3,009,044,600
Eutelsat	\$115,203,000	\$352,725,000
Telesat	\$92,277,000	\$282,531,000
Star One	\$3,362,000	\$10,295,600

220. Finally, we note that ABS, Hispamar, and Star One (collectively, the Small Satellite Operators) argue that any transition of C-band spectrum must provide compensation, including “premium” payments above relocation costs, to all satellite operators that operate space stations that cover parts of the United States using C-band spectrum.⁵⁴⁰ According to their filings, the Small Satellite Operators have launched operational satellites that have been granted market access and are on the U.S. Permitted Space Station List.⁵⁴¹ The Small Satellite Operators argue that grants of U.S. market access are “authorizations” made pursuant to Part 25 of the Commission’s rules and therefore provide the same protection from interference as is granted under licenses for space stations.⁵⁴² As a result, the Small Satellite Operators argue that they are entitled to compensation for the loss of spectrum access and corresponding future revenues that will result from a new primary allocation for terrestrial mobile services in the C-Band spectrum.⁵⁴³ The C-Band Alliance counters that the Small Satellite Operators should be compensated only for the earth station reconfiguration and relocation costs associated with repacking existing operations into the upper portion of the band, to the extent the Small Satellite Operators currently provide service to customers in the contiguous United States.⁵⁴⁴ The C-Band Alliance argues that any “premium” payments above relocation costs to C-band satellite operators that currently have no U.S. customers or revenue would be unwarranted; such satellite operators need not be compensated for prior investments, the C-Band Alliance argues, since they will still be able to provide service on existing satellites in the upper 200 megahertz retained for FSS service, and compensation based on opportunity costs would be purely speculative where a satellite operator has no existing revenues or customers on which to base a calculation of opportunity costs.⁵⁴⁵ The Small Satellite Operators counter that any transition process must provide a means for all C-band satellite operators authorized to provide service in the United States, irrespective of prior revenue, to be compensated for their prior investment and opportunity costs.⁵⁴⁶

221. We find that our definition of eligible space station operators appropriately encompasses the satellite entities entitled to participate in the transition process and to receive compensation for

⁵⁴⁰ Letter from Scott Blake Harris, Counsel to the Small Satellite Operators, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-22, at 3-4 (filed Nov. 21, 2019) (SSO Nov. 21 *Ex Parte*); Small Satellite Operators Reply at 6-18; Small Satellite Operators May 3 PN Comments at 7-16; Small Satellite Operators May 3 PN Reply at 6-17; Small Satellite Operators July 19 PN Reply at 6; Letter from Scott Blake Harris, Counsel, Small Satellite Operators, to Marlene H. Dortch, Secretary, FCC, IB Docket No. 18-122 (filed Feb. 21, 2019) (SSO Feb. 21 *Ex Parte*).

⁵⁴¹ Small Satellite Operators Reply at 9. *See* 47 CFR § 25.103 (the Permitted Space Station List is a list of all U.S.-licensed geostationary-orbit space stations, as well as non-U.S.-licensed geostationary-orbit space stations approved for U.S. market access, that provide FSS in the conventional C-band, among other bands); *see also id.* § 25.137 (provisions for requesting U.S. market access through non-U.S.-licensed space stations).

⁵⁴² Small Satellite Operators May 3 PN Comments at 7-9 (citing the definition of “station license” in section 153 of the Act as meaning the “instrument of authorization” required by the Act and Commission rules for radio transmissions “by whatever name the instrument may be designated by the Commission”).

⁵⁴³ Small Satellite Operators May 3 PN Comments at 10.

⁵⁴⁴ C-Band Alliance Comments at 27-28; C-Band Alliance Reply at 45-48.

⁵⁴⁵ *See* C-Band Alliance July 19 PN Reply at 6-8; C-Band Alliance Reply at 45-48; C-Band Alliance Comments at 27-28.

⁵⁴⁶ SSO Feb. 21 *Ex Parte* at 2.

relocation costs and potential accelerated relocation payments.⁵⁴⁷ Contrary to the Small Satellite Operators' arguments, we find that the appropriate standard for a successful transition is whether it includes all authorized satellite operators that provide C-band services to existing U.S. customers using incumbent U.S. earth stations that will need to be transitioned to the upper portion of the band or otherwise accommodated in order to avoid harmful interference from new flexible-use operations. The transition obligations we adopt require that, in order for a satellite operator to satisfy the clearing benchmarks and become eligible for reimbursement of reasonable relocation costs and potential accelerated relocation payments, it must demonstrate that the space station transmissions and receiving earth station operations have been sufficiently cleared such that the new flexible-use licensee could begin operating without causing harmful interference to registered incumbent earth stations. Because the rationale for relocation obligations is to ensure continued service to existing customers, we do not require any relocation costs or accelerated relocation payments to be paid to any satellite incumbent who has failed to demonstrate, in the face of claims to the contrary, that it has no such qualifying customer relationships. Based on the record before us, and despite claims in the record by the C-Band Alliance and others that only space station operators with existing U.S. customers or registered earth stations should be eligible for compensation, ABS and Hispamar have failed to demonstrate that they have existing relationships with U.S. programmers or registered earth stations that would require relocation such that they would meet our definition of eligible space station operators.⁵⁴⁸

222. *Allocating Payment Obligations Among Overlay Licensees.*—Finally, we explain the financial responsibilities that each flexible-use licensee will incur to reimburse the satellite operators. We find it reasonable to base the share for each overlay licensee on the licensee's *pro rata* share of gross winning bids.⁵⁴⁹ This approach is similar to the Commission's approach in the H-Block proceeding, where the Commission likewise used a *pro rata* cost-sharing mechanism based on gross winning bids.⁵⁵⁰

⁵⁴⁷ As described above, we define eligible space station operators as those that provided service to any part of the contiguous United States pursuant to an FCC-issued license or grant of market access and had demonstrated in the record prior to January 31, 2019 that, as of April 19, 2018, they had a pre-existing relationship to provide service via C-band satellite transmission to an incumbent earth station, whether directly with the incumbent earth station owner or with another entity that provides service to the incumbent earth station owner.

⁵⁴⁸ ABS and Hispamar have made no demonstrations of existing U.S. customers that they serve. ABS cites uncertainty about the outcome of this proceeding as the reason it failed to construct an earth station in Hudson, NY. See ABS Global Request for Extension of Time, Call Sign E180019, IBFS File No. SES-LIC20180213-00118 (filed Mar. 7, 2019) (seeking an extension of a March 29, 2019 deadline by which ABS was required to complete construction and commence operations on the Hudson, NY earth station). We find this argument both unconvincing and irrelevant. The only ABS satellite capable of serving the United States has been operational since 2015; ABS did not seek market access in the United States until March 2017, and only after the Commission released the *NOI* in this proceeding in August 2017 did ABS seek Commission authorization to construct the Hudson, NY earth station in February 2018. See Small Satellite Operators Reply at 13; Small Satellite Operators May 3 PN Reply at 9; ABS Global, Application for Earth Station Authorization, Call Sign E180019, IBFS File No. SES-LIC20180213-00118 (granted Mar. 29, 2018). In any event, as noted above, accelerated relocation payments are designed to incentivize accelerated relocation of customers, and ABS has failed to demonstrate that it has any such customers. In contrast to ABS and Hispamar, Star One made filings in response to the *May 2019 Information Collection* demonstrating the provision of service to registered earth stations in the United States in the 3.7-4.2 GHz band. While it is possible ABS and Hispamar *may* incur costs to adjust their transponder usage to only transmit on the upper 200 megahertz—though not probable given their lack of existing services in the contiguous United States—we anticipate that such costs will be *de minimis*, as transponder adjustments are a regular part of business in the satellite industry.

⁵⁴⁹ We note that if, as proposed we adopt an ascending clock auction format for Auction 107, each licensee's share would be based on its share of gross winning bids at the end of the clock phase of the auction. We further note that certain payments, such as the Phase I accelerated relocation payments, would be apportioned only among those purchasing overlay licenses in the Phase I spectrum blocks and areas.

⁵⁵⁰ *H Block Report and Order*, 28 FCC Rcd at 9548, para. 168.

Indeed, several commenters in this proceeding proposed the H-Block *pro rata* calculation as a model for determining winning bidders' shares here.⁵⁵¹

223. Specifically, the *pro rata* share of each flexible-use licensee will be the sum of the final clock phase prices (P) for the set of all license blocks (I) that a bidder wins divided by the total final clock phase prices for all N license blocks sold in the auction. To determine a licensee's reimbursement obligation (RO), that *pro rata* share would then be multiplied by the total eligible reimbursement costs (RC). Mathematically, this is represented as:

$$RO = \left(\frac{\sum_{i \in I} P_i}{\sum_{j=1}^N P_j} \right) \times RC$$

224. For incumbent earth stations and fixed service incumbent licensee transition costs, a flexible-use licensee's *pro rata* share will be determined on a PEA-specific basis, based on the final clock phase prices for the license blocks it won in each PEA. To calculate the *pro rata* share for incumbent earth station transition costs in a given PEA, the same formula above will be used except now I will be the set of licenses a bidder won in the PEA, N will be the total blocks sold in the PEA and RC will be the PEA-specific earth station and fixed service reimbursement costs.

5. Relocation Payment Clearinghouse

225. Next, we find that selecting a single, independent Relocation Payment Clearinghouse to oversee the cost-related aspects of the transition in a fair, transparent manner will best serve the public interest. The Commission's experience in overseeing other complicated, multi-stakeholder transitions of diverse incumbents demonstrates the need for an independent party to administer the cost-related aspects of the transition in a fair, transparent manner, pursuant to Commission rules and oversight, to mitigate financial disputes among stakeholders, and to collect and distribute payments in a timely manner.

226. In the *NPRM*, the Commission sought comment on a variety of approaches for expanding flexible use of the band. The Commission noted that, under the private-sale approach, there was record support for a centralized facilitator, and it sought comment on having the relevant satellite operators form a transition facilitator as a cooperative entity to coordinate negotiations, clearing, and repacking in the band.⁵⁵² The Commission also asked about the role of the transition facilitator and the form of supervisory authority the Commission should maintain over it.⁵⁵³

227. In the *July 19 Public Notice*, the Commission specifically sought comment on how the Commission's approaches during the AWS-3 and 800 MHz transitions might inform this proceeding.⁵⁵⁴ The Commission asked whether it should designate a transition administrator or require the creation of a clearinghouse to facilitate the sharing of the costs for mandatory relocation and repacking.⁵⁵⁵

228. We agree with those commenters who contend that, regardless of the approach selected to

⁵⁵¹ See, e.g., OTI May 3 PN Comments at 15-17 (noting the Commission's "long-established" practice of apportioning "cost-sharing obligations" for the H-Block "on a *pro rata* basis against the relocation costs attributable to the band"); PISC July 19 PN Comments at 23 (same).

⁵⁵² See *NPRM*, 33 FCC Rcd at 6939-40, paras. 70, 74.

⁵⁵³ See *NPRM*, 33 FCC Rcd at 6941, para. 78.

⁵⁵⁴ *July 19 Public Notice*, 34 FCC Rcd at 6211 (citing *Amendment of the Commission's Rules with Regard to Commercial Operations in the 1695-1710 MHz, 1755-1780 MHz, and 2155-2180 MHz Bands*, GN Docket No. 13-185, Report and Order, 29 FCC Rcd 4610 (2014) (*AWS Ninth Report and Order*); *800 MHz Order*, 19 FCC Rcd 14969).

⁵⁵⁵ *July 19 Public Notice*, 34 FCC Rcd at 6211.

transition some or all of the band to flexible use, the Commission should ensure that mechanisms exist to guarantee a transparent transition process with appropriate Commission oversight.⁵⁵⁶ The Commission has adopted cost-sharing plans that included private clearinghouses to administer reimbursement obligations among licensees,⁵⁵⁷ and we find a similar approach to be in the public interest here. The Clearinghouse must be a neutral, independent entity with no conflicts of interest (organizational or personal) on the part of the organization or its officers, directors, employees, contractors, or significant subcontractors.⁵⁵⁸ The Clearinghouse must have no financial interests in incumbent space station operators, incumbent earth station operators, content companies that distribute programming using this band, wireless operators, or any entity that may seek to acquire flexible-use licenses, or to manufacture or market equipment in this band. In addition, the officers, directors, employees, and/or contractors of the Clearinghouse should also have no financial or organizational conflicts of interest. The Clearinghouse must be able to demonstrate that it has the requisite expertise to perform the duties required, which will include collecting and distributing relocation and accelerated relocation payments, auditing incoming and outgoing invoices, mitigating cost disputes among parties, and generally acting as clearinghouse.

229. *Duties of the Clearinghouse.*—We are cognizant of the need to establish measures to prevent waste, fraud, and abuse with respect to reimbursement disbursements. We find that the record and the Commission’s experience in managing other complicated transitions demonstrate that an independent Clearinghouse will ensure that the transition is administered in a fair, transparent manner, pursuant to narrowly tailored Commission rules and subject to Commission oversight.⁵⁵⁹

230. *First*, the Clearinghouse will be responsible for collecting from all incumbent space station operators and all incumbent earth station operators a showing of their relocation costs for the transition as well as a demonstration of the reasonableness of those costs. The Clearinghouse will determine in the first instance whether costs submitted for reimbursement are reasonable. Parties seeking reimbursement for actual costs must submit to the Clearinghouse a claim for reimbursement, complete with sufficient documentation to justify the amount. The Clearinghouse shall review reimbursement requests to determine whether they are reasonable and to ensure they comply with the requirements adopted in this *Report and Order*. The Clearinghouse shall give parties the opportunity to supplement any reimbursement claims that the Clearinghouse deems deficient.

231. All incumbents seeking reimbursement for their actual costs shall provide justification for those costs. Entities must document their actual expenses and the Clearinghouse, or a third-party on

⁵⁵⁶ See Open Technology Institute at New America (OTI) *December 9, 2019 Ex Parte* ; NCTA Reply at 28; NAC Comments at 6; NAB Reply at 4-7; NPR Comments at 12-13; QVC/HSN Comments at 5; Comcast Comments at 26; Comcast Comments Reply at 12-13; Cox March 15, 2019 *Ex Parte* at 3; Global Eagle Comments at 9; Letter from Colby May, Communications Counsel, Trinity Broadcasting Network, to Marlene Dortch, Secretary, FCC, GN Docket No. 18-122, at 3 (filed May 16, 2019) (Trinity Broadcasting Network May 16, 2019 *Ex Parte*); ACA Connects October 15 *Ex Parte* at 1, Attach. at 16.

⁵⁵⁷ See, e.g., 47 CFR § 27.1162.

⁵⁵⁸ “Organizational conflicts of interest” means that because of other activities or relationships with other entities, the Clearinghouse, its contractors, or significant subcontractors are unable or potentially unable to render impartial services, assistance or advice; the Clearinghouse’s objectivity in performing its function is or might be otherwise impaired; or the Clearinghouse might gain an unfair competitive advantage. “Personal conflict of interest” means a situation in which an employee, officer, or director of the Clearinghouse, the Clearinghouse’s contractors or significant subcontractors has a financial interest, personal activity, or relationship that could impair that person’s ability to act impartially and in the best interest of the transition when performing their assigned role, or is engaged in self-dealing.

⁵⁵⁹ 800 MHz Order, 19 FCC Rcd at 15075, para. 200.

behalf of the Clearinghouse, may conduct audits of entities that receive reimbursements.⁵⁶⁰ Entities receiving reimbursements must make available all relevant documentation upon request from the Clearinghouse or its contractor.

232. To determine the reasonableness of reimbursement requests, the Clearinghouse may consider the submission and supporting documentation, and any relevant comparable reimbursement submissions. The Clearinghouse may also submit to the Wireless Telecommunications Bureau for its review and approval a cost category schedule. Reimbursement submissions that fall within the estimated range of costs in the cost category schedule issued by the Bureau shall be presumed reasonable. If the Clearinghouse determines that the amount sought for reimbursement is unreasonable, it shall notify the party of the amount it deems eligible for reimbursement. We also direct the Wireless Telecommunications Bureau to make further determinations related to reimbursable costs, as necessary, throughout the transition process.

233. *Second*, the Clearinghouse will apportion costs among overlay licensees and distribute payments to incumbent space stations, incumbent earth station operators, and appropriate surrogates of those parties that incur compensable costs.⁵⁶¹ Following the public auction, the Clearinghouse shall calculate the total estimated share of each flexible-use licensee, as well as the estimated costs for the first six months of the transition following the auction. The initial six-month estimate shall incorporate the costs incurred prior to the auction as well as the six months following the auction. Flexible-use licensees shall pay their share of the initial estimated relocation payments into a reimbursement fund, administered by the Clearinghouse, shortly after the auction. The Clearinghouse shall draw from the reimbursement fund to pay approved, invoiced claims.

234. Going forward, the Clearinghouse shall calculate the overlay licensees' share of estimated costs for a six-month period and provide overlay licensees with the amounts they owe at least 30 days before each six-month deadline. Within 30 days of receiving the calculation of their initial share, and then every six months until the transition is complete, overlay licensees shall pay their share of estimated costs into the reimbursement fund. The Clearinghouse shall draw from the reimbursement fund to pay approved reimbursement claims. The Clearinghouse shall pay approved claims within 30 days of invoice submission to flexible-use licensees so long as funding is available. If the reimbursement fund does not have sufficient funds to pay approved claims before a six-month replenishment, the Clearinghouse shall provide flexible-use licensees with 30 days' notice of the additional shares they must contribute. Any interest arising from the reimbursement fund shall be used to defray the costs of the transition for all overlay licensees on a *pro rata* basis. At the end of the transition, the Clearinghouse shall return any unused amounts to overlay licensees according to their shares.

235. As a condition of their licenses, flexible-use licensees shall be responsible collectively for the accelerated relocation payments based on their *pro rata* share of the gross winning bids, similar to the way a flexible-use licensee's space station relocation and Clearinghouse costs are calculated. Where a satellite operator has elected to meet the Accelerated Relocation Deadlines, the accelerated relocation payment *pro rata* calculation will be adjusted to reflect the winning bidders of the flexible-use licenses benefitting from the portion of cleared spectrum. Under this scenario, only the flexible-use licensees in the 46 PEAs of the lower 100 megahertz (A block) that are the subject of the Phase I Accelerated Relocation Deadline would pay the Phase I accelerated relocation payment, and all overlay licensees would pay the Phase II accelerated relocation payment.

236. Overlay licensees will, collectively, pay for the services of the Clearinghouse and staff.

⁵⁶⁰ See *Incentive Auction Report and Order*, 29 FCC Rcd at 6826, para. 636 (adopting mechanism for the Commission or a third-party to audit entities that received reimbursements for the repacking process).

⁵⁶¹ Surrogates are third parties that are directly involved in transition activities and employed by, or under contract to, incumbent space stations and incumbent earth station operators.

The Clearinghouse shall include its own reasonable costs in the cost estimates it uses to collect payments from overlay licensees. To ensure the Clearinghouse's costs are reasonable, the Clearinghouse shall provide to the Office of the Managing Director and the Wireless Telecommunications Bureau, by March 1 of each year, an audited statement of funds expended to date, including salaries and expenses of the Clearinghouse.⁵⁶² It shall also provide additional financial information as requested by the Office or Bureau to satisfy the Commission's oversight responsibilities and/or agency specific/government-wide reporting obligations.

237. *Third*, the Clearinghouse will serve in an administrative role and in a function similar to a special master in a judicial proceeding.⁵⁶³ The Clearinghouse may mediate any disputes regarding cost estimates or payments that may arise in the course of band reconfiguration; or refer the disputant parties to alternative dispute resolution fora. Any dispute submitted to the Clearinghouse, or other mediator, shall be decided within thirty days after the Clearinghouse has received a submission by one party and a response from the other party. Thereafter, any party may seek expedited non-binding arbitration, which must be completed within 30 days of the recommended decision or advice of the Clearinghouse or other mediator. The parties will share the cost of this arbitration if it is before the Clearinghouse.

238. Should any issues still remain unresolved, they may be referred to the Wireless Telecommunications Bureau within ten days of recommended decision or advice of the Clearinghouse or other mediator and any decision of the Clearinghouse can be appealed to the Chief of the Bureau. When referring an unresolved matter, the Clearinghouse shall forward the entire record on any disputed issues, including such dispositions thereof that the Clearinghouse has considered. Upon receipt of such record and advice, the Bureau will decide the disputed issues based on the record submitted. The Bureau is directed to resolve such disputed issues or designate them for an evidentiary hearing before an Administrative Law Judge. If the Bureau decides an issue, any party to the dispute wishing to appeal the decision may do so by filing with the Commission, within ten days of the effective date of the initial decision, a Petition for *de novo* review; whereupon the matter will be set for an evidentiary hearing before an Administrative Law Judge. Parties seeking *de novo* review of a decision by the Bureau are advised that, in the course of the evidentiary hearing, the Commission may require complete documentation relevant to any disputed matters; and, where necessary, and at the presiding judge's discretion, require expert engineering, economic or other reports or testimony. Parties may therefore wish to consider possibly less burdensome and expensive resolution of their disputes through means of alternative dispute resolution.

239. *Fourth*, the Clearinghouse shall provide certain information and reports to the Commission to facilitate our oversight of the transition. Each quarter, the Clearinghouse shall file progress reports in such detail as the Wireless Telecommunications Bureau may require. Such reports shall include detail on the status of reimbursement funds available for obligation, the relocation and accelerated relocation payments issued, the amounts collected from overlay licensees, and any certifications filed by incumbents. The quarterly progress reports must account for all funds spent to transition the band, including its own expenses (including salaries and fees paid to law firms, accounting firms, and other consultants). The quarterly progress reports shall include descriptions of any disputes and the manner in which they were resolved.

240. The Clearinghouse shall provide to the Wireless Telecommunications Bureau and the Office of the Managing Director additional information upon request. For example, the Bureau may request the Clearinghouse estimate the average costs of transitioning an incumbent earth station to aid the Bureau's determination of a lump sum payment for such stations that seek flexibility in pursuing the

⁵⁶² The audited statement should follow generally accepted accounting procedures (GAAP) or generally accepted government auditing standards (GAGAS).

⁵⁶³ See *800 MHz Order*, 19 FCC Rcd at 15071-72, para. 194; 47 CFR § 90.676.

transition. Or the Bureau may require the Clearinghouse to file special reports leading up to or after the Relocation Deadline or the Accelerated Relocation Deadlines, reporting on the status of funds associated with such deadlines so that the Commission can take appropriate action in response. We would anticipate the Bureau would require the Clearinghouse to issue a special, audited report after the Relocation Deadline, identifying any issues that have not readily been referred to the Commission as well as what actions, if any, need to be taken for the Clearinghouse to complete its obligations (including the estimated costs and time frame for completing that work). And we direct the Wireless Telecommunications Bureau to assign the Clearinghouse any additional tasks as needed to ensure that the transition of the band proceeds smoothly and expeditiously.

241. To the extent commenters argue that an independent Clearinghouse is unnecessary,⁵⁶⁴ we disagree. Allowing incumbent space station operators, or other stakeholders, to determine the reasonableness of their own costs and bill overlay licensees accordingly creates an inherent conflict of interest—one that can be easily mitigated through an independent third-party Clearinghouse.

242. *Selecting the Clearinghouse.*—In the 800 MHz proceeding, the Commission appointed a committee of stakeholders to select an independent Transition Administrator to manage the complicated process of relocating incumbent licensees, including public safety, within the 800 MHz band.⁵⁶⁵ We follow suit and find that the best approach for ensuring that the transition of the band will proceed on schedule is for a committee of stakeholders in the band to select a Relocation Payment Clearinghouse.

243. The search committee will be made composed of seven members appointed by seven entities that we find, collectively, reasonably represent the interests of stakeholders in the transition. Specifically, the C-Band Alliance, Eutelsat, NAB, NCTA, ACA, CTIA, and CCA will each appoint one representative to the search committee. The C-Band Alliance and Eutelsat represent varying views of the satellite operators, and Eutelsat shares many views similar to those of the Small Satellite Operators. Although the interests of incumbent earth stations are richly diverse, we find that the membership of NAB, NCTA, and ACA and their positions advocated in this proceeding fairly represent the broad interests of earth stations large and small, including those in rural areas and those that are transportable. We also find that the membership and advocacy of CTIA and CCA fairly represents the views of prospective flexible-use licensees, including small and rural businesses. The search committee should proceed by consensus; however, if a vote on selection of a Clearinghouse is required, it shall be by a majority vote.

244. The search committee shall convene by June 1, 2020. Further, it shall notify the Commission of the detailed selection criteria for the position of Clearinghouse by July 1, 2020. Such criteria must be consistent with the qualifications, roles, and duties of the Clearinghouse. The search committee should ensure that the Clearinghouse meets relevant best practices and standards in its operation to ensure an effective and efficient transition.

245. The Clearinghouse should be required, in administering the transition, to (1) engage in strategic planning and adopt goals and metrics to evaluate its performance, (2) adopt internal controls for its operations, (3) use enterprise risk management practices, and (4) use best practices to protect against improper payments and to prevent fraud, waste and abuse in its handling of funds. The Clearinghouse must be required to create written procedures for its operations, using the Government Accountability

⁵⁶⁴ C-Band Alliance Comments at 22 (creation of an independent transition facilitator is unnecessary); Verizon Comments at 5 (satellite operators are best positioned to serve as the transition facilitator); Letter from Carlos M. Nalda, Counsel, Eutelsat S.A., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Nov. 21, 2019) (no need for a single transition facilitator; rather, each satellite operator should serve to transition its own services and customers).

⁵⁶⁵ See 47 CFR § 90.676.

Office's (GAO) Green Book⁵⁶⁶ to serve as a guide in satisfying such requirements.

246. The search committee should also ensure that the Clearinghouse adopts robust privacy and data security best practices in its operations, given that it will receive and process information critical to ensuring a successful and expeditious transition. The Clearinghouse should therefore also comply with, on an ongoing basis, all applicable laws and Federal government guidance on privacy and information security requirements such as relevant provisions in the Federal Information Security Management Act (FISMA),⁵⁶⁷ National Institute of Standards and Technology (NIST) publications, and Office of Management and Budget (OMB) guidance. The Clearinghouse should be required to hire a third-party firm to independently audit and verify, on an annual basis, the Clearinghouse's compliance with privacy and information security requirements and to provide recommendations based on any audit findings; to correct any negative audit findings and adopt any additional practices suggested by the auditor; and to report the results to the Bureau.

247. The Wireless Telecommunications Bureau is directed to issue a Public Notice notifying the public that the search committee has published criteria for the selection of the Clearinghouse, outlining the submission requirements, and providing the closing dates for the selection of the Clearinghouse.

248. The search committee shall notify the Commission of its choice for Clearinghouse. This notification shall: (a) fully disclose any actual or potential organizational or personal conflicts of interest or appearance of such conflict of interest of the Clearinghouse or its officers, directors, employees, and/or contractors; and (b) set out in detail the salary and benefits associated with each position. The Clearinghouse shall have an ongoing obligation to update this information as soon as possible after any relevant changes are made.

249. After receipt of the notification, the Bureau is hereby directed to issue a Public Notice inviting comment on whether the entity selected satisfies the criteria set out here. Following the comment period, the Bureau will issue a final order announcing that the criteria established in this *Report and Order* either have or have not been satisfied; should the Bureau be unable to find the criteria have been satisfied, the selection process will start over and the search committee will submit a new proposed entity. During the course of the Clearinghouse's tenure, the Commission will take such measures as are necessary to ensure a timely transition.

250. In the event that the search committee fails to select a Clearinghouse and to notify the Commission by September 30, 2020, the search committee will be dissolved without further action by the Commission. In the event that the search committee fails to select a Clearinghouse and to notify the Commission by September 30, 2020, two of the seven members of the search committee will be dropped therefrom by lot, and the remaining five members of the search committee shall select a Clearinghouse by majority vote by October 15, 2020.

251. To ensure the timely and efficient transition of the band, the Commission directs the Wireless Telecommunications Bureau to provide the Clearinghouse with any needed clarifications or interpretations of the Commission's orders. The Bureau, in consultation with the Office of Managing Director, may request any documentation from the Clearinghouse necessary to provide guidance or carry out oversight.

⁵⁶⁶ GAO, The Green Book: *Standards for Internal Control in the Federal Government*, GAO-14-704G, (rel. Sep 10, 2014). Available at <http://www.gao.gov/greenbook/overview>.

⁵⁶⁷ Federal Information Security Management Act of 2002 (FISMA 2002), enacted as Title III, E-Government Act of 2002, Pub. L. No. 107-347, 116 Stat. 2899, 2946 (Dec. 17, 2002) was subsequently modified by the Federal Information Security Modernization Act of 2014 (Pub. L. No. 113-283, Dec. 18, 2014). As modified, FISMA is codified at 44 U.S.C. § 3551 *et seq.*

252. The Wireless Telecommunications Bureau is hereby directed to issue a Public Notice upon receipt of a request of the Clearinghouse to wind down and suspend operations. If no material issues are raised within 15 days of the release of said Public Notice, the Bureau may grant the Clearinghouse's request to suspend operations on a specific date. Overlay licensees must pay all costs prior to the date set forth in the Public Notice.

6. The Logistics of Relocation

253. We next address the logistics of relocating FSS operations out of the lower 300 megahertz of the C-band spectrum. We discuss the obligations for eligible space station operators that select to clear by the Accelerated Relocation Deadlines and adopt filing requirements and deadlines associated with those obligations. We also adopt additional requirements for eligible space station operators that do not elect to clear by the Accelerated Relocation Deadlines in order to ensure that incumbent earth station operators, other C-band satellite customers, and prospective flexible-use licensees are adequately informed and accommodated throughout the transition. Finally, we find it in the public interest to appoint a Relocation Coordinator to ensure that all incumbent space station operators are relocating in a timely manner.

