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

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

REPORT AND ORDER AND ORDER OF PROPOSED MODIFICATION

Adopted: February 28, 2020 **Released: March 3, 2020**

By the Commission: Chairman Pai and Commissioners O'Rielly and Carr issuing separate statements; Commissioners Rosenworcel and Starks dissenting and issuing separate statements.

TABLE OF CONTENTS

Heading Paragraph #

I. INTRODUCTION 1
II. BACKGROUND 5
A. Current Use of the 3.7-4.2 GHz Band and Adjacent Bands 8
B. Procedural History 13
III. REPORT AND ORDER 20
A. Public Auction of 280 Megahertz of C-Band Spectrum for Flexible Use 22
1. Allocation of the 3.7-4.2 GHz Band 54
2. Competitive Bidding Rules 59
3. Licensing and Operating Rules 71
B. The Transition of FSS Operations 110
1. Incumbent FSS Operations 113
2. Clearing the 3.7-4.0 GHz Band of FSS Operations 124
3. Transition Schedule 154
4. Relocation and Accelerated Relocation Payments 178
5. Relocation Payment Clearinghouse 255
6. The Logistics of Relocation 284
7. Other FSS Transition Issues 318
C. Fixed Use in the C-Band 321
1. Sunsetting Incumbent Point-to-Point Fixed Services 322
2. More Intensive Point-to-Multipoint Fixed Use 329
D. Technical Rules for the 3.7-4.2 GHz Band 332
1. Power Levels 335
2. Out-of-band Emissions 343
3. Antenna Height Limits 351
4. Service Area Boundary Limit 354
5. International Boundary Requirements 356
6. Other Part 27 Rules 357
7. Protection of Incumbent FSS Earth Stations 359
8. Protection of TT&C Earth Stations 373
9. Coexistence with Aeronautical Radionavigation 380

10. Coexistence with the Citizens Broadband Radio Service 396
IV. PROCEDURAL MATTERS 398
V. ORDERING CLAUSES 406
APPENDIX A—Final Rules
APPENDIX B—Final Regulatory Flexibility Analysis
APPENDIX C—List of Commenters
APPENDIX D—Confidential Appendix

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 by all terrestrial mobile providers for their 4G LTE operations combined.[5] Earlier in February, the

[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* The FCC's 5G FAST Plan, https://www.fcc.gov/5G (last visited Feb. 27, 2020).

[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).

[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*, GN Docket No. 14-177, 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*).

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 (5G) 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 of 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 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 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

[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) (*2.5 GHz Band Order*).

[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).

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, the MOBILE NOW Act provides that 100 megahertz below 8 GHz shall be identified for unlicensed use,[13] 100 megahertz below 6 GHz shall be identified for use on an exclusive, flexible-use, licensed basis for commercial mobile use,[14] and 55 megahertz below 8 GHz 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 band be the first primary band for 5G,[17] and CEPT currently is developing a report that will provide

[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/.

[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.").

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-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, space station 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

[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/.

[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).

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, space station 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. (Hispasat), 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 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.

[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] Hispamar S.A. is a wholly owned subsidiary of Hispasat and is responsible for operating Hispasat satellites in Brazil. While the relevant space station is licensed under "Hispamar," the majority of filings in this docket use the name "Hispasat" and we therefore use that name for all references herein to avoid confusion. 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 space station operator in this band that did not provide data in response to the *May 2019 Information Collection*.

[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.

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 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]

---

[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*, ET Docket No. 98-237, WT Docket No. 00-32, First Report and Order and Second Notice of Proposed Rule Making, 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*).

[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. *Id.* at 6385, para. 37.

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

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]

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-

[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.

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

[46] *Id.* at 6927-29, paras. 30-37.

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

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* 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

[48] *Id.* at 6932, paras. 47-48.

[49] *Id.* at 33 FCC Rcd at 6935-36, paras. 57-59.

[50] *Id.* at 6935-51, paras. 58-115.

[51] *Id.* 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 space station 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 space station 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).

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

[55] *Id.* at 2907.

[56] *Id.*

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-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]

---

[57] *Id.* 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. *See* ACA Connects Coalition Proposal; Cartesian Study.

[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.

[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 (continued….)

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, 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.

(Continued from previous page)
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, Appx. 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).

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 space station 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 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

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

[68] *Id.* at 6939-46, paras. 72-97.

[69] *Id.* 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 2.5 GHz Band Order* at 5473, para. 77 (2019). As we set forth in greater detail below, under the requirements we adopt in this *Report and Order*, overlay licensees in the C-band may not operate in a geographic area until the incumbents have been cleared from that area and any adjacent areas that may experience interference.

[73] *See, e.g.*, *2.5 GHz Band Order* at 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) (*2018 Spectrum Frontiers Order*); *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); (continued….)

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 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]

(Continued from previous page)
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).

[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
(continued….)

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.[80] 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.[81] Indeed, by considering the Auction Procedures Comment Public Notice 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.[82]

29. Our decision to hold a public auction has overwhelming support in the record. A range of commenters with diverse interests support Commission-led auction 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.[83] CCA argues that a public auction "will ensure an impartial and transparent process so that all

(Continued from previous page)
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] Courts will treat the Commission's predictive judgments regarding the best way to enable new uses of spectrum to "particularly deferential review." *NTCH, Inc. v. FCC*, -- F.3d –, 2020 WL 855465 *7 (D.C. Circ. 2020).

[81] *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 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).

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

[83] *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
(continued….)

potential bidders can have a fair opportunity to acquire the spectrum they need."[84] 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."[85] 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."[86] 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.[87] Many commenters that support a public auction of 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.[88] 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.[89]

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*

(Continued from previous page)
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).

[84] 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*).

[85] Comcast Nov. 19, 2019 *Ex Parte* at 4.

[86] 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)

[87] *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 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.

[88] *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.

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

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.[90] The C-Band Alliance initially supported clearing 200 megahertz, with commenters such as Boeing and QVC/HSN supporting this amount.[91] Subsequently, the C-Band Alliance proposed clearing 280 megahertz plus a 20 megahertz guard band.[92] 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;"[93] Paul Litchfield, Qualcomm, U.S. Cellular, and T-Mobile argue that all 500 megahertz should be made available for flexible use;[94] CCA argues that we should aim to clear at least 320 megahertz of spectrum;[95] 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.[96]

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.[97] 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.[98] Numerous commenters support clearing 280 megahertz or more to support terrestrial 5G use.[99]

---

[90] *See NPRM*, 33 FCC Rcd at 6941-42, para. 81.

[91] *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).

[92] *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).

[93] Ericsson Reply at 4; CTIA Comments at 10.

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

[95] CCA Reply at 6-7.

[96] *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).

[97] *See, e.g.*, C-Band Alliance Comments at 25; C-Band Alliance Reply at 14-17; CCA Reply at 6-7.

[98] *See, e.g.*, C-Band Alliance Comments at 1, 33; Ericsson Reply at 4; CTIA Comments at 10.

[99] *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).

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.[100] 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 space station operator's fleet.[101] 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.[102] As ABS, Hispasat, and Star One acknowledge, because of compression and filtering technologies, incumbent space station operators will be able to deliver the equivalent quality of service and even expand that service in the remaining 200 megahertz of C-band spectrum.[103] 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.[104] Furthermore, the rules that we adopt in this *Report and Order* will

[100] *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.").

[101] *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*).

[102] *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.

[103] *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).

[104] By ensuring the continuous and uninterrupted delivery of fixed satellite services currently offered in the band in the United States, our decision today avoids the "unnecessary disruption to existing licensed C-band satellite operations" of concern to the International Telecommunications Satellite Organization. International Telecommunications Satellite Organization Reply Comments at 3. In addition, our decisions do not affect in any way the Common Heritage ITU frequency assignments, which continue to be as valid as they were before this Commission *Report and Order*. The use of these frequency assignments in any country is subject to its national regulations and the effect of our current actions have fully taken into account the possible effects on currently authorized operators and other users of the services being provided. *See generally* International Telecommunications Satellite Organization Reply Comments; Letter from Patrick Masambu, Director General, International Telecommunications Satellite Organization, to Ajit Pai, Chairman, FCC, GN Docket No. 18-122 (filed Feb. 26, 2020).

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.[105]

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.[106] 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.[107] 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.[108]

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 United States, plus a 20 megahertz guard band, within 36 months of its private auction.[109] 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.[110] The C-Band Alliance claims it could achieve this

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

[106] *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).

[107] *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.

[108] *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*).

[109] *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.

[110] *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,

(continued….)

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.[111] 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).[112] 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.[113] By way of example, it noted that SES was considering retaining Telemetry, Tracking, and Command sites in Brewster, Washington and Hawley, Pennsylvania.[114]

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.[115] Many commenters support a private sale approach as an effective means of leveraging the expertise of space station operators and the incentives of secondary markets to facilitate a rapid repurposing of the C-band.[116] 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.[117] NCTA and Midcontinent Communications argue that a private sale of spectrum rights would not include procedural protections comparable to the protections provided by a

(Continued from previous page)
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.

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

[112] *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.

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

[114] 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.

[115] C-Band Alliance Comments at 8; C-Band Alliance Reply at 3.

[116] *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.

[117] 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 space station 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).

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.[118] 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.[119]

37. We decline to adopt the C-Band Alliance proposal for a private sale approach led by incumbent C-band space station 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 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.[120] This responsibility is directly at odds with space station 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

[118] 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.

[119] *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).

[120] *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).

users are able to maintain their existing services and are reimbursed for all reasonable costs associated with the transition.

39. *Third*, we believe that our public auction of overlay licenses will make spectrum available for flexible-use just as fast as a private sale approach.[121] 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.[122] 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 space station operators are members of the C-Band Alliance and have fully supported the C-Band Alliance's proposal.[123] Unless the Commission were to adopt rules granting the C-Band Alliance exclusive authority to lead the transition and compelling non-member space station 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 reduce the risk of potential holdouts by aligning the incentives of all relevant C-band space station 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.[124] While the Commission has previously modified the existing licenses of incumbents to assign new license rights

[121] *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)).

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

[123] In fact, the record in this proceeding clearly indicates that the C-Band Alliance and non-member space station 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.

[124] 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.

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.[125] 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.[126]

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 space station 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.[127] 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 space station 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.[128] 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 bidders already have extensive experience with such an auction format.[129]

42. U.S. Cellular supports T-Mobile's alternative method of conducting an incentive auction.[130] 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.[131] Opponents

[125] *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).

[126] The DC Circuit noted in a recent decision that it affords "the greatest deference" to the Commission when it acts to foster "innovative methods of exploiting the spectrum" in its function as a "policymaker." *NTCH, Inc. v. FCC*, -- F.3d –, 2020 WL 855465 at *6 (D.C. Circ. 2020).

[127] 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*).

[128] 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).

[129] T-Mobile Dec. 18, 2019 *Ex Parte* at 4.

[130] U.S. Cellular Comments at 6.

[131] *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.

argue that the Commission lacks the legal authority to conduct such an incentive auction.[132] They further argue that an incentive auction would be too costly and complex,[133] requires too much Commission intervention,[134] and harms incumbents through inferior service and inconsistent clearing across markets.[135]

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.[136] Unlike the incumbent space station operators, earth station registrants are not licensees.[137] 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."[138] Since 1979 the Commission has found that licensing receive-only earth stations was not 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.[139] While some receive-only earth stations in the C-band are licensed to

[132] 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.

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

[134] Intel/Intelsat/SES Brattle Paper at 34.

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

[136] 47 U.S.C. § 309(j)(8)(G)(ii)(I).

[137] *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.

[138] 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 space station 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 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.

[139] *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 (continued….)

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."[140] 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.[141]

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."[142] 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."[143] Because incumbent C-band space station 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 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.[144] We therefore find that T-Mobile's proposal would undermine the Commission's stated goals for this proceeding to close the digital

(Continued from previous page)
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).

[140] 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).

[141] 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").

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

[143] 47 U.S.C. § 309(j)(8)(G)(ii)(II) (emphasis added).

[144] 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").

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.[145]

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.[146] Their proposal has three key elements: (1) a Commission-driven auction that would award new terrestrial licenses and assign obligations for transition costs,[147] (2) a plan to transition multichannel video programming distributor (MVPD) earth station operators to fiber,[148] and (3) a plan for space station operators to repack remaining earth station users to the upper portion of the band.[149]

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.[150] 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,[151] incorrectly assumes that satellites covering the continental United States are fungible,[152] incorrectly asserts that its transition would not require new satellites within 36 months of Commission action,[153] and minimizes the difficulty of making fiber as reliable as C-band spectrum.[154]

---

[145] T-Mobile Dec. 18, 2019 *Ex Parte* at 4.

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

[147] ACA Connects Coalition Proposal at 4-6; Cartesian Study at 2, 12.

[148] *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).

[149] 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).

[150] *See* NTCA July 19 PN Comments at 2, 4.

[151] *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.

[152] *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.

[153] *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

(continued….)

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."[155] 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.[156] Broadcasters and programmers express concern that space station operators are unlikely to 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.[157] 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*.[158] The ACA Connects Coalition proposes that clearing would be conducted on

(Continued from previous page)
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.

[154] *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.

[155] 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).

[156] *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 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.

[157] *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.

[158] 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 (continued….)

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.[159] We share the concerns of many commenters who doubt that the ACA Connects Coalition proposal could be completed by those timelines.[160] 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.[161] 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.[162] 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 U.S. Treasury.[163] 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.[164] However, because space station 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.[165] 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, space station 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

(Continued from previous page)
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.

[159] ACA Connects Coalition 5G Plus Plan at 36.

[160] *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.

[161] CBS et al. July 19 PN Comments at 9; *see also* C-Band Alliance July 19 PN Comments at 20.

[162] *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.

[163] 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).

[164] *Id.* § 309(j)(8)(G).

[165] 47 U.S.C. § 309(j)(8)(G)(ii)(II).

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.[166] 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.[167]

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."[168] 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 and incentivize investment in next generation wireless services.[169] Mid-band spectrum is important for next generation wireless broadband service due to its favorable propagation and capacity characteristics.[170] 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.[171] In addition, adopting this allocation will harmonize the Commission's allocations for the 3.7-4.0 GHz band with international allocations.[172] 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.[173] Finally, because we adopt rules designating 3.98-

[166] 47 CFR § 2.106, Table of Frequency Allocations.

[167] *Id*. 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. *Id.*; *see also* 47 CFR § 2.104.

[168] *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.

[169] *Id.* at 6923, para. 18.

[170] *NPRM*, 33 FCC Rcd at 6917, para. 3.

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

[172] 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).

[173] Qualcomm Comments at 1-2; U.S. Cellular Comments at 4.

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 band. Commenters argue, and we agree, that the Commission should exclude locations outside of the contiguous United States from the public auction and relocation.[174] 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.[175] 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.[176] And incumbent space station operators have explicitly excluded Alaska, Hawaii, and the U.S. territories from being repurposed for terrestrial wireless use.[177] 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 3.7-4.2 GHz 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

[174] 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).

[175] *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); 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*).

[176] 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* RigNet Satcom, Inc. Reply.

[177] C-Band Alliance Comments at 22, n.50.

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.[178] 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.[179]

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

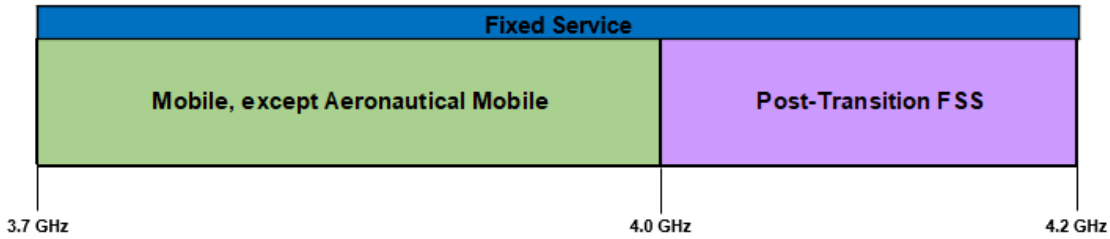
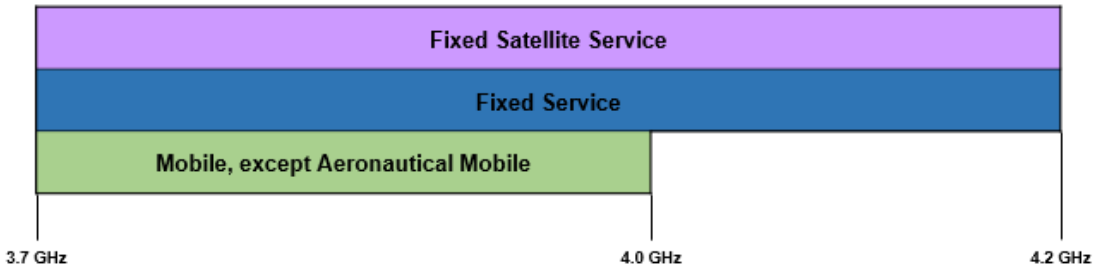


Figure 2: Post-Transition 3.7-4.2 GHz Band Allocations Outside the Contiguous United States



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.[180] 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.[181] 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.[182]

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.[183]

[178] NAB Comments at 8.

[179] 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).

[180] 47 U.S.C. § 309(j)(1).

[181] *NPRM*, 33 FCC Rcd at 6969-70, para. 163.

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

[183] *See* T-Mobile Comments at 31.

Subsequently, several parties in *ex parte* filings endorsed auction principles and procedures that the Commission has followed based on these rules.[184]

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.[185] 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 bidding orbital locations or spectrum used for the provision of international or global satellite communications services.[186] 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,"[187] 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.[188]

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.[189]

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.[190] 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."[191] Based on the

[184] *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).

[185] 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.

[186] *NPRM*, 33 FCC Rcd at 6949-50, para. 109.

[187] C-Band Alliance Comments at 38.

[188] American Cable Association Reply at 15-16.

[189] *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").

[190] *NPRM*, 33 FCC Rcd at 6969-70, para. 163.

[191] 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

(continued….)

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.[192]

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 particular service in establishing the appropriate threshold.[193] 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.[194] 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.[195]

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.[196] For example, the Commission adopted two small business definitions for the auction of licenses in the Upper Microwave Flexible Use Service (39 GHz band).[197] These two small business definitions are the highest two of three thresholds in the Commission's standardized schedule of bidding credits.[198]

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.[199] Accordingly, an entity

(Continued from previous page)
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).

[192] 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.

[193] *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).

[194] *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).

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

[196] *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).

[197] *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).

[198] *See* 47 CFR § 1.2110(f)(2)(i).

[199] 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, (continued….)

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.[200] 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.[201] 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.[202] This helps preclude designated entity benefits from flowing to entities for which such credits are not necessary.

(Continued from previous page)
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.

[200] *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).

[201] *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).

[202] *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).

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.[203] This proposal was modeled on the small business size standards and associated bidding credits that the Commission adopted for a range of other services.[204] 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.

69. *Rural Service Providers*.—In the *NPRM*, the Commission also sought comment on a proposal to offer a bidding credit for rural service providers.[205] 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.[206] 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."[207] 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."[208]

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.[209] We adopt licensing and operating rules that afford licensees the flexibility to align licenses

---

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

[204] *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).

[205] *NPRM*, 33 FCC Rcd at 6969-70, para. 163.

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

[207] *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).

[208] 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).

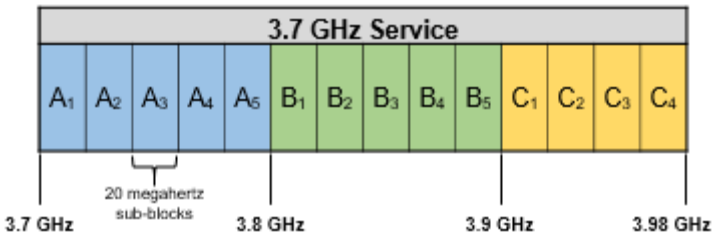
[209] *See, e.g.*, *Amendment of the Commission's Rules with Regard to Commercial Operations in the 1695-1710 MHz, 1755-1780 MHz, and 2155-2180 MHz Bands*, GN Docket No. 13-185, Report and Order, 29 FCC Rcd 4610, 4650-51, para. 108, 4652, para.112 (2014) (licensing AWS-3 spectrum under part 27 and providing AWS-3 licenses with the flexibility to provide any fixed or mobile service that is consistent with the allocations for the spectrum); *2015*

(continued….)

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.[210] Specifically, finding no opposition in the record, we adopt rules requiring 3.7 GHz Service 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,[211] regulatory status,[212] foreign ownership reporting,[213] compliance with construction requirements,[214] renewal criteria,[215] permanent discontinuance of operations,[216] partitioning and disaggregation,[217] and spectrum leasing.[218] 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.[219]

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."[220] 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:



(Continued from previous page)
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).

[210] *NPRM*, 33 FCC Rcd at 6962, para. 143.

[211] *See* 47 U.S.C. § 303(y); 47 CFR §§ 1.2106, 27.2, 27.3.

[212] 47 CFR § 27.10.

[213] 47 U.S.C. § 310; 47 CFR § 27.12.

[214] *Id.* § 27.14(k).

[215] *Id.* § 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*).

[216] 47 CFR § 1.953.

[217] *Id.* § 1.950.

[218] 47 CFR §§ 1.9001 *et seq.*

[219] *NPRM,* 33 FCC Rcd at 6962, para. 144.

[220] For example, the A Block will cover 100 megahertz from 3.7-3.8 GHz, with five 20-megahertz sub-blocks: 3.7-3.72 GHz (A1), 3.72-3.74 GHz (A2), 3.74-3.76 GHz (A3), 3.76-3.78 GHz (A4), and 3.78-3.8 GHz (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 3.98-4.0 GHz being reserved as a guard band.

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.[221] 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.[222] Commenters support relatively smaller sized sub-blocks with the potential to aggregate to larger sizes of 60 to 160 megahertz.[223]

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 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.[224] 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.[225] The inclusion of 20 megahertz sub-blocks provides sufficient flexibility for manufacturers 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.[226] Because we find that 20 megahertz sub-blocks provide sufficient flexibility, we find it unnecessary to divide the blocks even smaller into 10 megahertz sub-blocks, as some commenters have proposed.[227]

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

[221] *NPRM*, 33 FCC Rcd at 6960, para. 135.

[222] *Id.*

[223] 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.

[224] 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).

[225] *See* Verizon Comments at 18; Letter from Jared M. Carlson, Vice President, Government Affairs and Public Policy, Ericsson, to Marlene H. Dortch, Secretary, FCC, GN Docket No 18-122, at 1 (filed Feb. 12, 2020) (stating that 100 megahertz channels are essential to deliver a high-performance experience).

[226] 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); Verizon Feb. 6, 2019 *Ex Parte* at 1.