254. In the *NPRM*, the Commission sought comment on the logistics of relocating FSS operations. The Commission sought comment on having the relevant satellite operators form a transition facilitator as a cooperative entity to coordinate negotiations, clearing, and repacking in the band.⁵⁶⁸ The Commission also asked about the role of the transition facilitator and the form of supervisory authority the Commission should maintain over it.⁵⁶⁹ The Commission also sought comment on a process whereby, after the transition facilitator has coordinated with relevant stakeholders regarding the transition of services to the upper portion of the band, it would file with the Commission a transition plan describing the spectrum to be made available for flexible use, the timeline for completing the transition, and the commitments each party has made to ensure that all relevant stakeholders are adequately accommodated and able to continue receiving existing C-band services post-transition.⁵⁷⁰ The Commission sought comment on whether to require that the transition plan explain how the spectrum will be cleared, what types of provisions should be required to ensure that relevant stakeholders are adequately accommodated, and whether to set a deadline for the submission of a transition plan.⁵⁷¹ To facilitate transparency in the transition process, the *NPRM* sought comment on whether the transition plan should be subject to Commission approval, and on whether it should be made available for public review and comment.⁵⁷²

255. Several commenters argue for a centralized transition facilitator to guarantee a transparent transition process with appropriate Commission oversight.⁵⁷³ Several incumbent space station operators argue that a transition facilitator to coordinate relocation is either unnecessary or that incumbent

⁵⁶⁸ See *NPRM*, 33 FCC Rcd at 6939-40, paras. 70, 74.

⁵⁶⁹ See *NPRM*, 33 FCC Rcd at 6941, para. 78.

⁵⁷⁰ *NPRM*, 33 FCC Rcd at 6941, paras. 79-80.

⁵⁷¹ *NPRM*, 33 FCC Rcd at 6941-42, para. 81.

⁵⁷² *NPRM*, 33 FCC Rcd at 6943-45, paras. 87-94.

⁵⁷³ See Open Technology Institute at New America (OTI) *December 9, 2019 Ex Parte*; NCTA Reply at 28; NAC Comments at 6; NAB Reply at 4-7; NPR Comments at 12-13; QVC/HSN Comments at 5; Comcast Comments at 26; Comcast Comments Reply at 12-13; Cox March 15, 2019 *Ex Parte* at 3; Global Eagle Comments at 9; Letter from Colby May, Communications Counsel, Trinity Broadcasting Network, to Marlene Dortch, Secretary, FCC, GN Docket No. 18-122, at 3 (filed May 16, 2019) (Trinity Broadcasting Network May 16, 2019 *Ex Parte*); ACA Connects October 15 *Ex Parte* at 1, Attach. at 16.

space station operators should coordinate the relocation of their own customers.⁵⁷⁴ Several commenters in turn support requiring the submission of a transition plan to be made available for public review and comment.⁵⁷⁵ Commenters ask the Commission to require that the transition plan describe in detail the estimated costs to transition the band, including reimbursement of reasonable costs to incumbent earth station operators and satellite customers,⁵⁷⁶ the schedule for clearing and deadlines for a completed transition,⁵⁷⁷ and plans for how incumbents will be accommodated and continue to receive existing C-band services.⁵⁷⁸ Verizon supports tight timelines for both the submission of a transition plan and the Commission's review of the plan.⁵⁷⁹ In contrast, the C-Band Alliance opposes requiring the submission of a transition plan and argues that the Commission should instead require the submission of periodic reports on the status of negotiations and progress of clearing efforts.⁵⁸⁰ Global Eagle and NAB also support the regular filing of status reports either in lieu of, or in addition to, a transition plan.⁵⁸¹

256. We find that making eligible space station operators individually responsible for all space station clearing obligations will promote an efficient and effective space station transition process. In light of the complicated interdependencies involved in transitioning earth station operations to the upper 200 megahertz of C-band spectrum, as well as the extensive number of registered incumbent earth stations, incumbent space station operators are best positioned to know when and how to migrate incumbent earth stations and when filtering incumbent earth stations is feasible. Incumbent space station operators have the technical and operational knowledge to perform the necessary satellite grooming to transition C-band satellite services into the upper 200 megahertz of the band. This approach will leverage space station operators' expertise, as well as their incentive to achieve an effective transition of space station operations, in order to maintain ongoing C-band services in the future.

257. We nonetheless agree with commenters that the Commission must maintain oversight of the transition throughout. We tailor this transition plan to whether incumbent space station operators elect to meet the Accelerated Relocation Deadlines in recognition that such an election would align the incentives of the incumbent space station operators with the Commission's goal of rapidly introducing mid-band spectrum into the marketplace. We start with that election.

⁵⁷⁴ C-Band Alliance Comments at 22 (creation of an independent transition facilitator is unnecessary); Verizon Comments at 5 (satellite operators are best positioned to serve as the transition facilitator); Letter from Carlos M. Nalda, Counsel, Eutelsat S.A., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Nov. 21, 2019) (no need for a single transition facilitator; rather, each satellite operator should serve to transition its own services and customers).

⁵⁷⁵ AT&T Reply at 7-8; NCTA Comments at 30; GCI Reply at 15; Comcast Reply at 12-13; NAB Comments at 6; NAB Reply at 4-7; NPR Comments at 12-13; QVC/HSN Reply at 5.

⁵⁷⁶ NCTA Comments at 29 (should also include plans for ensuring sufficient funds will be placed in escrow to cover such costs); AT&T Reply at 7-8, 10 ("should be specific to each entity that may incur relocation or retrofitting costs and enable them to understand precisely how the transition will impact their operations," arguing that it should also propose an escrow for all proceeds to ensure transition is fully funded); GCI Reply at 15; NAB Reply at 6-7; NPR Comments at 12-13; QVC/HSN Reply at 5.

⁵⁷⁷ NCTA Comments at 29; AT&T Reply at 7-8, 10; GCI Reply at 15.

⁵⁷⁸ NCTA Comments at 29-30; NAB Comments at 6; NAB Reply at 4-7; QVC/HSN Reply at 5.

⁵⁷⁹ Verizon Comments at 16-17.

⁵⁸⁰ C-Band Alliance Comments at 23.

⁵⁸¹ Global Eagle Comments at 9 (while not commenting on the filing of a transition plan, supported the submission of monthly reports detailing the status of negotiations and including the referral of any reimbursement disputes between the transition facilitator and C-band incumbents and customers); NAB Reply at 7 (supporting the filing of regular status reports as to the progress of commitments detailed in a previously filed transition plan).

258. *Transition for Operators that Elect Accelerated Relocation.*—If satellite operators choose to clear on the accelerated timeframe in exchange for an accelerated relocation payment, they must do so via a written commitment by filing an Accelerated Relocation Election in this docket by June 12, 2020. Commitments to early clearing will be crucial components of prospective flexible-use licensees' decisions to compete for a particular license at auction.⁵⁸² We therefore find it appropriate to require satellite operators to commit to early clearing as soon as possible to provide bidders with adequate certainty regarding the clearing date and payment obligations associated with each license. Such elections shall be public and irrevocable, and we direct the Wireless Telecommunications Bureau to prescribe the precise form of such election via Public Notice no later than May 12, 2020.

259. Because we find that overlay licenses would only value accelerated relocation if a significant majority of incumbent earth stations are cleared in a timely manner, we find that at least 80% of accelerated relocation payments must be accepted via Accelerated Relocation Elections in order for the Commission to accept elections and require overlay licensees to pay accelerated relocation payments. We accordingly direct the Wireless Telecommunications Bureau to issue a Public Notice by June 26, 2020, announcing whether sufficient elections have been made to trigger early relocation or not.

260. By electing accelerated relocation, an eligible space station operator voluntarily commits to paying the administrative costs of the Clearinghouse until the Commission awards licenses to the winning bidders in the auction, at which time those administrative costs will be repaid to those space station operators.

261. By electing accelerated relocation, an eligible space station operator voluntarily commits not only to relocating its own services out of the lower 300 megahertz by the Accelerated Relocation Deadlines (both Phase I and Phase II) but also to take responsibility for relocating its associated incumbent earth stations by those same deadlines. The one exception to this rule is for incumbent earth station operators that choose to opt out of the formal relocation process by taking the lump sum relocation payment in lieu of its actual relocation costs. Such an incumbent earth station operator would then be responsible for coordinating with the relevant satellite operator as necessary and performing all relocation actions on its own, including switching to alternative transmission mechanisms such as fiber.⁵⁸³

262. Only incumbent earth station transition delays that are beyond the control of the incumbent space station operators will not impact their eligibility for the accelerated relocation payment. However, to partake of this exception, we require that any eligible space station operator submit a notice of any incumbent earth station transition delays to the Wireless Telecommunications Bureau within 7 days of discovering an inability to accomplish the assigned earth station transition task. Such a request must include supporting documentation to allow for resolution as soon as practicable and must be submitted before the Accelerated Relocation Deadlines.

263. We will determine whether an eligible space station operator has met its accelerated benchmark on an individual basis in order to protect such operators from potential holdout from other operators. Maintaining individualized eligibility can facilitate competition among satellite operators—after all, content distributors and incumbent earth stations are more likely to choose to use operators that can meet their publicly elected deadlines for the transition than those that fail to do so. And even if some eligible space station operators have not relocated by the Accelerated Relocation Deadlines, we find that value still exists for flexible-use licensees to be able to start deploying terrestrial operations in some areas before the final Relocation Deadline.

⁵⁸² Verizon Jan. 24, 2020 *Ex Parte* at 2; AT&T Comments at 16-17.

⁵⁸³ Earth station operators electing to opt out must inform the appropriate incumbent space station operator(s) that relocation services will not be necessary for the relevant earth station site and must coordinate any such transition with such operators to avoid any disruption in the distribution of video and radio programming.

264. By providing Accelerated Relocation Deadlines that eligible space station operators can commit to meet in order to receive accelerated relocation payments, we will align the satellite operators' incentives with the Commission's goal of rapidly introducing mid-band spectrum into the marketplace.

265. To the extent eligible space station operators can meet the Phase I and Phase II Accelerated Relocation Deadlines, they will be eligible to receive accelerated relocation payments. If an operator fails to meet the Phase I deadline, it will receive no more than the Phase II payment calculated herein by making the Phase II deadline. And we require the eligible space station operator to meet the Phase II deadline in order to receive *any* accelerated relocation payments—our goal is to facilitate the expeditious deployment of next-generation services nationwide across the entire 280 megahertz made available for terrestrial use, and our rules must properly align the incentives of eligible space station operators to hit that target.

266. Subject to confirmation as to the validity of the certification, an eligible space station operator's satisfaction of the Accelerated Relocation Deadlines will be determined by the timely filing of a Certification of Accelerated Relocation demonstrating that it has completed the necessary clearing actions to satisfy each deadline. An eligible space station operator shall file a Certification of Accelerated Relocation with the Clearinghouse once it completes its obligations but no later than the applicable relocation deadline. We direct the Wireless Telecommunications Bureau to prescribe the form of such certification.

267. An eligible space station operator that meets the Phase I Accelerated Relocation Deadline and files the appropriate Certification of Accelerated Relocation may request its Phase I accelerated relocation payment for disbursement. However, to ensure that satellite operators will be able to repay the initial accelerated relocation payment if they fail to meet the Phase II Accelerated Relocation Deadline, satellite operators shall be required to submit a standby letter of credit in the amount of the Phase I accelerated relocation payment before they can receive that payment. The Wireless Telecommunications Bureau shall, to the extent necessary, establish the precise terms required for such a letter of credit no later than 30 days before the Phase I Accelerated Relocation Deadline. Eligible space station operators' obligation to provide security for the potential repayment shall terminate upon verification that they have met the Phase II Accelerated Relocation Deadline and filed the appropriate Certification of Accelerated Relocation. The Clearinghouse shall announce the date on which any given letter of credit will terminate.

268. The Clearinghouse will collect and distribute the accelerated relocation payments. The Clearinghouse shall promptly notify overlay licensees following submission of the Certification of Accelerated Relocation. Overlay licensees shall pay the accelerated relocation payments to the Clearinghouse within 60 days of the notice that eligible space station operators have met their respective accelerated clearing benchmark.⁵⁸⁴ The Clearinghouse shall refund any returned accelerated relocation payment to the overlay licensees of the lower 100 megahertz according to the shares that they had contributed.

269. *Transition for Non-Electing Operators.*—By declining to elect for accelerated relocation payments, an incumbent space station operator is irrevocably forfeiting any right to accelerated relocation payments, even if it completes all tasks by the Accelerated Relocation Deadlines and files a Certification of Accelerated Relocation. This is so because bidders in the public auction must know what obligations they will incur if they become overlay licensees, and the commitment to accelerated relocation therefore must come well in advance of the auction. We therefore find it appropriate to limit eligible space station operators' ability to make such an election in the Accelerated Relocation Election filed no later than June 12, 2020.

⁵⁸⁴ We note that overlay licensees that fail to submit timely payment would be in violation of a condition of their license and therefore be subject to enforcement action, including potential monetary forfeitures, as well as loss of the license.

270. *Transition Plan.*—We require each eligible space station operator to submit to the Commission and make available for public review a Transition Plan describing the necessary steps and estimated costs to transition all existing services out of the lower 300 megahertz of C-band spectrum. Such plans must be filed by July 13, 2020. The Transition Plan must describe in detail the necessary steps for accomplishing the complete transition of existing C-band services to the upper 200 megahertz of the band by the Relocation Deadline or, as applicable, by the Accelerated Relocation Deadlines.⁵⁸⁵ The Transition Plan must include a satellite operator's individual timeline and necessary actions for clearing transponders in the 3700-4000 MHz band and the information it will provide to allow incumbent earth stations to appropriately relocate their services. To the extent an operator plans to assume responsibility for relocating its own incumbent earth station customers, it must make that clear in the Transition Plan (the responsibility otherwise falls on incumbent earth station owners to work with overlay licensees to facilitate an appropriate transition). The Transition Plan must also state a range of estimated costs for the transition, with appropriate itemization to allow reasonable review by overlay licensees, the Clearinghouse, and the Commission.

271. To ensure that incumbent earth station operators, other C-band satellite customers, and prospective flexible-use licensees are adequately informed regarding the transition, the Transition Plan must describe in detail: (1) all existing space stations with operations that will need to be repacked into the upper 200 megahertz; (2) the number of new satellites, if any, that the satellite operator will need to launch in order to maintain sufficient capacity post-transition, including detailed descriptions of why such new satellites are necessary; (3) the specific grooming plan for migrating existing services to the upper 200 megahertz, including the pre- and post-transition frequencies that each customer will occupy;⁵⁸⁶ (4) any necessary technology upgrades or other solutions, such as video compression or modulation, that the satellite operator intends to implement; (5) the number and location of earth station antennas currently receiving the satellite operator's transmissions that will need to be transitioned to the upper 200 megahertz; (6) an estimate of the number and location of earth station antennas that will require retuning and/or repointing in order to receive content on new transponder frequencies post-transition; and (7) the specific timeline by which the satellite operator will implement the actions described in items (2)-(6).

272. We recognize that certain satellite operators may find it advantageous or necessary to develop a combined space station grooming plan that allows for more efficient clearing by, for example, migrating customers to excess capacity on another satellite operator's satellites.⁵⁸⁷ Such satellite operators are free to file either individual or joint Transition Plans, so long as any combined plan separately identifies and describes all required information (i.e., items 1-7) as it pertains to each individual operator. We also recognize that there may be a need for an incumbent space station operator to make changes to its Transition Plan to update certain information or to cure any defects that may be identified by the Commission. Space station operators must make any necessary updates or resolve any deficiencies in their individual Transition Plans by August 12, 2020 (30 days after satellite operators' original submission of individual plans). After this date, space station operators may only make further adjustments to their individual plans with the approval of the Commission.

273. *Relocation Coordinator and Status Reports.*—We find it in the public interest to provide for a Relocation Coordinator to ensure that all incumbent space station operators are relocating in a timely

⁵⁸⁵ All required filings should be made in the docket for this proceeding, GN Docket No. 18-122.

⁵⁸⁶ While we recognize that satellite operators may have an interest in maintaining confidentiality regarding certain aspects of specific contractual agreements and identifying customer information, we require that any information necessary to effectuate the transition in a transparent manner must be included in this filing. If satellite operators will be migrating customers to frequencies on a different satellite operator's space station, the details of that arrangement between two satellite operators would be deemed necessary information.

⁵⁸⁷ See C-Band Alliance Reply at 15-16; C-Band Alliance Apr. 9 *Ex Parte*, Attach. at 1-5.

manner.

274. If eligible space station operators elect accelerated relocation so that a supermajority (80%) of accelerated payments are accepted (and thus accelerated relocation is triggered), we find it in the public interest to allow a search committee of such operators to select a Relocation Coordinator. Specifically, each electing space station operator may select one representative for the search committee, and the committee shall work by consensus to the extent possible or by supermajority vote (representing 80% of electing operators' accelerated relocation payments) to the extent consensus cannot be reached. If electing eligible space station operators select a Relocation Coordinator, they shall also be responsible for paying for its costs out of accelerated relocation payments—this will align the incentives of the Relocation Coordinator and the search committee to minimize costs while maximizing the chances of meeting the Accelerated Relocation Deadlines.

275. The Relocation Coordinator must be able to demonstrate that it has the requisite expertise to perform the duties required, which will include (1) coordinating the schedule for clearing the band; (2) performing engineering analysis, as necessary to determine necessary earth station migration actions; (3) assigning obligations, as necessary, for earth station migrations and filtering, (4) coordinate with overlay licensees throughout the transition process; (5) assessing the completion of the transition in each PEA and determining overlay licensees' ability to commence operations; and (6) mediating scheduling disputes.

276. The search committee shall notify the Commission of its choice of Relocation Coordinator, and the Wireless Telecommunications Bureau is hereby directed to issue a Public Notice inviting comment on whether the entity selected satisfies the criteria set out here. Following the comment period, the Bureau will issue a final order announcing that the criteria established in this *Report and Order* either have or have not been satisfied; should the Bureau be unable to find the criteria have been satisfied, the selection process will start over and the search committee will submit a new proposed entity. During the course of the Relocation Coordinator's tenure, the Commission will take such measures as are necessary to ensure a timely transition.

277. In the event that the search committee fails to select a Relocation Coordinator and to notify the Commission by September 30, 2020, the search committee will be dissolved without further action by the Commission. The Commission will initiate a procurement of a Relocation Coordinator to facilitate the transition. Specifically, we direct the Wireless Telecommunications Bureau to seek proposals for a Relocation Coordinator to ensure that the necessary actions are taken to meet the Accelerated Relocation Deadlines (to the extent applicable to any given operator) and the Relocation Deadline.

278. In the case that the Wireless Telecommunications Bureau selects the Relocation Coordinator, overlay licensees will, collectively, pay for the services of the Relocation Coordinator and staff. The Relocation Coordinator shall submit its own reasonable costs to the Relocation Clearinghouse, who will then collect payments from overlay licensees. It shall also provide additional financial information as requested by the Bureau to satisfy the Commission's oversight responsibilities and/or agency specific/government-wide reporting obligations.

279. However selected, the Relocation Coordinator's responsibilities will be the same. In short, the Relocation Coordinator may establish a timeline and take actions necessary to migrate and filter incumbent earth stations to ensure uninterrupted service during and following the transition. The Relocation Coordinator must review the Transition Plans filed by all eligible space station operators and recommend any changes to those plans to the Commission to the extent needed to ensure a timely transition. To the extent that incumbent earth stations are not accounted for in eligible space station operators' Transition Plans, the Relocation Coordinator must prepare an Earth Station Transition Plan for such incumbent earth stations and may require each associated satellite operator to file the information needed for such a plan with the Relocation Coordinator. Where space station operators do not elect to clear by the Accelerated Relocation Deadlines and therefore are not responsible for earth station filtering, the Earth Station Transition Plan must provide timelines that all earth station relocation is completed by

the Relocation Deadline. The Relocation Coordinator will describe and recommend the respective responsibility of each party for earth station migration obligations in the Earth Station Transition Plan and assist incumbent earth stations in transitioning including, for example, by installing filters or hiring a third party to install such filters to the extent necessary. For example, where an earth station requires repointing or retuning to receive transmissions on a new frequency or satellite, it might be most efficient for the same party performing those tasks to also install the necessary filter at the same time. The Relocation Coordinator shall coordinate its operations with overlay licensees, who must ultimately pay for such relocation costs. The most efficient party to install an earth station filter, and the timeframe for doing so, likely will vary widely across earth stations. Incumbent space station operators must cooperate in good faith with the Relocation Coordinator throughout the transition.

280. Finally, the Commission agrees with commenters like Global Eagle and NAB that regularly filed status reports would aid our oversight of the transition.⁵⁸⁸ Specifically, we require each eligible space station operator to report the status of its clearing efforts on a quarterly basis, beginning December 31, 2020. Because eligible space station operators will likely need to cooperate to meet the accelerated timelines, we invite and encourage them to file joint status reports. We also require the Relocation Coordinator to report on the overall status of clearing efforts on the same schedule. We direct the Wireless Telecommunications Bureau and the International Bureau to specify the form and format of such reports.

7. Other FSS Transition Issues

281. In this section, we address to additional issues related to the FSS Transition that were raised in the record.

282. *Maintenance of IBFS Data Accuracy.*—We decline to require annual certification requirements or discontinuance requirements, as requested by advocates of point-to-multipoint flexible use in the band. The *NPRM* asked several questions about how best to maintain accurate earth station data in IBFS.⁵⁸⁹ Entities like Google and Motorola supporting expanded fixed use and dynamic frequency management urged requiring FSS licensees to certify the accuracy of their earth station facilities and keep their registrations up-to-date if operational parameters change to facilitate point-to-multipoint spectrum sharing.⁵⁹⁰ Google asserts that, in non-co-channel sharing scenarios, frequency coordinators and prospective C-band users need this information on an ongoing basis to ascertain how much spectrum and which specific frequencies are available in a geographic area. Google also states that, in co-channel sharing cases, knowing actual pointing direction(s) or range(s) of FSS dishes maximizes sharing opportunities. Google argues that annual certification requirements would help to ensure that the data in IBFS remains accurate, as would denying interference protection to earth stations with inaccurate location or frequency information in IBFS.⁵⁹¹ We believe there is increased awareness among incumbent earth station operators of their rights and responsibilities as a result of this proceeding and the various public notices associated with it. In addition, because we are not setting aside spectrum for point-to-multipoint flexible use in the band or dynamic spectrum management, we do not believe that such additional measures are necessary or worth the additional regulatory requirements. Further, section 25.162 of the Commission's rules already require FSS licensees to keep their Commission registration

⁵⁸⁸ Global Eagle Comments at 9; NAB Reply at 7.

⁵⁸⁹ *NPRM*, 33 FCC Rcd at 6922, para. 34. Specifically, the Commission sought comment on (1) how to maintain data accuracy to facilitate frequency coordination; (2) whether to require periodic certification of data; and (3) for a constructed and operational earth station, whether 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. *See id.* at 35.

⁵⁹⁰ Google Comments at 7-8; Motorola Comments at 3.

⁵⁹¹ Google Comments at 8-9.

and license information up to date, and it is the responsibility of earth station registrants under the Commission's rules to surrender any registration or license for an earth station no longer in use.

283. *Revising the Coordination Policy Between FSS and FS Services.*—The full-band, full-arc coordination policy governs sharing between the co-primary FSS and FS services. In the contiguous United States this policy will be moot given our decisions today to transition the FSS allocation to the upper 200 megahertz of the band and to sunset incumbent point-to-point use of the band. Outside the contiguous United States, the record does not reflect any significant concerns with the existing policy. Indeed, satellite interests support retention of the full-band, full-arc policy and argue that the flexibility of full-band, full-arc is needed to deal with unanticipated satellite failures, emergencies on the ground, or unexpected interference.⁵⁹² NCTA notes that earth station operators require flexibility to repoint and change frequencies. Accordingly, we are not adopting our proposal to revise the coordination policy at this time to require earth stations to report to the Commission the actual frequencies and azimuths used.⁵⁹³ Nonetheless, if an earth station operator alleges harmful interference from wireless operations in adjacent bands, it must be prepared to provide all relevant technical data regarding its station's operation. Additionally, incumbent space station operations with earth stations will be protected on a primary basis in the remaining upper 200 megahertz of the band. Since we are clearing 300 megahertz of the band and declining to permit point-to-multipoint communications within this band at this time, we need not further limit the scope of earth station operations. Allowing continued flexibility will also facilitate antenna re-pointing to different satellites during the clearing process.⁵⁹⁴

C. Fixed Use in the C-Band

284. We adopt rules to sunset as of September 30, 2023, incumbent point-to-point Fixed Service use in the 3.7-4.2 GHz band in the contiguous United States. We find that doing so will serve the public interest by facilitating the introduction of flexible use into this band and providing incumbent Fixed Service licensees with a reasonable period to self-relocate their permanent fixed operations out of the 3.7-4.2 GHz band. We also decline to adopt modifications to Part 101 to permit point-to-multipoint Fixed Service use in the 4.0-4.2 GHz band, as doing so would undermine the continued use of the 4.0-4.2 GHz band by FSS licensees after the transition.

1. Sunsetting Incumbent Point-to-Point Fixed Services

285. As noted in the *NPRM*, point-to-point Fixed Service use of the band has declined steeply over the past 20 years and many other spectrum options are available for point-to-point links.⁵⁹⁵ In the contiguous United States, there are now only 87 point-to-point Fixed Service licenses in this band, of which 51 are permanent point-to-point Fixed Service and 36 temporary Fixed Service licenses.⁵⁹⁶ Frequency coordination allows FSS and terrestrial fixed microwave to share the band on a co-primary

⁵⁹² C-Band Alliance Comments at 49-50.

⁵⁹³ *NPRM*, 33 FCC Rcd at 6923, para. 37 (examining the continuation of the full-band/full-arc coordination policy in light of potential terrestrial use of the band; proposed that earth station operators would be entitled to protection only for those frequencies, azimuths, and elevation angles and other parameters reported; proposed that 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 acknowledging the policy affords FSS operational flexibility and sought comment on the consequences of eliminating the policy).

⁵⁹⁴ See, e.g., C-Band Alliance Comments, Exhibit 2 at 6, 8-12.

⁵⁹⁵ *NPRM*, 33 FCC Rcd at 6932, para. 47 (noting that fixed licensees in this band have migrated to fiber or other Fixed Service bands that offered more channelization options without the risk of interference disputes with earth stations). Indeed, many of the 87 licenses for the 3.7-4.2 GHz band also authorize point-to-point operations on frequencies in other bands, e.g., 5.925-6.425 GHz band

⁵⁹⁶ See Universal Licensing System, <https://wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp>.

basis but coordination of mobile systems would be more complicated because the movement of the devices would require analyses and interference mitigation to avoid harmful interference to/from both services.⁵⁹⁷ Indeed, the Commission's *Emerging Technologies* framework has largely involved the relocation of fixed services to allow for mobile operations under new, flexible-use licenses.⁵⁹⁸ We must therefore carefully balance these incumbent uses against the need for additional spectrum for flexible use in deciding upon the best means of resolving issues in this proceeding in the public interest.

286. We find that the relatively limited incumbent point-to-point Fixed Service use in this band may be accommodated by sunseting primary operations in the 3.7-4.2 GHz band in the contiguous United States as of September 30, 2023.⁵⁹⁹ Accordingly, we adopt a modified version of our proposal to sunset, in three years, incumbent point-to-point Fixed Service use in the 3.7-4.2 GHz band in the contiguous United States.⁶⁰⁰ Specifically, existing licensees, as of April 19, 2018, of licenses for permanent Fixed Service operations will have until September 30, 2023, to self-relocate their point-to-point links out of the 3.7-4.2 GHz band. We are also revising our part 101 rules to specify that no applications for new point-to-point Fixed Service operations in the 3.7-4.2 GHz band will be granted for locations in the contiguous United States.⁶⁰¹ The record in this proceeding demonstrates the need to allocate this spectrum for flexible use for the provision of 5G, and commenters overwhelmingly support our proposal to sunset incumbent point-to-point Fixed Service use in the contiguous United States.⁶⁰² On the other hand, because we are not authorizing new flexible use services outside of the contiguous U.S. at this time, we find that it would not be in the public interest to maintain the existing freeze on new point-to-point Fixed Service links in these areas. Therefore, the freeze on point-to-point microwave Fixed Service applications for sites outside of the contiguous United States will be lifted on the date of publication of this action in the Federal Register. This decision lifting the freeze, in part, relieves a restriction and therefore is exempt from the effective date requirements of the Administrative Procedure Act.⁶⁰³ Moreover, we find that there is good cause for not delaying the partial lifting of the freeze because such a delay would be unnecessary and contrary to the public interest because it would not serve purposes of the freeze.⁶⁰⁴

287. We note that the FWCC does not object to relocation to other frequency bands, so long as proponents of the incoming service pay all expenses needed to enable fixed microwave service in the new

⁵⁹⁷ See, e.g., *NPRM*, 33 FCC Rcd at 6932, para. 47.

⁵⁹⁸ See, e.g., 47 CFR § 101.69.

⁵⁹⁹ See generally FWCC Comments at 5 (noting that fixed operations were grandfathered for five years when the 3.65-3.7 GHz band was added to the Citizens Broadband Radio Service) (citing *2015 3.5 GHz Band Report Order*, 30 FCC Rcd. 3959, para. 400).

⁶⁰⁰ *NPRM*, 33 FCC Rcd at 6932 at para. 48.

⁶⁰¹ Point-to-point FS licensees in this band outside the contiguous United States may continue to operate as licensed and modify existing licenses and new applicants may seek to coordinate new paths consistent with our existing part 101 rules.

⁶⁰² CTIA Comments at 15-16; Ericsson Comments at 16; Qualcomm Comments at 6; Starry Comments at 4-5; T-Mobile Comments at 20; TIA Comments at 8; Verizon Comments at 11. *But see* CenturyLink Reply at 2-3 (point-to-point FS licensees should be grandfathered and allowed to operate indefinitely in the upper portion of the band unless a flexible-use licensee pay to relocate the incumbent); Fixed Wireless Communications Coalition Comments at 4-8 (generally same except applicable throughout the band and should grandfather licensees for at least five years or the remaining license term); NSMA Reply at 1-2 (generally same as Fixed Wireless Communications Coalition regarding compensation for relocation).

⁶⁰³ See 5 U.S.C. § 553(d)(1).

⁶⁰⁴ See 5 U.S.C. § 553 (d)(3).

band of at least equal quality in all pertinent respects.⁶⁰⁵ But CenturyLink, an incumbent licensee, as well as FWCC point out that “[m]any of the fixed systems are twenty years old and that the components needed to move them to new frequencies are no longer available.”⁶⁰⁶ CenturyLink states that grandfathered and new point-to-point should be permitted in whatever portion of the spectrum that is retained for FSS use because “new equipment may become available that would support new point-to-point links in this band.”⁶⁰⁷ Because this could give rise to increased complexity in the C-band and slow deployment of flexible use services, we disagree. New equipment in other bands is readily available for point-to-point operations and allowing new authorizations in the 4.0-4.2 GHz band could frustrate the satellite repacking and overall repurposing of the 3.7-3.98 GHz band for 5G in the contiguous United States.⁶⁰⁸ Other bands available for assignment for fixed microwave services under Part 101 include 5925-6425, 6525-6875, 6875-7125, 10,700-11,700, 17,700-18,300, 19,300-19,700 MHz, and 21,200-23,600 MHz.⁶⁰⁹ This sunset provision that we adopt pursuant to our spectrum management authority under Title III will protect the operations of incumbent Fixed Service licensees while avoiding harmful interference to new flexible-use licensees and facilitating the FSS transition to the upper 200 megahertz.⁶¹⁰

288. In the *NPRM*, the Commission also sought comment on whether to treat those with permanent licenses differently from those with temporary licenses.⁶¹¹ The 37 licenses for temporary fixed links in the contiguous United States are blanket licenses to use any frequencies in the 3.7-4.2 GHz band for temporary links within a defined geographic area, e.g., statewide. These licenses allow carriers to meet short-term needs for fixed links by prior coordinating specific frequencies and locations with all affected licensees.⁶¹² Although these licenses have 10-year terms, a link cannot be used at a given location for more than 180 days. To be sure, these temporary licenses are different from licenses for permanent links. We find, however, in the context of our actions today making 280 megahertz of mid-band spectrum available as rapidly as possible, that these distinctions do not provide a sufficient public interest justification for treating the 37 temporary fixed licensees differently from the 51 permanent fixed licensees in the 3.7-4.2 GHz band. While temporary fixed licensees operate on a non-interference basis, the burden of analyzing and responding to coordination requests from these operators and to protect any successfully coordinated operations for up to 180 days could add additional complexity to new flexible-use deployments and earth-station transitions. Accordingly, these 37 licensees will have until September 30, 2023, to modify or replace their temporary fixed 3.7-4.2 GHz band equipment with comparable

⁶⁰⁵ FWCC May 3 PN Comments at 3.

⁶⁰⁶ FWCC Comments at 7; CenturyLink Reply at 2 (stating that it has links in the band, some serving E911 and FAA circuitry, that have been in service for many years but that some of this equipment is discontinued (unavailable) and new equipment is not available; *see also* FWCC Reply at 3.

⁶⁰⁷ CenturyLink Reply at 2.

⁶⁰⁸ *See, e.g.*, FWCC May 3 PN Comments at 3.

⁶⁰⁹ *See, e.g.*, 47 CFR § 101.147(a).

⁶¹⁰ *See* 47 U.S.C. §§ 301, 302, 303(c), (f), (g), and (r); *see also* 47 U.S.C. § 157.

⁶¹¹ *NPRM*, 33 FCC Rcd at 6932, para. 48. Temporary fixed operations are authorized to operate in defined areas, e.g., statewide, continental U.S., for up to 180 days subject to prior coordination with all affected licensees. *See* 47 CFR §§ 101.31(a), 101.103(a), (d). When a fixed station, authorized to operate at temporary locations, is to remain at a single location for more than 6 months, an application for a station authorization designating that single location as the permanent location must be filed at least 90 days prior to the expiration of the 6-month period. *See* 47 CFR § 101.31(a)(1).

⁶¹² *See, e.g.*, *Universal Licensing System*, Call Sign KCA74 (authorizing temporary fixed operations statewide in two states in three bands); Call Sign KJA75 (authorizing temporary fixed operations statewide in nine states in over ten bands).

equipment that operates in other bands. Additionally, given that other bands are available for temporary fixed operations, we are revising our rules for the contiguous United States to bar acceptance of applications for new licenses for temporary fixed operations in the 3.7-4.2 GHz band.

289. *Relocation Reimbursement and Cost Sharing.*—Incumbent licensees of point-to-point Fixed Service links that relocate out of the 3.7-4.2 GHz band by September 30, 2023, shall be eligible for reimbursement of their reasonable costs based on the well-established “comparable facilities” standard used for the transition of microwave links out of other bands.⁶¹³ Similar to our approach for earth station clearing, because fixed service relocation affects spectrum availability on a local basis, all flexible-use licensees in a PEA where an incumbent Fixed Service licensee self-relocated will share in the reimbursement of these reasonable costs on a *pro rata* basis. Incumbent Fixed Service licensees will be subject to the same demonstration requirements and reimbursement administrative provisions as those adopted above for incumbent earth station operators.

290. *Estimated Relocation Costs of the FS Transition.*—We find it appropriate to provide potential bidders in our public auction with an estimate of the relocation costs that they may incur should they become overlay licensees. We caution that our estimates are estimates only, and we make clear that overlay licensees will be responsible for the entire allowed costs of relocation—even to the extent that those costs exceed the estimated range of costs. We further caution that the record contains no information on the cost estimates of clearing the 87 incumbent licensees in the band.

291. The Commission’s licensing records reflect that the 51 licenses for permanent links authorize a total of 702 links (discrete frequencies). We note that for microwave links relocated from the 2.1 GHz Advanced Wireless Services bands, \$184,991 was the average cost per link relocation registered with the AWS Clearinghouse.⁶¹⁴ Using this average cost per link to estimate the total cost of clearing 702 links from the 3.7-4.2 GHz band, results in a cost estimate of \$129.9 million. Licensees of temporary fixed links were not entitled to relocation reimbursement from AWS licensees so the AWS Clearinghouse data may be less informative. The record is devoid of any cost data but the average cost per temporary link should be 25-50% lower than for permanent links because temporary links do not usually involve towers. Using \$138,743 (25% lower) as the average replacement cost, if each of the 37 licensees has equipment for one temporary fixed link in the 3.7-4.2 GHz band, this results in a cost estimate of \$5.13 million and a total cost estimate for all fixed links of approximately \$135 million.

2. More Intensive Point-to-Multipoint Fixed Use

292. We have decided to adopt flexible-use rules for this band that allow operators the ability to use it for fixed or mobile operations (or a combination thereof), and thus decline to adopt changes to Part 101 that would limit terrestrial use of any portion the 3.7-4.2 GHz band to point-to-multipoint Fixed Service use.

293. In the *NPRM*, the Commission sought comment on rules that would allow for the more intensive point-to-multipoint Fixed Service use of the band, 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, and 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.⁶¹⁵ Although some commenters support variations of rules that would license non-geographic, unauctioned point-to-multipoint Fixed Service use of the 3.7-

⁶¹³ See, e.g., 47 CFR § 101.73(d) (defining comparable facilities as facilities possessing certain characteristics in terms of throughput, reliability and operating costs).

⁶¹⁴ See, e.g., ET Docket No. 00-258, Report of the CTIA Spectrum Clearinghouse, LLC, at 2 (filed Jan. 31, 2019).

⁶¹⁵ *NPRM*, 33 FCC Rcd at 6951-6952, para. 116.

4.2 GHz band,⁶¹⁶ an overwhelming number of commenters across industries oppose the proposal due to interference, coordination, and other concerns.⁶¹⁷ Commenters emphasize that licensing point-to-multipoint Fixed Service before or during the transition would substantially devalue the spectrum for flexible use, increase the costs of the transition, and undermine market-based approaches to placing this spectrum to its most valued use.⁶¹⁸

294. We agree and find that the record demonstrates that it would be unwise to open this band to point-to-multipoint Fixed use, as a stand-alone service, at this time. Other bands are available for point-to-multipoint use, including licensed spectrum immediately below 3.7 GHz. In short, permitting flexible use, fixed or mobile, services across the entire cleared band will ensure that prospective wireless providers have the ability to provide whichever services (including point-to-multipoint) that consumers most demand. And authorizing more intensive point-to-multipoint Fixed Service use of the 4.0-4.2 GHz band before the transition is over could dramatically complicate the repacking and relocation of FSS operations and earth station registrants.

D. Technical Rules for the 3.7-4.2 GHz Band

295. We adopt technical rules for the 3.7-4.2 GHz band spectrum. We find that the technical rules we adopt herein will encourage efficient use of spectrum resources and promote investment in the 3.7-3.98 GHz band while protecting incumbent users in the band and in adjacent bands.

296. We also note that Comcast recommends that the Commission “encourage interested stakeholders to convene a broad-based group to develop a comprehensive framework for addressing interference prevention, detection, mitigation, and enforcement.”⁶¹⁹ We agree and find that such a multi-stakeholder group could provide valuable insight into the complex coexistence issues in the band and provide a forum for the industry to work cooperatively towards efficient technical solutions to these issues. We therefore direct the Office of Engineering and Technology to convene a group of interested stakeholders to develop a proposed framework for interference prevention, detection, mitigation, and enforcement in the 3.7-4.2 GHz band. The Committee shall include, at a minimum, representatives of incumbent earth stations (including MVPDs and broadcasters), incumbent space station operators, mobile network operators, and network equipment manufacturers. The multi-stakeholder group will develop its findings and issue reports consistent with instructions from the Office of Engineering and Technology.

⁶¹⁶ See, e.g., Broadband Access Coalition Comments at 3, 19, 33; CenturyLink Comments at 4; Dynamic Spectrum Alliance Comments at 5; Dynamic Spectrum Alliance Reply at 5-6; Federated Wireless Comments at 1-2; Geolinks Reply at 1-4; Google Comments at 4-5, 7; Frontier/Windstream Comments at 4-5; Microsoft Comments at 9-10; Microsoft Reply at 2; PISC Comments at 5, 12; Frontier/Windstream July 19 PN Comments at 3; Google July 19 PN Comments at 4-11; WISPA July 19 PN Reply; Google July 19 PN Reply at 3-9; PISC July 19 PN Reply at 6-18.

⁶¹⁷ See, e.g., AT&T Reply at 26; Boeing Comments at 5-6; C-Band Alliance Comments at 41; C-Band Alliance Reply at 49-52; CTIA Reply at 11-12; Ericsson Comments at 17; GCI Comments at 21; QVC/HSN Comments at 2; LinkUp Communications Comments at 2; NAB Comments at 12-13; NCTA Reply at 24-25; PSSI Global Comments at 15; SIA Comments at 24-26; TIA Comments at 8; T-Mobile Comments at 202-21; Verizon Reply at 16-19; World Teleport Association Comments at 1-2; Verizon May 3 PN Reply at 6; SIA July 19 PN Comments at 5-6; The Church of Jesus Christ of Latter-Day Saints July 19 PN Comments at 5-7; NAB July 19 PN Reply at 8-10; AT&T July 19 PN Reply at 8-10; Raytheon July 19 PN Reply at 4-6; ABC et al. July 19 PN Reply at 7-8.

⁶¹⁸ See, e.g., AT&T Reply at 6, 25-26; C-Band Alliance Comments at 41; C-Band Alliance Reply at 49-52; CTIA Reply at 11-12; Cumulus Media/Westwood One Comments at 18; Digital Networks Reply at 1; Ericsson Comments at 17; Qualcomm Comments at 7; Verizon May 3 PN Reply at 6.

⁶¹⁹ See Letter from David M. Don, Comcast Corporation to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 6 (filed Jan. 31, 2020)

1. Power Levels

297. *Base Station Power.*—To support robust deployment of next-generation mobile broadband services, we will allow base stations in non-rural areas to operate at power levels up to 1640 watts per megahertz EIRP.⁶²⁰ In addition, consistent with other broadband mobile services in nearby bands (AWS-1, AWS-3, AWS-4 and PCS), we will permit base stations in rural areas to operate with double the non-rural power limits (3280 watts per megahertz) in rural areas.⁶²¹ We extend the same power density limit to emissions with a bandwidth less than one megahertz to facilitate uniform power distribution across a licensee's authorized band regardless of whether wideband or narrowband technologies are being deployed. This approach also provides licensees the flexibility to optimize their system designs to provide wide area coverage without sacrificing the flexibility needed to address coexistence issues with FSS operations. Further, because advanced antenna systems often have multiple radiating elements in the same sector, we clarify that the power limits we are adopting apply to the aggregate power of all antenna elements in any given sector of a base station.

298. Several commenters, including AT&T, C-band Alliance, CTIA, Ericsson, Nokia, T-Mobile, and Verizon support these base station power limits for wireless network deployments in the 3.7-3.98 GHz band.⁶²² Notably, CTIA and Samsung agree with the Commission that the AWS limits have “provided good service while avoiding harmful interference,” and the higher power limit for rural areas may “promote the Commission’s goals of furthering rural deployment of broadband services.”⁶²³ Ericsson asserts that “[t]hese levels are commensurate with existing rules and deployments, and the higher power limit for rural areas may promote rural deployment of broadband services.”⁶²⁴ We agree with these commenters and believe that, similar to development in other bands, these base station power limits will promote investment in the 3.7-3.98 GHz band and facilitate the rapid and robust deployment of next generation wireless networks, including 5G. We also find that adopting consistent power levels with other AWS bands will allow licensees to achieve similar coverage, creating network efficiencies between network deployments in different spectrum bands.⁶²⁵

299. We disagree with commenters that argue that the base station power limits in this band should be lower to facilitate coexistence with FSS earth stations and flexible-use operations below the 3.7 GHz band edge.⁶²⁶ We believe that the 3.7-3.98 GHz band will be a core band for next generation wireless networks, including 5G, and will require power levels consistent with other bands used for wide area wireless operations to reach its full potential.⁶²⁷ We also find that the protection mechanisms we adopt herein will ensure that the potential for harmful interference to incumbent FSS earth stations is minimized regardless of the base station power levels permitted in the band. Indeed, we note that the C-

⁶²⁰ See, e.g., Verizon Comments at 23; Ericsson Reply at 6; Nokia Comments at 11; AT&T Reply at 22; C-Band Alliance May 13, 2019 *Ex Parte* at 12.

⁶²¹ See, e.g., 47 CFR § 27.50(d)(1).

⁶²² See e.g., Samsung July 19 PN Reply at 4; Nokia July 19 PN Comments at 2; T-Mobile Reply at 38; Ericsson Reply at 7; CTIA Comments at 23, Verizon July 19 PN Reply at 10-11.

⁶²³ CTIA Comments at 23 (quoting *NPRM* at para. 164); Samsung July 19 PN Reply at 4 (quoting *NPRM* at para. 164).

⁶²⁴ Ericsson Comments at 19.

⁶²⁵ C-Band Alliance May 13, 2019 *Ex Parte* at 11.

⁶²⁶ See Federated Wireless Reply at 6-7; Motorola Comments at 5. We also note that several FSS Earth station interests argue that the proposed power limits have not been demonstrated to adequately protect FSS operations but fail to provide counter proposals for consideration. See, e.g., NCTA Reply at 9-11; Comcast Corporation and NBCUniversal Media LLC Reply at 16-17, 19.

⁶²⁷ See e.g., U.S. Cellular Corporation July 19 PN Comments at 2; T-Mobile July 19 PN Comments at 18.

Band Alliance modified its original proposal specifically to support base station power levels consistent with those we adopt here and has indicated that such power levels will not inhibit the rapid introduction of next generation wireless services to this band.⁶²⁸

300. We decline to adopt our proposal to impose a different power level for emissions less than one megahertz wide as we do not believe such a distinction is necessary.⁶²⁹ That is, rather than impose an absolute power limit for narrow emissions, we adopt the same power density limits for all emissions in the band. Verizon supports a power density rule without a separate power limit for emissions less than one megahertz and suggests a minimum channel bandwidth of five megahertz to ensure use of band for broadband applications.⁶³⁰ We note that the power rules for PCS and AWS-1, *e.g.*, where base stations are permitted an EIRP of 1640 Watts/MHz for emissions greater than 1 megahertz or 1640 Watts per emissions with a bandwidth of less than 1 MHz, were developed when mobile services were transitioning from narrowband (GSM systems) to wideband technologies (CDMA). Thus, the Commission adopted the rules to ensure continued service to the public regardless of technology deployed.⁶³¹ While 4G and 5G technologies have continued the trend towards wider channel bandwidths, certain narrowband Internet of Things (NB-IoT) technologies use smaller bandwidths (*e.g.* 180 kHz). We do not believe a separate power per emission distinction is necessary to accommodate narrowband emissions because they are often integrated with wideband emissions as additional resource blocks as opposed to being deployed as separate systems. Nor do we believe we should adopt a minimum emission bandwidth for the band because licensees should be permitted to choose the best technology or a mix of technologies to meet market demands. Moreover, we are mindful of the interference potential possible under our proposed rule whereby a licensee could deploy up to five NB-IoT channels in one megahertz. This situation could lead to an aggregate power of 8200 Watts/MHz in an urban area and 16400 Watts/MHz in a rural area. Licensees still have flexibility to implement any technology in accordance with our technical flexibility framework and can design their networks to ensure coverage, but our rules will ensure power parity between technologies. This approach should avoid an unlikely, yet problematic scenario where a system stacks narrowband high-powered emissions to meet coverage goals while also potentially interfering with adjacent channel operations. Thus, we set a uniform power density distribution across the full 3.7-3.98 GHz band regardless of channel bandwidth.

301. We also decline to adopt a maximum power limit of 75 dBm EIRP, summed over all antenna elements.⁶³² While the Commission sought comment on this limit in the *NPRM*, it received little support on the record⁶³³ and several parties claimed that such a limit could hinder network deployments.⁶³⁴ The C-Band Alliance argues that a maximum power limit is unnecessary as long as adequate earth station protection levels are established.⁶³⁵ Samsung argues that the limit would unnecessarily limit the use of wide channel bandwidths, which are crucial to 5G deployments to deliver

⁶²⁸ Compare C-Band Alliance Comments, Technical Annex at 9, with C-Band Alliance May 13, 2019 *Ex Parte* at 12.

⁶²⁹ *NPRM*, 33 FCC Rcd at 6969-70, para. 164.

⁶³⁰ Verizon Jan. 31, 2020 *Ex Parte* at 2-3.

⁶³¹ See Biennial Regulatory Review - Amendment of Parts 1, 22, 24, 27 and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services, WT Dkt. No. 03-264, Third Report and Order, 23 FCC Rcd 5319 (2008) at ¶ 25.

⁶³² *NPRM*, 33 FCC Rcd at 6970, para. 165.

⁶³³ We note that while Verizon initially supported the limit (Verizon Comments at 23), it later withdrew its support to agree with other terrestrial parties opposing the limit (Verizon July 19 PN Reply at 11).

⁶³⁴ Ericsson Comments at 19; CTIA Comments at 24; AT&T Reply at 22.

⁶³⁵ C-Band Alliance May 13, 2019 *Ex Parte* at 12.

high data rates and use “multi-input, multi-output” techniques.⁶³⁶ We agree and find that an upper limit could hinder flexibility to deploy wider bandwidth technologies⁶³⁷ without any corresponding benefit, as 3.7-3.98 GHz band licensees will design their systems to protect earth station locations around their deployments.

302. *Mobile Power.*—We adopt a 1 Watt (30 dBm) EIRP power limit for mobile devices, as proposed in the *NPRM*. We find that this mobile power limit will provide adequate power for robust mobile service deployment. Additionally, this limit will permit operation of mobile power classes as outlined in the 5G standards.⁶³⁸ We note that most commenters support the proposed 1 Watt EIRP mobile power limit as adequate for 5G operations and as being consistent with industry standards.⁶³⁹

303. While a few commenters suggest allowing higher power limits,⁶⁴⁰ we do not find the record supports a specific need for higher power at this time. Mobile devices typically operate at levels below 1 Watt to preserve battery life, meet human exposure limits, and meet power control requirements.⁶⁴¹

304. Similarly, we disagree with commenters that suggest lower mobile power limits consistent with those in the 3.5 GHz band.⁶⁴² The Citizens Broadband Radio Service, which is based on lower power, narrower channels and a dynamic spectrum sharing framework, is fundamentally different than the service we are permitting in the 3.7-3.98 GHz band. Thus, the limits adopted there are not appropriate for this band. Licensees are expected to deploy much wider channel bandwidths and will operate in exclusively licensed spectrum. The mobile power limit we are adopting is intended to provide consistency between mobile 5G deployments in the 3.7-3.98 GHz band and comparable macro cell deployment in the PCS, AWS, and similar bands.

2. Out-of-band Emissions

305. *Base Station Out-of-band Emissions.*—We adopt base station out-of-band emission (OOBE) requirements based on our proposed limits, which are similar to other AWS services.⁶⁴³ Specifically, base stations will be required to suppress their emissions beyond the edge of their authorization to a conducted power level of -13 dBm/MHz.

306. This limit is supported by several commenters, including Qualcomm, T-Mobile, and Verizon, because it avoids unnecessary constraints on flexible-use equipment in areas far from FSS earth

⁶³⁶ Samsung July 19 PN Reply at 4.

⁶³⁷ The 1640 watt per megahertz urban power limit corresponds to 32 dBW/MHz or 62 dBm/MHz providing only 13 dB headroom to reach a 75 dBm upper limit. Because 13 dBm represents a twenty-fold increase in power, a 75 dBm upper limit would correspondingly artificially cap the ability to operate at full power to a 20-megahertz channel; wider bandwidth channels would be required to operate at lower power. Similarly, the 3280 watt per megahertz rural limit would only have 10 dB headroom and be limited to a 10-megahertz channel for full power operation.

⁶³⁸ See 3GPP 38.101-1 NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone (Release15).

⁶³⁹ See 3GPP TS 38.101-3 version 15.2.0 Release 15 at 80 (UE Power class (PC) For FR1: Power class 3: 23 dBm and Power class 2: 26 dBm). AT&T Reply at 18; Ericsson Comments at 20; Nokia Comments at 12.

⁶⁴⁰ CTIA Comments at 24; Qualcomm Comments at 8.

⁶⁴¹ *NPRM*, 33 FCC Rcd at 6971, para. 167.

⁶⁴² Federated Wireless Reply at 6 and Motorola Comments at 5. We also note that T-Mobile initially suggested a maximum power of 43 dBm/100 MHz, but later urges the adoption of limits proposed in the *NPRM*. Compare T-Mobile Comments at 32 with T-Mobile October 2, 2019 *Ex Parte* at 10.

⁶⁴³ *NPRM*, 33 FCC Rcd at 6971-72, paras. 168-171; see also 47 CFR § 27.53(h) (AWS emission limits).

stations and is compatible with the rules governing other mobile broadband services.⁶⁴⁴ For example, T-Mobile warns that “more stringent emission limits will diminish the utility of the band and threaten coverage.”⁶⁴⁵ Verizon argues that “harmonized rules across bands serve the public interest by ensuring that market forces, not the disparate impact of varying rules, drive the growth of wireless services.”⁶⁴⁶ Verizon supplemented its emission limit recommendation to suggest a relaxation of the emission at the band edge and dropping to our adopted limit after 10 megahertz.⁶⁴⁷ We adopt a conducted limit of -13 dBm/MHz because it is consistent with the emission limits we have established for other mobile broadband services and the emission limits established for 5G technologies by standards bodies, and we find that this limit has been widely accepted as being adequate for reducing unwanted emissions into adjacent bands. While the C-Band Alliance supports the OOB limits contained in the 3GPP standard for band n77,⁶⁴⁸ we note that those emission masks vary by channel bandwidth and class of station. Here we establish a fixed emission mask that fits within the 3GPP specifications and is less complicated. Further, we are not adopting Verizon’s suggestion to relax the limits in the first 10 MHz outside of a licensee’s authorized band because there is insufficient debate in the record on the impact of such a relaxation to adjacent channel operations and we believe manufacturers and licensees are familiar with our standard -13 dBm/MHz limit and have tools to ensure they meet this limit.

307. While some commenters support emission suppression to levels lower than what we adopt, these more stringent emission limits would likely hinder the full potential of 5G deployment in this band. For example, we are not adopting the emission mask suggested by Nokia (-3 dBm/MHz between the edge of the 5G spectrum block up to 20 megahertz from the block, -40 dBm/MHz between 20-40 megahertz from the edge of the 5G spectrum block, -50 dBm/MHz between 40-50 megahertz from the edge of the 5G spectrum block and -60 dBm/MHz beyond that).⁶⁴⁹ Nokia’s proposal would permit 10 dB higher emission levels at the block edge (which could impact adjacent licenses) and the record lacks support for and does not provide adequate information regarding the viability and impact of imposing the -50 dBm/MHz and -60 dBm OOB limits at 40 megahertz and 50 megahertz beyond the edge of the 5G spectrum block. Ericsson does not object to the -13 dBm/MHz limit at the channel edge, but suggests a graduated limit of -40 dBm/MHz at the upper edge of a guard band (20-25 megahertz) to protect FSS.⁶⁵⁰ Because out-of-band emissions generally continue to decrease with spectral separation and manufacturers typically are able to filter those emissions to levels lower than what either our adopted limits or the 3GPP emission masks require,⁶⁵¹ we do not believe it is necessary to specify additional levels of suppression further outside the band as suggested by Nokia and Ericsson.

308. *Mobile Out-of-Band Emissions.*—As with base station out-of-band emission limits, we

⁶⁴⁴ See e.g., Verizon September 16, 2019 *Ex Parte* at 5; Qualcomm July 19 PN Comments at 6; T-Mobile Reply at 40. We note that while AT&T initially supported our adopted emission limit, it later supported an emission mask for base stations that starts at our adopted limit at the band edge, but drops to a suppression of $70 + 10 \log_{10}(P)$ dB after 20 MHz and $90 + 10 \log_{10}(P)$ dB after 40 MHz. Compare AT&T July 19 PN Reply at 3 with AT&T Jan. 30, 2020 *Ex Parte* at Appendix A.

⁶⁴⁵ T-Mobile Comments at 32.

⁶⁴⁶ Verizon Comment at 23.

⁶⁴⁷ Specifically, Verizon recommends out-of-band emissions be suppressed to -7 dBm/100 kHz at the nominal channel edge, sloping linearly to -14 dBm/100 kHz ± 5 MHz from the nominal channel edge; then -14 dBm/100 kHz to ± 10 MHz from the nominal channel edge; then -13 dBm/MHz. Verizon Jan. 31, 2020 *Ex Parte* at 1-2.

⁶⁴⁸ C-Band Alliance July 19 PN Comments at 34.

⁶⁴⁹ Nokia July 19 PN Comments at 2.

⁶⁵⁰ Ericsson Reply at 9.

⁶⁵¹ 3GPP Standard TS 38.104, version 16.1.0, clause 6.6.4.2.1 for Category A base stations

adopt mobile emission limits similar to our standard emission limits that apply to other mobile broadband services. Specifically, mobile units must suppress the conducted emissions to no more than -13 dBm/MHz outside their authorized frequency band.

309. This limit is widely supported by the comments.⁶⁵² For example, Qualcomm argues that a more stringent mobile emission mask would cause “massive reductions in mobile transmit power levels and thus cripple 5G in this band.”⁶⁵³ This limit will ensure new 3.7 GHz Service operators have a robust equipment market in which mobile devices can be designed to operate across the variety of spectrum bands currently available for mobile broadband services. We find that this limit has been widely accepted as being adequate for reducing unwanted emissions into adjacent bands.

310. We note that the C-Band Alliance proposed a more stringent mobile equipment emission mask,⁶⁵⁴ but later supported emission masks developed by standards bodies suitable for 5G devices.⁶⁵⁵ As with the requirements for base stations, our approach will provide equipment developers and adjacent channel licensees certainty as compared to the 3GPP 5G OOB specifications, which vary with bandwidth. The limit largely falls within the 3GPP mask and does not preclude higher levels of suppression should they be needed.

311. For both mobile and base station OOB, we apply the part 27 measurement procedures and resolution bandwidth that are used for AWS devices outlined in section 27.53(h).⁶⁵⁶ Specifically, a resolution bandwidth of 1 megahertz or greater will be used; except in the 1 megahertz bands immediately outside and adjacent to the licensee’s frequency block where a resolution bandwidth of at least 1% of the emission bandwidth may be employed. Verizon supports the use of the AWS measurement procedures because “AWS frequencies are closer [to the C-band] than UMFUS bands, and have a different resolution bandwidth.”⁶⁵⁷ These procedures have been successfully used to prevent harmful interference from similar services operating in nearby bands. Thus, we conclude that there is no demonstrated reason to change them for the 3.7-3.98 GHz band.

312. We note that, like the AWS requirements, we are adopting provisions that permit licensees in the 3.7-3.98 GHz band to implement private agreements with adjacent block licensees to exceed the adopted OOB limits.⁶⁵⁸ Finally, similar to other part 27 services, we apply section 27.53(i), which states that the FCC may, in its discretion, require greater attenuation than specified in the rules if an emission outside of the authorized bandwidth causes harmful interference.⁶⁵⁹

⁶⁵² See e.g., Qualcomm July 19 PN Comments at 6; AT&T July 19 PN Reply at 3; T-Mobile Reply at 40; Samsung July 19 PN Reply at 6. While Verizon initially supported our limit, it supplemented the record to request a relaxation of the emission limits at the band edge. Specifically, Verizon suggests emissions be suppressed to a level (a) -13 dBm measured in a bandwidth of 1% of the nominal channel bandwidth, or (b) for channel bandwidths of 50 MHz or greater, -24 dBm/30 kHz; then -10 dBm/MHz to ± 5 MHz from the nominal channel edge; then -13 dBm/MHz out to \pm the nominal channel bandwidth, except for a 5 MHz channel bandwidth where the -13 dBm/MHz applies to ± 6 MHz from the nominal channel edge; then -25 dBm/MHz. Compare Verizon Sept. 16, 2019 Comments at 5 with Verizon Jan. 30, 2020 *Ex Parte* at 2.

⁶⁵³ Qualcomm July 19 PN Comments at 4.

⁶⁵⁴ C-Band Alliance May 13, 2019 *Ex Parte* at 14.

⁶⁵⁵ C-Band Alliance July 19 PN Comments at 34.

⁶⁵⁶ See 47 CFR § 27.53(h)(3), (4).

⁶⁵⁷ Verizon Comments at 24.

⁶⁵⁸ See 47 CFR § 27.53(h)(4).

⁶⁵⁹ 47 CFR § 27.53(i).