[227] *See, e.g.*, Letter from Michael P. Goggin, Assistant Vice President, Senior Legal Counsel, AT&T, to Marlene H. Dortch, FCC, GN Docket No. 18-122, at 6 n.14 (filed Jan. 30, 2020) (AT&T Jan. 30, 2020 *Ex Parte*) (suggesting that to provide flexibility to aggregate contiguous channels efficiently, C-band spectrum should be auctioned by PEA in 10 megahertz blocks); 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, at 2 (filed Feb. 5, 2020) (U.S. Cellular Feb. 5, 2020 *Ex Parte*) (stating that adoption of 10 megahertz blocks would provide even greater flexibility of wireless service consistent with the channel bandwidths in 3GPP release 15); Letter from Steve B. Sharkey, Vice President, Government Affairs, T-Mobile, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 1 (filed Feb. 5, 2020) (T-Mobile Feb. 5, 2020 *Ex Parte*).

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.[228] 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.[229] 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."[230] 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.[231] There is wide support in the record for licensing C-band flexible-use spectrum on an exclusive, geographic basis,[232] and we find that such an approach will give certainty to licensees and provide the efficiencies of scale and scope that drive innovation, investment, and rapid deployment of next generation services.[233]

77. *Geographic License Area*.—We adopt PEAs as the geographic license area for new 3.7 GHz Service 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.[234] In the *NPRM*, the Commission sought comment on using PEAs, as well as on licensing on a county, nationwide, or other basis.[235]

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.[236]

---

[228] 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.

[229] *See, e.g.*, Broadband Access Coalition Comments at 23; CTIA Comments at 21; Verizon Comments at 18.

[230] *Id.*

[231] *See* 47 CFR § 27.6.

[232] *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 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.

[233] *See* CTIA Comments at 20-21; Verizon Comments at 18-19; T-Mobile Comments at 25.

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

[235] *NPRM*, 33 FCC Rcd at 6961, para. 139.

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

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.[237] 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.[238] Motorola argues that license areas should be no larger than counties.[239]

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.[240] 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.[241] PEAs therefore will encourage auction participation by a diverse group of 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.[242]

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).[243] 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.[244] Further, we adopt an open eligibility standard for licenses in the A, B, and C

[237] AT&T Reply at 20; Verizon Comments at 19.

[238] U.S. Cellular Comments at 12.

[239] Motorola Comments at 5. *See also* WISPA Feb. 14, 2020 *Ex Parte* at 1-3 (recommends setting aside up to four of the 14 blocks for competitive bidding at the county level).

[240] *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)").

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

[242] *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).

[243] *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).

[244] *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).

Blocks.[245] 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.[246] AT&T, T-Mobile, and Verizon support an open eligibility standard.[247] 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."[248]

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.[249] Generally applicable 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.[250]

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.[251] 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.[252] 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.[253]

---

[245] *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)).

[246] *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)).

[247] AT&T Comments at 19; T-Mobile Comments at 26; Verizon Comments at 20.

[248] *Id.* at 20.

[249] *See* 47 U.S.C. § 309(j)(3).

[250] *Cf.* 47 CFR § 27.12(b) (citing 47 U.S.C. § 1404(c)).

[251] *NPRM*, 33 FCC Rcd at 6963-64, paras. 147-48.

[252] *Id.* at 6963-64, para. 147.

[253] *Id.* at 6964, para. 148.

85. Similar to the Commission's approach in the *2017 Spectrum Frontiers Order and FNPRM*[254] and the *2018 Spectrum Frontiers Order and FNPRM*,[255] 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."[256]

86. We agree with AT&T and Verizon that an in-band spectrum aggregation limit is unnecessary for this band.[257] 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.[258] But limiting the amount of 3.7-3.98 GHz band spectrum that one party can acquire, as these commenters request,[259] could unnecessarily restrict providers' ability to participate in the auction and acquire spectrum in this band.[260] 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."[261] Further, "a variety of spectral paths to 5G deployment in the United States" exist,[262] including the additional

[254] *2017 Spectrum Frontiers Order and FNPRM*, 32 FCC Rcd at 11009-10, paras. 70, 73.

[255] *2018 Spectrum Frontiers Order and FNPRM*, 33 FCC Rcd at 5589, para. 32.

[256] *2017 Spectrum Frontiers Order and FNPRM*, 32 FCC Rcd at 11010-11, para. 73.

[257] *See* Verizon Comments at 20; AT&T Comments at 17; Letter from Gregory M. Romano, Federal Regulatory and Legal Affairs, Verizon, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 6-7 (filed Feb. 17, 2020) (Verizon Feb. 17, 2020 *Ex Parte*). 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.

[258] *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 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).

[259] *See, e.g.*, U.S. Cellular Comments at 19-20; CCA Reply at 11; T-Mobile Feb. 5, 2020 *Ex Parte* at 2-3 (recommending a spectrum aggregation limit for the initial tranche of one-third of the spectrum that will be made available in that tranche and an overall spectrum aggregation limit of one-third of the total amount of spectrum that will be made available in the C-band auction); Letter from Michael Calabrese, OTI, to Marlene H. Dortch, Secretary, FCC, GN Docket No, 18-122, at 17-18 (filed Feb. 4, 2020 (OTI Feb. 4, 2020 *Ex Parte*) (same); Letter from Jill Canfield, VP, Legal, NTCA; Alexi Maltas, Senior Vice President & General Counsel, CCA; Angie Kronenberg, Chief Advocate and General Counsel, INCOMPAS; Louis Pereartz, Vice President of Policy, WISPA; and Vann Bentley, Policy Counsel, CCIA, to Marlene H. Dortch, Secretary, FCC, GN Docket No 18-122, at 1-2 (filed Feb 18, 2020) (recommending a requirement that no single entity can acquire more than one-third of the spectrum in a geographic area); Letter from Harold Feld, Senior Vice President, Public Knowledge, to Marlene H. Dortch, Secretary, FCC, GN Docket No 18-122, et al., at 1 (filed Feb. 18, 2020 *Ex Parte*) (recommending spectrum cap); Letter from Steve B. Sharkey, Vice President, T-Mobile, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 2-3 (filed Feb. 21, 2020) (same).

[260] *See 2018 Spectrum Frontiers Order and FNPRM*, 33 FCC Rcd at 5589-90, para. 33; *see also* Verizon Feb. 17, 2020 *Ex Parte* at 2 ("Arbitrary spectrum aggregation limits undermine innovation and investment by preventing operators from acquiring the spectrum needed to serve the marketplace").

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

[262] *Id.* at 5589, para. 32.

opportunities for access to spectrum through our recent actions to remove restrictions on the 2.5 GHz band,[263] to make the 3.5 GHz band available for priority access licenses,[264] and to make millimeter-wave spectrum available through auction.[265] 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.[266]

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."[267] The relevant product market for the screen incorporates both mobile voice and data services, including services provided over advanced broadband wireless networks—particularly emerging, next generation wireless services.[268] We adopt flexible-use rules here to enable terrestrial mobile use for 5G deployment.[269] Accordingly, it is appropriate to incorporate this band into the screen for mobile telephony/broadband services.[270]

---

[263] *2.5 GHz Band Order,* 34 FCC Rcd 5446.

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

[265] *See generally 2016 Spectrum Frontiers Order and FNPRM*, 31 FCC Rcd 8014.

[266] *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); Verizon Feb. 17, 2020 *Ex Parte* at 3 ("To the extent aggregation concerns arise in the context of a particular acquisition, the Commission can address them through its well-tested and flexible case-by-case review process").

[267] *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.

[268] *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).

[269] Likewise, the record indicates that providers 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).

[270] *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). Although Verizon had asked to exclude the band from the screen "given the lack of clarity regarding whether use of the C-band would fit the services identified (continued….)

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.[271] 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).[272]

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."[273] 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*.[274] This review will create sufficient bidder certainty for the auction, consistent with section 309(j)(3)(E).[275]

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,[276] suggesting that 15 years would afford licensees sufficient time to achieve significant buildout obligations post-transition.[277] Many commenters agree that a longer term is warranted where time-consuming

(Continued from previous page)
for screen purposes," Verizon now supports including the band in the screen. *See* Verizon Feb. 17, 2020 *Ex Parte* (citing Verizon Comments at 20-21).

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

[272] *See id.* 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)).

[273] *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. *Id*. 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.*

[274] *Union Tel. Co. Cellco 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." *Id*.

[275] *Id*.

[276] *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).

[277] *NPRM*, 33 FCC Rcd at 6964, para. 149.

activities are needed to ready the spectrum for mobile use,[278] and several argue that 15 years will promote the provision of innovative services and applications.[279]

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*.[280]

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.[281] Given the critical role of mid-band spectrum in today's spectral environment, we find that this approach is warranted.[282]

94. Commenters generally support performance requirements to prevent warehousing of this valuable spectrum,[283] 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.[284] 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

[278] *See, e.g.*, AT&T Reply at 21; Nokia Comments at 8.

[279] 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).

[280] *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.

[281] 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 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 Id.* § 27.14(s), (t).

[282] *See* Comcast Reply at 19; Verizon Comments at 21; U.S. Cellular Comments at 16-17; CTIA Comments at 22.

[283] *See, e.g.*, U.S. Cellular Reply at 38.

[284] CTIA Comments at 22; Verizon Comments at 21-22; U.S. Cellular Comments at 17.

propagation characteristics of the 3.7-3.98 GHz band."[285] 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."[286] 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.[287] 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.[288]

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.[289] 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.[290]

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 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.[291] We, therefore, decline to set the second performance benchmark at the end of

[285] 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).

[286] T-Mobile Comments at 27-28 (footnotes omitted).

[287] CTIA Comments at 23; AT&T Reply at 21.

[288] *Id*.

[289] Verizon requests that overlay licensees be permitted to use the spectrum at any time during the transition, on a non-interfering basis. *See* Verizon Feb. 20, 2020 *Ex Parte* at 2-3. Given the importance of maintaining continued service and the complexities of clearing incumbents in the band, we clarify that—absent the consent of the affected incumbent earth stations—overlay licensees may not operate within a given PEA until the relevant spectrum has been cleared of incumbents in that PEA and of affected incumbents in adjacent PEAs. A validated Certification of Accelerated Relocation (or the lapse of the Relocation Deadline) will trigger an overlay licensee's ability to operate in a particular PEA without first receiving the consent of affected incumbent earth stations.

[290] *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).

[291] *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).

the license term, as some commenters proposed.[292] 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.[293]

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.[294] Therefore, the Commission sought comment on an alternative performance benchmark metric for licensees providing IoT-type fixed and mobile services.[295] Based on the record evidence,[296] 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.[297] 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.[298]

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.[299] Although we adopt an additional metric in order to 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.[300]

---

[292] *See, e.g.*, T-Mobile Comments at 27; Verizon Comments at 21-22; AT&T Comments at 19.

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

[294] *NPRM*, 33 FCC Rcd at 6965-66, para. 154.

[295] *Id*.

[296] 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).

[297] 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.

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

[299] *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 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).

[300] 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).

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.[301] 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.[302]

100. Today, we adopt performance metrics using this framework, as proposed in the *NPRM*.[303] 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.[304] 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 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.[305] 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.

---

[301] *NPRM*, 33 FCC Rcd at 6964-65, para. 151.

[302] *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).

[303] *See NPRM*, 33 FCC Rcd at 6964-65, para. 151.

[304] *See* 47 CFR § 27.14(p)(2).

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

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.[306] 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.[307]

103. This approach will promote prompt buildout and appropriately penalize a licensee for not meeting its performance obligations for a particular license area.[308] 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.[309] 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.[310]

104. *Compliance Procedures*.—In addition to compliance procedures applicable to all part 27 licensees, including the filing of electronic coverage maps and supporting documentation,[311] 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 small number of commenters addressed this issue.[312] AT&T supports the Commission's proposal regarding the documentation of build-out requirements and renewal term performance.[313] T-Mobile supports the proposed procedures so long as they accommodate small-cell or other deployments used to enhance capacity rather than coverage.[314]

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

---

[306] *Id.* at 6967, para. 157.

[307] *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).

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

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

[310] 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).

[311] *See id.* §§ 1.946(d); 27.14(k).

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

[313] AT&T Comments at 19; AT&T Reply at 20-21.

[314] *See* T-Mobile Comments at 30.

the option to measure its coverage using a smaller acceptable identifier such as a Census Block.[315] 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.[316] This approach will promote consistency across services.[317]

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.[318]

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.[319] 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.[320] Commenters generally support our adopting renewal term 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.[321] 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.[322]

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.

---

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

[316] *See id.* 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 id.* § 1.949(d) (renewal standard for covered geographic license).

[317] 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.

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

[319] *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.

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

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

[322] AT&T Reply at 21-22.

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.[323] 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 purposes.[324] CTIA asserts a stable regulatory environment and understanding of who is to be protected is needed to promote investment in 5G services.[325] And Verizon argues that identifying stations to be protected is a critical step to repurposing this band.[326]

115. *Incumbent Space Station Operators*.—We define "incumbent space station operators" to include all C-band space station 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 June 21, 2018—the date of the International Bureau's temporary freeze on certain new space station applications in the 3.7-4.2

[323] *See Emerging Technologies Order*.

[324] CCA Comments at 4; Microsoft Comments at 6; Motorola Comments at 3.

[325] CITA Comments at 10-11.

[326] Verizon Comments at 10.

GHz band.[327] There are eight such operators: ABS, Empresa, Eutelsat, Hispasat, 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.[328]

117. This definition largely parallels the definition we proposed in the *NPRM*,[329] with a few minor changes. For one, we affirm the finding of the International Bureau that registrants and licensees that filed applications or modifications during the processing window, which effectively updated or confirmed their earth station details, are exempt from the separate certification requirement.[330] 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.[331] For earth stations licensed or registered before the processing window, we find that renewal applications, as well as certifications, filed by the May 28, 2019 certification deadline, effectively updated or confirmed their earth station details.[332] 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.[333]

118. Several commenters, including CCA, Microsoft, Motorola, and Verizon, support our proposed definition of incumbent earth stations.[334] CCA argues that using this registration/certification standard will help to identify database errors and duplicate registrations, which will provide a more

[327] *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 bar new applications and petitions for market access concerning space-to-Earth operations but did not propose to bar 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).

[328] *See* Appx. A (adding a definition of incumbent earth stations to section 25.203 of the Commission's rules, 47 CFR § 25.203).

[329] *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).

[330] *See Order* at 6923-24, para. 19.

[331] *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).

[332] *See Deadline for Submission of Information On Earth Station and Satellite Use of the 3.7-4.2 GHz Band*, Public Notice, 34 FCC Rcd 2287 (IB, WTB, OET 2019).

[333] *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).

[334] CCA Comments at 4; Microsoft Comments at 6; Motorola Comments at 3; Verizon Comments at 10.

accurate understanding of actual use in the band and allow the Commission to determine the optimal approach for introducing flexible use of the band.[335]

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.[336] 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.[337]

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.[338] Moreover, the filing deadline was extended numerous times to accommodate filers.[339] 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.[340] 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 fixed[341] or temporary fixed (i.e., transportable)[342] earth stations in IBFS. That proposal was supported by the record.[343] The Commission did not propose to include other classes of earth stations registered in IBFS, such as earth stations on vessels[344] and other

[335] CCA Comments at 4.

[336] C-Band Alliance Comments at 23-24.

[337] Cumulus Media/Westwood One Comments at 9-10.

[338] 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).

[339] *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.

[340] C-Band Alliance Comments at 24.

[341] 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).

[342] *Id.* § 25.277.

[343] *See, e.g.*, PSSI Global Comments at 2-5, 6-9, Exhibits 1, 2, and 5.

[344] *See* 47 § CFR 25.228(h)(3) and (4).

licensees operating under blanket earth stations,[345] 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 receive-only 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).[346] Several commenters support such termination, as well as eliminating an obligation to protect those stations from harmful interference.[347] For the same reasons that we limit incumbent earth stations to those that timely filed the required certifications or submitted renewal applications by the certification deadline, we now direct the International Bureau to terminate automatically the registrations of those uncertified receive-only earth stations in IBFS, consistent with our treatment of surrendered licenses and registrations that no longer authorize operations. We propose to modify the licenses of transmit-receive earth stations that failed to submit a certification or submit a renewal application by the certification deadline to remove their protection rights in 3.7-4.0 GHz and to allow them to continue to receive transmissions on an unprotected basis in 4.0-4.2 GHz. These licensed transmit-receive earth stations will not be considered eligible earth stations and will not be eligible to have their relocation expenses reimbursed, but can adjust their reception so as to receive transmissions to the upper 200 megahertz at their own expense.

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 space station operators in the band.[348] 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."[349] 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,

[345] *Id.* § 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….").

[346] *NPRM*, 33 FCC Rcd at 6922, para. 34.

[347] *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.

[348] *See* 47 U.S.C. § 316.

[349] *Id. 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.").

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 operate an economically viable MSS system without interfering with maritime distress and safety communications.[350] 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.[351] 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.[352] The Commission has also relied on its section 316 authority to "rearrang[e] licensees within a spectrum band."[353] 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.[354]

127. Notably, the Commission's modification authority under section 316 does not require the consent of licensees.[355] 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."[356] 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."[357] Rather, the Commission need only find, as we do here, that the modification "serves the public interest, convenience and necessity."[358] Further, the courts have consistently held that the Commission may exercise its license

---

[350] *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*).

[351] *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).

[352] *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) (*800 MHz Order*).

[353] *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).

[354] *2018 Spectrum Frontiers Order* at 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).

[355] *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*).

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

[357] *Rainbow Broadcasting v. FCC*, 949 F.2d at 410.

[358] *California Metro Mobile Commc'ns, Inc. v. FCC*, 365 F.3d at 45. As the D.C. Circuit has noted, the Commission's judgements on the public interest arising from a license modification "are entitled to substantial judicial deference." *NTCH, Inc. v. FCC*, -- F.3d –, 2020 WL 855465 at *7 (D.C. Circ. 2020).

modification authority as part of a rulemaking proceeding, as we do here.[359]

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*.[360] 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.[361] 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."[362] 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."[363] 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')."[364] 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.[365]

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.[366] Although effectively revoking a license or substantially disrupting a licensee's ability to provide service may amount to a fundamental change,

[359] *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").

[360] *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").

[361] *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.

[362] Dynamic Spectrum Alliance Comments at 5.

[363] OTI May 3 PN Comments at 21.

[364] *Id.* at 22; *see also,* ACA Connects Dec. 11, 2019 *Ex Parte* at 8-9.

[365] 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.").

[366] *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"); *Cmty 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).

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.[367]

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.[368] 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 space station operators to continue their services uninterrupted.[369] 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."[370] 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. Consistent with prior practice, in these circumstances we will accord to grants of market access the same protections in this regard that we accord to Commission licenses and grants of market access.[371]

---

[367] *See, e.g., id.* 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 essentially the same services, with some flexibility to provide ancillary services as well, under their licenses during the transition").

[368] *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 . . . .").

[369] 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*)).

[370] T-Mobile Jan. 24, 2020 *Ex Parte* at 2.

[371] *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 (continued….)

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.[372] 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.[373] 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.[374] Indeed, the C-Band Alliance's clearing proposal explicitly excludes Alaska, Hawaii, and the U.S. territories from being repurposed for terrestrial wireless use.[375]

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 space station operators can reach many countries at the same time.[376] As a result of this, many transmissions from space station 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. Beyond these incidental transmissions, we will only permit space station operators to continue to operate in the contiguous United States in the

(Continued from previous page)
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.").

[372] 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).

[373] *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*.

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

[375] C-Band Alliance Comments at 22, n.50.

[376] NPR Oct. 3 *Ex Parte* at 7.

3.7-4.0 GHz band on an unprotected basis after the sunset date for the purpose of transmitting service to earth stations at four designated TT&C sites.[377]

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 without their consent would constitute a fundamental change to their license.[378] 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.[379] 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.[380] 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.[381] For the Small Satellite Operators, the record clearly demonstrates that their members provide little to no

[377] *See e.g.*, C-band Alliance Jan. 14, 2020 *Ex Parte* at 8-9 (seeking protected gateway use of the 3.7-4.2 GHz band at four TT&C locations); Letter from Brian D. Weimer, Counsel to SES, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, Attach. at 11 (filed Feb. 20, 2020) (SES Feb. 20, 2020 *Ex Parte*); NAB Feb. 14, 2020 *Ex Parte* at 5 (asking to permit space station operators to continue to transmit in the 3.7-4.0 GHz range on a secondary basis to the four designated TT&C locations); Letter from Matthew S. Delnero, Counsel for The Walt Disney Company and ESPN, Inc., to Marlene H. Dortch, FCC, Secretary, GN Docket No. 18-122, at 2-3 (filed Feb. 21, 2020) (Disney and ESPN Feb. 21, 2020 *Ex Parte*).

[378] *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 Jan. 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 space station 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.").

[379] *See* Letter from Scott Blake Harris, Counsel to the Small Satellite Operators, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-22, at 1-9 (filed Feb. 18, 2020) (Small Satellite Operators Feb. 18, 2020 *Ex Parte*).

[380] *See Cmty 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").

[381] *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 . . . .").

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.[382]

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.[383] They argue that a reduction in the spectrum use rights afforded a licensee constitutes a fundamental change, regardless of whether the licensee is actually using the spectrum at the time.[384] 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."[385] 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."[386] 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[387] 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."[388] 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."[389]

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

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

[383] *See* Letter from Laura Phillips, Counsel for Intelsat, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 2-3 (filed Feb. 21, 2020) (Intelsat Feb. 21, 2020 *Ex Parte*); Small Satellite Operators Feb. 18, 2020 *Ex Parte* at 6-10; 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).

[384] *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.").

[385] *MCI*, 512 U.S. at 228-29 (1994).

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

[387] *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); *see also NTCH, Inc. v. FCC*, --F.3d --, 2020 WL 855465 at *6 (D.C. Cir. 2020).

[388] 47 U.S.C. § 316(a)(1).

[389] *MCI*, 512 U.S. at 231-32.

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.[390] This functional test does not apply an arbitrary numerical 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.[391] 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.[392] 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*.[393] Moreover, the opportunities they will have to continue to serve existing customers and to

[390] *See, e.g.*, *Cmty 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 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.'").

[391] 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 rights 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.").

[392] 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"). Despite their argument that compression technology cannot mitigate the loss of spectrum, the Small Satellite Operators still do not make any claim of existing customers or services that they will be unable to serve after the transition, even absent the existence of compression technology. Small Satellite Operators Feb. 18, 2020 *Ex Parte* at 7.

[393] The Small Satellite Operators continue to claim that the unused C-band capacity on their existing satellites would have been used to provide robust service to the contiguous United States but for the Commission's action in this (continued….)

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.[394]

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 spectrum access rights here will not effect a "fundamental change" for these companies under section 316 precedent.[395]

141. The record in this proceeding, which sought comment on this question,[396] supports this conclusion.[397] For example, T-Mobile explains "[t]here can be no fundamental change if satellite

(Continued from previous page)
proceeding, citing specifically to significant investments ABS made in its ABS-3A satellite as part of a global network strategy to provide C-band services in the contiguous United States. *See* Small Satellite Operators Feb. 18, 2019 *Ex Parte* at 8-9. Such a proposition is clearly belied by the facts. The ABS-3A satellite is positioned just south of the Ivory Coast of northwest Africa, and both its global and western hemisphere C-band beams provide only edge coverage to the east coast of the United States. *See* Satbeams Coverage Report, https://www.satbeams.com/footprints?beam=8203 (last visited Feb. 23, 2020). The notion that ABS made significant investments in launching this satellite with the specific intent of providing robust services in the United States and that it must be compensated for the loss of those investments is contradicted both by its inaction in the United States in the four-and-a-half years since it launched ABS-3A and the actual capabilities of ABS-3A to provide service primarily outside the United States.