3. Antenna Height Limits

313. We adopt our proposal not to restrict antenna heights for 3.7-3.98 GHz band operations beyond any requirements necessary to ensure physical obstructions do not impact air navigation safety.⁶⁶⁰ This is consistent with part 27 AWS rules, which generally do not impose antenna height limits on antenna structures.

314. Commenters generally support adopting 3.7-3.98 GHz band rules similar to existing part 27 rules to promote consistency,⁶⁶¹ and AT&T specifically supports the proposal in the *NPRM* for flexible antenna height regulations.⁶⁶²

315. Rather than using antenna height limits to reduce interference between mobile service licensees, as has been done in the past, the Commission more recently has used service boundary limits to provide licensees more flexibility to design their systems while still ensuring harmful interference protection between systems. As this has proven successful in other services, we adopt that same approach in the 3.7-3.98 GHz band. Further, we believe such limits would have limited practical effect because we expect that licensees generally will deploy systems predicated on lower tower heights and increased cell density achieving maximum 5G data throughput to as many consumers as possible. In rural areas where higher antennas may be used to provide longer range to serve sparse populations, we believe that the service area boundary limits we are adopting will ensure that adjacent area licensees are protected from harmful interference.

4. Service Area Boundary Limit

316. We adopt the -76 dBm/m²/MHz power flux density limit at a height of 1.5 meters above ground at the border of the licensees' service area boundaries as proposed in the *NPRM* and we also permit licensees operating in adjacent geographic areas to voluntarily agree to higher levels at their common boundaries.⁶⁶³

317. The commenters that specifically address the service area boundary limit support the -76 dBm/m²/MHz PFD limit.⁶⁶⁴ We also note that this metric is straightforward to calculate or measure and also scales with channel bandwidth to provide licensees flexibility for demonstrating compliance.

5. International Boundary Requirements

318. We adopt our proposal to apply section 27.57(c) of our rules, which requires all part 27 operations to comply with international agreements for operations near the Mexican and Canadian borders. This requirement is consistent with all other part 27 services. Under this provision, licensee operations must not cause harmful interference across the border, consistent with the terms of the agreements currently in force. We note that modification of the existing rules might be necessary in order to comply with any future agreements with Canada and Mexico regarding the use of these bands.

6. Other Part 27 Rules

319. As proposed in the *NPRM*, we adopt several additional technical rules applicable to all part 27 services, including sections 27.51 (Equipment authorization), 27.52 (RF safety), 27.54 (Frequency stability), and 27.63 (Disturbance of AM broadcast station antenna patterns) for operations in the 3.7-3.98

⁶⁶⁰ See 47 CFR § 27.56.

⁶⁶¹ Verizon Comments at 23; T-Mobile Reply at 31.

⁶⁶² AT&T Reply at 23.

⁶⁶³ *NPRM*, 33 FCC Rcd at 6975, paras. 182-185. See also *2016 Spectrum Frontiers Order and FNPRM*, 31 FCC Rcd at 8123-8124, para. 312; 47 CFR § 30.204(a).

⁶⁶⁴ AT&T Comments at 19; Verizon Comments at 26; Ericsson Comments at 22; T-Mobile Comments at 35.

GHz band. As operations in the 3.7-3.98 GHz band will be a part 27 service, we find these rules implement important safeguards for all wireless services to ensure that devices meet RF safety limits and that the potential for causing harmful interference to other operations is minimized. Further, few commenters address these issues other than supporting uniformity of 3.7-3.98 GHz band regulations with other part 27 services that will operate in nearby bands.⁶⁶⁵

320. As the Commission has done for other part 27 services since 2014, we also require client devices to be capable of operating across the entire 3.7-3.98 GHz band. Specifically, we add the 3.7-3.98 GHz band to section 27.75, which requires mobile and portable stations operating in the 600 MHz band and certain AWS-3 bands to be capable of operating across the relevant band using the same air interfaces that the equipment uses on any frequency in the band. This requirement does not require licensees to use any particular industry standard. As CCA states, this requirement will prevent “Balkanization” of the band and ensure advanced communications across rural and urban markets alike.⁶⁶⁶ We agree that cross band operability is important to ensure a robust equipment market for all licensees.

7. Protection of Incumbent FSS Earth Stations

321. The record reflects widely varying views on how to protect incumbent operations and whether such protections should be negotiated or mandated by rule. For example, the C-Band Alliance has put forth a specific protection criterion and calculation method based on the received power spectral density (PSD) within an FSS Earth station and urges the promulgation of its proposal in the rules.⁶⁶⁷ However, several commenters, including CTIA, T-Mobile, and Verizon, argue that the C-Band Alliance’s protection criteria is overly conservative and its adoption will hinder 5G deployment.⁶⁶⁸ We adopt here specific criteria for the protection of the incumbent FSS earth stations but acknowledge the possibility of private negotiations that depart from these limits.⁶⁶⁹

322. We will require a power flux density (PFD) limit of -124 dBW/m²/MHz as measured at the earth station antenna. This PFD limit applies to all emissions within the earth station’s authorized band of operation, 4.0–4.2 GHz. In the event of early clearing of the lower 100 MHz (Phase 1 of the transition), the limit will apply to all emissions within the 3.82–4.2 GHz band. We also require a power flux density limit of -16 dBW/m²/MHz applied across the 3.7–3.98 GHz band at the earth station antenna as a means to prevent receiver blocking. This blocking limit applies to all emissions within the 3.7 GHz Service licensee’s authorized band of operation.

a. Protection from Out of Band Emissions

323. We adopt a Power Flux Density (PFD) limit to protect registered FSS earth stations from out of band emissions from 3.7 GHz Service operations. For base and mobile stations operating in the 3.7–3.98 GHz band, we adopt a PFD limit of -124 dBW/m²/MHz, as measured at the antenna of registered FSS earth stations. 3.7 GHz Service licensees will be obligated to ensure that the PFD limit at FSS earth stations is not exceeded by base and mobile station emissions, which may require them to limit mobile operations when in the vicinity of an earth station receiver.

324. The record contains a range of proposals on how FSS earth stations should be protected. Notably, the C-Band Alliance proposes a formula to calculate the expected received aggregate PSD at

⁶⁶⁵ See, e.g., Verizon Comments at 23; T-Mobile Comments at 31.

⁶⁶⁶ CCA Reply at 3. See also U.S. Cellular Reply at 29-30 (recommending a cross band operability requirement to promote a robust equipment ecosystem).

⁶⁶⁷ See C-Band Alliance July 19 PN Comments at Attach. A.

⁶⁶⁸ See, e.g., T-Mobile Second Supplemental Comments at 14; CTIA July 19 PN Comments at 11; Verizon September 16, 2019 *Ex Parte* at 5.

⁶⁶⁹ See T-Mobile Feb. 3, 2020 *Ex Parte* at Attach.

each FSS earth station receiver.⁶⁷⁰ The C-Band Alliance's proposed approach would require terrestrial licensees to consider the aggregate effect of all mobile and base station operations within 40 km of each earth station over a defined span of look angles for the earth station⁶⁷¹ and a defined reference antenna.⁶⁷² Several commenters argue that the C-Band Alliance's proposal is overly protective and would hinder 5G deployment.⁶⁷³ For example, AT&T contends that the C-Band Alliance's plan would create unnecessary coordination obligations for flexible-use licensees and would lead to inefficient spectrum use.⁶⁷⁴ AT&T recommends adopting a PFD limit of -124 dBW/m²/MHz for 5G operations in the 50 megahertz immediately below the FSS band edge.⁶⁷⁵ We agree with this PFD value, but rather than apply it to stations only in a specific 50 megahertz as suggested by AT&T, we will apply that limit to all wireless operations in the 3.7-3.98 GHz band to ensure that earth stations are adequately protected.

325. We find that requiring compliance with a PFD limit is relatively simple and less burdensome on FSS earth station operators and 3.7 GHz Service licensees to implement than a power spectral density (PSD) limit.⁶⁷⁶ Using PFD avoids the complexity of registering complex antenna gain patterns for more than twenty thousand earth stations, and it avoids multiple angular calculations that would be necessary to predict PSD within each satellite receiver. The PFD limit we are adopting is based on a reference FSS antenna gain of 0 dBi,⁶⁷⁷ interference-to-noise (I/N) protection threshold of -6 dB,⁶⁷⁸ a 142.8K FSS earth station receiver noise temperature,⁶⁷⁹ and results in a calculated PFD of -120 dBW/m²/MHz.⁶⁸⁰ To account for aggregate interference effects, which we expect will be dominated by a single interferer, we adjust our calculated value by -4 dB (i.e., assuming the dominant interferer is 40% of the aggregate power). This results in -120 dBW/m²/MHz - 4 dB = -124 dBW/m²/MHz as the PFD limit to protect earth stations from out-of-band emissions.⁶⁸¹ We find that using these parameters to calculate a PFD limit is reasonable and will adequately protect of FSS earth station receivers from out-of-band emissions from fixed and mobile operations in the 3.7-3.98 GHz band.

⁶⁷⁰ See C-Band Alliance July 19 PN Comments at Attach. A.

⁶⁷¹ The look angle will vary based on the location of the earth station but protects a full arc view of satellites between 87- and 139-degrees West longitude.

⁶⁷² The C-Band Alliance's proposal urges that PSD levels not exceed an in-band PSD of $-59 - 10 \log_{10}(\text{BW}) - 10 \log_{10}(n)$ dBm/MHz (where BW is the total amount of C-band spectrum cleared for flexible use in MHz and n is the number of flexible-use operations within the 40 km radius). Similarly, the out-of-band PSD limit would be $-133 - 10 \log_{10}(n2)$ dBm/MHz for Telemetry, Tracking, and Command stations and $-128 - 10 \log_{10}(n2)$ dBm/MHz for regular earth stations. C-Band Alliance July 19 PN Comments, Attach. at 2.

⁶⁷³ See, e.g., Verizon July 19 PN Reply at 3; T-Mobile July 19 PN Reply at 13; CTIA July 19 PN Comments at 8.

⁶⁷⁴ AT&T July 19 PN Comments at 6.

⁶⁷⁵ See AT&T October 22, 2019 *Ex Parte* at 2.

⁶⁷⁶ C-Band Alliance July 19 PN Comments at 26-29, 33, Appendix A.

⁶⁷⁷ See AT&T October 22, 2019 *Ex Parte* at 2. Also, see §25.209(a)(1) and §25.209(a)(4) for earth stations not operating in the Ku band. $32 - 25 \log(\Theta) = 0$ for $\Theta = 19^\circ$.

⁶⁷⁸ See Motorola July 19 PN Comments at 2.

⁶⁷⁹ See FCC 16-55, Order on Reconsideration and 2nd R&O, at 257.

⁶⁸⁰ $\text{PFD (dBW/m}^2\text{/MHz)} = 10 * \log[(kT) * (4\pi/\lambda^2) * (I/N) * (10^{-6} \text{ MHz/Hz})] = (-228.6 \text{ dBW/Hz}) + 10 * \log(142.8) + 33.5 \text{ dB/m}^2 - 6 \text{ dB (I/N)} + 60 \text{ dB-Hz/MHz} = -120 \text{ dBW/m}^2\text{/MHz}$.

⁶⁸¹ See AT&T October 22, 2019 *Ex Parte* at 4-5, which concludes from CommScope's study that interference of significance was dominated by a single 5G base station, and not by aggregate effect. Out of an abundance of caution, the PFD we adopt for a single interferer accounts for up to 2.5 times (1 / 0.4) more interference power from other sources.

326. The C-Band Alliance offered a method of estimating the effect of the aggregate power of all base stations within a certain distance of an FSS earth station.⁶⁸² It provides a formula that considers the impact of aggregate power from all base stations and mobile devices from one licensee for operations within 40 km of an earth station, and if there are more than one licensee within 40 km it essentially divides allotted power by the number of licensees that operate in the subject area. This approach has challenges in that the number and location of mobile operations may be constantly changing, making it difficult to predict the aggregate power for all such stations. Thus, the C-Band Alliance approach assumes all relevant stations have equal potential to cause interference to an earth station. AT&T argues that the C-Band Alliance's aggregate power proposal is flawed, overly complex and does not account for the fact that a single dominant interferer drives the interference power received, not aggregate interference.⁶⁸³ We agree that the base stations closest to any earth station will have a larger potential for causing harmful interference than stations further away. We decline to adopt the C-Band Alliance proposed methodology. We find that the methodology is excessively burdensome for FSS operators and terrestrial licensees, and it involves complex calculations that are unnecessary to reasonably limit the service impact of potential interference. Moreover, the PFD limit we are adopting accounts for the potential of aggregate interference and will protect FSS earth stations from harmful interference.

327. The C-Band Alliance proposes that earth station protection be applied to all locations within one arc second (i.e., about 30 meters depending on location) to provide a buffer around stations.⁶⁸⁴ We decline to establish a buffered protection area for earth stations. We observe that the angular variation over a 30 meter radius protection area is less than 1.7 degrees at distances greater than 1 km, and the path loss variation over a 30 meter radius protection area at distances greater than 1 km is less than 1 dB.⁶⁸⁵ We find that protecting an area of a certain radius instead of an actual deployment could hinder deployment closer to earth stations because it could minimize the effect of terrain or shielding.

b. Protection from Receiver Blocking

328. We will require base stations and mobiles to meet a power flux density (PFD) limit of -16 dBW/m²/MHz, as measured at the earth station antenna for all registered FSS earth stations. This blocking limit applies to all emissions within the 3.7 GHz Service licensee's authorized band of operation.

329. It is possible that emissions operating at high power, even one relatively removed in frequency, may overload a receiver in an adjacent band, also known as receiver blocking. Such blocking effects can be mitigated with filters designed to protect FSS earth stations from receiving energy intended for adjacent channels. Ericsson noted that the NTIA recommended the RF front-end preselection filters be included in new C-band earth station installation to preclude receiver front-end overload.⁶⁸⁶ The C-Band Alliance proposed an FSS blocking protection mechanism based on an aggregate power spectrum density (APSD) protection threshold that must be met by all terrestrial operators within 40 km of each earth station.⁶⁸⁷ The APSD is a function of the total amount of C-band spectrum, in megahertz, cleared for flexible-use licensees and the number of distinct licensees using the same frequency block within a 40 km radius of an earth station. The C-Band Alliance also proposed to install filters on all protected earth

⁶⁸² C-Band Alliance July 19 PN Comments at 32-34 & Attach. at 2-3.

⁶⁸³ AT&T June 6, 2019 Ex Parte at 8.

⁶⁸⁴ C-Band Alliance July 19 PN Comments at 30.

⁶⁸⁵ $35 * \log_{10}(1,030/970) = 0.91$ dB

⁶⁸⁶ Ericsson Ex Parte January 13, 2020 at 1. See U.S. Department of Commerce, Analysis of Electromagnetic Compatibility Between Radar Stations and 4 GHz Satellite Earth Station, NTIA Report 94-313, at 33 (July 1994).

⁶⁸⁷ C-Band Alliance July 19 PN Comments at 37.

stations to reduce their susceptibility to blocking.⁶⁸⁸ After a series of refinements and testing of several prototype filters, the C-Band Alliance proposed the following definition of the FSS earth station filter mask:⁶⁸⁹

Frequency Range	Attenuation
From 3700 to 100 MHz below FSS band edge	-70 dB
From 100 MHz below lower FSS band edge to 20 MHz below lower FSS band edge	-60 dB
From 20 MHz below lower FSS band edge to 15 MHz below lower FSS band edge	-30 dB
From 15 MHz below lower FSS band edge to lower FSS band edge	0 dB

330. The transition of the 3.7-3.98 GHz band to flexible use may be conducted in phases, with an accelerated clearing of the lower 100 megahertz of the band. Some earth stations may need to have two different filters installed over the course of the transition. The filter mask above is defined relative to the lower band edge of the FSS and is applicable to both phases of the accelerated clearing plan. In Phase I, the FSS lower band edge is defined to be 3.82 GHz while in Phase II the FSS lower band edge is defined to be 4.0 GHz.

331. The C-Band Alliance notes that filters have been used in earth stations around the world to mitigate interference for many decades.⁶⁹⁰ American Cable Association, however, believes that filters have proven of dubious effectiveness.⁶⁹¹ It states that one of its members discovered that a Wi-Max signal from 3.6 GHz can overcome the defenses of the filter and get through to the earth station receiver, particularly if it is two or three times more powerful than the victimized video signal.⁶⁹² We acknowledge that there can be variation in filter performance. However, when properly designed and installed, filters can have significant impact in reducing interference to FSS earth stations. Verizon states that there are real and continuing improvements in C-band earth station receive filter mask technology and, as a result, the Commission should continue to evaluate the performance of satellite receive filters.⁶⁹³ While we agree with Verizon that C-band filter mask technology may be subject to further improvement, we believe that failure to develop a baseline minimum specification can and will delay deployment of 5G networks in this band.

332. We adopt a power flux density (PFD) limit to protect FSS earth stations from receiver blocking, relying on C-Band Alliance's filter specification for suppression of signals from the 3.7-3.98 GHz band. Power flux density (PFD) is easily modeled at the design phase of a deployment, facilitates independent verification and testing by 3.7 GHz Service licensees and will greatly reduce the amount of coordination and the burden on all relevant parties. We decline to adopt C-Band Alliance's suggested power spectral density (PSD) limit for the same reasons described above in determining the PFD limit for out of band emissions. Most importantly, a PSD limit would require the use of detailed antenna pattern

⁶⁸⁸ The APSD threshold proposed by C-Band Alliance is given by $[-59 - 10\log_{10}(BW_{MHz}) - 10\log_{10}(n)]_{dBm/MHz}$. See C-Band Alliance July 19 Comments, Attachment at 1-2.

⁶⁸⁹ See C-Band Alliance Comments at 31.

⁶⁹⁰ See C-Band Alliance March. 4, 2019, Further Technical Statement at 10.

⁶⁹¹ See American Cable Association Reply at 8.

⁶⁹² See American Cable Association Reply at 8-9.

⁶⁹³ See Verizon Reply at 7.

data for each individual earth station antenna and a multitude of angular computations for each base station. This level of complexity is an unnecessary burden and it not needed to provide adequate protection for earth stations.

333. C-Band Alliance states that through testing and analysis they have determined that the earth station receiver will encounter insignificant degradation if the aggregate power level across its entire operational frequency range is lower than -59 dBm at the input of the low-noise block downconverter (LNB).⁶⁹⁴ In determining the PFD blocking limit, we use the -59 dBm saturation limit suggested by the C-Band Alliance which includes an aggregate power factor, the filter's total rejection, the bandwidth of flexible-use service, and a 0 dBi FSS antenna gain. We believe the use of 0 dBi FSS antenna gain is a valid assumption that helps simplify compliance and, for virtually all earth stations of record, provides greater than necessary protection. For the filter mask described above, we have determined the total rejection to be 60.85 dB, for an accelerated Phase I where flexible use will only operate in the 3.7-3.8 GHz frequency range. In the later Phase II band, we have determined the total rejection to be somewhat greater at 64.46 dB over the full 3.7-4.0 GHz frequency range.⁶⁹⁵ Based on these parameters, we adopt a PFD blocking limit of -16 dBW/m²/MHz for both Phase I and Phase II. This PFD applies at the earth station antenna and over the authorized band of operation of the 3.7 GHz Service licensee. We anticipate all stakeholders will work with manufacturers to obtain filters that have better performance characteristics than the baseline minimum specification if they are available. In the event of a claim of harmful interference, the earth station operator must demonstrate that they have installed a filter that complies with the mask described above. If they have not installed such a filter or are unable to make such a demonstration, and the 3.7 GHz Service licensee can confirm it meets the blocking PFD, the earth station operator will have to accept the interference.

c. Full Band/Full Arc Protections

334. Once the transition is complete, all FSS earth stations will operate above 4.0 GHz, so we will continue to allow full band/full arc use of that band. The Commission sought comment in the *NPRM* on revising the full-band/full-arc policy for the C-band and several commenters addressed this matter.⁶⁹⁶ For example, the C-Band Alliance proposed limiting the orbital arc of satellites that may serve earth stations in the contiguous United States to 87° W.L. and 139° W.L.⁶⁹⁷ We recognize, however, that the proposal excludes satellites of competing operators that operate outside that arc. While we find merit in knowing the actual spectrum uses and orientation of earth stations for protection purposes, we find these merits are outweighed by the need to provide flexibility to earth stations that will be transitioned to operate above 4.0 GHz. Accordingly, we will maintain the existing policy regarding full band/full arc for earth stations above 4.0 GHz.

⁶⁹⁴ See C-Band Alliance Comments, Technical Annex, at 5. Also see C-Band Alliance Mar. 4, 2019 *Ex Parte* at 11-13. A LNB is a receiver component that converts the received signal frequency to a different frequency for decoding or other signal processing.

⁶⁹⁵ The OOB limit in the guard band is -13 dBm/MHz.

⁶⁹⁶ See, e.g., Broadband Access Coalition Comments at 16-17; CTIA Comments at 13-14; Microsoft Comments at 5; Microsoft Reply at 9-10; PISC Comments at 11-17; Qualcomm Comments at 43-44; AT&T Comments at 12-13; Boeing Comments at 7; Comcast Comments at 33; Extreme Reach Comments at 5; NAB Comments at 24-28; SIA Comments at 21-24; Dynamic Spectrum Alliance May 3 PN Comments at 10; Google May 3 PN Comments at 13; OTI May 3 PN Comments at 23-26; BYU Broadcasting May 3 PN Comments at 10.

⁶⁹⁷ C-Band Alliance July 19 PN Comments at 28. The C-Band Alliance's original proposal was based on the legal standard set forth in the 25.205(a) that restricts earth station operators from *transmitting* at elevation angles less than 5 degrees. C-Band Alliance July 19 PN Comments at 27-28. The C-Band Alliance conducted an internal assessment and concluded that it could repack service currently provided to the United States by satellites throughout the arc by repacking and transmitting from satellites located between 87° W.L. and 139° W.L. C-Band Alliance July 19 PN Comments at 28.

8. Protection of TT&C Earth Stations

335. We establish a protection mechanism to allow continued use of the 3.7-4.0 GHz band by space station licensees operating TT&C links until these operations can be moved to other bands. We note that, for some satellites, TT&C links cannot be moved to other transponders within the satellite, but the earth station location for those TT&C links can be moved. Accordingly, until a replacement satellite can be launched, certain TT&C links will need to continue to operate on a co-channel basis with terrestrial 3.7 GHz Service spectrum.

a. Identification of TT&C Earth Stations to be Protected

336. Based on a review of our IBFS database, we believe there are 49 incumbent earth stations at 17 unique locations currently providing TT&C functions in the C-band.⁶⁹⁸ Due to the potential to hinder 3.7 GHz Service deployment around these locations, the C-Band Alliance indicated that these operations could be consolidated into four locations.⁶⁹⁹ Specifically, they identified Brewster, WA and Hawley, PA as two locations where consolidated TT&C could be located.⁷⁰⁰ C-Band Alliance noted “[t]he key selection criteria are that any site: (1) must be located at a sufficient distance from a major urban area or have a terrain profile such that the propagation losses between urban area and the TT&C/Gateway location will be large enough to attenuate Flexible Use base station transmissions to a level that will not unduly impair the Flexible Use licensee’s operation in that urban area; (2) must be geographically diverse from the other TT&C/Gateway sites; (3) requires nearby access to major telecommunications points-of-presence; (4) requires some existing FSS infrastructure in place that can be improved upon for new or additional TT&C/Gateway infrastructure; (5) requires unhindered visibility to the geostationary satellite arc to elevation angles as low as 5 degrees; (6) must have sufficient land available to accommodate up to 20 very large (i.e., up to 13m) transmit/receive antennas; (7) must be in an area unaffected by nearby aeronautical traffic; and (8) must be able to be built out (e.g., building permits, zoning requirements) within a 36-month time frame.”⁷⁰¹ The satellite operators must identify the four consolidated TT&C locations as soon as feasible, but not later than the submission of the Transition Plan. The Commission’s Wireless Telecommunications Bureau will assess the proposed locations and make a determination as to the reasonableness of the sites. The Wireless Telecommunications Bureau will consider the size of the population that would be affected as well as other factors in their assessment and may require alternative locations if the proposed sites are deemed deficient. Identification of the locations must also include all the technical parameters necessary to assess coexistence such as frequency, authorized bandwidth and specific look angles to existing satellites.

337. To facilitate protection of TT&C links while also transitioning them out of the 3.7 GHz Service band, we will not authorize any new TT&C earth station links in the 3.7 GHz Service band within the contiguous United States unless it is to consolidate existing TT&C links into the selected locations for temporary operation. That is, we will allow until September 30, 2021 to consolidate TT&C links to four protected locations. We may allow existing TT&C operations to continue in their current location beyond the September 30, 2021 deadline either through a waiver request upon a sufficient showing to the International Bureau or through negotiated agreements with affected 3.7 GHz Service licensees. During the transition period prior to September 30, 2021, the space station operators will work to consolidate TT&C sites to four locations and ensure operations are adequately protected through coordination. After

⁶⁹⁸ The IBFS database does not include a separate field for specifically identifying TT&C earth stations, so these estimates are based on earth stations stating in IBFS that they provide TT&C functionalities, such as tracking and telemetry beacons, telemetry ranging, and telecommand as well as “TT&C.”

⁶⁹⁹ C-Band Alliance July 19 PN Comments at 30.

⁷⁰⁰ C-Band Alliance July 19 PN Comments at 30.

⁷⁰¹ C-Band Alliance Ex Parte January 14, 2020

that date, operations that are not relocated may continue on an unprotected basis.

338. Further, for a period of 10 years after the effective date of this order, we will allow protected operation of TT&C operations in the 3.7-4.0 GHz band at the consolidated locations. This should allow sufficient time for replacement satellites to be launched and satisfy the lifespan of existing satellites. After this transition period, these TT&C links may continue to operate on an unprotected basis until the satellites they are communicating with cease operation. We will also allow negotiated agreements for longer operation where relevant parties should be able to arrange operating parameters to coexist to allow early entry by 3.7 GHz Service operations or extended operations by TT&C earth stations.

339. Further, we will allow private negotiation of TT&C sites as well. Given the limited number of TT&C sites, we believe private negotiations between the TT&C station operators and 3.7 GHz Service licensees may permit early entry of 3.7 GHz Service operations or may prolong TT&C operations in instances where these operations are designed to coexist. Alternatively, TT&C operations could negotiate to relocate to another country that is maintaining C-band FSS or a remote shielded location in the United States that is not heavily populated.

b. Co-Channel Protection Criteria

340. TT&C earth stations perform a critical function in maintaining space station operations. While these operations need adequate protection, their operations will have a direct impact on the ability of mobile broadband services to operate on the same spectrum. We adopted a single out-of-band emissions PFD level for protecting FSS earth stations above 4.0 GHz due to the large number of earth stations and the fact that many earth station operators lack sufficient technical skills to perform engineering analysis of potential interference sources. The PFD limit that we adopted for earth stations necessarily relied on assumptions of some parameters such as noise temperature and elevation angle. TT&C operations have a wider range of variability in some of these key parameters and previous assumptions may no longer be sufficient. Given that there are few TT&C locations to be protected, it is possible to do more detailed analysis specific to each site's particular parameters. We find that a protection criteria of $I/N = -6$ dB is appropriate for TT&C links, as we did for the FSS earth stations described above. The 3.7 GHz Service licensee must ensure that the aggregated power from its operations will meet an I/N of -6 dB as received by the TT&C earth station. We will require 3.7 GHz Service licensees to coordinate their operations within 70 km of TT&C earth stations that continue to operate in the 3.7-3.98 GHz band.

341. Our decision to coordinate actual parameters for TT&C deployments is supported by many factors in the record. For example, a significant factor in the distance over which coordination is needed is the elevation angle in which the earth station is pointed. Several commenters pushed for limiting protections based upon a minimum elevation angle in order to reduce the distance from the earth station in which 3.7 GHz Service operations must coordinate.⁷⁰² We agree that TT&C links are highly unlikely to conduct normal operations at such low elevation angles because control signals need a much higher degree of reliability than other traffic.⁷⁰³ But if a low elevation angle is unavoidable, an operator may be able to use technical solutions to achieve the necessary reliability.⁷⁰⁴ It is understood that low

⁷⁰² See e.g., Ericsson Comments at 4-6 (arguing that a minimum elevation angle of 20 degrees should be considered for earth station protections to minimize impact on flexible-use deployments).

⁷⁰³ See, e.g., Recommendation ITU-R S.1716, Performance and availability objectives for fixed-satellite service telemetry, tracking and command systems, at 1 (TT&C carriers need higher performance reliability objectives than normal traffic carriers) (2005), <https://www.itu.int/rec/R-REC-S.1716>.

⁷⁰⁴ See, e.g., T-Mobile Comments at 34 (supporting coordination of TT&C on a case by case basis, arguing that protection to FSS earth stations should take into account all technical solutions, such as filtering, shielding, directional antennas, terrain and operating characteristics of the earth station).

elevation angles may be needed during infrequent events such as loss of satellite.

342. Further, because there are fewer TT&C earth stations, and they are run by highly qualified technical staff, a coordination process that takes into account terrain, shielding, polarization and other technical parameters will result in adequate earth station protection and permit terrestrial use at a closer distance. The space station operators who manage TT&C links are sophisticated users with internal engineering resources. Reliance on our typical prior coordination process would be the simplest and most thorough approach. 3.7 GHz Service licensees are expected to take all practical steps necessary to minimize the risk of harmful interference to TT&C operations. Licensees will cooperate in good faith and make reasonable efforts to anticipate and resolve technical problems that may inhibit effective and efficient use of the spectrum. Licensees of stations suffering or causing harmful interference are expected to cooperate and resolve the problem by mutually satisfactory arrangements. If the licensees are unable to do so, the Commission may impose restrictions including specifying the transmitter power, antenna height, or area or hours of operation of the stations concerned. Any 3.7 GHz Service licensee with base stations located within the appropriate coordination distance is required to provide upon request an engineering analysis to the TT&C operator to demonstrate their ability to comply with the -6 dB I/N criteria. Both parties are expected to negotiate in good faith. If a dispute arises, either party can bring the issue to the FCC. Further, we are only providing protection for TT&C operations. Other services or content that are capable of moving to different transponders must be moved above 4.0 GHz or other FSS bands unless parties negotiate other arrangements.