[394] *See* Letter from Mark Racek, Ericsson, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-183 (filed Mar. 29, 2018) (citing a report by Northern Sky Research finding that C-Band transponder equivalent demand is expected to decline by 26% between 2017 and 2026, resulting in a corresponding increase of available capacity on today's satellites) (Ericsson Mar. 29, 2018 *Ex Parte*); Letter from Gregory M. Romano, Verizon, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Oct. 21, 2019) (Verizon Oct. 21, 2019 *Ex Parte*) (same); 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 of fiber deployment to the future of MVPD services).

[395] *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).

[396] *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.

[397] 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

(continued….)

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.[398] 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.[399] 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."[400] *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, 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.[401] 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, space station operators with grants of market access did not even have to pay an application fee to receive their license and have not been obligated to pay any regulatory fees as a condition of the authorization.[402] Thus, unlike terrestrial

(Continued from previous page)
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.").

[398] T-Mobile Jan. 24, 2020 *Ex Parte* at 6.

[399] Dynamic Spectrum Alliance May 3 PN Comments at 17.

[400] 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.").

[401] 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).

[402] 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 station "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 9868, 9883, para. 39 (1999) (FY 1999 Report and Order). (continued….)

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.[403] 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, space station 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.[404] Commission licenses do not constitute a property right. Section 301 of the Act states that Commission licenses "provide for the use of [radio] channels, but *not the ownership thereof*, by persons for limited periods of time."[405] 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."[406] Courts have generally affirmed that spectrum rights are not property rights subject to the Takings Clause.[407] The plain language of the Act makes clear that a spectrum license is just

(Continued from previous page)
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).

[403] The Small Satellite Operators misstate the Commission's position as arguing that spectrum reuse means no loss in spectrum rights will occur due to the transition. *See* Small Satellite Operators Feb. 18, 2020 *Ex Parte* at 7. Consistent with the standard for determining whether a license modification constitutes a fundamental change, the existence of spectrum reuse supports the conclusion that several mechanisms exist for space station operators to use spectrum more efficiently and continue providing the same services on fewer frequencies after the transition.

[404] *See, e.g.*, C-Band Alliance Jan. 14 *Ex Parte* at 12; C-Band Alliance Comments at 21.

[405] 47 U.S.C. § 301 (emphasis added).

[406] 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).

[407] *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]");
(continued….)

that—a license to use spectrum—not a deed of ownership.[408] 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.[409] 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."[410] 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."[411] Here, by the space station 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 for any costs they incur as a result of the transition.[412] Our modification of incumbent FSS licenses therefore does not amount to a taking under the U.S. Constitution.

(Continued from previous page)
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.'"). *Cf. Alpine PCS, Inc. v. United States*, 128 Fed. Cl. 303, 309 (2016) (recognizing that a spectrum license can confer certain property rights that are limited by the terms, conditions and periods of the license but dismissing case on statute of limitations grounds), *aff'd*, 878 F.3d 1086, 1095-98 (Fed. Cir. 2018) (relying on different grounds to affirm lower court ruling that it lacked jurisdiction over appellant's regulatory takings claim, by holding that Communications Act displaced Tucker Act jurisdiction, and that the case fell within the exclusive jurisdiction of the D.C. Circuit under 47 U.S.C. § 403(b)(5)). We note that in affirming the lower court's rejection of the appellant's taking claim in *Alpine PCS*, the U.S. Court of Appeals for the Federal Circuit not only explained why jurisdiction for such a claim lay within the exclusive jurisdiction of the D.C. Circuit, but it also made it clear that it (the Federal Circuit) was accepting the appellant's premise that the spectrum licenses are "property protected by the Takings Clause . . . for purposes of assessing the jurisdictional issue" but "without deciding whether [such premise] is correct." *Alpine PCS*, 878 F.3d at 1095.

[408] 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* Letter from Carlos M. Nalda, Counsel, Eutelsat, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, Attach. at 17 (Eutelsat Jan. 27, 2020 *Ex Parte*).

[409] *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).

[410] Eutelsat Jan. 27, 2020 *Ex Parte*, Attach. at 18.

[411] *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")).

[412] 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*.

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.[413] 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."[414] 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.[415] 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.[416]

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.[417] Like with the space station operators, this proposed modification does not effect 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.

---

[413] 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 CFR § 25.103 (definition of "Conventional C-band").

[414] 47 U.S.C. § 301 (emphasis added).

[415] *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).

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

[417] 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 space station 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 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).

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.[418] 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 upon publication of the *Report and Order* in the Federal Register.[419]

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.[420] 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.[421]

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.[422] 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

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

[419] *See* GCI Feb. 20, 2020 *Ex Parte.* We emphasize that earth stations registered after the filing freeze is lifted will not be considered incumbent earth stations and will not qualify for reimbursement of relocation costs. Further, any new registered earth stations outside of the contiguous United States may not claim protection from harmful interference from new flexible use licensees in the contiguous United States.

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

[421] Some commenters have asked the Commission to allow stakeholders to negotiate a limited number of registrations for operation in the 4.0-4.2 GHz band for transportable earth stations occasionally used at common venues. *See, e.g.*, Letter from Patrick McFadden, Associate General Counsel, NAB, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 4-5 (filed Feb. 21, 2020) (NAB Feb. 21, 2020 *Ex Parte*); Disney and ESPN Feb. 21, 2020 *Ex Parte* at 2. To maintain the status quo during the transition, we decline at this time to authorize additional registrations for occasional use of transportable earth stations. That decision, however, does not preclude the Commission from considering other methods of responding to temporary, targeted spectral needs on a negotiated, non-interfering basis, such as through the use of Special Temporary Authority.

[422] *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.

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.[423] Once the transition is completed, the International Bureau is directed to release a public notice announcing that the freeze is lifted.[424]

153. Several terrestrial wireless operators support limiting new space station operations as proposed by the Commission.[425] 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.[426] 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.[427] 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.[428]

3. Transition Schedule

154. Consistent with the *Emerging Technologies* framework,[429] 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 December 5, 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 December 5, 2021 and a Phase II deadline of December 5, 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.

---

[423] "Incumbent space station operators" are defined in section III.B.1 (Incumbent FSS Operations).

[424] *See* 5 U.S.C. § 553(b)(B), (d)(3).

[425] CTIA Comments at 16; Verizon Comments at 12.

[426] Boeing Comments at 6-7; C-Band Alliance Comments at 54-55.

[427] C-Band Alliance Comments at 54.

[428] AT&T suggests that any new FSS facilities deployed in the 4.0-4.2 GHz band after the transition should be secondary to deployed networks in the 3.7-3.98 GHz band. Letter from Michael P. Goggin, Assistant Vice President, Senior Legal Counsel, AT&T, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 5 (AT&T Feb. 19, 2020 *Ex Parte*). AT&T's suggestion is inconsistent with the transition we outline in this *Report and Order*, and accordingly we decline to adopt such a limitation on new FSS facilities after the freeze is lifted.

[429] *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).

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.[430] Recognizing that spectrum would likely 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 spectrum within the designated clearing time period.[431]

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 a sale 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.[432] 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.[433] 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.[434] Space station 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.[435] 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 at the end of 2021 and 2023, respectively.[436] 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.[437] And other commenters agree that the proposed 18-month and 36-month timelines are attainable if all stakeholders' incentives are properly aligned.[438]

---

[430] *NPRM*, 33 FCC Rcd at 6945-46, paras. 93-97.

[431] *Id.* at 6945-46, paras. 96-97.

[432] *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.

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

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

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

[436] Eutelsat Dec. 19 *Ex Parte* at 1; Eutelsat Nov. 7 *Ex Parte* at 1.

[437] Small Satellite Operators Sept. 13 *Ex Parte* at 1.

[438] 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.

158. Some commenters express skepticism that a transition of FSS operations can be accomplished under the timelines proposed by the C-Band Alliance.[439] ACA Connects and the Broadband Access Coalition, for instance, argue that the timeframe advanced by the C-Band Alliance is unrealistic.[440] 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.[441] 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.[442] Meanwhile, users of FSS services like broadcasters and NAB simply caution that the transition will be "enorm[ous] and complex[]."[443]

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.[444]

160. Specifically, we conclude that a Relocation Deadline of December 5, 2025 is in the public interest. In particular, we find that the December 5, 2025 transition date strikes a fair and appropriate balance between bringing C-band spectrum to market and ensuring space station 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, 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 December 5, 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."[445]

---

[439] *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.

[440] 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.

[441] ACA Connects Nov. 15 *Ex Parte* Attach. at 5.

[442] GCI Comments at 19; *see* CB2.0 Reply at 5.

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

[444] *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.

[445] C-Band Alliance Jan. 14 *Ex Parte* at 1.

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 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.[446] Recent transition timelines have been as short as 39 months—such as in the Broadcast Incentive Auction[447]—or longer than fourteen years—as in the 800 MHz transition.[448]

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 systems with high-density commercial wireless systems when situated in an increasingly congested, interleaved spectral environment.[449] 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,[450] sought to reallocate spectrum used by TV broadcasters in order to provide new spectrum to be used for next generation wireless services.[451] TV broadcasters, who previously used portions of spectrum above Channel 37, ranging from 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).[452] 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.[453] As

---

[446] *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); *800 MHz Order*, 19 FCC Rcd 14969.

[447] *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).

[448] *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).

[449] *800 MHz Order*, 19 FCC Rcd 14969.

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

[451] *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).

[452] 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).

[453] 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. C-band space station operators do not have direct contractual relationships with many of the earth stations that receive their service transmissions and, as such, it may take additional time and effort to ascertain which FSS earth stations receive content from each incumbent space station operator and to assign responsibility for clearing each earth station.[454] Regardless, the incumbent space station operators are in the best position to expeditiously transition this band to flexible use service and we note that they have already made significant progress in identifying earth stations and developing transition plans.[455]

167. 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.[456] 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.[457] But in doing so, the Commission expressly found that, based on the circumstances before it, a sunset period of ten years for continued co-primary status of existing terrestrial fixed stations 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" before the 10-year sunset.[458] 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

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

[454] AT&T Reply at 15; *see also* Letter from Pantelis Michalopoulos, Steptoe, Counsel for ACA Connects, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at n. 7 (filed Feb. 18, 2020) (ACA Connects Feb. 18, 2020 *Ex Parte*) ("ACA Connects members receive hundreds of satellite transmissions from dozens of programmers who lease transponders from two or more satellite operators. Many of these members have two or more earth station sites that each have as many as ten different satellite dishes.")

[455] C-Band Alliance Comments at 22 (space station operators are in the best position to transition their own customers or associated earth stations); Verizon Comments at 5 (same); Letter from Carlos M. Nalda, Counsel, Eutelsat S.A., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Nov. 21, 2019) (same).

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

[457] *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, 13433, 13464, paras. 4, 70 (2002).

[458] *Id.* at 13464-65, para. 71 (Commission stressed that "the significance of the ten-year period was limited to who will pay for the relocation of existing fixed stations when it is found that they would, due to interference that they would present, preclude the establishment of FSS stations.").

necessary for clearing the C-band."[459] And the C-Band Alliance fails to acknowledge that involuntary relocation procedures became available after only two years in the precedent it cites[460]—so no incumbent was "entitled" to a ten-year transition.[461]

168. *Accelerated Relocation*.—We also adopt two Accelerated Relocation Deadlines—a Phase I deadline of December 5, 2021 and a Phase II deadline of December 5, 2023—for incumbent space station operators that voluntarily relocate on an accelerated schedule (with additional obligations and incentives for such operators).[462] The Commission will provide an opportunity for accelerated clearing by space station operators by making them eligible for accelerated relocation payments, if those space station operators are able to meet certain early clearance benchmarks for the band.[463]

169. 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 space station 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 proceed at a more rapid pace in the years following release of this *Report and Order* than if we relied on the December 5, 2025 sunset date as the sole means of incentivizing space station operators to make C-band spectrum available for flexible use.

170. 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 December 5, 2021, and (2) clearing the remaining 180 megahertz (3.8-3.98 GHz) by December 5, 2023.[464] To satisfy the

[459] T-Mobile Jan. 24, 2020 *Ex Parte* at 3; *see also* Letter from Gregory M. Romano, Vice President, Federal Regulatory and Legal Affairs, Verizon, to Marlene H. Dortch, Secretary, FCC, at 2 (filed Feb. 21, 2020) (Verizon Feb. 21, 2020 *Ex Parte*) (noting Commission precedent for setting a sunset period of less than 10 years).

[460] *See, e.g.*, 47 CFR § 101.85(a) (before the sunset, FSS licensees may negotiate with incumbents to relocate their operations and incumbents may not refuse to negotiate). If no agreement is reached after two years (three years for public safety incumbents), the FSS licensee may initiate relocation procedures under which the incumbent is required to relocate if the FSS licensee meets the conditions to invoke involuntary relocation. *See* 47 CFR § 101.85(b)(3) (citing 47 CFR § 101.91 (Involuntary relocation procedures)); *see also* 47 CFR § 101.95(a) (FSS licensees are not required to pay relocation costs after the relocation rules sunset and may require an incumbent to cease operations if it intends to operate within the interference range of the incumbent).

[461] *See, e.g.*, 47 CFR § 101.85(a) (before the sunset, FSS licensees may negotiate with incumbents to relocate their operations and incumbents may not refuse to negotiate). If no agreement is reached after two years (three years for public safety incumbents), the FSS licensee may initiate relocation procedures under which the incumbent is required to relocate if the FSS licensee meets the conditions to invoke involuntary relocation. *See* 47 CFR § 101.85(b)(3) citing 47 CFR § 101.91 (Involuntary relocation procedures). *See also* 47 CFR § 101.95(a) (FSS licensees are not required to pay relocation costs after the relocation rules sunset and may require an incumbent to cease operations if it intends to operate within the interference range of the incumbent).

[462] Intelsat Feb. 20, 2020 *Ex Parte* at 4-5 (arguing for December 2021 and 2023 accelerated relocation deadlines).

[463] 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 December 5, 2021, and (2) clearing the remaining 180 megahertz (3.82-4.0 GHz) by December 5, 2023.

[464] 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.

early clearing benchmarks, space station 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.[465]

171. In order to satisfy the Phase I Accelerated Relocation Deadline, a space station 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 to associated incumbent earth stations in 46 of the top 50 PEAs by December 5, 2021.[466] To satisfy the Phase II Accelerated Relocation Deadline, a space station 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 to all associated incumbent earth stations in the contiguous United States by December 5, 2023. In both instances, the space station operator must not knowingly cause the incumbent earth stations that receive its transmission to temporarily or permanently lose service during or after the transition and must take all steps necessary to allow incumbent earth station operators to continue to receive substantially the same service during and after the relocation that they were able to receive before the transition.[467]

172. As discussed below, a space station 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.

173. *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.

174. 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 space station operator that elects to accept the Accelerated Relocation Payment for satisfying the Phase I Accelerated Relocation Deadline must also commit to complete the transition of the full 300 megahertz by the Phase II clearing deadline. If a space station operator fails to satisfy either the Phase I or Phase II deadline, it will not be eligible for the portion of the accelerated relocation payment attributable to the deadline that it missed.

175. 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 failure to timely clear. Radio transmissions must be authorized by the FCC pursuant to Section 301,[468] and transmissions sent by space station 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

[465] The relevant guard bands would be 3.8-3.82 GHz for the December 5, 2021 deadline, and 3.98-4.0 GHz for the December 5, 2023 deadline.

[466] PEAs 1-50, except Washington-Baltimore (5), Atlanta (11), Denver (20), and Honolulu (42). *See* C-Band Alliance Oct. 28, 2019 *Ex Parte*; C-Band Alliance Revised Transition Implementation Process at 5. AT&T has asked to delay defining the Phase I PEAs until after we finally determine the TT&C locations. *See* AT&T Feb. 19, 2020 *Ex Parte* at 11. Because the PEAs have been chosen with the TT&C locations in mind, such delay is unnecessary.

[467] *See* ACA Connects Feb. 18, 2020 *Ex Parte*, Appx. A.

[468] 47 U.S.C. § 301

operators, including forfeiture penalties.[469] Thus, after the Relocation Deadline, a space station 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.[470]

176. 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 space station operators—some of whom transmit from multiple satellites—transmit to thousands of earth stations in the contiguous U.S. A space station 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.[471]

177. The Commission's rules allow it to adjust forfeiture penalties upward according to a set of criteria.[472] 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."[473] 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.[474] Thus, we could potentially upwardly adjust the forfeiture penalties for space station operators if we found that a space station operator's misconduct merited an increase in penalties.

4. Relocation and Accelerated Relocation Payments

178. 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.

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

[469] 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.

[470] 47 CFR § 1.80 Section I.

[471] 47 CFR § 1.80 Section I.

[472] 47 U.S.C. § 503(b)(2)(E); 47 CFR § 1.80 Section II.

[473] 47 U.S.C. § 503(b)(2)(E).

[474] *Id.*

accelerated relocation payments before they are allowed to deploy in the spectrum made available for flexible use.[475]

180. 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.]"[476] 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.[477]

181. 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.[478] 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."[479] 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.[480]

182. Notably, the Commission has taken a flexible approach in applying the *Emerging Technologies* 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

[475] Indeed, new flexible-use licensees may not operate—without the consent of affected incumbent earth stations—until the necessary clearing has been completed and the new licensee has complied with obligations to provide reimbursement for relocation costs and any additional accelerated relocation payments.

[476] 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").

[477] *Id.* §§ 154(j), 301, 303(r), 309; *see also Mobile Communications Corp. of America v. FCC*, 77 F.3d 1399 (D.C. Cir. 1996) (upholding the Commission's authority under 47 U.S.C. §§ 154(i), 309(a), to condition the grant of a license on payment to the Commission).

[478] *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).

[479] *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*).

[480] *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*).

speedier clearing.[481] Indeed, in 2013, the Commission adopted a cost-sharing mechanism for winning bidders to reimburse the entities that had previously cleared incumbents from the band.[482]

183. Courts have upheld the Commission's use of this authority. In 1996, the U.S. Court of Appeals for the D.C. Circuit 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.[483] 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.[484] 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."[485] 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.[486]

184. 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."[487] 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."[488] Ten years later, the Commission expressly authorized incentive payments to incumbent operators to expedite clearing.[489] 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.

185. 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

---

[481] *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).

[482] *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*).

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

[484] *Id.* at 400.

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

[486] *Id.* at 86.

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

[488] *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)).

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

accelerating a transition of this spectrum. Studies in the record indicate that licensing mid-band spectrum will lead to substantial economic gains.[490] Economist Jeffrey Eisenach points to "consumer welfare gains 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."[491] Eisenach also notes that "for every year of delay" in making the C-band spectrum available, "consumer welfare is reduced by $15 billion."[492] 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%.[493] 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."[494] These studies underscore the importance of incentivizing incumbents to clear the band for 5G use as quickly as possible.

186. 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.[495] *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.[496] *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

[490] *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-economic-impacts-of-reallocating-mid-band-spectrum-to-5g-1.pdf).

[491] 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).

[492] Eisenach Decl. at 16, para. 15.

[493] Intel Corp., Intelsat License LLC and SES Americom, Inc. Comments, Appx. 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).

[494] Brattle Group Report at 27 & n.72.

[495] Despite the Small Satellite Operators' claim that the Communications Act does not empower the Commission to require accelerated relocation payments, the well-established *Emerging Technologies* precedent and our broad Title III authority, supported by the public interest factors associated with accelerated relocation described herein, provide ample authority to adopt such a mechanism. *See* Small Satellite Operators Feb. 18, 2020 *Ex Parte* at 7.

[496] *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)).

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, space station 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, relying solely on individual negotiations between licensees to accomplish earlier transition would be incompatible with the clearing deadlines established by the Commission.[497]

187. Based on the unique circumstances of the band, we therefore find that it would best serve the public interest, 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.[498]

188. 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.[499] OTI argues that such an approach would provide for a "speedy and straightforward reorganization of the band within [the Commission's] existing legal authority."[500] 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."[501] 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."[502]

---

[497] We clarify, however, that nothing in this *Report and Order* is intended to preclude private negotiations among parties (e.g., between overlay licensees and incumbent earth stations within a PEA) to accomplish earlier clearing than the deadlines we establish in this Order. *See, e.g.*, Verizon Feb. 20, 2020 *Ex Parte* at 4-6 (seeking clarification that parties may negotiate privately to secure earlier clearing).

[498] At the same time, we note that neither the reasoning nor the public interest determinations underlying other elements of the transition framework established in this Report and Order turn on the availability of an acceleration payment. While the acceleration payment should enable an earlier transition, the absence of an acceleration payment would not undermine any conclusion in this order supporting a five-year transition. We thus make clear that our decision to offer accelerated relocation payments (and all associated obligations) is severable from our other decisions to modify the licenses and market-access grants here and require transition by the Relocation Deadline (among other things).

[499] *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).

[500] OTI May 3 PN Comments at 15.

[501] PISC July 19 PN Comments at 21.

[502] Charter Feb. 22 *Ex Parte* at 5-6.

189. 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."[503] 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."[504] U.S. Cellular agrees that the Commission "should provide financial incentives to C-Band license holders to induce participation in a rapid clearing process."[505] 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."[506]

190. 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."[507] Charter points out that "[t]he Commission could require winning bidders to compensate incumbents beyond their relocation costs pursuant to its Title III authority."[508] ACA notes that the Commission's long practice of permitting voluntary relocation payments was affirmed by the D.C. Circuit in *Teledesic*.[509] 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.[510] The SSOs similarly agree that the Commission's exercise of its general Title III authority to condition wireless licenses would include a mandatory acceleration payment and would constitute a reasonable

[503] Eutelsat Dec. 19 *Ex Parte* at 3.

[504] ACA Connects Dec. 26 *Ex Parte* at 4.

[505] U.S. Cellular Dec. 18 *Ex Parte* at 3.

[506] Verizon Jan. 24, 2020 *Ex Parte* at 7.

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

[508] 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 space station 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").

[509] 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.

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

extension of the Commission's *Emerging Technologies* precedent.[511] 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."[512] 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."[513]

191. 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."[514] We 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 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.

192. Some parties argue that earth station operators should receive accelerated relocation payments in exchange for expedited clearing as well.[515] We find such arguments unavailing. Based on the record, we anticipate that clearing any given incumbent earth station will be a relatively 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

[511] Small Satellite Operators Jan. 3 *Ex Parte* at 2. *But see* Small Satellite Operators Feb. 18, 2020 *Ex Parte* (arguing that Title III does not authorize the size of the accelerated relocation payment established by the Commission).

[512] Brattle Group Report at 27 & n.72.

[513] Eisenach Declaration at para. 29.

[514] *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 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.

[515] *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); Eutelsat Feb. 20, 2020 *Ex Parte* at 8.

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.

193. *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.[516]

194. We expect incumbents to obtain the equipment that most closely replaces their existing equipment or, as needed, provides the targeted technology upgrades necessary for clearing the lower 300 megahertz, and all relocation costs must be reasonable.[517] "Reasonable" relocation costs are those necessitated by the relocation in order to ensure that incumbent space station operators continue to be able to provide substantially the same or better service to incumbent earth station operators, and that incumbent earth station operators continue to be able to provide substantially the same service to their customers after the relocation compared to what they were able to provide before.[518] 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

[516] *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 (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)"). ACA Connects argues that station operators who failed to register during the registration window but who will suffer financial hardship if they are unable to recover their relocation costs should be eligible to receive relocation costs. *See* ACA Connects Feb. 18, 2020 *Ex Parte* at 6. We reiterate, however, that 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, and extended the filing window numerous times to accommodate filers.

[517] *See* Verizon Feb. 20, 2020 *Ex Parte* at 7-8 (noting concern with requiring lowest-cost equipment because such requirement could cause transition delays, diminish quality, or increase the Clearinghouse's review burden (and further raise costs)); Letter from Pantelis Michalopoulos, Steptoe, Counsel for ACA Connects, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 3 (filed Feb. 24, 2020) (ACA Connects Feb. 24, 2020 *Ex Parte*) (arguing that, only after incumbent earth stations receive equipment that allows them to provide substantially the same service to their customers after relocation, judged by quality and reliability, should the Clearinghouse consider the "lowest cost" factor). We of course encourage incumbents to choose the lowest-cost equipment where such choice would not negatively impact safety, reliability, or timeliness of the transition.

[518] *See* ACA Connects Feb. 18, 2020 *Ex Parte* at 2. We further clarify that comparability for video distribution services requires that the video quality of the end-to-end, programmer-to-viewer chain is at least as good as it is today. *See* AT&T Feb. 19, 2020 *Ex Parte* at 7.

accelerated timeframe.[519] 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.[520] 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.[521] 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.

195. 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.[522] If a particular expenditure is unreasonable, the incumbent will only receive compensation for the reasonable costs that the incumbent would have incurred had it made a more prudent decision.

196. 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.[523] Since, however, the incumbent space station operators will be able not only to maintain their current level of service after the transition, but to potentially serve new clients by employing point 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. Indeed, some commenters have claimed that C-band FSS revenues are expected to decline in the future, as some users of C-band services are moving to alternative services.[524] The Small Satellite Operators have provided no

[519] *See* C-Band Alliance Revised Transition Implementation Process at 3; Disney and ESPN Feb. 21, 2020 *Ex Parte* at 1-2 (suggesting that HEVC compression will be necessary to provide the same quality video service over the amount of transponder space available post-transition); NAB Feb. 21, 2020 *Ex Parte* at 2-3 (explaining that HEVC compression may be necessary for spectral efficiency); AT&T Feb. 19, 2020 *Ex Parte* at 3 (agreeing with NAB that technology choices are not be a "one-size-fits-all" solution).

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

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

[522] *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.").

[523] *See* C-Band Alliance Jan. 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 space station 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.").

[524] *See* Ericsson Mar. 29, 2019 *Ex Parte*; Verizon Oct. 21, 2019 *Ex Parte*; *see also supra* note 394.

evidence to rebut these claims or to demonstrate how they plan to expand their businesses in a market that is declining.[525] Compensating licensees for such speculative claims of future loss would be inconsistent with established Commission precedent and would not serve the public interest.[526]

197. 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.[527] We define soft costs as transactional expenses directly attributable to relocation, to include engineering, consulting, and attorney fees, as well as costs of acquiring financing for clearing costs. This is consistent with suggestions from some commenters that the Commission should allow recovery of soft costs for relocation expenses.[528]

198. In some prior proceedings, the Commission has subjected "soft" costs to a cap of 2% of the hard costs involved.[529] 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.[530] Establishing a

---

[525] *Cf.* Verizon Feb. 21, 2020 *Ex Parte* at 2 (noting that the terms of its programming agreements with content providers are typically for three to five years).

[526] 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").

[527] *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).

[528] *See, e.g.*, Letter from Pantelis Michalopoulos, Counsel to ACA Connects, to Marlene H. Dortch, Secretary, FCC, GN 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, GN Docket No. 18-122, at 8-9 (filed Nov. 19, 2019) (noting examples of soft costs that it could incur with the transition). We reject, however, the request by SES that the soft costs incurred by the C-Band Alliance to develop its transition proposals, including the development of filters and compression solutions, be deemed reimbursable. SES Feb. 20, 2020 *Ex Parte*, Attach. at 9. Such costs, incurred prior to the Commission's adoption of this *Report and Order* providing for this transition, cannot be deemed directly attributable to relocation.

[529] *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' 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).

[530] *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) ("[O]utside expertise may be required in the negotiation of agreements and in analysis of 'comparable facilities' proposals. We can foresee that such outside (continued….)

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 a particularly hard look at any request involving transactional costs that exceed two percent."[531] As discussed below, we will establish a Relocation Payment Clearinghouse that can serve "as a watchdog over excess transactional costs."[532] Parties seeking reimbursement for soft costs that exceed 2% shall bear the burden of justifying these expenses.[533]

199. 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.[534] 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.[535] 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.[536] 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.[537] 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.

(Continued from previous page)
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).

[531] *800 MHz Rebanding Order on Reconsideration*, 19 FCC Rcd at 25151, para. 70) (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).

[532] *Id.* at 25151, para. 70.

[533] *Id.* (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).

[534] *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.

[535] Intelsat now requests reimbursement for construction of an additional TT&C site outside of the United States for "disaster recovery." *See* Intelsat Feb. 19, 2020 *Ex Parte* at 7. We find that this request is outside of the scope of the legitimate compensable relocation costs described herein—indeed, we see no reason why Intelsat cannot colocate any redundant disaster recovery operations at one of the TT&C sites that will remain inside the United States. In any case, costs associated with constructing facilities outside of the United States will not be considered compensable relocation costs.

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

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

200. 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 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. 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.

201. 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 space station 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.[538] 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.[539] We clarify that incumbent earth station operators will include

[538] *See, e.g.*, C-Band Alliance Revised Transition Implementation Process at 4.

[539] *See, e.g.*, *id.* at 1. Consistent with our definition of "incumbent earth stations," we clarify that, in order to qualify for reimbursement, any antenna at an incumbent earth station must also have been operational and registered in IBFS as of the relevant dates required by the *Freeze and 90-Day Earth Station Filing Window Public Notice*. *See* SES Feb. 20, 2020 *Ex Parte* at 6. We disagree with ACA Connects that compensable earth station migration costs should include the costs of transitioning to an alternative form of delivery, such as fiber, as long as it is not more expensive that C-band delivery by "an order of magnitude." *See* ACA Connects Feb. 18, 2020 *Ex Parte* at 6. We have defined clearly the migration in this context as the costs of transitioning C-band services to the upper 200 megahertz of the band (e.g., reporting, retuning, and replacing antennas, and installing filters and compression hardware).

some gateway earth station operators who are likewise eligible for reasonable relocation costs, and we recognize that their reasonable relocation costs may differ from those of non-gateway earth stations.[540]

202. Some commenters request that the Commission give incumbent earth station operators flexibility to replace existing earth stations with fiber in their transition planning.[541] We agree that 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 station 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.[542] Incumbent earth station owners that elect the lump sum payment will not be eligible to submit estimated or actual reasonable relocation costs to the Clearinghouse.[543] 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 the contiguous United States in order to prevent any improper cost shifting.[544] 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. While earth station operators that elect the lump sum payment will be responsible for performing any necessary transition actions, earth station operators that elect the lump sum payment must complete relocation consistent with the space station operator's deadlines (Phase I and Phase II Accelerated Relocation Deadlines to the extent applicable) for transition.[545]

---

[540] *See, e.g.*, Letter from Ryan W. King, Vice President & Head of Legal, Americas, SpeedCast Communications, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 2-3 (filed Feb. 19, 2020); Eutelsat Feb. 20, 2020 *Ex Parte* at 7-8.

[541] *See, e.g.*, ACA Connects Nov. 19, 2019 *Ex Parte* at 2 ("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 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, GN Docket No. 18-122, at 1, 2-4 (filed Nov. 19, 2019) (asking the Commission to give C-band users flexibility to choose their transmission method).

[542] The option for an incumbent earth station owner's decision to elect the lump sum payment and assume responsibility for any necessary transition obligations is not intended to impact in any way the respective obligations contained in private contracts between incumbent earth station owners and space station operators, programmers, or other entities.

[543] *See* ACA Connects Feb. 18, 2020 *Ex Parte*, Appx. A. In other words, if the average costs of relocating an incumbent earth station is $5,000, an incumbent earth station operator with three stations could elect to receive $15,000 or they may accept reimbursement for the reasonable actual relocation costs incurred to maintain satellite reception. *See* NAB Feb. 14, 2020 *Ex Parte* at 6 (asking Commission to establish a flat rate reimbursement that earth station operators can elect rather than tracking and submitting invoices); Letter from Danielle J. Piñeres, Vice President and Associate General Counsel, NCTA – The Internet & Television Association, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 2 (NCTA Feb. 21, 2020 *Ex Parte*).

[544] While lump sum elections must apply to all of each earth station operator's earth stations, the earth station operator may nevertheless pursue different transitions for various earth stations. Because of the need for consistency and certainty in the transition process, we decline to adopt NCTA's proposal to allow earth station operators to elect the lump sum for some earth stations, but not for others. *See* NCTA Feb. 21, 2020 *Ex Parte* at 2.

[545] *See* CTIA Feb. 21, 2020 *Ex Parte* at 3 (asking Commission to clarify that earth station operators that elect to transition to fiber rather than maintaining satellite reception must complete their transition by the relevant accelerated relocation deadline).

203. We direct the Wireless Telecommunications Bureau to announce the lump sum that will be available per incumbent earth station as well as the process for electing lump sum payments. The Bureau should identify lump sum amounts for various classes of earth stations—e.g., MVPDs, non-MVPDs, gateway sites—as appropriate.[546] Incumbent earth station owners must make the lump sum payment election no later than 30 days after release of the announcement, and must indicate whether each incumbent earth station for which it elects the lump sum payment will be transitioned to the upper 200 megahertz in order to maintain C-band services or will discontinue C-band services.[547]

204. 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.[548] 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 space station operators.[549] We stress that, should GCI or other parties seek cost reimbursement pursuant to the process outlined in this *Report and Order* for relocation costs outside of the contiguous United States, they must demonstrate that they were required to make the system modifications for which they seek reimbursement as a direct result of the transition in the contiguous United States to make spectrum available for flexible use.[550]

205. *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.

206. 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

[546] *See* ACA Connects Feb. 18, 2020 *Ex Parte* at 6 (asking the Commission to establish lump sum payments for different classes of earth station operators); Letter from Randy Clark, Vice President of Federal Regulatory Affairs, CenturyLink, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 2 (filed Feb. 21, 2020) (same).

[547] We stress that lump sum payments will only be calculated for the costs of transitioning to the upper 200 megahertz. Any costs over and above the lump sum (i.e., additional costs to transition to fiber) would be borne by the electing incumbent earth station operator. *Cf.* ACA Connects Feb. 18, 2020 *Ex Parte* at 6 (asking the Commission to include as reasonable costs of migration the cost of migrating to fiber, so long as fiber is not more expensive than C-band migration "by an order of magnitude"). In light of the transition deadlines we establish in this *Report and Order*, we decline to extend the time for making the lump sum election beyond 30 days, as requested by CenturyLink. *See* CenturyLink Feb. 21, 2020 *Ex Parte* at 2 (requesting 60 days to make lump sum election).

[548] Earth stations may apply to receive reimbursement costs to address their specific operational circumstances as part of the transition process. *See, e.g.*, Letter from Edward A. Yorkgitis, Jr., Counsel, Raytheon, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Feb. 21, 2020) (arguing that reimbursement may be necessary for earth stations currently operating only in the upper 200 megahertz of the band and stations they claim cannot effectively be relocated to the upper 200 megahertz).

[549] *See* Letter from Jessica DeSimone Gyllstrom, Counsel to GCI, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Jan. 8, 2020); GCI Feb. 20, 2020 *Ex Parte* at 2. AT&T also notes that changes affecting a broadcast signal made to accommodate the clearing in the contiguous United States may have implications for earth stations receiving that signal outside of the contiguous United States, and such earth stations may need to be repointed, repacked, replaced, or upgraded to accommodate such changes. AT&T Feb. 19, 2020 *Ex Parte* at 8.

[550] For this reason, incumbent earth station owners may not elect a lump sum payment for earth stations outside of the contiguous United States.

modulation equipment.[551] With respect to new satellites, the C-Band Alliance claims that SES and Intelsat need to procure and launch between eight to ten.[552] For each satellite, it estimates a cost of about $160 million, including the spacecraft, launcher, and ground equipment for each, for a total of $1.6 billion assuming 10 satellites.[553] SES estimates that capital costs of each satellite will be between $150 and $250 million.[554] With respect to TT&C sites, the 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 estate.[555] It estimates that the cost of this consolidation will be $300 million.[556]

207. 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.[557] 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 estimates the cost of these upgrades at about $100 million.[558] It estimates equipment costs of about $500 million for compression and modulation technology. It also argues that its migration plan decreases the total number of usable FSS transponders by 30, and that, as a result of the way many private contracts are written, this could result in a net present value loss to the satellite industry of up to $500 million.[559] However, while equipment upgrades and other changes that are necessary to transition FSS operations to the upper 200 megahertz are reimbursable, such "lost revenues" are not compensable costs, since we find that space station operators will remain able to continue providing the same services they provide today throughout and after the transition.[560]

208. Eutelsat estimates the maximum total cost of relocating all C-band space station operators with contiguous United States coverage to comparable facilities transmitting on the upper 200 megahertz to be $3.5 billion.[561] Eutelsat also estimates the direct costs of relocating protected earth station

---

[551] *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.

[552] The C-Band Alliance states that it documented the need to procure and launch eight 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 need to redesign their fleet plan and the required number of satellites will range from eight to ten. *See* C-Band Alliance Jan. 27, 2020 *Ex Parte* at 1.

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

[554] See SES *NOI* Reply at 25.

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

[556] *See id.*

[557] *See id.*

[558] *See id.*

[559] *Id*. *See also* SES Feb. 20, 2020 *Ex Parte*, Attach. at 7.

[560] Indeed, if we were to credit such possible losses, we would also have to discount them given the year-over-year declines in industry C-band revenues as well as credit the new revenue opportunities that incumbent space station operators might have after a new fleet of satellites designed to better handle next-generation content distribution. Consistent with precedent, we decline to follow this speculative path and instead limit payments to concrete compensable costs.

[561] 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 space station 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*, Attach. at 9 ("Based on Eutelsat's understanding (continued….)

operations to comparable facilities to be approximately $1 billion (as a maximum value).[562] For purposes of this estimate, Eutelsat accepted the C-Band Alliance's assertion that as many as 35,000 C-band antennas may need to be included, with a cost of $30,000 per antenna.[563]

209. ACA Connects argues that the C-Band Alliance's estimate of costs is insufficient and fails to accurately take into account MVPD out-of-pocket expenses. It estimates the total transition costs 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.[564] 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.[565] It also estimates that the cost for repacking transponders, filter installation, and repointing earth station dishes will be about $2.16 billion.[566]

210. 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 the 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 ten 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

(Continued from previous page)
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.").

[562] *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.").

[563] *See* Eutelsat Jan. 23, 2020 *Ex Parte* at 5.

[564] ACA Connects Nov. 19, 2019 *Ex Parte*, Cartesian Study Attach. at 7.

[565] *See* ACA Connects Jul. 15, 2019 *Ex Parte*, Cartesian Study Attach. 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 in the headends will need to be replaced with Integrated Receiver Decoders that have built-in transcoders. *See* ACA Connects Nov. 19, 2019 *Ex Parte*, Cartesian Study Attach. at 7; ACA Connects Feb. 24, 2020 *Ex Parte* at 5. 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. We further clarify that while these estimates generally presume use of HEVC, they are not intended to require (or preclude) use of either the HEVC or AVC compression standards. *See* NAB Feb. 14, 2020 *Ex Parte* at 3; Disney and ESPN Feb. 21, 2020 *Ex Parte* at 1-2; AT&T Feb. 19, 2020 *Ex Parte* at 7. At this time, however, we decline to make a finding that technology choices that space station operators include in their transition plans automatically will be deemed presumptively reasonable. *See* NAB Feb. 14, 2020 *Ex Parte* at 3 (asking Commission to deem technology choices in transition plans presumptively reasonable); AT&T Feb. 19, 2020 *Ex Parte* at 3 (agreeing with NAB).

[566] *See* ACA Connects Jul. 15, 2019 *Ex Parte*, Cartesian Study Attach. at 12.

million for compression costs.[567] This leads to a total clearing cost estimate ranging from about $3.3 billion to $5.2 billion.

211. *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.

212. 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-pop[568] and the Brattle Group suggests a range of $0.003 to $0.415 per MHz-pop from recent international C-band auctions.[569] On the high side, the C-Band Alliance recently submitted a report by NERA Economic Consulting that estimates $0.50 to $0.90 per MHz-pop.[570] In the middle, Kerrisdale Capital Management analyzed C-band auction revenues in three other advanced industrial economies to estimate $0.50 per MHz-pop[571] and the American Action Forum estimate a range topping out at $0.597 per MHz-pop based on an econometric analysis of previous auctions.[572]

213. 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.[573] 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."[574] We note, however, that the C-Band

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

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

[569] Brattle Group Report at 12-14. The joint comments of Trinity Broadcast Network and LPN refer to 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.

[570] Letter from Bill Tolpegin, Chief Executive Officer, C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, Attach. A, at 3-5 (filed Jan. 27, 2020) (C-Band Alliance Jan. 27, 2020 *Ex Parte*).

[571] 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 (Kerrisdale Report). Northern Sky Research refers to this Kerrisdale Report and decides on a range of $0.50 to $0.60 per MHz-pop for its 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/.

[572] 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/.

[573] *See* Letter from Carlos M. Nalda, Counsel, Eutelsat, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 7 (filed Jan. 23, 2020).

[574] C-Band Alliance Jan. 27, 2020 *Ex Parte*, Attach. A at 2. 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.

Alliance's analysis is based on the assumption that the Commission otherwise set a relocation deadline for FSS operations of 10 years.

214. We note, as a preliminary matter, that the C-Band Alliance's proposal seems to misunderstand the purpose of accelerated relocation payments. Incumbent space station operators are not "selling" their spectrum usage rights—instead they have the right to provide the services they currently offer going forward. Indeed, they have no terrestrial spectrum usage rights to "sell." Furthermore, the transition we adopt, including relocation payments, will make them whole during and after that transition. 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.

215. 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 December 5, 2021 rather than December 5, 2023 (the Phase II deadline). And if all eligible space station operators are able to hit the Phase II Accelerated Relocation Deadline, then terrestrial operations by overlay licensees can commence throughout the contiguous United States by December 5, 2023 rather than by December 5, 2025 (the Relocation Deadline).

216. One useful exercise to frame an appropriate accelerated relocation payment would be to estimate the price that overlay licensees would willingly pay for an 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.

217. 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.[575] 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: $A = [(1+r/12)^m - 1]S$.[576]

[575] 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 x $100 = $3, and the total value of receiving that amount at the start of year 4 is simply (1 + .03) x $100 = $103. Similarly, the total value of receiving $100 in year 3 instead of year 5 would be $(1 + .03)^2$ x $100 = $106.10, and the incremental value of receiving the $100 two years early would be $[(1 + .03)^2 - 1]$ x $100 = $6.10.

[576] 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: $A = [(1+.07/12)^{42} - 1]$ x $15 = $4.15. For ease of calculation, we assume monthly compounding.

218. To apply these observations in this context, we use a weighted average cost of capital of 8.5%, consistent with our precedent.[577] 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.[578] Finally, we estimate the 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.[579] 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.

219. Given the record, we find that a $9.7 billion accelerated relocation payment is reasonable and will serve the public interest.[580] We recognize that the Commission could find reasonable several of the methods advocated in the record for calculating the total size of the accelerated relocation payment, and in doing so, it would need to rely on estimates on several variables such as increased willingness to pay for the spectrum, potential future industry profits for flexible use licensees, spectrum valuation, and the costs of accelerated transitioning. Ultimately, we recognize that this determination is a line-drawing exercise, in which we must attempt to establish an amount that is less than the incremental value to new entrants of accelerating the clearing deadline but large enough to provide an effective incentive to 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 that $9.7 billion is reasonably close—but still falls below the total amount we conservatively estimate that overlay licensees themselves would be willing to pay to clear this spectrum

[577] *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 a 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.

[578] *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 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.

[579] *See* Verizon Feb. 21, 2020 *Ex Parte* at 3 (noting that Verizon believes the valuation at $0.50 per MHz-pop is reasonable for purposes of the accelerated clearing incentive framework).

[580] Indeed, a third-party analysis of the $9.7 billion accelerated relocation payment confirms the value of this payment to the public, finding that this amount "is expected to provide an additional $800 million in net proceeds to the U.S. Treasury." *See* Letter from Katie McAuliffe, Executive Director, Digital Liberty, and Federal Affairs Manager, Americans for Tax Reform, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, Attachment (filed Feb. 21, 2020) (attaching George S. Ford, *Could Acceleration Payments Increase Funding for Broadband? A Review of the FCC's C-Band Plan*, Perspectives, Phoenix Center for Advanced Legal & Economic Public Policy Studies (Feb. 18, 2020) (Phoenix Center Perspectives Report)). The analysis notes that this additional revenue "is not available absent the acceleration payments, since the additional value (of $10.52 billion) is a direct result of the expedited clearing." Phoenix Center Perspectives Report at 5. Accordingly, "[t]his billion-dollar bump is the result of the Commission applying economic reasoning to limit the size of the acceleration payments to a level below the revenue effect of the accelerated clearing. The Commission's plan ensures a beneficial outcome for all parties involved: the potential bidders are pleased, the incumbent satellite operators agreed, and the U.S. Treasury is expected to obtain more revenue with than without these payments." *Id*.

early and less than the additional profits overlay licensees expect to earn as a result of the accelerated clearing. This helps ensure that we do not impose an obligation on overlay licensees that we are not convinced they would have assumed on their own in the typical *Emerging Technologies* scenario in which voluntary accelerated relocation payments would be feasible.

220. Commenters challenge our decision to establish a $9.7 billion payment for accelerated relocation from two directions. Intelsat argues the amount is too low,[581] while the Small Satellite Operators argue that the amount of the payment is too high.[582] We reject these arguments. Set against one another, these competing arguments illustrate the complex policy considerations at issue and how our chosen accelerated relocation payment balances these competing concerns.