343. To minimize the impact of this coordination requirement, we advise that the protection criteria will be applied only for the frequencies, bandwidths and look angles that will be in use at each TT&C site, not full band or full arc. For our purposes here, we define co-channel operations as when any of the 3.7 GHz Service licensee's authorized frequencies are separated from the center frequency of the TT&C earth station by less than 150% of the maximum emission bandwidth in use by the TT&C operation. They must continue to be protected over the bandwidth that they use. While this definition affords co-channel protection over more bandwidth than is in use, it is reasonable to allow for graduated receiver selectivity outside of the desired channel. The record is clear that the actual parameters of earth stations make a significant difference in the coordination process and we do not feel it is justified to preclude 3.7 GHz Service operations by coordinating frequencies or look angles that are not being used. Unlike the typical conventional FSS earth station operator, TT&C earth station operators are aware of the precise engineering antenna patterns, look angles, noise temperature, and other specifications that allow a detailed coordination process to efficiently protect TT&C functions and allow 3.7 GHz Service operations at a safe distance, which can provide better margin for their robust operations.

344. While the C-Band Alliance contends that the critical nature of TT&C operations warrants a coordination zone of 150 km around all sites,⁷⁰⁵ others argue that this distance is overly conservative.⁷⁰⁶ AT&T argues that a 150 km coordination radius would have significant impact on 5G deployment around TT&C locations and the Commission should use all engineering and commercial tools to manage interference challenges prior to resorting to such coordination areas.⁷⁰⁷ Ericsson contends that coordination distances of 30 km may be needed in favorable conditions or up to 50-70 km may be needed for less favorable conditions for co-channel operation.⁷⁰⁸ T-Mobile supports coordination of TT&C on a

⁷⁰⁵ C-Band Alliance July 19 PN Comments at 29.

⁷⁰⁶ AT&T May 23, 2019 *Ex Parte* at 5, 15-16; Wireless Internet Service Providers Association Aug. 21, 2019 *Ex Parte* at 3.

See e.g., AT&T July 19 PN Reply at 5; T-Mobile Comments at 18; CTIA Comments at 8.

⁷⁰⁷ AT&T May 23, 2019 *Ex Parte* at 5, 15-16.

⁷⁰⁸ Ericsson May 31, 2018 Comments at 5.

case by case basis and argues that protection to FSS earth stations should take into account all technical solutions, such as filtering, shielding, directional antennas, terrain, and operating characteristics of the earth station.⁷⁰⁹

345. We agree with commenters asserting that a 150 km coordination distance is overly conservative and instead, we set a co-channel coordination distance of 70 km for all TT&C operations. First, we note that we are allowing coordination based on the parameters of the TT&C's actual operations and we find it highly unlikely that the relevant TT&C locations will be pointed at the horizon presenting a burdensome coordination process with multiple terrestrial licensees for a scenario that is highly unlikely. Further, a 150 km coordination would complicate 3.7 GHz Service deployment for several licensees, many of whom would have an unlikely chance of having any impact on TT&C operations, especially due to their consolidation to areas with terrain shielding and other protective factors. Further, should any interference to a protected TT&C location occur, we require parties to act in good faith to resolve the interference.

c. Adjacent Channel Protection Criteria

346. To protect TT&C earth stations from adjacent channel interference due to out-of-band emissions, we set the same interference protection criteria of -6 dB I/N ratio. This limit will apply to all emissions removed from the TT&C's center frequency by less than 150% of the TT&C's necessary emission bandwidth. Prior coordination is not required for adjacent channel licenses. Both 3.7 GHz Service licensees and TT&C earth station operators are expected to cooperate in good faith and make reasonable efforts to anticipate and resolve technical problems that may inhibit effective and efficient use of the spectrum. The TT&C operators should make available pertinent technical information about their systems upon request by the 3.7 GHz Service licensees. Licensees of stations suffering or causing harmful interference are expected to cooperate and resolve the problem by mutually satisfactory arrangements. To provide protection from potential receiver overload, we will require base stations and mobiles to meet a power flux density (PFD) limit of -16 dBW/m²/MHz, as measured at the TT&C earth station antenna. This blocking limit applies to all emissions within the 3.7 GHz Service licensee's authorized band of operation. This is the same limit that is applied to other earth stations as described above and for the same reasons. All TT&C earth stations will be protected based on the assumption that robust filters have been installed at the facilities, like other FSS earth stations. Because the bandwidth of the TT&C emission can vary, this filter will have to be custom fit for each earth station. The quality should be just as robust, providing a minimum of 60 dB of rejection. The frequency at which the TT&C filter must meet this 60 dB of rejection will vary with the bandwidth. We expect that the filter should meet 60 dB of rejection for all frequencies removed from the TT&C's center frequency by more than 150% of the TT&C's emission bandwidth, both above and below the TT&C channel. Further, the filter should provide 70 dB of rejection for all frequencies removed from the TT&C's center frequency by more than 250% of the TT&C's emission bandwidth, both above and below. In the event of a claim of harmful interference, the earth station operator must demonstrate that they have installed a filter that complies with the mask described above. If they have not installed such a filter or are unable to make such a demonstration, and the 3.7 GHz Service licensee can confirm it meets the PFD, the TT&C operator will have to accept the interference.

9. Coexistence with Aeronautical Radionavigation

347. The nearby 4.2-4.4 GHz band is allocated to Aeronautical Radionavigation and aeronautical mobile (route) service services worldwide.⁷¹⁰ This band is home to radio altimeters and

⁷⁰⁹ T-Mobile Comments at 34.

⁷¹⁰ World Radio Conference-15 added a primary aeronautical mobile (route) service (AM(R)S) allocation to the 4.2-4.4 GHz band in all ITU Regions, and adopted footnote 5.436, which reserves the use of this allocation exclusively for wireless avionics intra-communications systems.

Wireless Avionics Intra-Communications systems used on aircraft and helicopters worldwide. Radio altimeters are critical aeronautical safety-of-life systems primarily used at altitudes under 2500 feet above ground level (AGL) and must operate without harmful interference. Wireless Avionics Intra-Communications systems provide communications over short distances between points on a single aircraft and are not intended to provide air-to-ground communications or communications between two or more aircraft.

348. By licensing only up to 3.98 GHz as flexible-use spectrum, we are providing a 220-megahertz guard band between new services in the lower C-band and radio altimeters and Wireless Avionics Intra-Communications services operating in the 4.2-4.4 GHz band. This is double the guard band supported in initial comments by Boeing and ASRC.⁷¹¹

349. A set of preliminary test results prepared by the Aerospace Vehicle Systems Institute was provided to the Commission after the reply and comment period. AVSI's study simulated an aggregate 5G emission for various amounts of allocated spectrum and measured the received power level at which the accuracy of height measurements exceeds certain criteria. In one scenario, AVSI modeled a worst-case scenario with an aircraft altimeter operating at 200 feet AGL, with numerous other altimeters nearby creating in-band interference and aggregate base station emissions across the 3.7 to 4.0 GHz band. The preliminary results show that there may be a large variation in radio altimeter receiver performance between different manufacturers. The measured power spectral density levels at which errors occurred ranged from -21 to -51 dBm/MHz for the various types of altimeters that were tested. AVSI concluded that "most of the altimeters reported broadly consistent susceptibility to OoBI PSD levels until more than approximately 200 to 250 MHz of OoBI was introduced."⁷¹² AVSI noted that as the amount of active spectrum increased above 3.9 GHz, the acceptable levels of PSD began to decrease.

350. T-Mobile commissioned a study by Alion to review the AVSI report and they raised several concerns.⁷¹³ Alion noted that AVSI's analysis identified levels of interference where performance degradation occurred, but did not investigate whether these levels would occur in any reasonable scenario.⁷¹⁴ Alion questioned the interference margin assumptions,⁷¹⁵ noting that two of the initial altimeters types failed due to interference from other altimeters and the scenario had to be adjusted. They also questioned the simulated waveform for the 5G emissions, which showed flat out-of-band emissions approximately 40 dB below the carrier. Alion noted that emissions naturally decrease with frequency separation and concluded that the simulated emission "would not comply with the emission limits for virtually any services associated with a base station or fixed station governed by FCC rules Part 27 services, Part 27.53 or Part 96 services."⁷¹⁶

351. The technical rules on power and emission limits we set for the 3.7 GHz Service and the spectral separation of 220 megahertz offers significant protection of services in the 4.2-4.4 GHz band. We agree with T-Mobile and Alion that the AVSI study does not demonstrate that harmful interference

⁷¹¹ See Boeing Reply at 5-6; Aviation Spectrum Resources Comments 5-6.

⁷¹² See "Behavior of Radio Altimeters Subject to Out-Of-Band Interference," attachment to Letter of Dr. David Redman, Aerospace Vehicle Systems Institute, to Marlene H. Dortch, Secretary, Federal Communications Commission, Docket No. 18-122 (filed Oct 22, 2019).

⁷¹³ T-Mobile Jan. 22, 2020 *Ex Parte* at 1.

⁷¹⁴ T-Mobile Jan. 22, 2020 *Ex Parte* at 11.

⁷¹⁵ T-Mobile Jan. 22, 2020 *Ex Parte* at 7. "During testing of the 200 ft. altitude case, two of the RAs would not operate in the presence of baseline in-band RA interference. To restore operation, the loop loss was reduced by 2 to 3 dB. This indicates that the available interference margin of the RA under test was consumed by the in-band RAs before any adjacent-band interference was introduced."

⁷¹⁶ T-Mobile Jan. 22, 2020 *Ex Parte* at 10.

would likely result under reasonable scenarios. We thus find the limits we set for the 3.7 GHz Service are sufficient to protect aeronautical services. We will of course continue to monitor the results of this and other studies as they are provided and take appropriate action, if necessary, to protect such devices.

10. Coexistence with the Citizens Broadband Radio Service

352. We do not require dynamic spectrum management or other protection mechanisms suggested by some to protect the Citizens Broadband Radio Service (operating below 3.7 GHz) or FSS operations (in the 4.0-4.2 GHz band) from new 3.7 GHz Service operations. Although Federated Wireless and others support the use of some form of dynamic spectrum management or an automated coordination capability to mitigate interference from new 3.7 GHz Service operations into the 3550-3700 MHz band,⁷¹⁷ we find such provisions are unwarranted in this instance and could hinder efficient 5G deployment in the band. Specifically, we note that the dynamic management approach is needed in the Citizens Broadband Radio Service to coordinate access between Priority Access Licensees and General Authorized Access users and to prevent interference to incumbent Federal and non-Federal operations. The same considerations are not present in the 3.7-4.2 GHz band and the transition and licensing approach we adopt for introducing 3.7 GHz Service to the 3.7-3.98 GHz band is appropriate for the unique circumstances and anticipated use cases for the band. As Ericsson noted, “database management approaches work best when there is sparse use of the spectrum by competing services.”⁷¹⁸ Ericsson cited SIA’s comments that “a database attempting to determine whether to authorize a terrestrial wireless transmission in the 3.7-4.2 GHz band would need to consider the impact on hundreds or even thousands of C-band receive earth station antennas in the surrounding area,” and that the computing power needed to make each determination “would be staggering.”⁷¹⁹

353. We find that 3.7 GHz Service operations above 3.7 GHz can coexist with operations below the band edge. First, we note that the emission limits we are adopting are consistent with other mobile service bands that have proven successful in coexisting with a variety of adjacent services. Further, the flexible nature of the equipment that will likely operate in the Citizens Broadband Radio Service band and the advanced spectrum management capabilities of the SAS should allow flexibility to access different channels in any location that might be near a higher-powered 3.7 GHz Service tower or make opportunistic use of different channels in different areas. Further, in some instances, operations above and below the 3.7 GHz band edge may be synchronized when they are deployed as part of a carrier’s network.⁷²⁰ As noted by Verizon, synchronization of two different carriers can be implemented using traditional 3GPP methods based on an absolute timing reference.

IV. PROCEDURAL MATTERS

354. *Paperwork Reduction Analysis.*—This *Report and Order* contains new and modified information collection requirements subject to the Paperwork Reduction Act of 1995 (PRA), Public Law No. 104-13. It will be submitted to the Office of Management and Budget (OMB) for review under section 3507(d) of the PRA. OMB, the general public, and other Federal agencies will be invited to comment on the new and modified information collection requirements contained in the proceeding. In addition, we note that pursuant to the Small Business Paperwork Relief Act of 2002,⁷²¹ we previously sought specific comment on how we might “further reduce the information collection burden for small

⁷¹⁷ Federated Reply at 7 and October 31, 2019 *Ex Parte* at 2; Dynamic Spectrum Alliance Comments at 6.

⁷¹⁸ Ericsson Comments at 6-7 (5/31/18).

⁷¹⁹ *Id.*

⁷²⁰ Verizon November 12, 2019 *Ex Parte* at 2.

⁷²¹ Pub. L. No. 107-198.

business concerns with fewer than 25 employees.”⁷²² We have described impacts that might affect small businesses, which includes most businesses with fewer than 25 employees, in the Final Regulatory Flexibility Analysis (FRFA), attached as Appendix C.

355. *Congressional Review Act.*—The Commission has determined, [and the Administrator or the Office of Information and Regulatory Affairs, Office of Management and Budget, concurs] that these rules are “major” under the Congressional Review Act, 5 U.S.C. § 804(2). The Commission will send a copy of this *Report and Order* to Congress and the Government Accountability Office pursuant to the Congressional Review Act, *see* 5 U.S.C. § 801(a)(1)(A).

356. *Regulatory Flexibility Act.*—The Regulatory Flexibility Act of 1980, as amended (RFA), requires that an agency prepare a regulatory flexibility analysis for notice and comment rulemakings, unless the agency certifies that “the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities.”⁷²³ The FRFA concerning the impact of the rule changes contained in the *Report and Order* is attached as Appendix C.

357. *Ex Parte Presentations.*—This proceeding shall be treated as a “permit-but-disclose” proceeding in accordance with the Commission’s *ex parte* rules.⁷²⁴ Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within two business days after the presentation (unless a different deadline applicable to the Sunshine period applies). Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentation must (1) list all persons attending or otherwise participating in the meeting at which the *ex parte* presentation was made, and (2) summarize all data presented and arguments made during the presentation. If the presentation consisted in whole or in part of the presentation of data or arguments already reflected in the presenter’s written comments, memoranda or other filings in the proceeding, the presenter may provide citations to such data or arguments in his or her prior comments, memoranda, or other filings (specifying the relevant page and/or paragraph numbers where such data or arguments can be found) in lieu of summarizing them in the memorandum. Documents shown or given to Commission staff during *ex parte* meetings are deemed to be written *ex parte* presentations and must be filed consistent with rule 1.1206(b). In proceedings governed by rule 1.49(f) or for which the Commission has made available a method of electronic filing, written *ex parte* presentations and memoranda summarizing oral *ex parte* presentations, and all attachments thereto, must be filed through the electronic comment filing system available for that proceeding, and must be filed in their native format (e.g., .doc, .xml, .ppt, searchable .pdf). Participants in this proceeding should familiarize themselves with the Commission’s *ex parte* rules.

358. *Comment Period and Filing Procedures.*—Pursuant to section 316 of the Communications Act, 47 U.S.C. § 316, interested parties may file any protest of the proposed modifications no later than thirty (30) days after publication of this *Report and Order* in the Federal Register. Protests 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>.
- Paper Filers: Parties who choose to file by paper must file an original and one copy of each filing. If more than one active docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number.

359. Filings can be sent by hand or messenger delivery, by commercial overnight courier, or

⁷²² 44 U.S.C. § 3506(c)(4).

⁷²³ 5 U.S.C. §§ 601 *et seq.*

⁷²⁴ 47 CFR §§ 1.1200 *et seq.*

by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

- All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th St., SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes and boxes must be disposed of before entering the building.
- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9050 Junction Drive, Annapolis Junction, MD 20701.
- U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554.

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

361. *Availability of Documents.*—Comments, reply comments, and *ex parte* submissions will be available for public inspection during regular business hours in the FCC Reference Center, Federal Communications Commission, 445 12th Street, S.W., Room CY-A257, Washington, D.C. These documents will also be available via ECFS. Documents will be available electronically in ASCII, Microsoft Word, and/or Adobe Acrobat.

V. ORDERING CLAUSES

362. Accordingly, IT IS ORDERED that, pursuant to sections 1, 2, 4(i), 4(j), 5(c), 201, 302, 303, 304, 307(e), and 316 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 152, 154(i), 154(j), 155(c), 201, 302, 303, 304, 307(e), and 316, this *Report and Order* IS HEREBY ADOPTED.

360. IT IS FURTHER ORDERED that the rules and requirements as adopted herein ARE ADOPTED, effective sixty (60) days after publication in the Federal Register; and that the Order of Proposed Modification is effective as of the date of publication in the Federal Register; provided, however, that Sections [] of the Commission's rules, which contain new or modified information collection requirements that require review by the Office of Management and Budget (OMB) under the Paperwork Reduction Act, will not become effective until the effective date for those information collections is announced in a document published in the Federal Register after the Commission receives OMB approval. The Commission directs the Bureau to issue such document and to cause section [] to be revised accordingly.

361. IT IS FURTHER ORDERED that, pursuant to Section 309 and 316 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 309 and 316, in the Order of Proposed Modification the Commission proposes that the licenses and authorizations of all 3.7-4.2 GHz FSS licensees and market access holders; all transmit-receive earth station licenses; and all Fixed Service licenses will be modified pursuant to the conditions specified in this *Report and Order* at []; these modification conditions will be effective 60 days after publication of this *Report and Order* in the Federal Register, provided, however, that in the event any FSS licensee, Fixed Service licensee, transmit-receive earth station licensee, or any other licensee or permittee who believes that its license or permit would be modified by this proposed action, seeks to protest this proposed modification and its accompanying timetable, the proposed license modifications specified in this *Report and Order* and contested by the licensee or permittee shall not be made final as to such licensee or permittee unless and until the Commission orders otherwise. Pursuant to Section 316(a)(1) of the Communications Act of 1934, as amended, 47 U.S.C. § 316(a)(1), publication of this *Report and Order* in the Federal Register shall constitute notification in writing of our *Order* proposing the modification of the 3.7-4.2 GHz FSS licenses, Fixed Service Licenses, transmit-receive earth station licenses, and of the grounds and reasons therefore, and those licensees and any other party seeking to file a protest pursuant to Section 316

shall have 30 days from the date of such publication to protest such Order.

362. IT IS FURTHER ORDERED, pursuant to Section 309 and 316 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 309 and 316, that following the final modification of each FSS license and transmit-receive earth station license, the International Bureau shall further modify such licenses as are necessary in order to implement the specific band reconfiguration in the manner specified in this *Report and Order*; and the Wireless Telecommunications Bureau shall modify each Fixed Service license as necessary in order to implement the specific band reconfiguration in the manner specified in this *Report and Order*.

363. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this *Report and Order*, including the Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

364. IT IS FURTHER ORDERED that this *Report and Order* SHALL BE sent to Congress and the Government Accountability Office pursuant to the Congressional Review Act, see 5 U.S.C. 801(a)(1)(A).

365. It is our intention in adopting these rules that, if any provision of the *Report and Order* or the rules, or the application thereof to any person or circumstance, is held to be unlawful, the remaining portions of such *Report and Order* and the rules not deemed unlawful, and the application of the *Report and Order* and the rules to other persons or circumstances, shall remain in effect to the fullest extent permitted by law.

APPENDIX A

Adopted Rules

The Federal Communications Commission amends 47 CFR parts 1, 2, 25, 27, and 101 as follows:

PART 1 – PRACTICE AND PROCEDURE

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

Authority: 47 U.S.C. chs. 2, 5, 9, 13; 28 U.S.C. 2461 note, unless otherwise noted.

2. Amend section 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); 3.7 GHz 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); Citizens Broadband Radio Service (part 96, subpart C); 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 section 1.9005 by adding paragraph (mm) to read as follows:

§ 1.9005 Included services.

* * * * *

(mm) The 3.7 GHz Service in the 3.7-3.98 GHz 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. Section 2.106 is amended by revising page 41 and, in the list of Non-Federal Government (NG) Footnote, by adding footnote NG182 and by revising footnote NG457A to read as follows:

§ 2.106 Table of Frequency Allocations.

* * * * *

3500-5460 MHz (SHF)

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)	3500-3600 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 5.431B 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 5.434 Radiolocation 5.433	3600-3700 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile Radiolocation	US105 US107 US245 US433	3600-3650 FIXED FIXED-SATELLITE (space-to-Earth) US107 US245 MOBILE except aeronautical mobile US105 US433	Satellite Communications (25) Citizens Broadband (96)
		5.435	3650-3700 US109 US349	3650-3700 FIXED FIXED-SATELLITE (space-to-Earth) NG169 NG185 MOBILE except aeronautical mobile US109 US349	
	3700-4200 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile		3700-4200	3700-3980 FIXED MOBILE except aeronautical mobile NG182 NG457A	Satellite Communications (25) Wireless Communications (27)
				3980-4000 FIXED MOBILE except aeronautical mobile NG182 NG457A	
				4000-4200 FIXED FIXED-SATELLITE (space-to-Earth) NG457A NG182	Satellite Communications (25)
4200-4400 AERONAUTICAL MOBILE (R) 5.436 AERONAUTICAL RADIONAVIGATION 5.438 5.437 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 5.441A 5.441B 5.442 Radio astronomy			US113 US245 US342	4800-4940 US113 US342	
5.149 5.339 5.443			4940-4990	4940-4990 FIXED MOBILE except aeronautical mobile 5.339 US342 US385	Public Safety Land Mobile (90Y)
4990-5000 FIXED MOBILE except aeronautical mobile			5.339 US342 US385 G122 4990-5000 RADIO ASTRONOMY US74		

RADIO ASTRONOMY	Space research (passive)	
Space research (passive)		
5.149	US246	

* * * * *

NON-FEDERAL GOVERNMENT (NG) FOOTNOTES

* * * * *

NG182 In the band 3700-4200 MHz, the following provisions shall apply:

(a) Any currently authorized space stations serving the contiguous United States 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 June 21, 2018, 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) In areas outside the contiguous United States, the band 3700-4200 MHz is allocated to the fixed-satellite (space-to-Earth) services on a primary basis.

(c) In the contiguous United States,

(i) Incumbent use of the fixed-satellite service (space-to-Earth) in the band 3700-4000 MHz is subject to the provisions of 47 CFR 25.203(n) and 47 CFR part 27, subpart O;

(ii) In the band 3700-4200 MHz, existing permanent and temporary Fixed Service licensees authorized as of April 19, 2018, pursuant to 47 CFR part 101 must self-relocate their point-to-point links out of the 3700-4200 MHz band by September 30, 2023.

(iii) In the band 3980-4000 MHz, no mobile operations will be permitted until specified by Commission rule, order, or notice.

* * * * *

NG457A Earth stations on vessels (ESVs), as regulated under 47 CFR part 25, are an application of the fixed-satellite service and the following provisions shall apply:

(a) In the band 3700-4200 MHz, ESVs may be authorized to receive FSS signals from geostationary satellites. ESVs in motion are subject to the condition that these earth stations may not claim protection from transmissions of non-Federal stations in the fixed and mobile except aeronautical mobile services. While docked, ESVs receiving in the band 4000-4200 MHz may be coordinated for up

to 180 days, renewable. NG182 applies to incumbent licensees that provide service to ESVs in the band 3700-4000 MHz.

(b) In the band 5925-6425 MHz, ESVs may be authorized to transmit to geostationary satellites on a primary basis.

* * * * *

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 Section 25.103 by adding a new paragraph between the definitions for “blanket license” and “conventional C-band” to read as follows:

Section 25.103 Definitions.

* * * * *

Contiguous United States (CONUS). For purposes of subpart, the contiguous United States consists of the lower-48, contiguous states and the District of Columbia. In this context, the rest of the United States includes Honolulu, Anchorage, Kodiak, Fairbanks, Juneau, Puerto Rico, Guam-Northern Mariana Islands, U.S. Virgin Islands, American Samoa, and the Gulf of Mexico.

* * * * *

8. Add Section 25.138 to read as follows:

Section 25.138 Earth Stations in the 3.7-4.2 GHz band.

The 3.7-4.0 GHz portion of the band is being transitioned in CONUS from FSS GSO (space-to-Earth) and FS operations to the 3.7 GHz Service.

(a) Applications for new, modified, or renewed earth station licenses and registrations in the 3.7-4.0 GHz portion of the band in CONUS are no longer accepted.

(b) Applications for new earth station licenses or registrations within CONUS in the 4.0-4.2 GHz portion of the band will not be accepted until the transition is completed and upon announcement by the International Bureau via Public Notice that applications may be filed.

(c) Fixed and temporary fixed earth stations operating in the 3.7-4.0 GHz portion of the band within CONUS will be protected from interference by licensees in the 3.7 GHz Service subject to the deadlines set forth in Section 27.1412 and are eligible for transition into the 4.0-4.2 GHz band so long as they:

- (1) were operational as of April 19, 2018 and continue to be operational;
 - (2) were licensed or registered (or had a pending application for license or registration) in the IBFS database on November 7, 2018; and
 - (3) timely certified the accuracy of the information on file with the Commission by May 28, 2019.
- (d) Fixed and temporary earth licenses and registrations that meet the criteria in section 25.138(c) may be renewed or modified to maintain operations in the 4.0-4.2 GHz band.
- (e) Applications for new, modified, or renewed licenses and registrations for Earth stations outside CONUS operating in the 3.7-4.2 GHz band will continue to be accepted.

9. Add Section 25.147 to read as follows:

Section 25.147 Space Stations in the 3.7-4.2 GHz band.

The 3.7-4.0 GHz portion of the band is being transitioned in CONUS from FSS GSO (space-to-Earth) to the 3.7 GHz Service.

(a) New applications for space station licenses and petitions for market access concerning space-to-Earth operations in the 3.7-4.0 GHz portion of the band within CONUS will no longer be accepted.

(b) Applications for new or modified space station licenses or petitions for market access in the 4.0-4.2 GHz portion of the band within CONUS will not be accepted during the transition except by existing operators in the band to implement an efficient transition to that portion of the band.

(c) Applications for new or modified space station licenses or petitions for market access for space-to-Earth operations in the 3.7-4.2 GHz band outside CONUS will continue to be accepted.

10. Amend Section 25.203 by adding paragraph (n) to read as follows:

§ 25.203 Choice of sites and frequencies.

* * * * *

(2) From September 30, 2021 until September 30, 2030, consolidated telemetry, tracking, and control (TT&C) operations at no more than four locations may be authorized on a primary basis to support space station operations, and no other TT&C operations shall be entitled to interference protection.

PART 27 – MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

11. 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.

12. Amend Section 27.1 by adding paragraph (b)(15) to read as follows:

§ 27.1 Basis and purpose.

* * * * *

(b) * * *

(15) 3700-3980 MHz.

13. Amend Section 27.4 by adding the following definitions:

§ 27.4 Terms and Definitions.

* * * * *

3.7 GHz Service. A radiocommunication service licensed to operate in the 3.7-3.98 GHz band.

* * * * *

Relocation Payment Clearinghouse. A neutral, independent third-party to administer the cost management for the transition of the 3700-4000 MHz band from the Fixed Satellite Service to the 3.7 GHz Service.

* * * * *

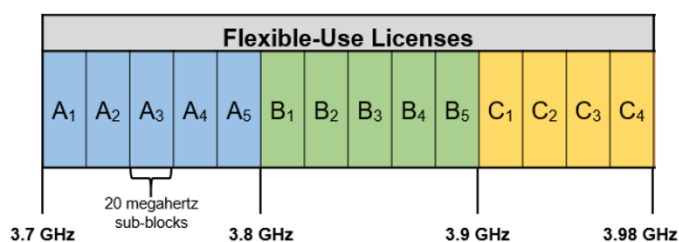
14. Amend Section 27.5 by adding paragraph (m) to read as follows:

§ 27.5 Frequencies.

* * * * *

(m) *Frequency assignments in the 3700-3980 MHz band.*

(1) In the 3700-3980 MHz band, licenses in the 3.7 GHz Service will comprise the A Block (3700-3800 MHz); B Block (3800-3900 MHz); and C Block (3900-3980 MHz) and be licensed in 20 megahertz sub-blocks, available for assignment on a Partial Economic Area basis as follows:



15. Amend Section 27.6 by adding paragraph (m) to read as follows:

§ 27.6 Service Areas.

* * * * *

(m) *3700-3980 MHz Band.* Service areas in the 3.7 GHz Service are based on Partial Economic Areas (PEAs) as defined by *Wireless Telecommunications Bureau Provides Details About Partial Economic Areas*, Public Notice, 29 FCC Rcd 6491, App. B (2014), with the exception of the following PEAs:

42	Honolulu, HI
212	Anchorage, AK
264	Kodiak, AK

298	Fairbanks, AK
360	Juneau, AK
412	Puerto Rico
413	Guam-Northern Mariana Islands
414	US Virgin Islands
415	American Samoa
416	Gulf of Mexico

16. Amend Section 27.11 by adding paragraph (l) to read as follows:

§ 27.11 Applications.

* * * * *

(l) *3700-3980 MHz band.* Authorizations for licenses in the 3.7 GHz Service will be based on Partial Economic Areas (PEAs), as specified in § 27.6(m), and the frequency blocks specified in § 27.5(m).

* * * * *

17. Amend Section 27.13 by adding paragraph (m) to read as follows:

§ 27.13 License period.

* * * * *

(m) *3700-3980 MHz band.* Authorizations for licenses in the 3.7 GHz Service in the 3700-3980 MHz band will have a term not to exceed 15 years from the date of issuance or renewal.

18. Amend Section 27.14 by revising the first sentence of paragraphs (a) and (k), and adding paragraph (w) 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 in the 3700-3980 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 (w) 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. * * *

* * * * *

(w) The following provisions apply to any licensee holding an authorization in the 3700-3980 MHz band:

(1) Licensees relying on mobile or point-to-multipoint service shall provide reliable signal coverage and offer service within eight (8) 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”). 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”). Licensees relying on point-to-point service shall demonstrate within eight years of the license issue date that they have four links operating and providing service to customers or for internal use if the population within the license area is equal to or less than 268,000 and, if the population is greater than 268,000, that they have at least one link in operation and providing service to customers, or

for internal use, per every 67,000 persons within a license area (“First Buildout Requirement”). Licensees relying on point-to-point service shall demonstrate within 12 years of the license issue date that they have eight links operating and providing service to customers or for internal use if the population within the license area is equal to or less than 268,000 and, if the population within the license area is greater than 268,000, shall demonstrate they are providing service and have at least two links in operation per every 67,000 persons within a license area (“Second Buildout Requirement”).