221. At the outset, each party questions how long relocation should take without any accelerated relocation payments. The Small Satellite Operators assert the Commission should simply set the relocation deadline at the accelerated relocation deadlines (notably not a problem for those operators since they have almost no affected U.S. operations)—shrinking the time saved by acceleration to zero and implying no need for accelerated relocation payments.[583] In contrast, Intelsat claims the relocation deadline should be pushed back to 10 years—significantly expanding the time saved by acceleration and implying more accelerated relocation payments may be needed.[584] We have already explained at length our reasoning for selecting the deadlines we do, but we reiterate that reasoning briefly: The Relocation Deadline we choose reflects the balance between bringing C-band spectrum to market quickly (and thus not setting an excessively long transition) and ensuring no disruption to the C-band content distribution market that hundreds of millions of Americans currently rely on C-band services (and thus not setting a too short mandatory transition). Hence we disagree with each party that we should adjust the acceleration periods at issue in calculating accelerated relocation payments.

222. Next, both parties challenge the decision to establish an upper bound at the overlay licensees' willingness to pay for the early clearing of spectrum. On the one hand, Intelsat argues that this ceiling is too low—and that focusing only on the economic benefit to new licensees ignores potential benefits to American consumers from the rapid deployment of 5G.[585] The Small Satellite Operators, on the other hand, argue that this willingness-to-pay ceiling is too high. They argue that the upper bound must be "proportionate to the cost of providing comparable facilities."[586] We find that both parties misunderstand the *Emerging Technologies* framework.

223. To Intelsat's point, we agree that we must take into account the tremendous public benefits of authorizing terrestrial use of this mid-band spectrum—but that does not mean our ability to impose obligations on overlay licensees is unbounded. Instead, we read our precedent as recognizing the justification for accelerated relocation payments only to the extent that willing market actors (free from holdout and free-rider problems) would pay for accelerated relocation. And in the end, no rational licensee would pay *more* than the amount they stood to gain from earlier access to the spectrum—regardless of whatever value was created for third parties.[587]

---

[581] Intelsat Feb. 21, 2020 *Ex Parte* at 4-5.

[582] Small Satellite Operators Feb. 18, 2020 *Ex Parte* at 13.

[583] *Id.*

[584] Intelsat Feb. 21, 2020 *Ex Parte* at 4-5.

[585] *Id.* at 4.

[586] Small Satellite Operators Feb. 18, 2020 *Ex Parte* at 13 (quoting *Teledesic*, 275 F.3d at 82).

[587] Intelsat also argues that, once an overlay licensee has specified precisely how much it would be willing to pay for a license, it would prefer to structure its payments so that a greater share went toward accelerated relocation payments to increase the likelihood that the spectrum would be cleared earlier. Intelsat Feb. 21, 2020 *Ex Parte* at 5. To the extent we can follow Intelsat's argument, it appears to assume away the hard problem we face: how to

(continued….)

224. And to the Small Satellite Operators' point, we do not read the language quoted as limiting the Commission's authority under the *Emerging Technologies* framework but instead just recognizing how the Commission applied that framework in one particular context. In that case the Commission had established guidelines for good-faith negotiations that limited incumbents' ability to demand "premium payments" that were not proportionate to the cost of providing comparable facilities.[588] But as the court recognized in *Teledesic*, the Commission added that limitation as a check against holdout problems created by mandatory good-faith negotiations.[589] Here we choose a different approach to address the problem of holdouts as well as the free-rider problem inherent to this transition. And by estimating the willingness of overlay licensees to make accelerated relocation payments, we avoid the need for a lengthy period of mandatory negotiations before mandatory relocation—which we estimate will bring about significant benefits to the public of making this spectrum available for terrestrial use much sooner.

225. Both parties also challenge the determination that an acceleration payment total of $9.7 billion strikes the appropriate balance. Again, the Small Satellite Operators argue that it is too much, while Intelsat argues that it is not enough. Small Satellite Operators assert that "a vastly reduced amount would have been sure to result in a deal."[590] In contrast, Intelsat argues that there is no analysis demonstrating that $9.7 billion will be sufficient to encourage incumbent space station operators to clear on an expedited schedule.[591] To that end, Intelsat challenges the conservativeness of the estimated value of the spectrum being cleared, suggesting that the Commission should have chosen a higher estimate of value on which to calculate an acceleration payment.[592]

226. To some extent both parties are correct: There is no precise science that allows us to arrive at the "right" accelerated relocation payment total. But that is in large part because eligible space station operators have had every incentive not to disclose precisely how high an accelerated relocation payment must be for them to accept it. As these arguments make plain, the Commission's determination of an acceleration payment is a line-drawing exercise that balances a number of competing considerations. The accelerated relocation payment of $9.7 billion is an $800 million reduction from the estimated total willingness of flexible use licensees to pay $10.52 billion for earlier access to this spectrum. Allocating the vast majority of the estimated total willingness to pay to satellite operators (1) maximizes the possibility that such a payment will be sufficient to incent early clearing (2) while not exceeding the estimated value of acceleration to new licensees, and (3) accounts, to some extent, for a

(Continued from previous page)
estimate how much an overlay licensee (and thus a bidder that has already won the relevant license at auction) would pay to accelerate relocation. Indeed, any accelerated relocation payment should be, as its name suggests, for the accelerated clearing of spectrum—not for the overall value of the underlying licenses.

[588] *See, e.g.*, *Teledesic*, 275 F.3d at 82; *Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum at 2 GHz for Use by the Mobile-Satellite Service*, Second Report and Order and Second Memorandum Opinion and Order, 15 FCC Rcd 12315, 12344, para. 89 (2000) ("adopt[ing] the good faith guidelines of Section 101.73(b) to negotiations for relocation of FS incumbents"); *18 GHz Order*, 15 FCC Rcd. at 13503-04 (adopting same rules for negotiations among fixed-satellite service licenses and fixed service licensees).

[589] *Teledesic*, 275 F.3d at 88.

[590] Small Satellite Operators Feb. 18, 2020 *Ex Parte* at 12.

[591] Intelsat Feb. 21, 2020 *Ex Parte* at 4-5.

[592] *Id.* at 5. Intelsat also faults the Commission for not considering the increase in expected future profits that new licensees could capture from providing early access to their new technology. *Id.* This argument seems to rest on a misunderstanding of the Commission's analysis. The Commission's analysis calculates the increase in expected profits by comparing the total difference of the income stream associated with deploying on an accelerated schedule with that of deploying on the non-accelerated transition schedule. This analysis compares the present value of two infinite streams of profits, and therefore accounts for any difference in future profits that would result from acceleration.

relatively conservative estimate of the value of the underlying spectrum. Of course, the Commission might have chosen a number lower than $9.7 billion, to gamble that space station operators might accept a lower price. But the smaller the payment the greater the risk that such a payment will be insufficient to incent earlier clearing. In light of the enormous benefit that the rapid deployment of 5G will confer on American consumers, and the costs of delaying such deployment for even one additional year, we have chosen the figure that most minimizes that risk. While this exercise is necessarily imprecise, we believe that $9.7 billion threads the needle through all of the considerations raised by the Small Satellite Operators, Intelsat, others in the record, as well as our own predictive judgment on what is necessary here.

227. 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 that each can make an intelligent decision whether to elect to participate in the accelerated relocation process. To accelerate clearing, each space station operator will need to engage in a complex and iterative process of coordinating between its programmer customers and incumbent earth stations, allocating resources to effectuate changes in both the space station and earth station segments of the FSS network, and orchestrating changes both in space and on the ground in order to ensure continuous and uninterrupted delivery of content. As SES explains, "the clearing process will involve a painstakingly choreographed set of precise steps, including procuring, building, and launching new satellites, installing thousands of new antenna filters, and consolidating [TT&C] and gateway sites."[593] Given that these burdens will fall more heavily on some space station operators than others, we find that the most appropriate basis on which to allocate accelerated relocation payments among eligible space station operators is to estimate the relative contribution that each eligible space station operator is likely to make towards accelerating the transition of the 3.7–3.98 GHz band to flexible use and clearing the 3.98-4.0 GHz band, assuming all other operators accelerate their clearing. To that end, we examine several pieces of evidence in the record.

228. To start, we find the best evidence in the record is a confidential 2019 report prepared by an independent accounting firm on behalf of the C-Band Alliance, which SES has submitted into the record. Based on data provided by C-Band Alliance members, this report purports to calculate each member of the C-Band Alliance's contribution to clearing (based in part on qualifying 2017 revenue) for the purpose of determining the share that each C-Band Alliance member would receive as a result of this proceeding.[594] We can think of no better evidence of the C-Band Alliance members' own understanding of their relative contribution to clearing than their own market-based assessment of the relative value that each member should derive from the process of freeing up this spectrum for flexible use. While many variables might enter into any valuation of contribution to clearing—such as each operator's relative number of earth stations, transponder usage, revenue, coverage, or other factors—the C-Band Alliance members were best situated to take all those variables into account in assigning allocations representing each member's valuation of its entitlement to a percentage of the proceeds from a private sale. We call this the "the market-based agreement" factor (note we do not apply this factor to Star One, which was not a party to this agreement).

229. Despite Intelsat's own agreement that "the most appropriate basis for the allocation of . . . accelerated relocation payments among eligible space station operators, is the contribution each space station operator makes toward clearing the spectrum,"[595] Intelsat objects to any reliance on this report and its prior agreement with SES, Eutelsat, and Telesat on how to approach a swift transition of the C-band. We find Intelsat's objections to the 2019 report unpersuasive. For one, Intelsat objects that the methodology of the report was premised largely on an assumption that SES and Intelsat had equal market

[593] Letter from John Purvis, Chief Legal Officer, SES Americom, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 2-3 (SES Feb. 20, 2020 Confidential *Ex Parte*).

[594] *See* SES Feb. 20, 2020 Confidential *Ex Parte*, Attach. B.

[595] Intelsat Feb. 19, 2020 *Ex Parte* at 1.

share.[596] That may be true—but that does not explain why Intelsat agreed to such an assumption just last year (nor what it has learned since then). Indeed, whatever the precise inputs underlying the confidential 2019 report, the ultimate findings were ratified by each member of the C-Band Alliance at the time—including Intelsat.[597] For another, Intelsat points out that the confidential report was developed in the context of a private sale proposal in which the C-Band Alliance would receive a single payment for both clearing in an accelerated manner and relocation costs. But we fail to see the relevance of these distinctions. For example, we separately account for relocation payments from accelerated relocation payments in this *Report and Order*—but Intelsat provides no evidence, nor does any appear on the face of the report, that the relative contributions of each operator depended on relative relocation costs (nor does Intelsat explain why the separate treatment of such costs merits greater (or lesser) allocation of accelerated relocation payments). As another example, we do not see why the negotiation of these allocations in the context of a private sale approach would fail to capture the contributions of the various signatories to another approach—like the public auction approach we adopt herein.[598] Indeed, we find the fact that these numbers were negotiated between experienced space station operators in the context of a concrete plan to clear the C-band for terrestrial use makes them more reliable, not less, as evidence of relative contribution to clearing.[599] In short, despite Intelsat's recent protestations, we find the report is the single best proxy that we have for determining the relative contribution of each eligible space station operator (at least those four that signed the agreement) to accelerating the process of repurposing this spectrum.

230. Next, we find that transponder usage provides another proxy for the relative contributions of each space station operator to clearing. At a high level, the amount of transponder usage should correspond to the amount of traffic that the operator needs to repack—and space station operators with more traffic are likely to serve a greater number of earth stations with more content. And we have reliable data for relative transponder usage: Satellite operators submitted confidential usage information in response to the Commission's May 2019 request for information on satellite use of the C-band.[600] FSS space station licensees with C-band coverage of the United States or grants of market access were required to submit the average percentage of each transponder's capacity (megahertz) used and the maximum percentage of capacity used for each day in March of 2019. From this data we can calculate the average megahertz of transponder usage as well as the usage shares for each satellite operator. We thus include transponder usage in our calculations because we believe that it is a reliable proxy of the amount of traffic all eligible incumbent space station operators need to repack, as well as their relative contribution to accelerated clearing.

231. Third, we take into account each eligible space station operator's coverage of the contiguous United States with its C-band satellites. All operators with existing FSS space station licenses

[596] Intelsat Feb. 21, 2020 *Ex Parte* at 3.

[597] SES Feb. 20, 2020 Confidential *Ex Parte*. We note also that the estimates in the confidential report submitted by SES are generally consistent with other revenue estimates filed in the public record. *See, e.g.*, Kerrisdale Report; 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/.

[598] Letter from John Purvis, Chief Legal Officer, SES, and Christopher DiFracesco, Vice President, General Counsel & Secretary, Telesat, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 1-2 (filed Feb. 24, 2020) (SES-Telesat Feb. 25, 2020 *Ex Parte*) (the work to clear the spectrum and the operators' relative contributions remain unchanged since the C-Band Alliance arrived at the allocation agreement).

[599] SES-Telesat Feb. 25, 2020 *Ex Parte* at 1 ("The Draft Report and Order lays out the same allocation rationale that the CBA members considered when agreeing to allocations among themselves—their relative contributions to clearing the spectrum.").

[600] *May 2019 Information Collection*. Although Intelsat recently filed its own estimates of its relative transponder usage, Intelsat Feb. 19, 2020 *Ex Parte*, Attach. B, we find the confidential data collected by the Commission from all providers a more reliable source of relative transponder usage.

or grants of United States market access in the 3.7-4.2 GHz band also have equal access to the 280 megahertz of spectrum designated to transition to flexible use and the 20-megahertz guard band and an equal ability to serve customers in this band. Due to this shared licensing structure, all eligible space station operators serving incumbent earth stations in the contiguous United States will need to play a role in the transition and must cooperate to transition the spectrum successfully. This factor is, therefore, a very rough proxy for the myriad tasks that all eligible space station operators must undertake to clear the spectrum and for the fact that one of the eligible space station operators does not transmit to the full contiguous United States.[601]

232. Finally, we note that there is no single correct weight to apply to each of these three factors. We place the most significant weight on the market-based agreement factor because it reflects the parties' own valuation of each operator's relative contribution to clearing. But in acknowledgment of Intelsat's reservations about using the 2019 report, the fact that the report does not consider one eligible space station operator (Star One) because it wasn't a member of the C-Band Alliance, and the fact that the Commission does not have access to the underlying inputs evaluated by the independent auditor, we are also assigning some weight to transponder usage and coverage separately. Among these two factors, we find that transponder usage, which reflects actual usage of the band, greatly outstrips (by an order of magnitude) the value of the third factor (coverage).[602] Thus, we specify the allocations as follows:

Accelerated Relocation Payment by Operator

	Payment	Phase I Payment	Phase II Payment
Intelsat	$ 4,865,366,000	$ 1,197,842,000	$ 3,667,524,000
SES	$ 3,968,133,000	$ 976,945,000	$ 2,991,188,000
Eutelsat	$ 506,978,000	$ 124,817,000	$ 382,161,000
Telesat	$ 344,400,000	$ 84,790,000	$ 259,610,000
Star One	$ 15,124,000	$ 3,723,000	$ 11,401,000
Totals	$ 9,700,001,000	$ 2,388,117,000	$ 7,311,884,000

233. The Clearinghouse will distribute the accelerated relocation payments to each eligible space station operator according to the amounts provided in the table. We allocate roughly 25% of each

[601] We note that, of the eligible space station operators, Intelsat, SES, Telesat, and Eutelsat all cover the entire contiguous United States population at an Equivalent Isotropically Radiated Power (EIRP) threshold of 37 dBW or better. Star One, which says on its own website that the EIRP threshold of 37 dBW constitutes typical service, only covers roughly the state of Florida at this power level. We also note that all the registered earth stations that it serves (according to the available data in IBFS) are in the state of Florida, and Star One has made no claim or showing in this proceeding that it serves incumbent earth stations outside of that area. *See* www.starone.com.br/en/internas/satelite_c1; *see also* https://www.satbeams.com/satellites?norad=32293. The Census Bureau estimates that there were 325,009,505 people in the continental United States as of July 1, 2018 and 21,299,325 people living in Florida. *See* U.S. Census Bureau, Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2010 to July 1, 2018 (NST-EST2018-01), Table 1 (Dec. 2018), https://www2.census.gov/programs-surveys/popest/tables/2010-2018/state/totals/nst-est2018-01.xlsx. This implies that Star One has a share of 1.6% of the sum C-band population coverage in the contiguous United States (21,299,325/ (4 x 325,009,505 + 21,299,325) = 1.6%). The other four firms have an equal 24.6% share ((100% - 1.6%) ÷ 4 = 24.6%).

[602] We round all payments to the nearest thousand dollars and therefore the payment total does not sum exactly to $9.7 billion. Because we rely on confidential information in calculating these allocations and find that disclosing the relative weights placed on each factor could inadvertently disclose that confidential information to operators with knowledge of their own information, we reserve our discussion of the precise numbers involved in our calculations to a confidential appendix. And because Star One was not a signatory of the market-based agreement, we allocate the weight that would otherwise apply to that factor to the second most important factor (transponder usage) for its calculation and normalize all calculations to take this into account.

operator's accelerated relocation payment to the completion of Phase I and 75% to the completion of Phase II. This split corresponds to the value of accelerated relocation that space station operators will need to make at each respective deadline. To be specific, the value of Phase II accelerated relocation (vis-à-vis relocation by the Relocation Deadline) is accelerating relocation of all 280 megahertz of spectrum across the contiguous United States by two years. Using the acceleration formula discussed above, this represents 75.38% of the total value to bidders of accelerated relocation. The value of Phase I accelerated relocation (vis-à-vis relocation by the Phase II Accelerated Relocation Deadline) is accelerating the relocation of 100 megahertz of spectrum in the 46 Phase I PEAs by two additional years. This represents 24.62% of the total value of bidders of accelerated relocation. We note that allocating the Phase I and Phase II payments this way maximizes the incentive for incumbent space station operators to complete the full Phase II transition in a timely manner, ensuring that all Americans get early access to next-generation uses of the 3.7 GHz band.[603]

234. Taken together, we find that the three measures above should reflect—directly or by proxy—a variety of inputs, including relative contribution shares to relocation, population coverage in the contiguous United States, traffic, and number of earth stations served. These measures incorporate the best data presently available to the Commission on which to estimate the contributions of each eligible space station operator to the accelerated relocation process. Whatever the shortcomings of each individual measure or dataset, we find that these three measures considered together provide a reasonable approximation of the eligible space station operators' respective contributions, and therefore a reasonable basis on which to apportion accelerated relocation payments.

235. We also find that several alternative methods advocated by space station operators for allocating accelerated relocation payments are less reliable and objective than those we rely on. For example, several parties suggest that we should rely upon C-band revenues in measuring relative contributions,[604] with Intelsat claiming that "revenue earned with respect to the current use of C-band spectrum in the contiguous 48 states provides a reasonable proxy for every one of the factors cited by the FCC for value being created by accelerated clearing: the number of customers, the amount of encumbered spectrum; the scope of incumbent earth stations served; content-distribution revenues; population of the United States; and traffic."[605] Although we agree that such revenues ordinarily would be closely correlated with traffic and a good proxy for a variety of other factors relevant to an eligible space station operator's estimated contribution—the record is largely bereft of such data. Intelsat itself, for example, has failed to file any reliable revenue or revenue share data. Instead, it estimates its own C-band revenues based on average usage as well as its own assertion that it has higher average wholesale prices than its competitors.[606] The only other source evident of Intelsat's market share is a public report from Kerrisdale Capital Management that estimates Intelsat to have a roughly equal share with SES—although that report did not claim its estimates were particularly precise.[607] In short, we fail to see the value in relying on

[603] And it avoids some absurd results. Consider, for example, Intelsat's proposal to tie all four years of accelerated relocation payments for Phase I areas to the Phase I payment (increasing the split to 45%). *See* Letter from Michelle V. Bryan, Executive Vice President, General Counsel and Chief Administrative Officer, Intelsat, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 2-3 (filed Feb. 19, 2020). And assume that an incumbent space station operator missed the Phase I deadline. Such a split would imply that such a space station operator should receive no accelerated relocation payments whatsoever from meeting the Phase II deadline for the Phase I spectrum (even though they would still need to transition that spectrum to meet the Phase II deadline). And it would imply that overlay licensees in Phase I areas would not have to make any accelerated relocation payments whatsoever (unlike other overlay licensees)—even though they would still benefit from a two-year accelerated relocation (like other overlay licensees).

[604] *See, e.g.*, C-Band Alliance Comments at 28.

[605] Intelsat Feb. 19, 2020 *Ex Parte* at 2.

[606] *Id.*, Ex. B.

[607] *See* Kerrisdale Report at 21, 24.

these incomplete and not-particularly-reliable proxies for revenue shares, especially given that actual revenue share itself is but a proxy for each operator's relative contribution to accelerated relocation.[608]

236. Or consider the C-Band Alliance's suggestion to allocate based on the number of incumbent earth station C-band feeds in the contiguous United States.[609] Whatever the merits of such an approach (including the decision to count feeds, not incumbent earth stations), we find the record evidence insufficiently reliable to incorporate this metric into our analysis. For example, in the span of a single month, the C-Band Alliance went from claiming that collecting such information would require "the Commission to develop a new, comprehensive dataset"[610] to its own estimate that its own members should get 99% of accelerated relocation payments because they will be responsible for 99% of feeds.[611] Two weeks later, Intelsat offered its own estimate of its own share of such feeds (68%) based on its own sampling as well an abbreviated explanation of its method.[612] And SES responded with its own estimate of its share (48%) and Intelsat's (50%).[613] And then SES doubled down in its argument for equal shares by claiming it will be required to order approximately the same number of satellites, install the same number of antennas, and decommission the same number of TT&C/gateway sites as Intelsat.[614] Rather than pick and choose amongst this chaff of last-minute calculations that inevitably favor the filer, we find little evidence that relying on these estimates would produce a more accurate estimate of each operator's relative contribution to clearing (and we cannot find that a significant delay as initially suggested by the C-Band Alliance to create a new dataset would be in the public interest).

237. We also reject Eutelsat's proposal to allocate accelerated relocation payments not by relative contributions to a successful accelerated transition but instead based on "stranded capacity," i.e., the proportion of C-band satellite capacity that will be rendered unusable for protected FSS downlink services during the remaining useful lifetime of each relevant satellite.[615] Eutelsat's proposal represents a significant departure from the *Emerging Technologies* precedent, fundamentally misinterprets the Commission's basis for the allocation of accelerated relocation payments among eligible space station operators, and lacks any economic rationale.

238. *First*, Eutelsat argues that allocation of accelerated relocation payments must be "reasonably related to the cost of relocation" and that the Commission's focus on the relative contribution of each operator to a successful transition is inconsistent with the *Emerging Technologies* framework.[616] We disagree. Contrary to Eutelsat's claim, the basis of our allocation method is designed specifically to capture the relative contribution, in terms of both effort and cost, that each eligible space station operator will make to meet the Accelerated Relocation Deadlines based on three objective factors related to each

[608] Ironically enough, the confidential report filed by SES does contain estimated (and audited) revenue shares for one space station operator, SES Feb. 20, 2020 *Ex Parte*, Attach. B (confidential), and to its credit, Intelsat does acknowledge as such, Intelsat Feb. 21, 2020 *Ex Parte* at 3. But to the extent such information is valuable, we find it better to incorporate it directly through the market-based agreement factor described above rather than by placing this information on par with other unreliable information about revenue shares from elsewhere in the record.

[609] Letter from Bill Tolpegin, Chief Executive Officer, C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 13 (filed Jan. 16, 2020).

[610] *Id.*

[611] Letter from Bill Tolpegin, Chief Executive Officer, C-Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Feb. 4, 2020).

[612] Intelsat Feb. 19, 2020 *Ex Parte* at 2.

[613] SES Feb. 20, 2020 *Ex Parte* at 5.

[614] *Id.*

[615] *See* Eutelsat Feb. 20, 2020 *Ex Parte* at 1-2; Eutelsat Feb. 21, 2020 *Ex Parte* at 2.

[616] Eutelsat Feb. 20, 2020 *Ex Parte* at 2.

space station operator's relative contribution: a market-based agreement reflecting space station operators' assessment of their own relative contribution to clearing; transponder usage; and satellite coverage in the contiguous United States. Each of these factors reflects both the effort that it will take to accelerate relocation and the corresponding costs of each operator to accomplish such acceleration.

239. *Second*, Eutelsat argues that stranded capacity is the better "proxy" for calculating relocation costs and thus allocating accelerated relocation payments.[617] Again, we disagree. For one, stranded capacity is not a proxy for actual relocation costs. Actual relocation costs are those needed to relocate incumbents to comparable facilities that allow them to continue to provide *existing* services.[618] Stranded capacity lacks any consideration of the extent to which existing services are actually provided over such capacity such that they would need to be relocated.[619] Indeed, Eutelsat fails to acknowledge the substantial evidence in the record that the C-band satellite business suffers from significant and increasing excess capacity and rapidly declining revenues[620] or that a space station operator with much stranded capacity but little existing business could likely continue to provide all of its existing services within the contiguous United States at relatively low cost (e.g., without the need for new satellites). In other words, stranded capacity is not a good proxy for space station operator relocation costs. Nor is it a good proxy for the relocation costs of incumbent earth stations (indeed, stranded capacity does not account for such costs at all)—and Eutelsat simply asserts that such costs are not relevant.[621] But of course, such costs *are* relevant to a successful relocation; and of course we have expressly designed accelerated relocation payments to expedite the relocation of incumbent space stations *and* incumbent earth stations, to the benefit of the overlay licensees that require both to be relocated so they can deploy new terrestrial services in the band.

240. *Third*, despite Eutelsat's claim that its proposal is not a request to compensate satellite operators for the "lost revenues" or opportunity costs resulting from the transition, allocating relocation payments according to "lost C-band capacity," without any consideration of whether such capacity actually has existing services that will need to be relocated as a result of the transition, as Eutelsat proposes, is precisely the type of opportunity cost calculation for which our *Emerging Technologies* precedent expressly declines to provide compensation.[622] Rather than compensate space station operators based on the burden they are likely to bear in accelerating the clearing process, Eutelsat's proposal would reward those space station operators with the least-intensive use of existing capacity based on an

[617] *Id.*

[618] *Teledesic*, 275 F.3d at 84-86 (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") (emphasis added).

[619] *See* Eutelsat Feb. 21, 2020 *Ex Parte* at 1-2.

[620] For example, Ericsson, citing data from Lyngsat, asserts that "only 37% of the C-band satellites have any significant transponder usage (10 or more, i.e., 7 out of 19 satellites)," and that, "[i]n many cases, the transponders are spread across the spectrum band, even though many of the blocks may be unused." Citing findings of Northern Sky Research, it notes that "[t]ransponder equivalent (TPE) demand is expected to decline by 26% of the 10-year period from 2017 through 2016" and that "annual C-band satellite projected revenue for the North American market is estimated to decline from $547M in 2017 to $358M in 2026." Ericsson Mar. 29, 2018 *Ex Parte* at 2.

[621] Eutelsat Feb. 20, 2020 *Ex Parte* at 4 (arguing that "acceleration payments to satellite operators [must be] designed to facilitate expedited relocation of satellite operators – and not their earth station customers – to comparable facilities").

[622] *See id.* at 4-5 and Annex B; *see also Incentive Auction Report and Order*, 29 FCC Rcd at 6824-25, para. 630 (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); *Microwave Relocation Cost Sharing Order*, 11 FCC Rcd. at 8848, para. 43 (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").

assumption of future use of such capacity that far exceeds reasonably foreseeable demand. We therefore find that the formula for allocating accelerated relocation payments among eligible space station operators adopted herein, which provides compensation based on the relative contributions of each eligible space station operator to the accelerated relocation process, is far more grounded in Commission precedent and the underlying rationale for providing accelerated relocation payments than the allocation method proposed by Eutelsat.

241. Finally, we find that our definition of eligible space station operators appropriately encompasses the incumbent space station operators that will incur costs in order to transition existing U.S. services to the upper portion of the band and are therefore entitled to receive compensation for relocation costs and potential accelerated relocation payments. The Small Satellite Operators argue that any transition of C-band spectrum must provide compensation, including "premium" payments above relocation costs, to all space station operators that operate space stations that cover parts of the United States using C-band spectrum.[623] However, the purpose of relocation costs and potential accelerated relocation payments is to compensate authorized space station 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.[624] We address the arguments of two of the Small Satellite Operators—Hispasat and ABS—that do not satisfy our definition of eligibility for relocation costs.[625]

242. *Hispasat*.—Hispasat recently asked the Commission to make Hispasat eligible for relocation costs and accelerated relocation payments by changing the definition of eligible space station operators to remove the requirement that the incumbent space station operator must provide service to an *incumbent* earth station.[626] We note that our definition of incumbent earth stations requires that earth stations must have been registered (or licensed as a transmit-receive earth station) by the relevant deadlines to qualify for relocation cost reimbursement. Hispasat states that it "does currently provide service in the contiguous United States" to nine earth stations in the contiguous United States operated by an evangelical church that did not register its earth stations with the Commission.[627]

243. We reject Hispasat's request. *First*, we are somewhat skeptical of Hispasat's apparently recent discovery that it serves earth stations using C-band spectrum in the contiguous United States. In its October 2018 comments in this proceeding, Hispasat made no mention of providing service to those or any other earth stations—indeed, Hispasat there claimed its plans to provide C-band services to the United States were placed on hold pending the outcome of the July 2018 *NPRM*.[628] The Small Satellite Operators' July 19 PN Reply explicitly states that all of the Hispasat satellite's C-band capacity was

[623] Letter from Scott Blake Harris, Counsel to 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 to Small Satellite Operators, to Marlene H. Dortch, Secretary, FCC, IB Docket No. 18-122 (filed Feb. 21, 2019) (SSO Feb. 21, 2019 *Ex Parte*).

[624] Our definition of "incumbent earth stations" includes C-band 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 the accuracy of information on file with the Commission.

[625] 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, did not make any filings in this proceeding or provide data in response to the *May 2019 Information Collection.*

[626] Letter from Scott Blake Harris, Counsel to Small Satellite Operators, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Feb. 21, 2020) (Small Satellite Operators Feb. 21, 2020 *Ex Parte*).

[627] Small Satellite Operators Feb. 21, 2020 *Ex Parte* at 1.

[628] Small Satellite Operators Comments at 5-6.

contracted for non-United States services through the end of 2019.[629] The Small Satellite Operators' January 28, 2020 *Ex Parte* states only that "some [Small Satellite Operator] satellites transmit in CONUS in C-band today," but does not make a single mention of U.S. services provided by Hispasat (Star One, another member of that group, does provide such service).[630] And so we put little weight in Hispasat's recent claim to have generated "U.S. C-band revenue" in 2017 from services provided to the "at least nine" earth station locations that it claims it still currently serves (a claim unsupported by any further documentation).[631] And we decline to accept Hispasat's revisions to history that its prior filings in this proceeding demonstrate (rather than disclaim) that it has been providing satellite service in the contiguous United States for some time.[632]

244. *Second*, although Hispasat makes much of its speculation that the owner of these nine earth stations lacked the sophistication or knowledge to register by the relevant deadlines and qualify as incumbent earth stations, we find that Hispasat has not even shown that these nine earth stations were eligible to register. For one, Hispasat appears to be careful in its filings not to claim that it uses the *C-band* spectrum to provide service to all those earth stations. Indeed, we do not see how it could given that publicly-available coverage data for the Amazonas-3 satellite C-band beam footprint indicate that it is not capable of providing service to several of those earth station locations.[633] (In contrast, that same satellite's *Ku-band* North America beam does cover the entire contiguous United States.[634]) For another, Hispasat does not provide any specific information regarding *when* the earth stations it claims to serve began using C-band spectrum—they had to have been operational as of April 19, 2018, if they were going to be eligible to be registered.[635] For yet another, Hispasat provides no explanation of unique circumstances that might merit consideration of these stations—and we decline to adopt a different standard for the earth stations Hispasat claims to serve than we do for any other existing C-band earth stations that were not registered by the relevant deadlines. Indeed, Hispasat fails to address one of the primary reasons the Commission froze new earth station authorizations and required existing earth stations to register by a fixed deadline in the first place: to avoid gamesmanship and stop operators from establishing new C-band operations or earth stations for the purpose of obtaining monies from the transition to new terrestrial, flexible-use operations in the band. It appears that Hispasat's entire premise is that it, and it alone, should be able to engage in that type of last-minute gamesmanship. We do not accept that premise.

245. *Third*, we reject Hispasat's request because even if we accepted it, Hispasat would not be an eligible incumbent space station operator. Specifically, we limit relocation and accelerated relocation payments to those space station operators that had demonstrated, as of February 1, 2020, that they would incur any eligible costs as a result of the transition. Because Hispasat under its own proposal would not

---

[629] Small Satellite Operators July 19 PN Reply at 10.

[630] Small Satellite Operators Jan. 28, 2020 *Ex Parte* at 8.

[631] *See* Letter from Scott Blake Harris, Counsel to Hispasat, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 1 and Attach. (filed Feb. 21, 2020).

[632] Small Satellite Operators Feb. 21, 2020 *Ex Parte* at 1 (citing Letter from Cristina García de Miguel, Orbit-Spectrum & Regulatory Affairs Manager, Hispamar Satélites S.A., to Marlene H. Dortch, Secretary, FCC, IBFS File No. SAT-PPL-20121018-00183 (filed May 28, 2019) (Hispasat May 2019 Information Collection Response); Small Satellite Operators July 19 PN Reply at 6-12; Letter from Scott Blake Harris, Counsel to Small Satellite Operators, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 8 (filed Jan. 28, 2020) (Small Satellite Operators Jan. 28, 2020 *Ex Parte*)). Although the contents of the Hispasat May 2019 Information Collection Response are confidential, nothing in that confidential filing demonstrates provision of service to the contiguous United States.

[633] *See* https://www.satbeams.com/footprints?beam=7690 (last visited Feb. 23, 2020).

[634] *Id.*

[635] Beginning April 19, 2018, the Commission placed a freeze on all FSS earth station registrations for earth stations that were not operational as of that date.

be able to recover any costs for transitioning incumbent earth stations (it makes clear that it is not asking to obtain incumbent status for the nine earth stations it now claims to serve), the only eligible costs it might have would be to transition transponder usage to the upper 200 megahertz. And Hispasat does not provide any information regarding what, if any, steps it would need to take to transition these alleged C-band services to the upper 200 megahertz; indeed it does not explicitly claim that those services are provided over frequencies in the lower 300 megahertz such that they would need to be transitioned *at all*.

246. In short, because the purpose of relocation and accelerated relocation payments is to compensate eligible space station operators for actually relocating their existing services to the upper 200 megahertz, Hispasat has failed to demonstrate that our definition of "eligible space station operators" unduly excludes it from the class of incumbent space station operators entitled to relocation and accelerated relocation payments.

247. *ABS.*—ABS asks the Commission to make incumbent space station operators eligible for reimbursement of space station facilities that "will not remain comparable after the transition."[636] Specifically, to be eligible for such reimbursement, ABS proposes that an incumbent space station operator must operate a non-replacement satellite that gained its FCC authorization to provide service to any part of the contiguous United States within 12 months of the announcement of the freeze on C-band earth station applications or, alternatively, within 18 months of the issuance of the *NPRM* in this proceeding.[637] ABS argues that the *NOI*, freeze on new earth station applications, and the *NPRM* in this proceeding "undermined ABS's reasonable efforts to commercialize the newly licensed satellite—and thus the Commission cannot know how much bandwidth ABS would have needed (but for the Commission's actions) to avoid an impairment of its C-band authorization." As a result, ABS argues that it should be compensated for the proportion of the costs of launching its ABS-3A satellite attributable to eight transponders that will be effected by the transition.

248. We reject ABS's argument that uncertainty about the outcome of this proceeding resulted in its failure to commercialize any of its ABS-3A capacity, as we find this argument both unconvincing and irrelevant. The only ABS satellite capable of serving the United States has been operational since 2015. The ABS-3A satellite is positioned just south of the Ivory Coast of northwest Africa, and both its global and western hemisphere C-band beams provide only edge coverage to portions of the Eastern United States.[638] 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 an earth station in Hudson, NY in February 2018.[639] Despite being granted such authorization in March 2018, ABS failed to construct and commence operations on the Hudson, NY earth station.[640] In sum, ABS's satellite was operational for a year-and-a-half before it sought U.S. market access, for two years prior to the *NOI*, and nearly three years prior to the freeze on new C-band earth station registrations and the subsequent *NPRM*. The notion that ABS made significant investments in launching this satellite with the specific intent of providing robust services in the United States and that it must be compensated for the loss of those investments is contradicted both by its inaction in the United States in the four-and-a-half years since it launched ABS-3A and the actual capabilities of ABS-3A to provide service outside the United States. Indeed, the satellite's global and western hemisphere C-band

[636] Small Satellite Operators Feb. 21, 2020 *Ex Parte* at 2.

[637] *Id.*

[638] *See* Satbeams Coverage Report, https://www.satbeams.com/footprints?beam=8203 (last visited Feb. 23, 2020).

[639] *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).

[640] *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).

beams target all or most of the South Atlantic Ocean, Africa, the Middle East, Europe, and South America and the eastern hemisphere C-band beam covers all or most of Africa, Europe, the Mediterranean Sea, and the Middle East.[641]

249. In any event, the requirement that new licensees reimburse incumbents for relocation costs applies to reasonable actual costs incurred in clearing the spectrum. This obligation does not include reimbursement of space station operators on an assumption of future use of currently unused capacity that far exceeds reasonably foreseeable demand—the loss of capacity that has not been used, is not used, and not likely to ever be used given the significant unused capacity that remains available to ABS is not a cognizable expense. Thus, we reject ABS's claim.

250. *Allocating Payment Obligations Among Overlay Licensees*.—Finally, we explain the financial responsibilities that each flexible-use licensee will incur to reimburse the space station operators. We find it reasonable to base the share for each overlay licensee on the licensee's *pro rata* share of gross winning bids.[642] 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.[643] Indeed, several commenters in this proceeding proposed the H-Block *pro rata* calculation as a model for determining winning bidders' shares here.[644]

251. Specifically, for space station transition and Relocation Payment Clearinghouse costs, and in the event the Wireless Telecommunications Bureau selects a Relocation Coordinator, Relocation Coordinator 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 relocation costs (*RC*). Mathematically, this is represented as:

$$RO = \left(\frac{\sum_{i \in I} P_i}{\sum_{j=1}^{N} P_j}\right) \times RC$$

252. 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 relocation costs.

253. For the Phase I accelerated relocation payments, the *pro rata* share of each flexible use licensee of the 3.7 to 3.8 MHz in the 46 PEAs that are cleared by December 5, 2021, will be the sum of the final clock phase prices (*P*) that the licensee won divided by the total final clock phase prices for all *M* license blocks sold in those 46 PEAs. To determine a licensee's *RO* the *pro rata* share would then be multiplied by the total accelerated relocation payment due for Phase I, *A1*. Mathematically, this is

---

[641] *See* http://www.absatellite.com/satellite-fleet/abs-3a/ (last visited Feb. 23, 2020); *accord* https://www.satbeams.com/footprints?beam=8203 (last visited Feb. 23, 2020).

[642] 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.

[643] *H Block Report and Order*, 28 FCC Rcd at 9548, para. 168.

[644] *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).

represented as:

$$RO = \left(\frac{\sum_{i \in I} P_i}{\sum_{j=1}^{M} P_j}\right) \times A1$$

254. For Phase II accelerated relocation payments, the *pro rata* share of each flexible use licensee will be the sum of the final clock phase prices (*P*) that the licensee won in the entire auction, divided by the total final clock phase prices for all *N* license blocks sold in the auction. To determine a licensee's *RO* the *pro rata* share would then be multiplied by the total accelerated relocation payment due for Phase II, *A2*. Mathematically, this is represented as:

$$RO = \left(\frac{\sum_{i \in I} P_i}{\sum_{j=1}^{N} P_j}\right) \times A2$$

5. Relocation Payment Clearinghouse

255. 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.

256. 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 space station operators form a transition facilitator as a cooperative entity to coordinate negotiations, clearing, and repacking in the band.[645] The Commission also asked about the role of the transition facilitator and the form of supervisory authority the Commission should maintain over it.[646]

257. 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.[647] 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.[648]

258. We agree with those commenters who contend that, regardless of the approach selected to 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.[649] The Commission has adopted cost-sharing plans that included private clearinghouses to administer reimbursement

[645] *See NPRM*, 33 FCC Rcd at 6939-40, paras. 70, 74.

[646] *See id.* at 6941, para. 78.

[647] *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).

[648] *Id.*

[649] *See* 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 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 H. 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.

obligations among licensees,[650] 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.[651] 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.

259. *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.[652]

260. *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.[653] In the event a party other than an incumbent earth station operator performs relocation work to transition an earth station (such as an incumbent space station operator or a network performing such work pursuant to an existing affiliation agreement), that party may directly submit the showing of relocation costs and receive reimbursement, provided the parties do not submit duplicate filings for the same earth station relocation work.[654] 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.

261. 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

[650] *See, e.g.*, 47 CFR § 27.1162.

[651] "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.

[652] *800 MHz Order*, 19 FCC Rcd at 15075, para. 200.

[653] When an incumbent space station operator takes responsibility for clearing an incumbent earth station, the incumbent space station operator bears solely the responsibility of showing relocation costs and their reasonableness.

[654] *See* NAB Feb. 21, 2020 *Ex Parte* at 6 (seeking clarification that parties that perform relocation work for earth stations may submit for reimbursement); Letter from Amanda Huetinck, Counsel, NPR, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, Attach. at 3 (filed Feb. 21, 2020) (NPR Feb. 21, 2020 *Ex Parte*) (same); ACA Connects Feb. 18, 2020 *Ex Parte* at 3. We also clarify that nothing in this *Report and Order* is intended to affect or change the terms of any private contractual arrangement governing responsibility for such work.

behalf of the Clearinghouse, may conduct audits of entities that receive reimbursements.[655] Entities receiving reimbursements must make available all relevant documentation upon request from the Clearinghouse or its contractor.

262. 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.

263. *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.[656] 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.[657] 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.

264. 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.[658] 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.

---

[655] *See Incentive Auction Report and Order*, 29 FCC Rcd at 6826, para. 636 (adopting a mechanism for the Commission or a third-party to audit entities that received reimbursements for the repacking process).

[656] 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.

[657] SES asks that we require potential bidders to contribute prior to auction, early clearing payments for relocation based on a $/MHz-Pop basis. *See* SES Feb. 20, 2020 *Ex Parte* at 7. Because the requirement to make relocation reimbursements is a condition of the *licenses*, however, we cannot apply such a requirement until those licenses have been issued after the auction.

[658] SES asks the Commission to require overlay licensees to secure a letter of credit based on their *pro rata* share of relocation costs and accelerated relocation payments. *See* SES Feb. 20, 2020 *Ex Parte*, Attach. at 8. We decline to adopt such a requirement, which could impose an undue burden on overlay licensees and find that the approach we adopt for a reimbursement fund will effectively ensure prompt and full payments of relocation costs. We likewise reject SES's request that costs incurred prior to initial reimbursement be reimbursable "at a rate defined by the Clearinghouse." *Id.*, Attach. at 9. We find that our decision to make reasonable financing costs reimbursable negates the need for such a provision.

265. 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 space station 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.

266. If an overlay license is relinquished to the Commission prior to all relocation cost reimbursements and accelerated relocation payments being paid, the remaining payments will be distributed among other similarly situated overlay licensees. If a new license is issued for the previously relinquished rights prior to final payments becoming due, the new overlay licensee will be responsible for the same *pro rata* share of relocation costs and accelerated relocation payments as the initial overlay license. If an overlay licensee sells its rights on the secondary market, the new overlay licensee will be obligated to fulfill all payment obligations associated with the license.

267. Overlay licensees will, collectively, pay for the services of the Clearinghouse and staff. 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.[659] 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.

268. *Third*, the Clearinghouse will serve in an administrative role and in a function similar to a special master in a judicial proceeding.[660] 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.[661] Any dispute submitted to the Clearinghouse, or other mediator, shall be decided within 30 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.

269. Should any issues still remain unresolved, they may be referred to the Wireless Telecommunications Bureau within 10 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 10 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

[659] The audited statement should follow generally accepted accounting procedures (GAAP) or generally accepted government auditing standards (GAGAS).

[660] *See 800 MHz Order*, 19 FCC Rcd at 15071-72, para. 194; 47 CFR § 90.676.

[661] We clarify that the Clearinghouse's dispute resolution role is limited to disputes over cost estimates or payments. Disputes related to the transition itself (e.g., facilities, workmanship, preservation of service) should be reported to the Relocation Coordinator or the Wireless Telecommunications Bureau, as detailed below.

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.

270. *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.

271. 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 that 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 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 that 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.

272. To the extent commenters argue that an independent Clearinghouse is unnecessary,[662] 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.

273. *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.[663] 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.

274. The search committee will be composed of nine members appointed by nine entities that we find, collectively, reasonably represent the interests of stakeholders in the transition. Specifically, Intelsat, SES, Eutelsat, NAB, NCTA, ACA, CTIA, CCA, and WISPA will each appoint one representative to the search committee. Intelsat, SES, and Eutelsat represent varying views of the space station operators, and Eutelsat shares many views similar to those of the Small Satellite Operators.

---

[662] C-Band Alliance Comments at 22 (creation of an independent transition facilitator is unnecessary); Verizon Comments at 5 (space station 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) (Eutelsat Nov. 21, 2019 *Ex Parte*) (no need for a single transition facilitator; rather, each space station operator should serve to transition its own services and customers).

[663] *See* 47 CFR § 90.676.

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, CCA, and WISPA 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.

275. We recommend the search committee convene by March 31, 2020; we require that it shall convene no later than 60 days after publication of this *Report and Order* in the Federal Register. Further, it shall notify the Commission of the detailed selection criteria for the position of Clearinghouse by June 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.