(2) In the alternative, a licensee offering Internet of Things type services shall provide geographic area coverage within eight (8) years from the date of the initial license to thirty-five (35) percent of the license (“First Buildout Requirement”). A licensee offering Internet of Things type services shall provide geographic area coverage within twelve (12) years from the date of the initial license to sixty-five (65) percent of the license (“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. 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.

(4) 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 or geographic area served on areas no larger than the Census Tract level. The population or area 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 or geographic area within the Census Tract (or other acceptable identifier) towards meeting the performance requirement of a single, individual license. If a licensee does not provide

reliable signal coverage to an entire license area, the license must provide a map that accurately depicts the boundaries of the area or areas within each license area not being served. 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.

19. Amend Section 27.50 by adding paragraph (j) to read as follows:

§ 27.50 Power limits and duty cycle.

* * * * *

(j) The following power requirements apply to stations transmitting in the 3700-3980 MHz band:

(1) The power of each fixed or base station transmitting in the 3700-3980 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 an equivalent isotropically radiated power (EIRP) of 3280 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.

(2) The power of each fixed or base station transmitting in the 3700-3980 MHz band and situated in any geographic location other than that described in paragraph (j)(1) of this section is limited to an equivalent isotropically radiated power (EIRP) of 1640 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.

(3) Mobile and portable stations are limited to 1 watt EIRP. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

(4) Equipment employed must be authorized in accordance with the provisions of §27.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (j)(5) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

(5) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, and any other relevant factors, so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

20. Amend Section 27.53 by revising paragraph (l) to read as follows:

§ 27.53 Emission limits.

* * * * *

(l) For operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Measurement procedure must comply with paragraph (h)(3) of this section.

* * * * *

21. Amend Section 27.55 by adding paragraph (d) to read as follows:

§ 27.55 Power strength limits.

* * * * *

(d) *Power flux density for stations operating in the 3700-3980 MHz band.* For base and fixed stations operation in the 3700-3980 MHz band in accordance with the provisions of 27.50(j), the power flux density (PFD) at any location on the geographical border of a licensee's service area shall not exceed -76 dBm/m²/MHz. This power flux density will be measured at 1.5 meters above ground. Licensees in adjacent geographic areas may voluntarily agree to operate under a higher PFD at their common boundary.

22. Amend Section 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 3700-3980 MHz bands is subject to international agreements with Mexico and Canada.

23. Amend Section 27.75 by adding paragraph (a)(3) to read as follows:

§27.75 Basic interoperability requirement.

(a)(1) * * *

* * * * *

(3) Mobile and portable stations that operate on any portion of frequencies in the 3700-3980 MHz band must be capable of operating on all frequencies in the 3700-3980 MHz band using the same air interfaces that the equipment utilizes on any frequencies in the 3700-3980 MHz band.

* * * * *

24. Add new subpart O to read as follows:

Subpart O—3.7 GHz Service (3700-3980 MHz)

Sec. [xxx]

- 27.1401 Licenses in the 3.7 GHz Service are subject to competitive bidding.
- 27.1402 Designated entities in the 3.7 GHz Service.
- 27.1411 Transition of the 3700-3980 MHz band to the 3.7 GHz Service.
- 27.1412 Transition plan.
- 27.1413 Relocation coordinator.
- 27.1414 Relocation Payment Clearinghouse.
- 27.1415 Documentation of expenses.
- 27.1416 Reimbursable costs.
- 27.1417 Reimbursement fund.
- 27.1418 Payment obligations.
- 27.1419 Cost category schedule.
- 27.1420 Cost-sharing formula
- 27.1421 Disputes over costs and cost-sharing.
- 27.1422 Accelerated relocation payments.
- 27.1423 Protection of incumbent operations.
- 27.1424 Agreements between 3.7 GHz Service licensees and C-Band earth station operators.

§ 27.1401 Licenses in the 3.7 GHz Service are subject to competitive bidding.

Mutually exclusive initial applications for licenses in the 3.7 GHz Service 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.

§ 27.1402 Designated entities in the 3.7 GHz Service.

(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 five (5) 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 five (5) years.

(2) *Bidding credits.* A winning bidder that qualifies as a small business, as defined in this section, or a consortium of such small businesses as provided in § 1.2110(c)(6) of this chapter, may use a bidding credit of 15 percent, subject to the cap specified in § 1.2110(f)(2)(ii) of this chapter. A winning bidder that qualifies as a very small business, as defined in this section, or a consortium of such very small businesses as provided in § 1.2110(c)(6) of this chapter, may use a bidding credit of 25 percent, subject to the cap specified in § 1.2110(f)(2)(ii) 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.

Section 27.1411 Transition of the 3700-3980 MHz band to the 3.7 GHz Service.

(a) *Transition of the 3700-3798 MHz Band.* The 3700-3980 MHz band is being transitioned in the lower 48, contiguous states and the District of Columbia from geostationary satellite orbit (GSO) fixed-satellite service (space-to-Earth) and fixed service operations to the 3.7 GHz Service.

(b) *Definitions.*

(1) *Incumbent space station operator.* An incumbent space station operator is defined as a space station operator authorized to provide service to any part of the contiguous United States pursuant to an FCC-issued license or grant of market access as of June 21, 2018.

(2) *Eligible space station operator.* Eligible space station operators may receive reimbursement for relocation costs incurred as a result of the transition of FSS operations to the 4.0-4.2 GHz band. An eligible space station operator is defined as an incumbent space station operator that has demonstrated as

of February 1, 2020 that it has an existing relationship to provide service via C-band satellite transmission to one or more incumbent earth stations in the contiguous United States. Such existing relationships may be directly with the incumbent earth station, or indirectly through content distributors or other entities, so long as the relationship requires the provision of C-band satellite services to one or more specific incumbent earth stations in the contiguous United States

(3) *Incumbent earth station.* An incumbent earth station for this subpart is defined as an earth station that is entitled to interference protection pursuant to Section 25.203(n)(1). An incumbent earth station must transition above 4000 MHz pursuant to this subpart. An incumbent earth station will be able to continue receiving uninterrupted service both during and after the transition.

(4) *Earth station migration.* Earth station migration includes any necessary changes that allow the uninterrupted reception of service by an incumbent earth station on new frequencies in the upper portion of the band, including, but not limited to retuning and repointing antennas, “dual illumination” during which the same programming is simultaneously downlinked over the original and new frequencies, and the installation of new equipment or software at earth station uplink and/or downlink locations for customers identified for technology upgrades necessary to facilitate the repack, such as compression technology or modulation.

(5) *Earth station filtering.* A passband filter must be installed at the site of each incumbent earth station at the same time or after it has been migrated to new frequencies to block signals from adjacent channels and to prevent harmful interference from licensees in the 3.7 GHz Service. Earth station filtering can occur either simultaneously with, or after, the earth station migration, or can occur at any point after the earth station migration so long as all affected earth stations in a given Partial Economic Area and surrounding areas are filtered prior to a licensee in the 3.7 GHz Service commencing operations.

(6) *Contiguous United States (CONUS).* For the purposes of the rules established in Subpart O, contiguous United States consists of the lower-48, contiguous states and the District of Columbia. In this context, the rest of the United States includes Honolulu, Anchorage, Kodiak, Fairbanks, Juneau,

Puerto Rico, Guam-Northern Mariana Islands, U.S. Virgin Islands, American Samoa, and the Gulf of Mexico.

Section 27.1412 Transition plan.

(a) *Relocation Deadlines.* Eligible Space station operators are responsible for all necessary actions to clear their services transponders from the 3700-4000 MHz band (e.g., launching new satellites, reprogramming transponders, exchanging customers) and to migrate the existing services of incumbent earth stations in CONUS to the 4000-4200 MHz band as of September 30, 2025. Eligible space station operators that fail to do so will be in violation of the conditions of their license authorization and potentially subject to forfeitures and other sanctions.

(b) *Accelerated Relocation Deadlines.* An eligible space station operator shall qualify for accelerated relocation payments by completing an early transition of the band to the 3.7 GHz Service.

(1) *Phase I Deadline.* An eligible space station operator shall receive an accelerated relocation payment if it clears its transponders from the 3700-3820 MHz band and migrates all associated incumbent earth stations in CONUS above 3820 MHz no later than September 30, 2021 (Phase I Deadline). To satisfy the Phase I deadline, an eligible space station operator must also provide passband filters to block signals from the 3700-3820 MHz band on all associated incumbent earth stations in PEAs 1-4, 6-10, 12-19, 21-41, and 43-50 no later than September 30, 2021. If an eligible space station operator receives an accelerated relocation payment for meeting this deadline, it must also satisfy the second early clearing deadline of September 29, 2023.

(2) *Phase II Deadline.* An eligible space station operator shall receive an accelerated relocation payment if it clears its transponders from the 3700-4000 MHz band and migrates incumbent earth stations in CONUS above 4000 MHz no later than September 30, 2023 (Phase II Deadline). To satisfy the Phase II Deadline, an eligible space station operator must also provide passband filters on all associated incumbent earth stations in CONUS no later than September 30, 2023. An eligible space station operator that fails to do so is required to return the full sum of any received accelerated relocation payments no later than October 30, 2023 to the Relocation Payment Clearinghouse to disperse refunds to licensees in

the 3.7 GHz Service.

(3) An eligible space station operator shall not be held responsible for circumstances beyond their control related to earth station migration or filtering.

(i) An eligible space station operator must submit a notice of any incumbent earth station transition delays to the Wireless Telecommunications Bureau within 7 days of discovering an inability to accomplish the assigned earth station transition task. Such a request must include supporting documentation to allow for resolution as soon as practicable and must be submitted before the Accelerated Relocation Deadlines.

(4) An eligible space station operator's satisfaction of the Accelerated Relocation Deadlines shall be determined on an individual basis.

(c) *Accelerated Relocation Election.* An eligible space station operator may elect to receive accelerated relocation payments to transition the 3700-4000 MHz band to the 3.7 GHz Service according to the Phase I and Phase II Deadlines via a written commitment by filing an Accelerated Relocation Election in GN Docket No. 18-122 no later than June 12, 2020

(1) The Wireless Telecommunications Bureau will prescribe the precise form of such election via Public Notice no later than May 12, 2020.

(2) Each eligible space station operator that makes an Accelerated Relocation Election will be required, as part of its filing of this Accelerated Relocation Election, to commit to paying the administrative costs of the Clearinghouse until the Commission awards licenses to the winning bidders in the auction, at which time those administrative costs will be repaid to those space station operators.

(d) *Transition Plan.* Eligible space station operators must file with the Commission in GN Docket No. 18-122 no later than July 13, 2020 a Transition Plan that describes the actions that must be taken to clear transponders on space stations and to migrate and filter earth stations.

(1) The Transition Plan must detail the eligible space station operator's individual timeline and necessary actions for clearing its transponders from the 3700-4000 MHz band, including (i) all existing

space stations with operations that will need to be transitioned to operations above 4000 MHz; (ii) the number of new satellites, if any, that the space station operator will need to launch in order to maintain sufficient capacity post-transition, including detailed descriptions of why such new satellites are necessary; (iii) the specific grooming plan for migrating existing services above 4000 MHz, including the pre- and post-transition frequencies that each customer will occupy; (iv) any necessary technology upgrades or other solutions, such as video compression or modulation, that the space station operator intends to implement; (v) the number and location of incumbent earth station antennas currently receiving the space station operator's transmissions that will need to be transitioned above 4000 MHz; (vi) an estimate of the number and location of incumbent earth station antennas that will require retuning and/or repointing in order to receive content on new transponder frequencies post-transition; and (vii) the specific timeline by which the space station operator will implement the actions described in its plan including any commitments to satisfy an early clearing.

(2) *Earth Station Transition Plan.* To the extent that incumbent earth stations are not accounted for in eligible space station operators' Transition Plans, the Relocation Coordinator must prepare an Earth Station Transition Plan for such incumbent earth stations and may require each associated satellite operator to file the information needed for such a plan with the Relocation Coordinator.

(A) Where space station operators do not elect to clear by the Accelerated Relocation Deadlines and therefore are not responsible for earth station relocation, the Earth Station Transition Plan must provide timelines such that all earth station relocation is completed no later than the Relocation Deadline.

(B) The Relocation Coordinator will describe and recommend the respective responsibility of each party for earth station migration and filtering obligations in the Earth Station Transition Plan and assist incumbent earth stations in transitioning including, for example, by installing filters or hiring a third party to install such filters to the extent necessary.

(e) *Incumbent earth station opt-out.* An incumbent earth station may opt out of the Transition Plan and will be eligible to receive a payment equal to the estimated reasonable transition costs of earth station migration and filtering, as determined by the Relocation Payment Clearinghouse. An incumbent

earth station that opts out of the Transition Plan is responsible for coordinating with the relevant space station operator as necessary and performing all earth station migration and filtering actions on their own, and it will not receive further reimbursement for any costs exceeding the estimated reasonable transition costs. An incumbent earth station choosing to opt out of the Transition Plan must inform the appropriate space station operator and the Relocation Coordinator that earth station migration and filtering will not be necessary for the relevant earth station site and must coordinate the timeline for such discontinuation of service.

(f) *Status Reports.* Beginning December 31, 2020, each eligible space station operator, the Relocation Payment Clearinghouse, and the Relocation Coordinator, shall provide quarterly and annual progress reports on the progress taken to complete the Transition Plan.

(g) *Clearing Certification.* Eligible space station operators and the Relocation Coordinator must make a filing with the Commission in GN Docket No. 18-122 that certifies the completion of its clearing for each benchmark committed to in its Transition Plan.

(h) The Wireless Telecommunications Bureau is delegated the role of providing clarifications or interpretations to eligible space station operators of the Commission's orders for all aspects of the transition. The Bureau, in consultation with the Office of Managing Director, may request any documentation from the Relocation Coordinator necessary to provide guidance or carry out oversight.

Section 27.1413 Relocation coordinator.

(a) *Selection process.* If eligible space station operators elect to receive accelerated relocation payments no later than June 12, 2020, so that a supermajority (80%) of accelerated relocation payments are accepted, each such electing eligible space station operator shall be eligible to appoint one member to a search committee that will seek proposals for a third-party with technical experience in understanding and working on earth stations to serve as a Relocation Coordinator and to manage the migration and filtering of incumbent earth stations of eligible space station operators that decline accelerated relocation payment.

(1) The search committee should proceed by consensus; however, if a vote on selection of a Relocation Coordinator is required, it shall be by a supermajority (80%).

(a) The search committee shall notify the Commission of its choice of Relocation Coordinator.

(b) The Wireless Telecommunications Bureau shall issue a Public Notice inviting comment on whether the entity selected satisfies the criteria established in paragraph (b) of this section and issue a final order announcing whether the criteria has been satisfied;

(c) Should the Wireless Telecommunications Bureau be unable to find the criteria have been satisfied, the selection process will start over and the search committee will submit a new proposed entity.

(2)) In the event that the search committee fails to select a Relocation Coordinator and to notify the Commission by September 30, 2020, the search committee will be dissolved without further action by the Commission. The Commission will initiate a procurement of a Relocation Coordinator to facilitate the transition. Specifically, we direct the Wireless Telecommunications Bureau to seek proposals for a Relocation Coordinator to ensure that the necessary actions are taken to meet the Accelerated Relocation Deadlines (to the extent applicable to any given operator) and the Relocation Deadline. In the case that the Wireless Telecommunications Bureau selects the Relocation Coordinator, overlay licensees will, collectively, pay for the services of the Relocation Coordinator and staff. The Relocation Coordinator shall submit its own reasonable costs to the Relocation Clearinghouse, who will then collect payments from overlay licensees. It shall also provide additional financial information as requested by the Bureau to satisfy the Commission's oversight responsibilities and/or agency specific/government-wide reporting obligations

(b) *Relocation Coordinator Criteria.* The Relocation Coordinator must be able to demonstrate that it has the requisite expertise to perform the duties required, which will include (1) coordinating the schedule for clearing the band; (2) performing engineering analysis, as necessary to determine necessary

earth station migration actions; (3) assigning obligations, as necessary, for earth station migrations and filtering, (4) coordinate with overlay licensees throughout the transition process; (5) assessing the completion of the transition in each PEA and determining overlay licensees' ability to commence operations; and (6) mediating scheduling disputes.

(c) *Relocation Coordinator duties.* The Relocation Coordinator shall:

(1) Establish a timeline and take actions necessary to migrate and filter incumbent earth stations to ensure uninterrupted service during and following the transition.

(2) Review the Transition Plans filed by all eligible space station operators and recommend any changes to those plans to the Commission to the extent needed to ensure a timely transition.

(3) To the extent that incumbent earth stations are not accounted for in eligible space station operators' Transition Plans, the Relocation Coordinator must include those incumbent earth stations in an Earth Station Transition Plan.

(A) The Relocation Coordinator may require each associated satellite operator to file the information needed for such a plan with the Relocation Coordinator.

(B) The Relocation Coordinator will describe and recommend the respective responsibility of each party for earth station migration obligations in the Earth Station Transition Plan and assist incumbent earth stations in transitioning including, for example, by installing filters or hiring a third party to install such filters to the extent necessary

(4) Coordinate its operations with overlay licensees.

(5) Incumbent space station operators must cooperate in good faith with the Relocation Coordinator throughout the transition.

Section 27.1414 Relocation Payment Clearinghouse.

A Relocation Payment Clearinghouse shall be selected and serve to administer the cost-related aspects of the transition in a fair, transparent manner, pursuant to Commission rules and oversight, to

mitigate financial disputes among stakeholders, and to collect and distribute payments in a timely manner for the transition of the 3700-4000 MHz band to the 3.7 GHz Service.

(a) Selection process.

(1) A search committee will select the Relocation Payment Clearinghouse. The search committee shall consist of member appointed by each of following seven entities: ACA Connects, C-Band Alliance, Eutelsat S.A., National Association Broadcasters, National Cable Television Association, CTIA, Competitive Carriers Association.

(2) The search committee shall convene no later than June 1, 2020 and shall notify the Commission of the detailed selection criteria for the position of Relocation Payment Clearinghouse no later than July 1, 2020. Such criteria must be consistent with the qualifications, roles, and duties of the Relocation Payment Clearinghouse specified in this subpart. The Wireless Telecommunications Bureau (Bureau) is directed, on delegated authority, to issue a Public Notice notifying the public that the search committee published criteria, submission requirements, and closing dates for the selection of the Relocation Payment Clearinghouse and source (i.e., web page).

(3) The search committee should proceed by consensus; however, if a vote on selection of a Relocation Payment Clearinghouse is required, it shall be by a majority.

(4) In the event that the search committee fails to select a Relocation Payment Clearinghouse and to notify the Commission by September 30, 2020, the search committee will be dissolved without further action by the Commission. In the event that the search committee fails to select a Clearinghouse and to notify the Commission by September 30, 2020, two of the seven members of the search committee will be dropped therefrom by lot, and the remaining five members of the search committee shall select a Clearinghouse by majority vote by October 15, 2020.

(5) During the course of the Relocation Payment Clearinghouse's tenure, the Commission will take such measures as are necessary to ensure timely compliance, including, should it become necessary, issuing subsequent public notices to select new Relocation Payment Clearinghouses(s).

(b) *Selection Criteria.*

(1) The Relocation Payment Clearinghouse must be a neutral, independent entity with no conflicts of interest (organizational or personal) on the part of the organization or its officers, directors, employees, contractors, or significant subcontractors.

(i) Organizational conflicts of interest means that because of other activities or relationships with other entities, the Relocation Payment Clearinghouse, its contractors, or significant subcontractors are unable or potentially unable to render impartial services, assistance or advice; the Relocation Payment Clearinghouse's objectivity in performing its function is or might be otherwise impaired; or the Relocation Payment Clearinghouse might gain an unfair competitive advantage.

(ii) Personal conflict of interest means a situation in which an employee, officer, or director of the Relocation Payment Clearinghouse, the Relocation Payment Clearinghouse's contractors or significant subcontractors has a financial interest, personal activity, or relationship that could impair that person's ability to act impartially and in the best interest of the transition when performing their assigned role, or is engaged in self-dealing.

(2) The Relocation Payment Clearinghouse must be able to demonstrate that it has the requisite expertise to perform the duties required, which will include coordinating the schedule for clearing the band, acting as a clearinghouse, auditing cost-estimates, and mediating scheduling and cost disputes.

(3) The search committee must should ensure that the Relocation Payment Clearinghouse meets relevant best practices and standards in its operation to ensure an effective and efficient transition. First, the Relocation Payment Clearinghouse should be required, in administering the transition, to (1) engage in strategic planning and adopt goals and metrics to evaluate its performance, (2) adopt internal controls for its operations, (3) utilize enterprise risk management practices, and (4) use best practices to protect against improper payments and to prevent fraud, waste and abuse in its handling of funds. The Relocation Payment Clearinghouse must be required to create written procedures for its operations, using the Government Accountability Office's Green Book to serve as a guide in satisfying such requirements.

(4) The search committee must also ensure that the Relocation Payment Clearinghouse adopts robust privacy and data security best practices in its operations, given that it will receive and process information critical to ensuring a successful and expeditious transition. When the prohibition in Section 1.2105(c) applies to competitive bidding for licenses in the 3.7 GHz service, the Relocation Payment Clearinghouse must make real time disclosures of the content and timing of and the parties to communications, if any, from or to applicants to participate in the competitive bidding, as defined by Section 1.2105(c)(5)(i). The Relocation Payment Clearinghouse should therefore also comply with, on an ongoing basis, all applicable laws and Federal government guidance on privacy and information security requirements such as relevant provisions in the Federal Information Security Management Act (FISMA), National Institute of Standards and Technology (NIST) publications, and Office of Management and Budget (OMB) guidance. The Relocation Payment Clearinghouse should be required to hire a third-party firm to independently audit and verify, on an annual basis, the Relocation Payment Clearinghouse's compliance with privacy and information security requirements and to provide recommendations based on any audit findings; to correct any negative audit findings and adopt any additional practices suggested by the auditor; and to report the results to the Bureau.

(c) Reports and Information.

(1) The Relocation Payment Clearinghouse must file a quarterly progress report with the Commission and in GN Docket No. 18-122, within 30 days of the end of each financial quarter, detailing the extent to which the transition has been completed and that amount of reimbursement paid. The quarterly progress reports must distinguish between efforts undertaken and costs incurred to further or complete transponder clearing and earth station migration and filtering. The quarterly progress reports shall include descriptions of any disputes and the manner in which they were resolved. These quarterly progress reports need not be audited.

(2) The Relocation Clearing House shall provide to the Bureau additional information upon request.

Section 27. 1415 Documentation of expenses.

Documentation of expenses. Parties seeking reimbursement of compensable relocation costs must document their actual expenses and the Relocation Payment Clearinghouse, or a third-party on behalf of the Relocation Payment Clearinghouse, may conduct audits of entities that receive reimbursements. Entities receiving reimbursements must make available all relevant documentation upon request from the Relocation Payment Clearinghouse or its contractor.

Section 27.1416 Reimbursable costs

(a) *Determining reimbursable costs.* The Relocation Payment Clearinghouse shall review reimbursement requests to determine whether they are reasonable and to ensure they comply with the requirements adopted in this sub-part. The Relocation Payment Clearinghouse shall give parties the opportunity to supplement any reimbursement claims that the Relocation Payment Clearinghouse deems deficient. Reimbursement submissions that fall within the estimated range of costs in the cost category schedule issued by the Wireless Telecommunications Bureau shall be presumed reasonable. If the Relocation Payment Clearinghouse determines that the amount sought for reimbursement is unreasonable, it shall notify the party of the amount it deems eligible for reimbursement. The Wireless Telecommunications Bureau shall make further determinations related to reimbursable costs, as necessary, throughout the transition process.

(b) Following a determination of the reimbursable amount, the Relocation Payment Clearinghouse shall incorporate approved claims into invoices, which it shall issue to each licensee indicating the amount to be paid. The Relocation Payment Clearinghouse shall pay approved claims within 30 days of invoice submission. The Relocation Payment Clearinghouse shall also include its own reasonable costs in the invoices.

Section 27.1417 Reimbursement fund.

The Relocation Payment Clearinghouse will establish and administer an account that will fund the costs for the transition of this band to the 3.7 GHz Service after an auction for the 3.7 GHz Service concludes. Licensees in the 3.7 GHz Service shall pay their *pro rata* share of six months' worth of

estimated transition costs into a reimbursement fund, administered by the Relocation Payment Clearinghouse, shortly after the auction and then every six months until the transition is complete. The Relocation Payment Clearinghouse shall draw from the reimbursement fund to pay approved, invoiced claims. If the reimbursement fund does not have sufficient funds to pay approved claims before a six-month replenishment, the Relocation Payment Clearinghouse shall provide 3.7 GHz Service licensees with 30 days' notice of the additional *pro rata* shares they must contribute. At the end of the transition, the Relocation Payment Clearinghouse shall refund any unused amounts to 3.7 GHz Service licensees according to their *pro rata* shares.

Section 27.1418 Payment obligations.

(a) The costs for transponder clearing and earth station migration will initially be borne by each individual space station operators until 6 months after the close of the auction for 3.7 GHz Service. Each eligible space station operator is responsible for the payment of its own satellite transponder costs until the auction winners have been announced. The eligible space station operators are responsible, jointly and severally, for payments to the Relocation Payment Clearinghouse, including but not limited to staff and overhead, and reasonable expenses that the Relocation Payment Clearinghouse determines are common expenses shared among all space station operators.

(b) Licensees in the 3.7 GHz Service shall pay their *pro rata* share of the reasonable costs of the Relocation Payment Clearinghouse and Relocation Coordinator; the actual relocation costs, provided that they are not unreasonable, for eligible space station operators and incumbent fixed service licensees; the actual transition costs, provided they are not unreasonable, associated with the necessary migration and filtering of incumbent earth stations; and specified accelerated relocation payments for space station operators that clear on an accelerated timeframe. Licensees in the 3.7 GHz Service shall be responsible for the full costs of space station transition, the Relocation Payment Clearinghouse, and, if established, Relocation Coordinator, based on their *pro rata* share of the total auction bids of each licensee's gross winning bids in the auction overall; they shall be responsible for incumbent earth station and incumbent fixed service transition costs in a Partial Economic Area based on their *pro rata* share of the total gross

bids for that Partial Economic Area. Following the auction, and every six months until the close of the transition, licensees in the 3.7 GHz Service shall submit their portion of estimated transition costs to a reimbursement fund, from which the Relocation Payment Clearinghouse will reimburse parties incurring transition costs. If actual costs exceed estimated costs, the Relocation Payment Clearinghouse shall perform a true-up for additional funds from 3.7 GHz Service licensees. Likewise, following transition, the Relocation Payment Clearinghouse shall return any funds that exceed actual costs. If a licensee returns a license to the Commission's inventory mid-transition, it would be eligible for a return only of the funds it contributed for that license that exceed actual costs as of the date the licensee returned the license. If this occurs, the remaining licensees in the 3.7 GHz Service shall cover the additional *pro rata* share that the licensee returning the license would have owed, subject to reimbursement if the license is auctioned prior the completion of the band clearing.

Section 27.1419 Cost category schedule.

The Wireless Telecommunications Bureau shall seek comment on, and prepare a schedule of, cost categories with a preliminary range of cost estimates before the auction to inform potential bidders of the estimated costs for which they will be responsible beyond auction bids.

Section 27.1420 Cost-sharing formula.

The cost-formula is specific to:

(a) For space station transition and Relocation Payment Clearinghouse costs, the *pro rata* share of each flexible-use licensee will be the sum of the final clock phase prices (P) for the set of all license blocks (I) that a bidder wins divided by the total final clock phase prices for all N license blocks sold in the auction. To determine a licensee's reimbursement obligation (RO), that *pro rata* share would then be multiplied by the total eligible reimbursement costs (RC). Specifically:

$$RO = \left(\frac{\sum_{i \in I} P_i}{\sum_{j=1}^N P_j} \right) \times RC$$

(b) For registered and licensed transmit-receive earth station and fixed service incumbent licensee

transition costs, a flexible-use licensee's *pro rata* share will be determined on a PEA-specific basis, based on the final clock phase prices for the license blocks it won in each PEA. To calculate the *pro rata* share for registered and licensed transmit-receive earth station transition costs in a given PEA, the same formula as in subpart (a) will be used except (*I*) will be the set of licenses a bidder won in the PEA, *N* will be the total blocks sold in the PEA, and (*RC*) will be the PEA-specific earth station and fixed service reimbursement costs..

(c) Where a space station operator has elected to meet the early clearing benchmarks, the accelerated relocation payment *pro rata* calculation will be adjusted to reflect the winning bidders of the flexible-use licenses benefitting from the portion of cleared spectrum. Under this scenario, only the flexible-use licensees of the lower 100 megahertz (A block), which would be available to flexible-use licensees by September 30, 2021 under the accelerated timeframe, would pay the September 30, 2021 accelerated relocation payment, and only the flexible-use licensees of the remaining 180 megahertz (B and C blocks), which would be available to flexible-use licensees by September 30, 2023 under the elected accelerated timeframe, would pay the September 30, 2023 accelerated relocation payment.

Section 27.1421 Disputes over costs and cost-sharing.

(a) Parties disputing a cost estimate, cost invoice, or payment or cost-sharing obligation must file an objection with the Relocation Payment Clearinghouse.

(b) The Relocation Payment Clearinghouse may mediate any disputes regarding cost estimates or payments that may arise in the course of band reconfiguration; or refer the disputant parties to alternative dispute resolution fora. Any dispute submitted to the Relocation Payment Clearinghouse, or other mediator, shall be decided within 30 days after the Relocation Payment Clearinghouse has received a submission by one party and a response from the other party. Thereafter, any party may seek expedited non-binding arbitration, which must be completed within 30 days of the recommended decision or advice of the Relocation Payment Clearinghouse or other mediator. The parties will share the cost of this arbitration if it is before the Relocation Payment Clearinghouse.