276. 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 Office's (GAO) Green Book[664] to serve as a guide in satisfying such requirements.

277. 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),[665] National Institute of Standards and Technology (NIST) publications, and Office of Management and Budget 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.

278. 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.

279. The search committee shall notify the Commission of its choice for the Clearinghouse no later than July 31, 2020. 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. Additionally, we expect that the Clearinghouse will enter into one or more appropriate contracts with incumbent space station operators, overlay licensees, and their agents or designees. The Clearinghouse shall have an ongoing obligation to update this information as soon as possible after any relevant changes are made.

---

[664] 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.

[665] 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*.

280. 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.

281. In the event that the search committee fails to select a Clearinghouse and to notify the Commission by July 31, 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 July 31, 2020, two of the nine members of the search committee will be dropped therefrom by lot, and the remaining seven members of the search committee shall select a Clearinghouse by majority vote by August 14, 2020.

282. 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 the Managing Director, may request any documentation from the Clearinghouse necessary to provide guidance or carry out oversight. And to protect the fair and level playing field for applicants to participate in the Commission's auction, beginning on the initial deadline for filing auction applications until the deadline for making post-auction down payments, the Clearinghouse must make real time disclosures of the content and timing of, and the parties to, communications, if any, from or to applicants in the auction, as applicants are defined by the Commission's rule prohibiting certain auction-related communications.[666]

283. 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

284. 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.

285. In the *NPRM*, the Commission sought comment on the logistics of relocating FSS operations. The Commission sought comment on having the relevant space station operators form a transition facilitator as a cooperative entity to coordinate negotiations, clearing, and repacking in the band.[667] The Commission also asked about the role of the transition facilitator and the form of

[666] See 47 CFR § 1.2105(c). Because all applicants' communications with the Clearinghouse will be public as a result of this requirement and therefore available to other applicants, applicants must take care that their communications with the Clearinghouse do not violate the prohibition against communications by revealing bids or bidding strategies. Applicants further will have to consider their independent obligation to report potential violations to the Commission pursuant to auction rules.

[667] *See NPRM*, 33 FCC Rcd at 6939-40, paras. 70, 74.

supervisory authority the Commission should maintain over it.[668] 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.[669] 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.[670] 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.[671]

286. Several commenters argue for a centralized transition facilitator to guarantee a transparent transition process with appropriate Commission oversight.[672] Several incumbent space station operators argue that a transition facilitator to coordinate relocation is either unnecessary or that incumbent space station operators should coordinate the relocation of their own customers.[673] Several commenters in turn support requiring the submission of a transition plan to be made available for public review and comment.[674] 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,[675] the schedule for clearing and deadlines for a completed transition,[676] and plans for how incumbents will be accommodated and continue to receive existing C-band services.[677] Verizon supports tight timelines for both the submission of a transition plan and the Commission's review of the plan.[678] In contrast, the C-Band Alliance opposes requiring the submission

[668] *See id.* at 6941, para. 78.

[669] *Id.* at 6941, paras. 79-80.

[670] *Id.* at 6941-42, para. 81.

[671] *Id.* at 6943-45, paras. 87-94.

[672] *See* Open Technology Institute at New America (OTI) Dec. 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 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 Oct. 15, 2019 *Ex Parte* at 1, Attach. at 16.

[673] C-Band Alliance Comments at 22 (creation of an independent transition facilitator is unnecessary); Verizon Comments at 5 (space station operators are best positioned to serve as the transition facilitator); Eutelsat Nov. 21, 2019 *Ex Parte* (no need for a single transition facilitator; rather, each space station operator should serve to transition its own services and customers).

[674] 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.

[675] 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.

[676] NCTA Comments at 29; AT&T Reply at 7-8, 10; GCI Reply at 15.

[677] NCTA Comments at 29-30; NAB Comments at 6; NAB Reply at 4-7; QVC/HSN Reply at 5.

[678] Verizon Comments at 16-17.

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.[679] Global Eagle and NAB also support the regular filing of status reports either in lieu of, or in addition to, a transition plan.[680]

287. 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.

288. 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.

289. *Transition for Operators that Elect Accelerated Relocation*.—If space station 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 May 29, 2020. Commitments to early clearing will be crucial components of prospective flexible-use licensees' decisions to compete for a particular license at auction.[681] We therefore find it appropriate to require space station 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.

290. Because we find that overlay licensees 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.[682]

---

[679] C-Band Alliance Comments at 23.

[680] 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).

[681] Verizon Jan. 24, 2020 *Ex Parte* at 2; AT&T Comments at 16-17.

[682] We make clear that if the accelerated elections meet the 80% threshold, only those space station operators that chose to clear on an accelerated timeframe will be expected to meet the accelerated deadlines. Because accelerated relocation is on an individualized and voluntary basis, we decline AT&T's request to require all space station operators to meet the accelerated deadlines if at least 80% elect accelerated clearing. *See* AT&T Feb. 19, 2020 *Ex Parte* at 3; *see also* 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, at 1-2 (filed Feb. 21, 2020) (supporting AT&T's proposal to require mandatory accelerated clearing after 80% threshold met). We likewise reject SES's request that we let electing space station operators clear non-electing space station operators' earth stations and collect their share of the accelerated relocation payments, or to simply split their remaining share without performing any additional clearing. *See* SES Feb. 20, 2020 *Ex Parte*, Attach. at 10. The former would violate the voluntary nature of accelerated relocation elections and the latter is inconsistent with the purpose of accelerated relocation payments.

We accordingly direct the Wireless Telecommunications Bureau to issue a Public Notice by June 5, 2020, announcing whether sufficient elections have been made to trigger early relocation or not.

291. 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.

292. 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. A space station operator must plan, coordinate, and perform (or contract for the performance of) all the tasks necessary to migrate any incumbent earth station that receives or sends signals to a space station owned by that operator, whether the satellite service provider is in direct privity of contract with the earth station operator or indirectly through another entity; in short, the space station operator must provide a turnkey solution to the transition.[683] When a space station operator takes responsibility, its associated incumbent earth station operators need only facilitate the space station operator's completion of that earth station's relocation, for example, by helping with scheduling, providing access to facilities, and confirming the work performed.

293. The one exception to the 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 space station operator as necessary and performing all relocation actions on its own, including switching to alternative transmission mechanisms such as fiber.[684]

294. 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.[685] 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 seven 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. To be clear, a space station operator's associated incumbent earth stations will lose their interference protection for the relevant band once the space station operator has met its obligations under the Accelerated Relocation Deadline for Phase I or Phase II.[686]

295. 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 space station

[683] *See* AT&T Feb. 19, 2020 *Ex Parte* at 6 (seeking clarification of space station operator's responsibility to perform all clearing tasks to receive accelerated relocation payments).

[684] 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. We clarify that nothing in this *Report and Order* is intended to affect or change the terms of any private contractual arrangement.

[685] *See* SES Feb. 20, 2020 *Ex Parte*, Attach. at 5. SES asks that all relocation deadlines "be adjustable based on *force majeure* events, including government and court actions beyond the control of the eligible space station operators, on a day-by-day basis." *Id.* To the extent such events delay an eligible space station operator's transition, it should seek resolution through the process described herein.

[686] *See* AT&T Feb. 19, 2020 *Ex Parte* at 3. Such obligations include the process detailed in this *Report and Order* for submitting a Certification of Accelerated Relocation.

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.[687]

296. 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 space station operators' incentives with the Commission's goal of rapidly introducing mid-band spectrum into the marketplace.

297. 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. To the extent eligible space station operators can meet the Phase I and Phase II Accelerated Relocation Deadlines, they will be eligible to receive the accelerated relocation payments associated with those deadlines. And we agree with commenters that electing space station operators should receive reduced, but non-zero, accelerated relocation payments should they miss the specific deadlines. Indeed, commenters rightly argue that creating a "cliff" on the first day beyond the relevant deadline could create perverse incentives for space station operators to rush the relocation process at the expense of their customers (to avoid the loss of the entire payment), or to stop transition work entirely (since they could not get any accelerated relocation payment if they miss the deadline even by a day or a month).[688] We thus adopt a sliding scale of decreasing accelerated relocation payments that will provide enough of a "carrot" for space station operators to continue to accelerate their relocation even where they miss the relevant deadline while also maintaining a "stick" that does not render the accelerated relocation deadlines meaningless. Specifically, we adopt the following schedule of declining accelerated relocation payments for the six months following each Accelerated Relocation Deadline. If an incumbent space station operator cannot complete the transition within six months of the relevant Accelerated Relocation Deadline, its associated payment will drop to zero.

Date of Completion	Incremental Reduction	Accelerated Relocation Payment
By Deadline	--	100%
1-30 Days Late	5%	95%
31-60 Days Late	5%	90%
61-90 Days Late	10%	80%
91-120 Days Late	10%	70%
121-150 Days Late	20%	50%
151-180 Days Late	20%	30%
181+ Days Late	30%	0%

[687] Although we anticipate that flexible-use licensees may begin deploying and constructing their networks before all incumbents have cleared the band, we clarify that—absent the consent of affected incumbent earth stations—flexible-use licensees may not begin operations until either the filing of a validated Certification of Accelerated Relocation or the lapse of the Relocation Deadline.

[688] Letter from Patrick McFadden, Associate General Counsel, NAB, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 4 (filed Feb. 14, 2020); SES Feb. 20, 2020 *Ex Parte*, Attach. at 6; Letter from Michelle V. Bryan, Executive Vice President, General Counsel, and Chief Administrative Officer, Intelsat, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 4 (filed Feb. 20, 2020) (Intelsat Feb. 20, 2020 *Ex Parte*); Letter from Martin L. Stern and Robert A. Silverman, Counsel to QVC, Inc. and HSN, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, Attach. at 2 (filed Feb. 21, 2020) (QVC/HSN Feb. 21, 2020 *Ex Parte*).

298. 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, in good faith, 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 and make it available for public review in this docket 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.

299. The Bureau, Clearinghouse, and relevant stakeholders will have the opportunity to review the Certification of Accelerated Relocation and identify potential deficiencies.[689] We direct the Wireless Telecommunications Bureau to prescribe the form of any challenges by relevant stakeholders as to the validity of the certification, and to establish the process for how such challenges will impact the incremental decreases in the accelerated relocation payment. If credible challenges as to the space station operator's satisfaction of the relevant deadline are made, the Bureau will issue a public notice identifying such challenges and will render a final decision as to the validity of the certification no later than 60 days from its filing. Absent notice from the Bureau of any such deficiencies within 30 days of the filing of the certification, the Certification of Accelerated Relocation will be deemed validated.

300. 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. The Clearinghouse will collect and distribute the accelerated relocation payments. The Clearinghouse shall promptly notify overlay licensees following validation 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.[690] The Clearinghouse shall disburse accelerated relocation payments to relevant space station operators within seven days of receiving the payment from overlay licensees. Overlay licensees may begin operations in their respective blocks and PEAs upon notice of a validated Certification of Accelerated Relocation, and, as relevant, following payment of any required accelerated relocation payments.[691]

301. *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 May 29, 2020.

302. *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 June 12, 2020. The Transition Plan must describe in detail the necessary

[689] *See* NAB Feb. 14, 2020 *Ex Parte* at 3 (asking the Commission to seek information from stakeholders to confirm that the transition has been successfully completed); NPR Feb. 21, 2020 *Ex Parte*, Attach. at 2 (same); QVC/HSN Feb. 21, 2020 *Ex Parte*, Attach. at 2.

[690] 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.

[691] To the extent overlay licensees negotiate to clear incumbents from the band earlier than any deadlines, they may deploy service with the consent of affected incumbent earth stations earlier than the deadline—but only so long as they make all required payments to the Clearinghouse in a timely manner.

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.[692] Except where an incumbent earth station owner elects the lump sum payment and assumes responsibility for transitioning its own earth stations, eligible space station operators that elect Accelerated Relocation Payments are responsible for relocating all associated incumbent earth stations, and therefore must detail the details of such relocation in the Transition Plan.[693] To the extent an incumbent space station operator does not elect Accelerated Relocation Payments but nevertheless plans to assume responsibility for relocating its own associated incumbent earth stations, 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.

303. 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 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; (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;[694] (4) any necessary technology upgrades or other solutions, such as video compression or modulation, that the space station operator intends to implement; (5) the number and location of earth stations antennas currently receiving the space station 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 space station operator will implement the actions described in items (2)-(6).

304. We recognize that certain space station 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 space station operator's satellites.[695] Such space station 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.

305. Incumbent earth station operators, programmers, and other C-band stakeholders will have

[692] All required filings should be made in the docket for this proceeding, GN Docket No. 18-122.

[693] We encourage space station operators to coordinate with and seek input from associated incumbent earth station operators and other C-band satellite customers in developing their Transition Plans, and to work cooperatively with earth station operators—even those that elect a lump sum payment—during the transition. *See* QVC/HSN Feb. 21, 2020 *Ex Parte*, Attach. at 1 (requesting that satellite operators seek input from their customers in preparation of their transition plans); NCTA Feb. 21, 2020 *Ex Parte* at 2. We decline, however, to require space station operators to include all of their "express agreed commitments" to their customers in the transition plans, as QVC and HSN request, as such requirement would be overly burdensome. *See* QVC/HSN Feb. 21, 2020 *Ex Parte* at 2. The opportunity to comment on Transition Plans provides these customers the opportunity to raise concerns.

[694] While we recognize that space station 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 space station operators will be migrating customers to frequencies on a different operator's space station, the details of that arrangement between two space station operators would be deemed necessary information.

[695] *See* C-Band Alliance Reply at 15-16; C-Band Alliance Apr. 9, 2019 *Ex Parte*, Attach. at 1-5.

an opportunity to file comments on each Transition Plan by July 13, 2020.[696] The Wireless Telecommunications Bureau is directed to issue a Public Notice detailing the process for such notice and comment.

306. 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 or by relevant stakeholders during the comment window. Space station operators must make any necessary updates or resolve any deficiencies in their individual Transition Plans by August 14, 2020. After this date, space station operators may only make further adjustments to their individual plans with the approval of the Commission.

307. *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 manner.

308. If eligible space station operators elect accelerated relocation so that a supermajority (80%) of accelerated relocation 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.[697] 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.[698]

309. 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) coordinating 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. The search committee shall notify the Commission of its choice of Relocation Coordinator no later than July 31, 2020.

310. 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*

---

[696] Several commenters have asked the Commission to allow opportunity for stakeholders to comment on the Transition Plan. *See, e.g.*, NAB Feb. 21, 2020 *Ex Parte* at 2; AT&T Feb. 19, 2020 *Ex Parte* at 7; NPR Feb. 21, 2020 *Ex Parte*, Attach. at 3; ACA Connects Feb. 18, 2020 *Ex Parte* at 5; QVC/HSN Feb. 21, 2020 *Ex Parte*, Attach. at 1 (asking the Commission to allow satellite customers to comment on transition plans); Letter from Elizabeth Andrion, Senior Vice President, Regulatory Affairs, Charter Communications, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Feb. 21, 2020) (Charter Feb. 21, 2020 *Ex Parte*).

[697] Given that the space station operators have primary responsibility for transitioning their associated incumbent earth stations, we decline NCTA's request to include earth station operators in the search committee for the Relocation Coordinator. *See* NCTA Feb. 21, 2020 *Ex Parte* at 4.

[698] Because this approach for selecting the Relocation Coordinator does not require that the selected entity be a neutral third-party, it is possible that the search committee will select a consortium of eligible space station operators. We therefore reject SES's request that overlay licensees, rather than space station operators, pay for the costs of the Relocation Coordinator, as such an approach could lead to self-dealing on the part of the Relocation Coordinator and create unnecessary additional costs for overlay licensees. *See* SES Feb. 20, 2020 *Ex Parte*, Attach. at 10.

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.

311. In the event that the search committee fails to select a Relocation Coordinator and to notify the Commission by July 31, 2020, the search committee will be dissolved without further action by the Commission. In the event the search committee fails to select a Relocation Coordinator, or in the case that at least 80% of accelerated relocation payments are not accepted (and thus accelerated relocation is not triggered), the Commission will initiate a procurement of a Relocation Coordinator to facilitate the transition. Specifically, we direct the Office of the Managing Director to initiate a procurement process, and the Wireless Telecommunications Bureau to take other necessary actions to meet the Accelerated Relocation Deadlines (to the extent applicable to any given operator) and the Relocation Deadline.

312. 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 Payment 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. Once selected, we expect that the Relocation Coordinator will enter into one or more appropriate contracts with incumbent space station operators, overlay licensees, and their agents or designees.

313. 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 space station 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 migration and filtering, the Earth Station Transition Plan must provide timelines that ensure 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.

314. The Relocation Coordinator shall coordinate its operations with overlay licensees, who must ultimately pay for such relocation costs. The most efficient party to perform earth station migration actions or 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—and the Relocation Coordinator must, likewise, coordinate in good faith with incumbent space station operators—throughout the transition. The Relocation Coordinator will also be responsible for receiving notice from earth station operators or other satellite customers of any disputes related to comparability of facilities, workmanship, or preservation of service during the transition and shall

subsequently notify the Wireless Telecommunications Bureau of the dispute and provide recommendations for resolution.[699]

315. To protect the fair and level playing field for applicants to participate in the Commission's auction, beginning on the initial deadline for filing auction applications until the deadline for making post-auction down payments, the Relocation Coordinator must make realtime disclosures of the content and timing of, and the parties to, communications, if any, from or to applicants in the auction, as applicants are defined by the Commission's rule prohibiting certain auction-related communications.[700]

316. The Commission also agrees with commenters like Global Eagle and NAB that regularly-filed status reports would aid our oversight of the transition.[701] 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 to specify the form and format of such reports.

317. Finally, we reject Eutelsat's assertion that the Commission should require the Relocation Coordinator to be a neutral third party. Eutelsat argues that allowing the Relocation Coordinator to be selected by a supermajority vote representing at least 80% of the electing operators' accelerated relocation payments would give Intelsat and SES effective control over the Relocation Coordinator, leading to potential conflicts of interest.[702] Eutelsat argues that the Relocation Coordinator should, instead, be a neutral, independent third party akin to the Relocation Payment Clearinghouse.[703] We disagree. The Relocation Coordinator's responsibilities will require detailed coordination with space station operators and earth stations to assess the validity of Transition Plans and ensure that the space station operators meet their relocation deadlines. A truly independent Relocation Coordinator may not have the requisite knowledge or expertise to perform these essential functions and complete the transition in a timely manner. Given the complexity of the transition process, the importance of rapid clearing, and the need for ongoing coordination and cooperation with space station operators and their customers, we find that it is in the public interest for the Relocation Coordinator to be selected by parties representing the vast majority of the clearing responsibilities in the band. We also find that requiring the Relocation Coordinator to be a neutral, disinterested third party could create inefficiencies in the clearing process and endanger the successful completion of the transition. We note, however, that the Relocation Coordinator's responsibilities are the same vis-à-vis all incumbent space station operators and that it must operate in good faith to perform its duties on behalf of each incumbent operator.

---

[699] *See* NAB Feb. 21, 2020 *Ex Parte* at 2 (requesting real-time dispute resolution process during the transition for disputes related to facilities, workmanship, or preservation of service); ACA Connects Feb. 18, 2020 *Ex Parte* at 4 (seeking dispute resolution process, including reporting such disputes to the Wireless Telecommunications Bureau); QVC/HSN Feb. 21, 2020 *Ex Parte*, Attach. at 2; Charter Feb. 21, 2020 *Ex Parte* at 2.

[700] *See* 47 CFR § 1.2105(c). Because all applicants' communications with the Relocation Coordinator will be public as a result of this requirement and therefore available to other applicants, applicants must take care that their communications with the Relocation Coordinator do not violate the prohibition against communications by revealing bids or bidding strategies. Applicants further will have to consider their independent obligation to report potential violations to the Commission pursuant to auction rules.

[701] Global Eagle Comments at 9; NAB Reply at 7.

[702] *See* Eutelsat Feb. 13, 2020 *Ex Parte* at 2; Eutelsat Feb. 20, 2020 *Ex Parte* at 6-7.

[703] *See id.* ("Neutrality and independence of the Relocation Coordinator are vital, particularly in light of the large size of the proposed accelerated relocation payments. A conflicted Relocation Coordinator would face competitive incentives to favor the relocation activities of the satellite operators whose interests it shares, while impeding the transition efforts of their competitors.").

7. Other FSS Transition Issues

318. In this section, we address two additional issues related to the FSS Transition that were raised in the record.

319. *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.[704] 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.[705] 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.[706] 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 FSS will no longer share with point-to-point in the contiguous United States and we are not setting aside spectrum for point-to-multipoint or flexible use in the band on a shared basis with FSS using coordination 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 requires FSS licensees to keep their Commission registration 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.[707]

320. *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.[708] 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

[704] *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 para. 35.

[705] Google Comments at 7-8; Motorola Comments at 3.

[706] Google Comments at 8-9.

[707] *See* 47 CFR § 25.162(e) (protection from interference afforded by registration of a receiving earth station shall be automatically terminated if the Commission finds that the actual use of the facility is inconsistent with what was set forth in the registrant's application). *See also id.* § 25.161(b),(c) (a station authorization shall be terminated . . . if no authorized space station is functional in orbit or upon the removal or modification of the facilities which renders the station not operational for more than 90 days, unless specific authority is requested).

[708] C-Band Alliance Comments at 49-50.

this time to require earth stations to report to the Commission the actual frequencies and azimuths used.[709] 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.[710]

C. Fixed Use in the C-Band

321. We adopt rules to sunset as of December 5, 2023, incumbent point-to-point Fixed Service use under part 101 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 could complicate the continued use of the 4.0-4.2 GHz band by FSS licensees during and after the transition.

1. Sunsetting Incumbent Point-to-Point Fixed Services

322. 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.[711] 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.[712] Frequency coordination allows FSS and terrestrial fixed microwave to share the band on a co-primary basis but coordination of mobile systems would be more complicated because the movement of the devices would require analyses and interference mitigation to avoid harmful interference to/from both services.[713] 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.[714] 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.

323. We find that the relatively limited incumbent point-to-point Fixed Service use in this band may be accommodated by sunsetting primary operations in the 3.7-4.2 GHz band in the contiguous

[709] *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).

[710] *See, e.g.*, C-Band Alliance Comments, Exhibit 2 at 6, 8-12.

[711] *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., the 5.925-6.425 GHz band.

[712] *See* Universal Licensing System, https://wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp.

[713] *See, e.g.*, *NPRM*, 33 FCC Rcd at 6932, para. 47.

[714] *See, e.g.*, 47 CFR § 101.69.

United States as of December 5, 2023.[715] 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.[716] Specifically, existing licensees, as of April 19, 2018, of licenses for permanent Fixed Service operations will have until December 5, 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.[717] 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.[718] On the other hand, because we are not authorizing new flexible-use services outside of the contiguous United States 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 those 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.[719] 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.[720]

324. 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 band of at least equal quality in all pertinent respects.[721] 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."[722] CenturyLink states that grandfathered and new point-to-point services 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."[723] 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

[715] *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 and Order*, 30 FCC Rcd at 4075, para. 400).