(c) Should any issues still remain unresolved, they may be referred to the Bureau within ten days of recommended decision or advice of the Relocation Payment Clearinghouse or other mediator and any decision of the Relocation Payment Clearinghouse can be appealed to the Chief of the Bureau. When referring an unresolved matter, the Relocation Payment Clearinghouse shall forward the entire record on any disputed issues, including such dispositions thereof that the Relocation Payment Clearinghouse has considered. Upon receipt of such record and advice, the Commission will decide the disputed issues based on the record submitted. The Bureau is directed to resolve such disputed issues or designate them for an evidentiary hearing before an Administrative Law Judge. If the Bureau decides an issue, any party to the dispute wishing to appeal the decision may do so by filing with the Commission, within ten days of the effective date of the initial decision, a Petition for *de novo* review; whereupon the matter will be set for an evidentiary hearing before an Administrative Law Judge. Parties seeking *de novo* review of a decision by the Bureau are advised that, in the course of the evidentiary hearing, the Commission may require complete documentation relevant to any disputed matters; and, where necessary, and at the presiding judge's discretion, require expert engineering, economic or other reports or testimony. Parties may therefore wish to consider possibly less burdensome and expensive resolution of their disputes through means of alternative dispute resolution.

Section 27.1422 Accelerated relocation payment.

(a) Eligible space station operators that meet the applicable early-clearing benchmark(s), as confirmed in their clearing certification set-forth in Section 27.1414(d), will be eligible for their respective accelerated relocation payment.

(b) The Relocation Payment Clearinghouse will distribute the accelerated relocation payments accordingly:

Operator	Phase I Payment	Phase II Payment
Intelsat	\$1,194,498,000	\$3,657,286,800
SES	\$982,777,000	\$3,009,044,600
Eutelsat	\$115,203,000	\$352,725,000
Telesat	\$92,277,000	\$282,531,000
Star One	\$3,362,000	\$10,295,600

(c) The Relocation Payment Clearinghouse shall promptly notify 3.7 GHz Service licensees following submission of the clearing certifications as set-forth in Section 27.1414(d).

(b) *Letter of credit.* To ensure that space station operators that receive Phase I accelerated relocation payments will be able to repay this initial payment if they fail to meet the Phase II Accelerated Relocation Deadline, space station operators shall be required to submit a standby letter of credit in the amount of the initial accelerated relocation payment before they can receive that payment. The Wireless Telecommunications Bureau shall, to the extent necessary, establish the precise terms required for such a letter of credit no later than 30 days before the Phase I Accelerated Relocation Deadline. Incumbent space station operators' obligation to provide security for the potential repayment shall terminate upon verification that they have met the Phase II Accelerated Relocation Deadline and filed the appropriate Certification of Accelerated Relocation. The Relocation Payment Clearinghouse shall announce the date on which any given letter of credit will terminate.

Section 27.1423 Protection of incumbent operations.

(a) To protect incumbent earth stations from out-of-band emissions from fixed stations, base stations and mobiles, the power flux density (PFD) of any emissions within the 4000 -4200 MHz band must not exceed -124 dBW/m²/MHz as measured at the earth station antenna.

(b) To protect incumbent earth stations from blocking, the power flux density (PFD) of any emissions within the 3700—3980 MHz band must not exceed -16 dBW/m²/MHz as measured at the earth station antenna.

(c) All 3.7 GHz Service licensees, prior to initiating operations from any base or fixed station, must coordinate cochannel frequency usage with all incumbent TT&C earth stations within a 70 km radius. The licensee must ensure that the aggregated power from its operations meets an interference to noise ratio (I/N) of -6 dB to the TT&C earth station receiver. A base station's operation will be defined as cochannel when any of the 3.7 GHz Service licensee's authorized frequencies are separated from the center frequency of the TT&C earth station by less than 150% of the maximum emission bandwidth in

use by the TT&C earth station.

(d) All 3.7 GHz Service licensees operating on an adjacent channel to an incumbent TT&C earth station must ensure that the aggregated power from its operations meets an interference to noise ratio (I/N) of -6 dB to the TT&C earth station receiver.

(e) To protect incumbent TT&C earth stations from blocking, the power flux density (PFD) of any emissions within the 3700-3980 MHz band must not exceed -16 dBW/m²/MHz as measured at the TT&C earth station antenna.

Section 27.1424 Agreements between 3.7 GHz Service licensees and C-Band earth station operators.

a) The PFD limits in paragraph 27.1431 of this section may be modified by the private contractual agreement of licensees of 3.7 GHz Service and entities operating earth stations in the 4000-4200 MHz band or TT&C operations in the 3700-3980 MHz band. A licensee of the 3.7 GHz Service who is a party to such an agreement must maintain a copy of the agreement in its station files and disclose it, upon request, to prospective license assignees, transferees, or spectrum lessees, and to the Commission.

* * * * *

PART 101 – FIXED MICROWAVE SERVICES

25. The authority citation for Part 101 continues to read as follows:
AUTHORITY: 47 U.S.C. 154, 303

26. Amend Section 101.3 to add a definition for the Contiguous United States in alphabetical order, to read as follows:

§101.3 Definitions.

As used in this part:

* * *

Contiguous United States. For the 3700-4200 MHz band, the contiguous United States consists of the contiguous states and the District of Columbia (PEAs 1-41, 43-211, 213-263, 265-297, 299-359, and 361-411). In this context, the rest of the United States consists of Honolulu, Anchorage, Kodiak,

Fairbanks, Juneau, Puerto Rico, Guam-Northern Mariana Islands, U.S. Virgin Islands, American Samoa, and the Gulf of Mexico (PEAs numbers 42, 212, 264, 298, 360, 412-416).

* * * * *

27. Amend Section 101.101 by revising rows 1 and 2 of the table and the row for frequencies 3700-4200, and to add Note 2 to read as follows:

§101.101 Frequency availability.

Frequency band (MHz)	Radio service				Notes
	Common carrier (Part 101)	Private radio (Part 101)	Broadcast auxiliary (Part 74)	Other (Parts 15, 21, 22, 24, 25, 27, 74, 78 & 100)	

* * * * *

3700-4200	CC LTTS	OFS		SAT , ET	(2).
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Notes

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(2) Frequencies in this band are shared with stations in the fixed satellite service outside the contiguous United States. Applications for new permanent or temporary facilities in these bands will not be accepted for locations in the contiguous United States. Licensees, as of April 19, 2018, of existing permanent and temporary point-to-point Fixed Service links in the contiguous United States have until September 30, 2023, to self-relocate their point-to-point links out of the 3,700-4,200 MHz band.

* * * * *

28. Amend Section 101.147 by revising Notes 8, 14, and 25 to paragraph (a), and the introductory text of paragraph (h) to read as follows:

§101.147 Frequency assignments.

(a) * * *

NOTES

* * *

(8) This frequency band is shared with station(s) in the Local Television Transmission Service for locations outside the contiguous United States and applications for new permanent or temporary facilities in this band will not be accepted for locations in the contiguous United States. Existing licensees as of April 19, 2018, for permanent and temporary point-to-point Fixed Service links in the contiguous United States have until September 30, 2023, to self-relocate their point-to-point links out of the 3,700-4,200 MHz band. This frequency band is also shared in the U.S. Possessions in the Caribbean area, with stations in the International Fixed Public Radiocommunications Services.

* * *

(14) Frequencies in this band are shared with stations in the fixed satellite service. For 3,700-4,200 MHz frequencies are only available for locations outside the contiguous United States and applications for new permanent or temporary facilities in this band will not be accepted for locations in the contiguous United States. In the contiguous United States, licensees as of April 19, 2018, for permanent and temporary point-to-point Fixed Service links have until September 30, 2023, to self-relocate their point-to-point links out of the 3,700-4,200 MHz band.

* * *

(25) Frequencies in these bands are available for assignment to television STL stations. For 3,700-4,200 MHz frequencies are only available for locations outside the contiguous United States and applications for new permanent or temporary facilities in this band will not be accepted for locations in the contiguous United States. Existing licensees as of April 19, 2018, of permanent and temporary point-to-point Fixed Service links in the contiguous United States have until September 30, 2023, to self-relocate their point-to-point links out of the 3,700-4,200 MHz band.

* * * * *

(h) 3,700 to 4,200 MHz outside the contiguous United States: maximum authorized bandwidth.

20 MHz bandwidth channels:

* * * * *

29. Amend Section 101.803 by revising Note 1 to paragraph (d) to read as follows:

§101.803 Frequencies.

* * * * *

(d) * * *

NOTES

(1) This frequency band is shared with stations in the Point to Point Microwave Radio Service and, in United States Possessions in the Caribbean area, with stations in the International Fixed Radiocommunications Services. For 3,700-4,200 MHz frequencies are only available for locations outside the contiguous United States and applications for new permanent or temporary facilities in this band will not be accepted for locations in the contiguous United States. In the contiguous United States, licensees of existing licenses, as of April 19, 2018, for permanent point-to-point Fixed Service links have until September 30, 2023, to self-relocate their point-to-point links out of the 3,700-4,200 MHz band.

* * * * *

APPENDIX B

Final Regulatory Flexibility Analysis

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),⁷²⁵ an Initial Regulatory Flexibility Analysis (IRFA) was incorporated in the *Notice of Proposed Rulemaking (Notice)* released in July 2018 in this proceeding.⁷²⁶ The Commission sought written public comment on the proposals in the *Notice*, including comments on the IRFA. No comments were filed addressing the IRFA. This present Final Regulatory Flexibility Analysis (FRFA) conforms to the RFA.⁷²⁷

A. Need for, and Objectives of, the Report and Order

2. In the *Report and Order and Order of Proposed Modification (Report and Order)*, the Commission expands on its efforts to close the digital divide and secure U.S. leadership in the next generation of wireless services, including fifth-generation (5G) wireless and other advanced spectrum-based services by making the 3.7-3.98 GHz band available for flexible terrestrial wireless use. The Commission adopts new rules for this band that are designed to achieve four key goals: 1) make a significant amount of spectrum available for flexible use, including 5G services; 2) ensure that a significant amount of that spectrum is made available quickly so it can be used in upcoming 5G deployments; 3) recover for the public a portion of the value of this public spectrum resource; and 4) ensure the continuous and uninterrupted delivery of services currently offered in the 3.7-4.2 GHz band (C-band). Specifically, the Commission makes 280 MHz of spectrum available on a national basis through an auction conducted by the Commission. Because this band is prime spectrum for next generation wireless services, this action will serve as a critical step in advancing United States leadership in 5G and in implementing the Commission's comprehensive strategy to Facilitate America's Superiority in 5G Technology (the 5G FAST Plan). At the same time, the Commission adopts rules to accommodate incumbent Fixed Satellite Service and Fixed Services operations in the band, enabling those operators to have continuous and uninterrupted delivery of the same video programming and other content that they do today.

3. The 3.7-4.2 GHz band currently is allocated in the United States exclusively for non-Federal use on a primary basis for Fixed Satellite Service (FSS) and Fixed Service. 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 the 3.7-4.2 GHz 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. FSS operators use this band to deliver programming to television and radio broadcasters throughout the country and to provide telephone and data services to consumers. The 3.7-4.2 GHz band is also used for reception of telemetry signals transmitted by satellites, typically near the edges of the band, i.e., at 3.7 GHz or 4.2 GHz.

4. The *Report and Order* expands on the Commission's efforts to open up mid-band spectrum by making the 3.7-3.98 GHz band available for flexible-use wireless services. The Commission adds a mobile, except aeronautical mobile, allocation to the 3.7-3.98 GHz band. The Commission also

⁷²⁵ See 5 U.S.C. § 603. The RFA, 5 U.S.C. §§ 601-612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996, (SBREFA) Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

⁷²⁶ *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, Order & Notice of Proposed Rulemaking, GN Docket No. 18-122, 33 FCC Rcd 6915 (2018) (*Notice*).

⁷²⁷ See 5 U.S.C. § 604.

adopts a process to transition this 280 megahertz of spectrum from incumbent use to new flexible-use by September 30, 2025 with premium-payment options for satellite operators that serve earth stations in the contiguous United States to accelerate this transition in two stages: (1) 100 megahertz (3.7-3.8 GHz) by September 30, 2021 and (2) all 280 megahertz by September 30, 2023. In both cases, the satellite operators would clear an additional 20 megahertz to be used as a guard band. The Commission adopts relocation and premium payment rules including rules establishing a Fund Administrator to manage the intake, payout, and auditing of relocation funds, as well as a Relocation Coordinator to coordinate the transition with respect to certain satellite operators in the event such satellite operators elect not to clear on accelerated timelines in exchange for an accelerated relocation payment. The Commission adopts service and technical rules for flexible-use licensees in the 280 megahertz of spectrum designated for transition to flexible use.

5. Adopting a primary non-Federal mobile, except aeronautical mobile, allocation to the 3.7-3.98 GHz band will foster more efficient and intensive use of mid-band spectrum to facilitate and incentivize investment in next generation wireless services. Mid-band spectrum is ideal for next generation wireless broadband service due to its favorable propagation and capacity characteristics. Allocating the 3.7-3.98 GHz band for mobile services will also meet the Commission's mandate under the MOBILE NOW Act to identify spectrum for mobile and fixed wireless broadband use. In addition, adopting this allocation will harmonize the Commission's allocations for the 3.7-3.98 GHz band with international allocations. The Commission's plan will ensure that content that FSS now delivers to incumbent earth stations will continue uninterrupted.

B. Summary of Significant Issues Raised by Public Comments in Response to the IRFA

6. There were no comments filed that specifically addressed the proposed rules and policies presented in the IRFA.

C. Response to Comments by the Chief Counsel for Advocacy of the Small Business Administration

7. Pursuant to the Small Business Jobs Act of 2010, which amended the RFA, the Commission is required to respond to any comments filed by the Chief Counsel for Advocacy of the Small Business Administration (SBA), and to provide a detailed statement of any change made to the proposed rules as a result of those comments.⁷²⁸

8. The Chief Counsel did not file any comments in response to the proposed rules in this proceeding.

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

9. 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 adopted herein.⁷²⁹ The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."⁷³⁰ In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.⁷³¹ A "small business

⁷²⁸ 5 U.S.C. § 604(a)(3).

⁷²⁹ *Id.*

⁷³⁰ 5 U.S.C. § 601(6).

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

concern” is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.⁷³²

10. *Small Businesses, Small Organizations, Small Governmental Jurisdictions.* Our actions, over time, may affect small entities that are not easily categorized at present. We therefore describe here, at the outset, three broad groups of small entities that could be directly affected herein.⁷³³ 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.⁷³⁴ These types of small businesses represent 99.9% of all businesses in the United States, which translates to 30.7 million businesses.⁷³⁵

11. 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.”⁷³⁶ The Internal Revenue Service (IRS) uses a revenue benchmark of \$50,000 or less to delineate its annual electronic filing requirements for small exempt organizations.⁷³⁷ Nationwide, for tax year 2018, there were approximately 571,709 small exempt organizations in the U.S. reporting revenues of \$50,000 or less according to the registration and tax data for exempt organizations available from the IRS.⁷³⁸

12. 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.”⁷³⁹ U.S. Census Bureau data from the 2017 Census of Governments⁷⁴⁰ indicate that there were 90,075 local governmental jurisdictions consisting of general purpose governments and special purpose governments in the United States.⁷⁴¹ Of this number there were

⁷³² 15 U.S.C. § 632.

⁷³³ See 5 U.S.C. § 601(3)-(6).

⁷³⁴ See SBA, Office of Advocacy, “What’s New With Small Business,” <https://cdn.advocacy.sba.gov/wp-content/uploads/2019/09/23172859/Whats-New-With-Small-Business-2019.pdf> (Sept 2019).

⁷³⁵ *Id.*

⁷³⁶ 5 U.S.C. § 601(4).

⁷³⁷ The IRS benchmark is similar to the population of less than 50,000 benchmark in 5 U.S.C § 601(5) that is used to define a small governmental jurisdiction. Therefore, the IRS benchmark has been used to estimate the number small organizations in this small entity description. See Annual Electronic Filing Requirement for Small Exempt Organizations — Form 990-N (e-Postcard), “Who must file,”

<https://www.irs.gov/charities-non-profits/annual-electronic-filing-requirement-for-small-exempt-organizations-form-990-n-e-postcard>. We note that the IRS data does not provide information on whether a small exempt organization is independently owned and operated or dominant in its field.

⁷³⁸ See Exempt Organizations Business Master File Extract (EO BMF), “CSV Files by Region,” <https://www.irs.gov/charities-non-profits/exempt-organizations-business-master-file-extract-eo-bmf>. The IRS Exempt Organization Business Master File (EO BMF) Extract provides information on all registered tax-exempt/non-profit organizations. The data utilized for purposes of this description was extracted from the IRS EO BMF data for Region 1-Northeast Area (76,886), Region 2-Mid-Atlantic and Great Lakes Areas (221,121), and Region 3-Gulf Coast and Pacific Coast Areas (273,702) which includes the continental U.S., Alaska, and Hawaii. This data does not include information for Puerto Rico.

⁷³⁹ 5 U.S.C. § 601(5).

⁷⁴⁰ See 13 U.S.C. § 161. The Census of Governments survey is conducted every five (5) years compiling data for years ending with “2” and “7”. See also Census of Governments, <https://www.census.gov/programs-surveys/cog/about.html>.

⁷⁴¹ See U.S. Census Bureau, 2017 Census of Governments – Organization Table 2. Local Governments by Type and State: 2017 [CG1700ORG02]. <https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html>. Local governmental jurisdictions are made up of general purpose governments (county, municipal and town or township)

(continued....)

36,931 general purpose governments (county⁷⁴², municipal and town or township⁷⁴³) with populations of less than 50,000 and 12,040 special purpose governments - independent school districts⁷⁴⁴ with enrollment populations of less than 50,000.⁷⁴⁵ Accordingly, based on the 2017 U.S. Census of Governments data, we estimate that at least 48,971 entities fall into the category of “small governmental jurisdictions.”⁷⁴⁶

13. *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.⁷⁴⁷ The appropriate size standard under SBA rules is that such a business is small if it has 1,500 or fewer employees.⁷⁴⁸ For this industry, U.S. Census Bureau data for 2012 show that there were 967 firms that operated for the entire year.⁷⁴⁹ Of this total, 955 firms had employment of 999 or fewer employees and 12 had employment of 1,000 employees or more.⁷⁵⁰ Thus under this category and the associated size standard, the Commission estimates that the majority of wireless telecommunications carriers (except satellite) are small entities.

(Continued from previous page) _____
and special purpose governments (special districts and independent school districts). *See also* Table 2. CG1700ORG02 Table Notes_Local Governments by Type and State_2017.

⁷⁴² *See* U.S. Census Bureau, 2017 Census of Governments - Organization, Table 5. County Governments by Population-Size Group and State: 2017 [CG1700ORG05]. <https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html>. There were 2,105 county governments with populations less than 50,000. This category does not include subcounty (municipal and township) governments.

⁷⁴³ *See* U.S. Census Bureau, 2017 Census of Governments - Organization, Table 6. Subcounty General-Purpose Governments by Population-Size Group and State: 2017 [CG1700ORG06]. <https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html>. There were 18,729 municipal and 16,097 town and township governments with populations less than 50,000.

⁷⁴⁴ *See* U.S. Census Bureau, 2017 Census of Governments - Organization, Table 10. Elementary and Secondary School Systems by Enrollment-Size Group and State: 2017 [CG1700ORG10]. <https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html>. There were 12,040 independent school districts with enrollment populations less than 50,000. *See also* Table 4. Special-Purpose Local Governments by State Census Years 1942 to 2017 [CG1700ORG04], CG1700ORG04 Table Notes_Special Purpose Local Governments by State_Census Years 1942 to 2017.

⁷⁴⁵ While the special purpose governments category also includes local special district governments, the 2017 Census of Governments data does not provide data aggregated based on population size for the special purpose governments category. Therefore, only data from independent school districts is included in the special purpose governments category.

⁷⁴⁶ This total is derived from the sum of the number of general purpose governments (county, municipal and town or township) with populations of less than 50,000 (36,931) and the number of special purpose governments - independent school districts with enrollment populations of less than 50,000 (12,040), from the 2017 Census of Governments - Organizations Tables 5, 6, and 10.

⁷⁴⁷ U.S. Census Bureau, 2017 NAICS Definitions, “517312 Wireless Telecommunications Carriers (Except Satellite),” <https://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517312&search=2017%20NAICS%20Search>.

⁷⁴⁸ 13 CFR § 121.201, NAICS code 517312 (previously 517210).

⁷⁴⁹ U.S. Census Bureau, 2012 Economic Census of the United States, Table EC1251SSSZ5, Information: Subject Series: Estab and Firm Size: Employment Size of Firms for the U.S.: 2012 NAICS Code 517210, https://factfinder.census.gov/bkmk/table/1.0/en/ECN/2012_US/51SSSZ5/naics~517210.

⁷⁵⁰ *Id.* Available census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with “1000 employees or more.”

14. *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.”⁷⁵¹ Satellite telecommunications service providers include satellite and earth station operators. The category has a small business size standard of \$35 million or less in average annual receipts, under SBA rules.⁷⁵² 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.⁷⁵³ Of this total, 299 firms had annual receipts of less than \$25 million.⁷⁵⁴ Consequently, we estimate that the majority of satellite telecommunications providers are small entities.

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

15. The Commission expects the rules adopted in the *Report and Order* will impose new or additional reporting or recordkeeping and/or other compliance obligations on small entities as well as other applicants and licensees. In addition to the rule changes associated with transitioning the band through the approach adopted in the *Report and Order*, there are new service rule compliance obligations. New licensees in the 3.7-3.98 GHz band will have to meet various service rules, including construction benchmarks and technical operating requirements. In the event a small entity obtains licenses through auction, the small entity licensee would be required to satisfy construction requirements, operate in compliance with technical rules (*e.g.*, power, out of band emissions, and field strength limits), and may have to coordinate with incumbent FSS operations in limited instances. Small entity 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.

16. All filing, recordkeeping and reporting requirements adopted in the *Report and Order*, including professional, accounting, engineering or survey services used in meeting these requirements will be the same for small and large entities that intend to utilize these new 3.7 GHz Service licenses. To the extent having the same requirements for all licensees results in the costs of complying with the rules being relatively greater for smaller entities than for large ones, these costs are necessary to effectuate the purpose of the Communications Act, namely to further the efficient use of spectrum, to prevent spectrum warehousing and are necessary to promote fairness. Likewise, compliance with the service and technical rules and coordination requirements are necessary for the furtherance of the goals of protecting the public while also providing interference free services. Small entities must therefore comply with these rules and requirements. The Commission believes however, that small entities will benefit from having more information about opportunities in the 3.7-3.98 GHz band, more flexibility to provide a wider range of services, and more options for gaining access to wireless spectrum.

17. In order to comply with the rule changes adopted in the *Report and Order*, small entities may be required to hire attorneys, engineers, consultants, or other professionals. While the Commission cannot quantify the cost of compliance with the rule changes, we note that several of the rule changes are consistent with and mirror existing policies and requirements used for other Part 27 flexible-use licenses. Therefore, small entities with existing licenses in other bands may already be familiar with such policies

⁷⁵¹ U.S. Census Bureau, *2017 NAICS Definitions*, “517410 Satellite Telecommunications,” <https://www.census.gov/cgi-bin/sssd/naics/naicsrch?input=517410&search=2017+NAICS+Search&search=2017>.

⁷⁵² 13 CFR § 121.201, NAICS code 517410.

⁷⁵³ U.S. Census Bureau, *2012 Economic Census of the United States*, Table EC1251SSSZ4, Information: Subject Series - Estab and Firm Size: Receipts Size of Firms for the United States: 2012, NAICS code 517410, https://factfinder.census.gov/bkmk/table/1.0/en/ECN/2012_US/51SSSZ4/naics~517410.

⁷⁵⁴ *Id.* The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard of annual receipts of \$35 million or less.

and requirements and have the processes and procedures in place to facilitate compliance resulting in minimal incremental costs to comply with our requirements for the 3.7-4.2 GHz band. The recordkeeping, reporting and other compliance obligations for small entities and other licensees are described below.

18. *Designated Entity Provisions.* The Commission adopts the proposal to apply the two small business definitions with higher gross revenues thresholds to auctions of overlay licenses in the 3.7-3.98 GHz band.⁷⁵⁵ Accordingly, an entity with average annual gross revenues for the relevant preceding period not exceeding \$55 million will qualify as a “small business,” while an entity with average annual gross revenues for the relevant preceding period not exceeding \$20 million will qualify as a “very small business.” Since their adoption in 2015, the Commission has used these gross revenue thresholds in auctions for licenses likely to be used to provide 5G services in a variety of bands. The results in these auctions indicate that these gross revenue thresholds have provided an opportunity for bidders claiming eligibility as small businesses to win licenses to provide spectrum-based services at auction. These thresholds do not appear to be overly inclusive as a substantial number of qualified bidders in these auctions do not come within the thresholds. This helps preclude designated entity benefits from flowing to entities for which such credits are not necessary.

19. The Commission also adopts the proposal to provide qualifying “small businesses” with a bidding credit of 15% and qualifying “very small businesses” with a bidding credit of 25%, consistent with the standardized schedule in Part 1 of the rules.⁷⁵⁶ This proposal was modeled on the small business size standards and associated bidding credits that the Commission adopted for a range of other services.⁷⁵⁷ The Commission believes that use of the small business tiers and associated bidding credits set forth in the Part 1 bidding credit schedule will provide consistency and predictability for small businesses.

20. *Rural Service Providers.* In the *NPRM*, the Commission also sought comment on a proposal to offer a bidding credit for rural service providers.⁷⁵⁸ The rural service provider bidding credit awards a 15% bidding credit to those that service predominantly rural areas and that have fewer than 250,000 combined wireless, wireline, broadband and cable subscribers.⁷⁵⁹ As a general matter, the

⁷⁵⁵ Following adoption of the *NPRM*, the Commission sought consultation on July 23, 2018, regarding these proposed size standards with the U.S. Small Business Administration (SBA), as required by the Small Business Act, 15 U.S.C. § 632(a)(2)(c), and 13 C.F.R. §§ 121.901-903. The standardized schedule of bidding credits provided in section 1.2110(f)(2)(i) defines small businesses based on average gross revenues for the preceding three years. The SBA indicated that the proposed size standards appeared reasonable and that it had no specific comments. See Letter from Khem R. Sharma, Chief, Office of Size Standards, U.S. Small Business Administration, to Gary D. Michaels, Deputy Chief, Auctions and Spectrum Access Division, Wireless Telecommunications Bureau, Federal Communications Commission, dated August 27, 2018. Subsequently, in December 2018, Congress revised the standard set out in the Small Business Act for categorizing a business concern as a “small business concern,” by providing as a general matter that a Federal agency cannot propose to categorize a business concern as a “small business concern” for Small Business Act purposes unless the size of the concern is based on its annual average gross receipts “over a period of not less than 5 years.” 15 U.S.C. § 632(a)(2)(C)(ii)(II), *as amended by* Small Business Runway Extension Act of 2018, Pub. L. 115-324 (Dec. 17, 2018). To implement the proposal in the *NPRM* consistent with this statutory requirement, average annual gross revenues for purposes of small business bidding credits in this band will be based on the preceding 5 years.

See *NPRM*, 33 FCC Rcd at 6969-70, para. 163. See also 47 C.F.R. § 1.2110(f)(2)(i)(B), (C).

⁷⁵⁷ *NPRM*, 33 FCC Rcd at 6969-70, para. 163. See, e.g., Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands, WT Docket No. 02-353, *Report and Order*, 18 FCC Rcd 25162, 25220, para. 149 (2003); *Service Rules for Advanced Wireless Services in the 2000-2020/2180-2200 MHz Bands, et al.*, WT Docket No. 12-70, *et al.*, 27 FCC Rcd 16102, 16185, para. 217 (adopting the AWS-1 size standards and associated bidding credits for small businesses for any AWS-4 licenses awarded through competitive bidding).

⁷⁵⁸ *NPRM*, 33 FCC Rcd at 6969-70, para. 163.

⁷⁵⁹ *Competitive Bidding Update Report and Order*, 30 FCC Rcd at 7530, para. 88.

Commission “has made closing the digital divide between Americans with, and without, access to modern broadband networks its top priority . . . [and is] committed to ensuring that all Americans, including those in rural areas, Tribal lands, and disaster-affected areas, have the benefits of a high-speed broadband connection.”⁷⁶⁰ In this proceeding, a variety of organizations and associations that in turn represent the providers that serve the most rural and sparsely populated areas of the country have come together to stress that “rules [for bringing this spectrum to market] should balance the competing needs of interested parties and offer meaningful opportunities for providers of all kinds and sizes to offer spectrum-based services to rural consumers.”⁷⁶¹

21. *Licensing and Operating Rules.* The Commission adopts licensing and operating rules that afford licensees the flexibility to align licenses in the 3.7-3.98 GHz band with licenses in other spectrum bands governed by Part 27 of the Commission’s rules and other flexible-use services. Specifically, the Commission adopts rules requiring 3.7 GHz Service licensees in the 3.7-3.98 GHz band to comply with licensing and operating rules that are similar to all part 27 services, including flexible use, regulatory status, foreign ownership reporting, compliance with construction requirements, renewal criteria, permanent discontinuance of operations, partitioning and disaggregation, and spectrum leasing.

22. *Application Requirements & Eligibility.* Licensees in the A, B, and C blocks must comply with the Commission’s general application requirements.⁷⁶² Further, the Commission adopts an open eligibility standard for licenses in the A, B, and C Blocks.⁷⁶³ The Commission has determined that eligibility restrictions on licenses may be imposed only when open eligibility would pose a significant likelihood of substantial harm to competition in specific markets and when an eligibility restriction would be effective in eliminating that harm.⁷⁶⁴

23. *Mobile Spectrum Holdings.* The Commission does not impose a pre-auction bright-line limit on acquisitions of the 3.7-3.98 GHz band. Instead, the Commission will incorporate into the spectrum screen the 280 megahertz of spectrum that the Commission makes available in the 3.7-3.98 GHz band. The Commission will also perform case-by-case review of the long-form license applications filed as a result of the auction. In regards to mobile spectrum holdings, the Commission will include the A, B, and C Blocks of the 3.7-3.98 GHz band in the screen for secondary market transactions because the spectrum will become “suitable and available in the near term for the provision of mobile telephony/broadband services.” The Commission will add the 280 megahertz of spectrum to the screen

⁷⁶⁰ Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, *Broadband Deployment Report*, 34 FCC Rcd 3857, 3858 (2019).

⁷⁶¹ Letter from Rural Representatives (NTCA-The Rural Broadband Association); National Rural Electrical Cooperative Association; Rural Wireless Association; The League of Rural Voters; National Organization of Black County Officials; Michigan Broadband Cooperative; Fredericksburg Chamber of Commerce; Kentucky Rural Health Association; Indiana Small and Rural Schools Association), to The Honorable Roger Wicker, The Honorable Frank Pallone, Jr., and The Honorable Ajit Pai, Chairman, FCC, GN Docket No. 18-122 (filed Mar. 24, 2019).

⁷⁶² See 47 CFR §§ 1.901-1.959. To grant a license application, the Commission must determine that the public convenience, interest, or necessity will be served thereby under section 307 of the Communications Act. See 47 U.S.C. § 307; see also *id.* §§ 309(a), 310(a), (b).

⁷⁶³ *NPRM*, 33 FCC Rcd at 6963, para. 145, note 256 (citing *AWS-4 Service Rules R&O*, 27 FCC Rcd at 16193, paras. 241-42; *Service Rules for the 746-764 and 776-794 MHz Bands et al.*, WT Docket No. 06-150 et al., 22 FCC Rcd 15289, 15381, 15383-84, paras. 253, 256 (2007) (*700 MHz Second Report and Order*); *Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands*, Report and Order, 18 FCC Rcd 23318, 23346-47, para. 70 (2003)). *NPRM*, 33 FCC Rcd at 6963, para. 145.

⁷⁶⁴ See *NPRM*, 33 FCC Rcd at 6963, n.256 (citing *AWS-4 Service Rules R&O*, 27 FCC Rcd at 16193, paras. 241-42; *Service Rules for the 746-764 and 776-794 MHz Bands et al.*, WT Docket No. 06-150 et al., 22 FCC Rcd 15289, 15381, 15383-84, paras. 253, 256 (2007) (*700 MHz Second Report and Order*); *Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands*, Report and Order, 18 FCC Rcd 23318, 23346-47, para. 70 (2003)).

once the auction closes.

24. *Mobile or Point-to-Multipoint Performance Requirements.* The Commission concludes that licensees in the A, B, and C Blocks offering mobile or point-to-multipoint services must provide reliable signal coverage and offer service to at least 45% of the population in each of their license areas within eight years of the license issue date (first performance benchmark), and to at least 80% of the population in each of their license areas within 12 years from the license issue date (second performance benchmark).

25. *Alternate IoT Performance Requirements.* The Commission recognized in the *NPRM* that 3.7-3.98 GHz licenses have flexibility to provide services potentially less suited to a population coverage metric.⁷⁶⁵ Therefore, the Commission sought comment on an alternative performance benchmark metric for licensees providing IoT-type fixed and mobile services.⁷⁶⁶ Based on the record evidence,⁷⁶⁷ the Commission will allow licenses in the A, B, and C Blocks offering IoT-type services to provide geographic area coverage of 35% of the license area at the first (eight-year) performance benchmark, and geographic area coverage of 65% of the license area at the second (12-year) performance benchmark.

26. *Fixed Point-to-Point under Flexible Use Performance Requirements.* The Commission adopts a requirement that Part 27 geographic area licensees providing Fixed Service in the A, B, and C Blocks band must demonstrate within eight 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 requires a licensee relying on point-to-point service to demonstrate it has at least one link in operation and providing service, either to customers or for internal use, per every 67,000 persons within a license area. The Commission requires 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 requires 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.

27. *Penalty for Failure to Meet Performance Requirements.* Along with performance benchmarks, the Commission adopts meaningful and enforceable penalties for failing to ensure timely build-out. Specifically, as proposed in the *NPRM*, the Commission adopts a rule requiring that, in the event a licensee in the A, B, or C Block 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.⁷⁶⁸ If a 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.⁷⁶⁹

⁷⁶⁵ *NPRM*, 33 FCC Rcd at 6965, para. 154.

⁷⁶⁶ *NPRM*, 33 FCC Rcd at 6965, para. 154.

⁷⁶⁷ T-Mobile Comments at 28-29; Verizon Comments at 22 (arguing the Commission should adopt an alternative geographic coverage requirement that may be more suitable for some Internet of Things or low-power services that are not designed to cover residential populations).

⁷⁶⁸ *NPRM*, 33 FCC Rcd at 6967, para. 157.

⁷⁶⁹ See, e.g., 2018 3.5 GHz Band Report and Order, 33 FCC Rcd at 10638, para 73; *Service Rules for Advances Wireless Services H Block—Implementing Section 6401 of the Middle Class Tax Relief and Job Creation Act of 2012 Related to the 1915-1920 MHz and 1995-2000 MHz Bands*, Report and Order, 28 FCC Rcd 9483, 9564, para.

(continued....)

28. *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 adopts a rule requiring that such electronic coverage maps must accurately depict both the boundaries of each licensed area and the coverage boundaries of the actual areas to which the licensee provides service. As proposed in the *NPRM*, the rule the Commission is adopting requires measurements of populations served on areas no larger than the Census Tract level so a licensee deploying small cells has the option to measure its coverage using a smaller acceptable identifier such as a Census Block. 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.

29. *License Renewal.* As proposed in the *NPRM*, the Commission will apply the general renewal requirements applicable to all Wireless Radio Services (WRS) licensees to 3.7-3.98 GHz band licensees in the A, B, and C Blocks.⁷⁷⁰ This approach will promote consistency across services.⁷⁷¹

30. *Renewal Term Construction Obligation.* In addition to, and independent of, these general renewal provisions, the Commission finds that any additional renewal term construction obligations adopted in the *Wireless Radio Services Renewal Reform* proceeding would apply to licenses in the A, B, and C Blocks of the 3.7-3.98 GHz band.⁷⁷²

31. *New Earth Stations.* 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.⁷⁷³ Given the Commission's decision to limit FSS operations in the 3.7-4.0 GHz band in the contiguous United States but not elsewhere, the Commission converts the freeze for new FSS earth stations in the 3.7-4.0 GHz band in the contiguous United States into an elimination of the application process for registrations and licenses for those operations, and the Commission lifts the freeze for new FSS earth stations in the 3.7-4.2 GHz band outside of the contiguous United States.

32. The Commission revises the part 25 rules such that applications for 3.7-4.0 GHz band earth station licenses or registrations in the contiguous United States will no longer be accepted. Limiting, as described, the registration of new earth stations in spectrum being transitioned to primary terrestrial use will provide a stable spectral environment for more intensive terrestrial use of 3.7-3.98 GHz and facilitate the rapid transition to terrestrial use.

33. With respect to registered incumbent earth stations that are transitioned to the 4.0-4.2 GHz

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212 (2013) (*H Block Report and Order*); *Wireless Telecommunications Bureau Reminds Wireless Licensees of Construction Obligations*, Public Notice, 32 FCC Rcd 4802, 4802-03 (WTB 2017).

⁷⁷⁰ See *NPRM*, 33 FCC Rcd at 6967-68, 6979, para. 160 (citing 47 CFR § 1.949 (Application for renewal of authorization)) and Appx. A, Proposed Rules, 47 CFR § 1.907 (proposing to add 3.7-4.2 GHz band to definition of "Covered Geographic Licenses"). See also 47 CFR § 1.949(d) (renewal standard for covered geographic license).

⁷⁷¹ The Commission, for example, applied the same principles in the *2016 Spectrum Frontiers Order and FNPRM*, concluding that UMFUS licensees would meet the renewal standard in their initial license terms if they met certain performance benchmarks and were "using [their] facilities to provide service." *2016 Spectrum Frontiers Order and FNPRM*, 31 FCC Rcd at 8088, para. 206. See also T-Mobile Comments at 31; AT&T Reply at 22.

⁷⁷² See *Wireless Radio Services Renewal Reform FNPRM*, 33 FCC Rcd at 8911-18, paras. 100-23.

⁷⁷³ See *Freeze and 90-Day Earth Station Filing Window Public Notice* at 1.

band, the Commission will permit these earth stations to be renewed and/or modified to maintain their operations in the 4.0-4.2 GHz band. The Commission will not, however, accept applications for new earth stations in the 4.0-4.2 GHz portion of the band for the time being, during this transition period.

34. *Relocation and Accelerated Relocation Payments.* New overlay licensees must pay their share of relocation and accelerated relocation payments to reimburse incumbents for the reasonable costs of transitioning out of the lower 300 megahertz of the C-band in the contiguous United States. Based on the unique circumstances of the band, the Commission also finds it necessary to condition new licenses on making acceleration payments to satellite incumbents that voluntarily choose to clear the band on an expedited schedule. Like relocation payments, the Commission finds that requiring such mandatory payments is both in the public interest and within the Commission's Title III authority.

35. *Sunsetting Incumbent Point-to-Point Fixed Services.* Incumbent licensees of permanent point-to-point Fixed Service links will have until September 30, 2023, to self-relocate their point-to-point links out of the 3.7-4.2 GHz band. The Commission also revises its part 101 rules to specify that no applications for new point-to-point Fixed Service will be granted in the contiguous United States.

36. *Relocation Reimbursement and Cost Sharing for Point-to-Point Fixed Services.* Incumbent licensees of permanent point-to-point Fixed Service links that self-relocate out of the band within the three-year sunset period for point-to-point fixed permanent services shall be eligible for reimbursement of their reasonable costs based on the well-established "comparable facilities" standard used for the transition of microwave links out of other bands.⁷⁷⁴ Similar to the Commission's approach for earth station clearing, because fixed service relocation affects spectrum availability on a local basis, all flexible-use licensees in a PEA where an incumbent Fixed Service licensee self-relocated will share in the reimbursement of these reasonable costs on a *pro rata* basis. Incumbent Fixed Service licensees will be subject to the same demonstration requirements and reimbursement administrative provisions as those adopted above for incumbent earth station operators.

37. *Power Levels for Base Station Power.* To support robust deployment of next-generation mobile broadband services, the Commission will allow base stations in non-rural areas to operate at power levels up to 1640 watts per megahertz EIRP.⁷⁷⁵ In addition, consistent with other broadband mobile services in nearby bands (AWS-1, AWS-3, AWS-4 and PCS), the Commission will permit base stations in rural areas to operate with double the non-rural power limits (3280 watts per megahertz) in rural areas.⁷⁷⁶ The Commission extends the same power density limit to emissions with a bandwidth less than one megahertz to facilitate uniform power distribution across a licensee's authorized band regardless of whether wideband or narrowband technologies are being deployed.

38. *Power Levels for Mobile Power.* The Commission adopts a 1Watt (30 dBm) EIRP power limit for mobile devices, as proposed in the *NPRM*.

39. *Base Station Out-of-band Emissions.* The Commission adopts base station out-of-band emission (OOBE) requirements based on the proposed limits, which are similar to other AWS services.⁷⁷⁷ Specifically, base stations will be required to suppress their emissions beyond the edge of their authorization to a conducted power level of -13 dBm/MHz.

⁷⁷⁴ See, e.g., 47 CFR § 101.73(d) (defining comparable facilities as facilities possessing certain characteristics in terms of throughput, reliability and operating costs). We note that for the Advanced Wireless Services in the 2.1 GHz band, \$184,991 was the average cost per link relocation registered with the AWS Clearinghouse. See, e.g., ET Docket No. 00-258, Report of the CTIA Spectrum Clearinghouse, LLC, at 2 (filed Jan. 31, 2019).

⁷⁷⁵ See, e.g., Verizon Comments at 23; Ericsson Reply at 6; Nokia Comments at 11; AT&T Reply at 22; C-Band Alliance May 13, 2019 *Ex Parte* at 12.

⁷⁷⁶ See, e.g., 47 CFR § 27.50(d)(1).

⁷⁷⁷ *NPRM*, 33 FCC Rcd at 6971-72, paras. 168-171; see also 47 CFR § 27.53(h) (AWS emission limits).

40. *Mobile Out-of-Band Emissions.* As with base station out-of-band emission limits, the Commission adopts mobile emission limits similar to the standard emission limits that apply to other mobile broadband services. Specifically, mobile units must suppress the conducted emissions to no more than -13 dBm/MHz outside their authorized frequency band.

41. *Antenna Heights Limit.* The Commission adopts the proposal not to restrict antenna heights for 3.7-3.98 GHz band operations beyond any requirements necessary to ensure air navigation safety.⁷⁷⁸ This is consistent with part 27 AWS rules, which generally do not impose antenna height limits on antenna structures.

42. *Protection of Incumbent FSS Earth Stations.* The Commission will require a power flux density (PFD) limit of -124 dBW/m²/MHz as measured at the earth station antenna. This PFD limit applies to all emissions within the earth station's authorized band of operation, 4.0–4.2 GHz. In the event of early clearing of the lower 100 MHz (Phase 1 of the transition), the limit will apply to all emissions within the 3.82–4.2 GHz band. The Commission also requires a power flux density limit of -16 dBW/m²/MHz applied across the 3.7–3.98 GHz band at the earth station antenna as a means to prevent receiver blocking. This blocking limit applies to all emissions within the 3.7 GHz Service licensee's authorized band of operation.

43. *Protection from Out of Band Emissions.* The Commission adopts a Power Flux Density (PFD) limit to protect registered FSS earth stations from out of band emissions from 3.7 GHz Service operations. For base and mobile stations operating in the 3.7–3.98 GHz band, The Commission adopts a PFD limit of -124 dBW/m²/MHz, as measured at the antenna of registered FSS earth stations. 3.7 GHz Service licensees will be obligated to ensure that the PFD limit at FSS earth stations is not exceeded by base and mobile station emissions, which may require them to limit mobile operations when in the vicinity of an earth station receiver.

44. *Protection from Receiver Blocking.* The Commission will require base stations and mobiles to meet a power flux density (PFD) limit of -16 dBW/m²/MHz, as measured at the earth station antenna for all registered FSS earth stations. This blocking limit applies to all emissions within the 3.7 GHz Service licensee's authorized band of operation.

45. *Co-Channel Protection Criteria for TT&C Earth Stations.* A protection criteria of I/N = -6 dB is appropriate for TT&C links. The Commission will require 3.7 GHz Service licensees to coordinate their operations within 70 km of TT&C earth stations that continue to operate in the 3.7-3.98 GHz band.

46. *Adjacent Channel Protection Criteria for TT&C Earth Stations.* To protect TT&C earth stations from adjacent channel interference due to out-of-band emissions, the Commission sets the same interference protection criteria of -6 dB I/N ratio. Prior coordination is not required for adjacent channel licenses. To provide protection from potential receiver overload, the Commission will require base stations and mobiles to meet a power flux density (PFD) limit of -16 dBW/m²/MHz, as measured at the TT&C earth station antenna.

47. *International Boundary Requirements.* The Commission adopts the proposal to apply section 27.57(c) of the rules, which requires all part 27 operations to comply with international agreements for operations near the Mexican and Canadian borders.

48. Small entities may be required to hire attorneys, engineers, consultants, or other professionals to comply with the rule changes adopted in the Report and Order. Although the Commission cannot quantify the cost of compliance with the rule changes, we note that several of the rule changes are consistent with and mirror existing policies and requirements used for other Part 27 flexible-

⁷⁷⁸ See 47 CFR § 27.56.

use licenses. Therefore, small entities with existing licenses in other bands may already be familiar with such policies and requirements and have the processes and procedures in place to facilitate compliance resulting in minimal incremental costs to comply with our requirements for the 3.7-4.2 GHz band.

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

49. The RFA requires an agency to describe any significant, specifically small business, alternatives that it has considered in reaching its approach, which may include the following four alternatives (among others): (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.⁷⁷⁹

50. In the *Report and Order*, the Commission has adopted a transition using a Commission-led competitive bidding process to make C-band spectrum available for next generation terrestrial wireless use. We considered the position of the Small Satellite Operators, the C-Band Alliance, and the approaches of other commenters but believe that the Commission-led forward auction will leverage the best features of the various proposals submitted in the record and allow us to repurpose the socially efficient amount of spectrum for flexible use rapidly and transparently. It will also facilitate robust deployment of next generation terrestrial wireless networks and ensure that qualified incumbents in the band are able to continue their operations without interruption. The advantages of the public auction approach include making a significant amount of 3.7-4.2 GHz band spectrum available quickly through a public auction of flexible use license, followed by a transition period that leverages incumbent FSS operators' expertise to achieve an effective relocation of existing services to the upper portion of the band, aligns stakeholders' incentives so as to achieve an expeditious transition, and ensures effective accommodation of incumbent users. It will also facilitate robust deployment of next generation terrestrial wireless networks and ensure that qualified incumbents in the band are able to continue their operations without interruption. We find that the public auction approach fulfills the Commission's obligations to manage spectrum in the public interest.

51. To ensure that small entities and all eligible interests are included in the Transition Facilitation Plan and compensated for the transition to the upper 200 megahertz of the band, the standard the Commission adopts for a qualified Transition Facilitation Plan developed by the Transition Facilitator is whether it includes all authorized satellite operators that provide C-Band services to existing U.S. customers using registered U.S. earth stations that will need to be transitioned to the upper portion of the band or otherwise accommodated in order to avoid harmful interference from new flexible-use operations. The transition obligations the Commission adopts require that, in order for a satellite operator to satisfy the clearing benchmarks and become eligible for reimbursement of reasonable relocation costs and potential accelerated relocation payments, it must demonstrate that the space station transmissions and receiving earth station operations have been sufficiently cleared such that the new flexible-use licensee could begin operating without causing harmful interference to registered incumbent earth stations. We find that, if the Small Satellite Operators satisfy our definition of eligible satellite operators such that they have incumbent registered earth station customers that will need to be transitioned to the upper portion of the band, then they would be entitled to reimbursement of reasonable relocation costs and potential accelerated relocation payments. This will ensure that any small satellite operator incumbent affected by the transition will have the opportunity to participate.

52. The *Report and Order* adopts bidding credits for small and very small businesses. The auction of flexible-use licenses relies heavily on a competitive marketplace to set the value of spectrum and compensate incumbents for the costs of transitioning out of the lower 300 megahertz of the band.

⁷⁷⁹ 5 U.S.C. § 603(c)(1)-(4).

Specifically, for small entities, 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.

53. The license areas chosen in the *Report and Order* should provide spectrum access opportunities for smaller carriers by giving them access to less densely populated areas that match their footprints. While PEAs are small enough to provide spectrum access opportunities for smaller carriers and PEAs can be further disaggregated, these units of area also nest within and may be aggregated to form larger license areas. Thus, the rules should enable small entities and other providers providing service in the 3.7-3.98 GHz band to adjust their spectrum holdings more easily and build their networks pursuant to individual business plans, allowing them to manage the economic impact. We also believe this should result in small entities having an easier time acquiring or accessing spectrum.

54. Another step taken by the Commission that should help minimize the economic impact for small entities is the adoption of 15-year license terms for licenses in the 3.7-3.98 GHz band. Small entities should benefit from the opportunity for long term operational certainty and a longer period to develop, test and provision innovative services and applications. This longer licensing term should also allow small entities to curtail and spread out its costs. Lastly, as mentioned above, many of the rule changes adopted in the *Report and Order* are consistent with and mirror existing requirements for other bands. The Commission's decision to take this approach for the 3.7-3.98 GHz band should minimize the economic impact for small entities who are already obligated to comply with and have been complying with existing requirements in other bands.

Report to Congress

55. The Commission will send a copy of the *Report and Order*, including this FRFA, in a report to Congress pursuant to the Congressional Review Act.⁷⁸⁰ In addition, the Commission will send a copy of the *Report and Order*, including this FRFA, to the Chief Counsel for Advocacy of the SBA. A copy of the *Report and Order*, and FRFA (or summaries thereof) will also be published in the Federal Register.⁷⁸¹

⁷⁸⁰ See 5 U.S.C. § 801(a)(1)(A).

⁷⁸¹ See 5 U.S.C. § 604(b).

APPENDIX C**List of Commenters**C-band NPRM Comments:

Aerospace Industries Association, General Aviation Manufacturers Association
Alaska Communications Internet, LLC (Alaska Comm.)
Altice USA, Inc. (Altice)
American Cable Association
ABS Global Ltd., Hispasat S.A., Embratel Star One S.A. (collectively, "Small Satellite Operators")
AT&T Services, Inc. (AT&T)
Aviation Spectrum Resources, Inc. (Aviation Spectrum Resources)
Block Communications, Inc. Gray Television, Inc. Meredith Corporation
The Boeing Company (Boeing)
Broadband Access Coalition
Broadband Connects America Coalition
CB2.0 Communications Inc. (CB2.0)
C-Band Alliance
Charter Communications, Inc. (Charter)
Cisco Systems, Inc. (Cisco)
Comcast Corporation and NBCUniversal Media, LLC (Comcast)
Competitive Carriers Association (CCA)
CBS Corporation, Discovery, Inc., The Walt Disney Company, 21st Century Fox, Inc., Univision Communications Inc., and Viacom Inc. (CBS, *et al.*)
CTIA
Cumulus Media Inc. and Westwood One, LLC (Cumulus Media/Westwood One)
Digital Networks, LLC
Dynamic Spectrum Alliance
Ericsson
Eternal Word Television Network, Inc.
Eutelsat S.A. (Eutelsat)
Extreme Reach, Inc. (Extreme Reach)
Federated Wireless, Inc. (Federated Wireless)
Fixed Wireless Communications Coalition Inc. (FWCC)
Frontier Communications and Windstream Services (Frontier/Windstream)
Garmin International, Inc.
Gary E. Timm

GCI Communication Corp. (GCI)
Global Eagle Entertainment (Global Eagle)
Google LLC (Google)
Inmarsat Inc. (Inmarsat)
Intel Corporation, Intelsat License LLC, SES Americom, Inc.
ITC Global, Inc. (ITC Global)
Information Technology & Innovation Foundation
Lockheed Martin Corporation (Lockheed Martin)
Luken Communications, LLC (Luken Communications)
Linkup Communications Corporation (LinkUp Communications)
Microsoft Corporation (Microsoft)
Motorola Solutions, Inc. (Motorola)
National Association of Broadcasters (NAB)
National Public Radio (NPR)
NCTA - The Internet & Television Association (NCTA)
Nokia
North American Broadcasters Association
Olympusat
PSSI Global, LLC (PSSI Global)
Public Interest Spectrum Coalition (PISC)
Qualcomm Inc. (Qualcomm)
QVC, Inc. and HSN, Inc. (QVC/HSN)
R Street Institute
Robert Bosch LLC and Supporting Parties
Satellite Industry Association (SIA)
Society of Broadcast Engineers, Inc.
Speedcast Communications, Inc. (Speedcast)
Starry, Inc. (Starry)
Telecommunications Industry Association (TIA)
The Boeing Company (Boeing)
The C-SPAN Networks
T-Mobile USA, Inc. (T-Mobile)
Thomas C. Smith
United States Cellular Corporation (U.S. Cellular)
Verizon
World Teleport Association

C-band NPRM Reply Comments:

ABC Television Affiliates Association, CBS Television Network Affiliates Association, FBC Television Affiliates Association, NBC Television Affiliates (“ABC Television Affiliates Association et al.”)

ABS Global Ltd., Hispasat S.A., Embratel Star One S.A. (“Small Satellite Operators”)

Aerospace Industries Association, General Aviation Manufacturers Association

Alaska Communications Internet, LLC (Alaska Comm.)

Alaska Telecom Association (Alaska Telecom)

Alphastar International, LLC

American Cable Association

AT&T Services, Inc. (AT&T)

Aviation Spectrum Resources, Inc. (Aviation Spectrum Resources)

BASF Corporation

Broadband Access Coalition

CB2.0 Communications Inc. (CB2.0)

C-Band Alliance

CenturyLink

Charter Communications, Inc. (Charter)

Comcast Corporation and NBCUniversal Media, LLC (collectively, “Comcast”)

Competitive Carriers Association (CCA)

Comsearch

CBS Corporation, Discovery, Inc., The Walt Disney Company, 21st Century Fox, Inc., Univision Communications Inc., and Viacom Inc. (CBS, *et al.*)

CTIA

Digital Networks, LLC (Digital Networks)

Dynamic Spectrum Alliance

Ericsson

Federated Wireless, Inc. (Federated Wireless)

Fixed Wireless Communications Coalition (FWCC)

Foxconn Industrial Internet

Garmin International, Inc.

GCI Communication Corp.

GeoLinks

Google LLC (Google)

iHeartCommunications, Inc.,

Intel Corporation (Intel)

Intelsat License LLC, SES Americom, Inc.
Learfield IMG College
Luken Communications, LLC
Maxar Technologies Holdings Inc.
Meredith Corporation
Microsoft Corporation (Microsoft)
Microspace Communications Corporation
National Association of Broadcasters (NAB)
National Spectrum Management Association
National Translator Association
NCTA - The Internet & Television Association (NCTA)
Nokia
North American Broadcasters Association
Northrop Grumman
NTCA - The Rural Broadband Association (NTCA)
Paul Litchfield
PSSI Global, LLC (PSSI Global)
Public Interest Spectrum Coalition (PISC)
Qualcomm Incorporated (Qualcomm)
QVC, Inc. and HSN, Inc. (QVC/HSN)
RigNet Satcom, Inc.
Robert Bosch LLC
Satellite Industry Association (SIA)
Sherrod Munday
Siemens Corporation
The Boeing Company (Boeing)
Thomas C Smith
Volkswagen Group of America
T-Mobile USA, Inc. (T-Mobile)
U.S. Electrodynamics, Inc.
United States Cellular Corporation (U.S. Cellular)
Verizon

May 3 PN Comments:

ABS Global LTD., Hispasat S.A., and Claro S.A. (“Small Satellite Operators”)

ACA Connects

AT&T Services, Inc. (AT&T)

BYU Broadcasting

Competitive Carriers Association (CCA)

Charter Communications, Inc. (Charter)

Dyanmic Spectrum Alliance

Fixed Wireless Communications Coalition (FWCC)

Google LLC (Google)

National Public Radio, Inc. (NPR)

NTCA-The Rural Broadband Association (NTCA)

Open Technology Institute at New America (OTI)

PSSI Global Services, LLC (PSSI Global)

Public Interest Spectrum Coalition (PISC)

Raytheon Corporation (Raytheon)

Satellite Industry Association (SIA)

T-Mobile USA, Inc. (T-Mobile)

Verizon

Wireless Internet Service Providers Association (WISPA)

May 3 PN Reply:

ABS Global LTD., Hispasat S.A., and Claro S.A. (“Small Satellite Operators”)

ACA Connects

AT&T Services, Inc. (AT&T)

C-Band Alliance

Charter Communications, Inc. (Charter)

Comcast

Inmarsat Inc. (Inmarsat)

International Telecommunications Satellite Organization (ITSO)

Raytheon Corporation (Raytheon)

Satellite Industry Association (SIA)

ABS Global Ltd., Hispasat S.A., Embratel Star One S.A. (collectively, “Small Satellite Operators”)

T-Mobile USA, Inc. (T-Mobile)

Verizon

Wireless Internet Service Providers Association (WISPA)

July 19 PN Comments:

ABS Global LTD., Hispasat S.A., and Claro S.A. (“Small Satellite Operators”)
Airspan Networks Inc.
Alaska Communications Internet, LLC (Alaska Comm.)
Alaska Telecom Association (Alaska Telecom)
Arthur B. Reis
AT&T Services, Inc. (AT&T)
Broadband Connects America Coalition
Cambium Networks, LTD.
C-Band Alliance
CommScope, Inc.
CBS Corporation, Discovery, Inc., The Walt Disney Company, 21st Century Fox, Inc., Univision Communications Inc., and Viacom Inc. (CBS *et al.*)
CTIA
Cumulus Media Inc. and Westwood One, LLC (Cumulus Media/Westwood One)
Dynamic Spectrum Alliance
Frontier Communications and Windstream Services (Frontier/Windstream)
GCI Communication Corp. (GCI)
Globecast America, Incorporated (Globecast)
Google LLC (Google)
Learfield IMG College
LinkUp Communications Corporation (LinkUp Communications)
Lockheed Martin Corporation
Motorola Solutions Inc. (Motorola)
National Association of Broadcasters (NAB)
North American Broadcasters Association
National Public Radio, Inc. (NPR)
Nokia
North American Broadcasters Association
NTCA-The Rural Broadband Association (NTCA)
PSSI Global Services, LLC (PSSI)
Public Interest Spectrum Coalition (PISC)
Qualcomm Incorporated (Qualcomm)
QVC, Inc. and HSN, Inc. (QVC/HSN)
Riverfront Broadcasting, LLC (Riverfront Broadcasting)
Satellite Industry Association (SIA)

The Church of Jesus Christ of Latter-Day Saints
T-Mobile USA, Inc. (T-Mobile)
WTVY-TV
United States Cellular Corporation (U.S. Cellular)
Verizon
Wireless Internet Service Providers Association (WISPA)

July 19 PN Reply:

A&E Television Networks (AETN)
ABS Global LTD., Hispasat S.A., and Claro S.A. (“Small Satellite Operators”)
ABC Television Affiliates Association, CBS Television Network Affiliates Association, FBC Television Affiliates Association, NBC Television Affiliates (ABC Television Affiliates Association et al.)
ACA Connects, Charter, Competitive Carriers Association (ACA Connects Coalition)
Altice
Arthur B Reis
AT&T Services, Inc. (AT&T)
C-Band Alliance
Encompass Digital Media (Encompass)
Google LLC (Google)
Igolgi
National Association of Broadcasters (NAB)
NovelSat
Olympusat
Public Interest Spectrum Coalition (PISC)
Randy Williams
Raytheon Corporation (Raytheon)
Samsung Electronics (Samsung)
The Space Connection, Inc. (SpaceConnection)
T-Mobile USA, Inc. (T-Mobile)
Trinity Broadcasting Network
Verizon
Wireless Internet Service Providers Association (WISPA)
Wireless Internet Service Providers Association , Google, Microsoft (WISPA et al.)