[716] *NPRM*, 33 FCC Rcd at 6932, para. 48. Nothing in this *Report and Order* is intended to preclude parties from privately negotiating to accomplish earlier clearing of Fixed Service operations.

[717] Point-to-point Fixed Service 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.

[718] 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 Fixed Service 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); FWCC 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 FWCC regarding compensation for relocation).

[719] *See* 5 U.S.C. § 553(d)(1).

[720] *See id.* § 553 (d)(3).

[721] FWCC May 3 PN Comments at 3.

[722] FWCC Comments at 7; CenturyLink Reply at 2 (stating that it has links in the band, some serving E911 and Federal Aviation Administration 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.

[723] CenturyLink Reply at 2.

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.[724] 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.[725] 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.[726]

325. In the *NPRM*, the Commission also sought comment on whether to treat those with permanent licenses differently from those with temporary licenses.[727] The 36 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.[728] 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 36 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 36 licensees will have until December 5, 2023, to modify or replace their temporary fixed 3.7-4.2 GHz band equipment with comparable 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.

326. *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 December 5, 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.[729] 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

[724] *See, e.g.*, FWCC May 3 PN Comments at 3.

[725] *See, e.g.*, 47 CFR § 101.147(a).

[726] *See* 47 U.S.C. §§ 301, 302, 303(c), (f), (g), and (r); *see also id.* § 157.

[727] *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 id.* § 101.31(a)(1).

[728] *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).

[729] *See, e.g.*, 47 CFR § 101.73(d) (defining comparable facilities as facilities possessing certain characteristics in terms of throughput, reliability, and operating costs as compared to the incumbent's existing facilities). Parties may negotiate to accomplish early clearing of Fixed Service operations, including through agreements to make premium payments.

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.

327. *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.

328. 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.[730] 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 36 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

329. 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.

330. 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.[731] Although some commenters support variations of rules that would license non-geographic, unauctioned point-to-multipoint Fixed Service use of the 3.7-4.2 GHz band,[732] a number of commenters oppose the proposal.[733] Commenters emphasize that licensing point-to-multipoint Fixed Service before or during the transition would substantially devalue the spectrum

[730] *See, e.g.*, ET Docket No. 00-258, Report of the CTIA Spectrum Clearinghouse, LLC, at 2 (filed Jan. 31, 2019).

[731] *NPRM*, 33 FCC Rcd at 6951-52, para. 116.

[732] *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; FWCC 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.

[733] *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.

for flexible use, increase the costs of the transition, and undermine market-based approaches to placing this spectrum to its most valued use.[734]

331. 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

332. 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.

333. We 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."[735] Such groups have been successful in the past in providing the Commission with valuable insights and useful information regarding spectrum transitions for new uses.[736] We believe that such a multi-stakeholder group could provide valuable insight into the complex coexistence issues in this band and provide a forum for the industry to work cooperatively towards efficient technical solutions to these issues. We encourage the industry to convene a group of interested stakeholders to develop a framework for interference prevention, detection, mitigation, and enforcement in the 3.7-4.2 GHz band.[737] We also encourage any multi-stakeholder group that is formed to consider best practices and procedures to address issues that may arise during the various phases of the C-band transition and to consider coexistence issues related to terrestrial wireless operations below 3.7 GHz. To ensure that all viewpoints are considered, we encourage industry to include representatives of incumbent earth stations (including MVPDs and broadcasters), incumbent space station operators, wireless network operators, network equipment manufacturers, and aeronautical radionavigation equipment manufacturers. We do not, however, take a position on the exact makeup or organizational structure of any such stakeholder group.[738]

334. We direct the Office of Engineering and Technology to act as a liaison for the Commission with any such multi-stakeholder group so formed. In particular, we expect the Office to observe the functioning of any such group and the technical concerns aired to keep an ear to the ground,

---

[734] *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.

[735] *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).

[736] For example, after the Commission created the Citizen's Broadband Radio Service, the Wireless Innovation Forum stood up the Spectrum Sharing Committee to serve as a common industry and government standards body to support the development and advancement of Citizen's Broadband Radio Service Standards. *See* https://cbrs.wirelessinnovation.org/about.

[737] *See* Letter from Elizabeth Andrion, Senior Vice President, Regulatory Affairs, Charter Communications to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 2 (filed Feb. 20, 2020) (Charter Feb. 20, 2020 *Ex Parte*).

[738] At this time, we find it unnecessary to establish a deadline for the multi-stakeholder group, as AT&T requests. *See* AT&T Feb. 19, 2020 *Ex Parte* at 9.

as it were, on technical developments that come to light as the relocation process occurs. We also expect the Office to provide guidance to any such group on the topics on which it would be most helpful for the Commission to receive input and a sense of the time frames in which such input would be helpful.

1. Power Levels

335. *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.[739] 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.[740] 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.

336. 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.[741] 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."[742] 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."[743] 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.[744]

337. 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.[745] 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.[746] We also find that the protection mechanisms we

[739] *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.

[740] *See, e.g.*, 47 CFR § 27.50(d)(1).

[741] *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.

[742] CTIA Comments at 23 (quoting *NPRM* at para. 164); Samsung July 19 PN Reply at 4 (quoting *NPRM* at para. 164).

[743] Ericsson Comments at 19.

[744] T-Mobile Reply at 38.

[745] *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.

[746] *See, e.g.*, U.S. Cellular Corporation July 19 PN Comments at 2; T-Mobile July 19 PN Comments at 18.

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-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.[747]

338. 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.[748] 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 the band for broadband applications.[749] 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.[750] 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.

339. We also decline to adopt a maximum power limit of 75 dBm EIRP, summed over all antenna elements.[751] While the Commission sought comment on this limit in the *NPRM*, it received little support on the record[752] and several parties claimed that such a limit could hinder network deployments.[753] The C-Band Alliance argues that a maximum power limit is unnecessary as long as adequate earth station protection levels are established.[754] Samsung argues that the limit would

[747] *Compare* C-Band Alliance Comments, Technical Annex at 9, *with* C-Band Alliance May 13, 2019 *Ex Parte* at 12.

[748] *NPRM*, 33 FCC Rcd at 6969-70, para. 164.

[749] Verizon Jan. 31, 2020 *Ex Parte* at 2-3.

[750] *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 para. 25.

[751] *NPRM*, 33 FCC Rcd at 6970, para. 165.

[752] 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).

[753] Ericsson Comments at 19; CTIA Comments at 24; AT&T Reply at 22.

[754] C-Band Alliance May 13, 2019 *Ex Parte* at 12.

unnecessarily limit the use of wide channel bandwidths, which are crucial to 5G deployments to deliver high data rates and use "multi-input, multi-output" techniques.[755] We agree and find that an upper limit could hinder flexibility to deploy wider bandwidth technologies[756] without any corresponding benefit, as 3.7-3.98 GHz band licensees will design their systems to protect earth station locations around their deployments.

340. *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.[757] 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.[758]

341. While a few commenters suggest allowing higher power limits,[759] 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.[760]

342. Similarly, we disagree with commenters that suggest lower mobile power limits consistent with those in the 3.5 GHz band.[761] 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

343. *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.[762] 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.

344. 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

[755] Samsung July 19 PN Reply at 4.

[756] 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.

[757] *See* 3GPP 38.101-1 NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone (Release15).

[758] *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.

[759] CTIA Comments at 24; Qualcomm Comments at 8.

[760] *NPRM*, 33 FCC Rcd at 6971, para. 167.

[761] 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.

[762] *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.[763] For example, T-Mobile warns that "more stringent emission limits will diminish the utility of the band and threaten coverage."[764] 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."[765] 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.[766] 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. The C-Band Alliance supports the OOBE limits contained in the 3GPP standard for band n77.[767] 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 megahertz 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.

345. 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).[768] 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 OOBE 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.[769] 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,[770] we do not believe it is necessary to specify additional levels of suppression further outside the band as suggested by Nokia and Ericsson.

346. For base station OOBE, we apply the part 27 measurement procedures and resolution bandwidth that are used for AWS devices outlined in section 27.53(h).[771] Specifically, a resolution

[763] *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 log10(P) dB after 20 MHz and 90 + 10 log10(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.

[764] T-Mobile Comments at 32.

[765] Verizon Comment at 23.

[766] 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.

[767] C-Band Alliance July 19 PN Comments at 34.

[768] Nokia July 19 PN Comments at 2.

[769] Ericsson Reply at 9.

[770] 3GPP Standard TS 38.104, version 16.1.0, clause 6.6.4.2.1 for Category A base stations,

[771] *See* 47 CFR § 27.53(h)(3), (4).

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."[772] 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.

347. *Mobile Out-of-Band Emissions*.—As with base station out-of-band emission limits, we 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.

348. This limit is widely supported by the comments.[773] 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.[774] Verizon supplemented its emission limit recommendation to relax the emission limit within the first five megahertz from the channel edge in order to conform to the OOBE limits contained in the 3GPP standard for band n77.[775] We note that those emission masks vary by channel bandwidth. We agree that requiring limits more stringent than the 3GPP requirements "could prevent user equipment that operates on wide channel bandwidths from being certified for use in the United States."[776] We adopt a relaxation of the emission limit within the first five megahertz of the channel edge by varying the resolution bandwidth used when measuring the emission. For emissions within 1 megahertz from the channel edge, the minimum resolution bandwidth will be either one percent of the emission bandwidth of the fundamental emission of the transmitter or 350 kilohertz. In the bands between one and five megahertz removed from the licensee's authorized frequency block, the minimum resolution bandwidth will be 500 kilohertz. The adopted relaxation will not affect the interference to FSS above 4.0 GHz. The adopted relaxation will be entirely contained within the 20 megahertz guard band. The effect on Citizens Broadband Radio Service operations below 3.7 GHz should be minimal. 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.

349. We note that the C-Band Alliance proposed a more stringent mobile equipment emission mask,[777] but later supported emission masks developed by standards bodies suitable for 5G devices.[778] As with the requirements for base stations, our approach will provide equipment developers and adjacent

[772] Verizon Comments at 24.

[773] *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 ± 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.

[774] Qualcomm July 19 PN Comments at 4.

[775] Verizon Feb. 21, 202 *Ex Parte* at 2.

[776] *Id* at 2.

[777] C-Band Alliance May 13, 2019 *Ex Parte* at 14.

[778] C-Band Alliance July 19 PN Comments at 34.

channel licensees certainty as compared to the 3GPP 5G OOBE 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.

350. 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 OOBE limits.[779] 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.[780]

3. Antenna Height Limits

351. 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.[781] This is consistent with part 27 AWS rules, which generally do not impose antenna height limits on antenna structures.

352. Commenters generally support adopting 3.7-3.98 GHz band rules similar to existing part 27 rules to promote consistency,[782] and AT&T specifically supports the proposal in the *NPRM* for flexible antenna height regulations.[783]

353. 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

354. We adopt the -76 dBm/m^2/MHz power flux density (PFD) 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.[784]

355. The commenters that specifically address the service area boundary limit support the -76 dBm/m^2/MHz PFD limit.[785] 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.

---

[779] *See* 47 CFR § 27.53(h)(4).

[780] *Id.* § 27.53(i).

[781] *See id.* § 27.56.

[782] Verizon Comments at 23; T-Mobile Reply at 31.

[783] AT&T Reply at 23.

[784] *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).

[785] AT&T Comments at 19; Verizon Comments at 26; Ericsson Comments at 22; T-Mobile Comments at 35.

5. International Boundary Requirements

356. We adopt our proposal to apply section 27.57(c) of our rules to this band, 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

357. 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 part 1, subpart BB of the Commission's rules (Disturbance of AM Broadcast Station Antenna Patterns) for operations in the 3.7-3.98 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.[786]

358. 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.[787] We agree that cross band operability is important to ensure a robust equipment market for all licensees.

7. Protection of Incumbent FSS Earth Stations

359. 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.[788] 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.[789] 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.[790]

360. We will require a PFD limit of -124 dBW/m^2/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 megahertz (Phase 1 of the transition), the limit will apply to all emissions within the 3.82-4.2 GHz band. We also require a PFD limit of -16 dBW/m^2/MHz applied across the 3.7-3.98 GHz band at the earth station antenna as a means to prevent

[786] *See, e.g.*, Verizon Comments at 23; T-Mobile Comments at 31.

[787] 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).

[788] *See* C-Band Alliance July 19 PN Comments at Attach. A.

[789] *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.

[790] *See* T-Mobile Feb. 3, 2020 *Ex Parte* at Attach.

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

361. We adopt a 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/m^2/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.

362. 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 each FSS earth station receiver.[791] 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 station[792] and a defined reference antenna.[793] Several commenters argue that the C-Band Alliance's proposal is overly protective and would hinder 5G deployment.[794] 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.[795] Intelsat recommended a PFD level of -134 dBW/m^2/MHz.[796] AT&T recommends adopting a PFD limit of -124 dBW/m^2/MHz for 5G operations in the 50 megahertz immediately below the FSS band edge.[797] 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.

363. 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 PSD limit.[798] 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,[799] interference-to-noise (I/N) protection threshold of -6 dB,[800] a 142.8K FSS earth station receiver noise temperature,[801] and results in a calculated PFD of -120 dBW/m^2/MHz.[802] To

[791] *See* C-Band Alliance July 19 PN Comments at Attach. A.

[792] 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.

[793] The C-Band Alliance's proposal urges that PSD levels not exceed an in-band PSD of -59 -10 $\log_{10}$(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.

[794] *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.

[795] AT&T July 19 PN Comments at 6.

[796] Intelsat Feb. 21, 2020 *Ex Parte* at 3.

[797] *See* AT&T October 22, 2019 *Ex Parte* at 2.

[798] C-Band Alliance July 19 PN Comments at 26-29, 33, Appendix A.

[799] *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. 32-25log(Θ) = 0 for Θ = 19°.

[800] *See* Motorola July 19 PN Comments at 2.

[801] *See* FCC 16-55, Order on Reconsideration and 2nd R&O, at 257.

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/m^2/MHz - 4 dB = -124 dBW/m^2/MHz as the PFD limit to protect earth stations from out-of-band emissions.[803] We find that using these parameters to calculate a PFD limit is reasonable and will adequately protect FSS earth station receivers from out-of-band emissions from fixed and mobile operations in the 3.7-3.98 GHz band.

364. 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.[804] 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.[805] 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.

365. 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.[806] 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.[807] 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

366. We will require base stations and mobiles to meet a PFD limit of -16 dBW/m^2/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.

367. 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

(Continued from previous page)

[802] PFD (dBW/m^2/MHz) = 10*log[(kT)*(4π/λ^2)*(I/N)*(10^{-6} MHz/Hz)] = (-228.6 dBW/Hz) + 10*log(142.8) + 33.5 dB/m^2 - 6 dB (I/N) + 60 dB-Hz/MHz = -120 dBW/m^2/MHz.

[803] *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.

[804] C-Band Alliance July 19 PN Comments at 32-34 & Attach. at 2-3.

[805] AT&T June 6, 2019 Ex Parte at 8.

[806] C-Band Alliance July 19 PN Comments at 30.

[807] 35*log$_{10}$(1,030/970) = 0.91 dB

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.[808] 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.[809] 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 stations to reduce their susceptibility to blocking.[810] 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:[811]

Frequency Range	Attenuation
From 3.7 GHz to 100 megahertz below FSS band edge	-70 dB
From 100 megahertz below lower FSS band edge to 20 megahertz below lower FSS band edge	-60 dB
From 20 megahertz below lower FSS band edge to 15 megahertz below lower FSS band edge	-30 dB
From 15 megahertz below lower FSS band edge to lower FSS band edge	0 dB

368. 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.

369. The C-Band Alliance notes that filters have been used in earth stations around the world to mitigate interference for many decades.[812] American Cable Association, however, believes that filters have proven of dubious effectiveness.[813] 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.[814] 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.[815] While we

[808] Ericsson Jan. 13, 2020 *Ex Parte* 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).

[809] C-Band Alliance July 19 PN Comments at 37.

[810] The APSD threshold proposed by C-Band Alliance is given by $[-59 - 10log_{10}(BW_{MHz}) - 10log_{10}(n)]$ dBm/MHz. *See* C-Band Alliance July 19 Comments, Attachment at 1-2.

[811] *See* C-Band Alliance Comments at 31.

[812] *See* C-Band Alliance March. 4, 2019, Further Technical Statement at 10.

[813] *See* American Cable Association Reply at 8.

[814] *Id.* at 8-9.

[815] *See* Verizon Reply at 7.

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.

370. We adopt a 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. 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 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 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 is not needed to provide adequate protection for earth stations.

371. 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).[816] 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 3.7 GHz Service 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.[817] Based on these parameters, we adopt a PFD blocking limit of -16 dBW/m^2/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 decline to adopt Intelsat's request to set the PFD blocking limit to -30 dBW/m2/MHz, which incorrectly asserts that aggregation was not included in the calculation of the value.[818] 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

372. 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.[819] For example, the C-Band Alliance proposed limiting the orbital arc of satellites that may serve earth

[816] *See* C-Band Alliance Comments, Technical Annex, at 5. Also see C-Band Alliance Mar. 4, 2019 *Ex Parte* at 11-13. An LNB is a receiver component that converts the received signal frequency to a different frequency for decoding or other signal processing.

[817] The OOBE limit for base stations in the guard band is -13 dBm/MHz.

[818] Intelsat Feb. 21, 2020 *Ex Parte* at 4.

[819] *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.

stations in the contiguous United States to 87° W.L. and 139° W.L.[820] 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.

8. Protection of TT&C Earth Stations

373. 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 and Operations at Protected Sites

374. According to the record, there are 14 unique locations in the contiguous United States where earth stations are currently providing TT&C functions in the C-band.[821] 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.[822] Specifically, they identified Brewster, WA and Hawley, PA as two locations where consolidated TT&C could be located.[823] 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."[824] The space station operators must identify the four consolidated TT&C locations as soon as feasible, but not later than the submission of the

[820] 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.

[821] C-Band Alliance Comments, Technical Annex at 3. Lockheed Martin has identified an additional site in Carpentersville, New Jersey, where it provides TT&C functions during Launch and Early Operations Phase missions. Lockheed Martin Comments at 7-9; Lockheed Martin Feb 14, 2020 *Ex Parte*; Lockheed Martin Feb 18, 2020 *Ex Parte*.

[822] C-Band Alliance July 19 PN Comments at 30.

[823] *Id.* at 30.

[824] C-Band Alliance Jan. 14, 2020 *Ex Parte.*

Transition Plan.[825] Should the incumbent space station operators fail to come to consensus, we expect that SES would identify two locations and Intelsat would identify the other two locations.[826] The Commission's Wireless Telecommunications Bureau will assess the proposed locations, including consideration of the criteria proposed by C-band Alliance, 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.

375. 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 December 5, 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 December 5, 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 December 5, 2021, the space station operators will work to consolidate TT&C sites to four locations and ensure operations are adequately protected through coordination. After that date, operations that are not relocated may continue on an unprotected basis.

376. Further, until December 5, 2030, 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.

377. 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.

378. Lockheed Martin provides Launch and Early Operations Phase (LEOP) missions for new satellites. They state that the earth station, located in Carpentersville, NJ, has a unique topography that "ensures that interference from the facility is highly unlikely and has historically resulted in no known interference from Lockheed Martin's operations to other users of the band."[827] They requested that these LEOP operations be allowed to continue through use of the Commission's Special Temporary Authority ("STA") licensing mechanism. We agree that such operations may seek authorization through the STA process.

379. We also find that earth stations located at TT&C sites may continue to be used—on an

[825] X2nSat requests that the Commission designate the TT&C site located in Las Cruces, New Mexico as one of the four protected TT&C sties. X2nSat Feb. 13, 2020 Ex Parte at 1. We decline the invitation because X2nSat's arguments do not address the key criteria we expect the space station operators will use to make their selections.

[826] Intelsat Feb. 19, 2020 *Ex Parte* at 7. Consistent with the key criteria laid out here, we expect that all incumbent space station operators will have the opportunity to co-locate their TT&C and international gateways at these four sites. And such a requirement, of course, does not preclude any other incumbent space station operator from suggesting alternative locations to the Bureau that it thinks better meet the identified criteria.

[827] Lockheed Martin Feb. 14, 2020 *Ex Parte.*

unprotected basis—for international gateway and other operations in the 3.7-4.0 GHz band. According to the C-band Alliance, these sites are critical ingestion points for a variety of customer services, including foreign language programming uplinked outside of the U.S, that require the use of the full 3.7-4.2 GHz band.[828] SES contends that operations at these locations should be permitted to continue in the 3.7-4.0 GHz band on a protected basis.[829] Intelsat argues that the Commission should permit FSS operations at designated TT&C sites on a secondary basis.[830]

380. We agree with NAB and find that it is in the public interest to allow earth stations located at the four designated TT&C sites to continue to use the 3.7-4.0 GHz band for international gateway, and other purposes, on an unprotected basis during the TT&C transition period. Such uses will not cause harmful interference to terrestrial deployments in the band and will not be protected from harmful interference. As such, permitting these operations will not affect future deployments by flexible use licensees or delay the transition of the band. Extending interference protection to these operations, as requested by SES and C-band Alliance, could effectively preclude terrestrial operations across a wide geographic area near each TT&C facility across the entire 3.7-4.0 GHz band. This outcome would be inconsistent with the Commission's goals for this proceeding and the transition plan detailed herein.

381. We decline to adopt Disney and Eutelsat's requests to allow secondary or unprotected FSS operations in the 3.7-4.0 GHz band nationwide.[831] Expanding FSS access to the 3.7-4.0 GHz band during the transition period—even on an unprotected basis—could introduce uncertainty into the transition process and raise doubts about the availability of the band for new flexible use services. Such uses also create a perverse incentive for space station operators and earth station operators not to complete their transition work on schedule—leading to potential harmful interference or delays in making the spectrum available for next-generation services like 5G. In contrast, we agree with NAB that these operations should be permitted to continue in the 3.7-4.0 GHz band on an unprotected basis at designated TT&C sites during the 10-year TT&C transition period, or longer if agreements can be negotiated with terrestrial wireless operators.[832] If all of the overlay licensees in the relevant PEA(s) agree that extending the use of any or all of these four TT&C sites for FSS operations is the highest and best use of the spectrum in the area, we find no public policy justification to intervene in such a voluntary transaction and second-guess the market.

b. Co-Channel Protection Criteria

382. 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

[828] *See* C-Band Alliance Jan. 14, 2020 *Ex Parte* at 8.

[829] *Id.* at 8-9; SES Feb. 20, 2020 *Ex Parte*, Attach. at 11.

[830] *See* Intelsat Feb. 21, 2020 *Ex Parte* at 2.

[831] *See* Disney and ESPN Feb. 21, 2020 *Ex Parte* at 3 (requesting that earth stations be permitted to "continue to receive international programming from non-CONUS satellites on a secondary, non-protected basis in the lower 300 MHz of the C-band."); Eutelsat Feb. 20, 2020 *Ex Parte* at 6.

[832] *See* NAB Feb. 14, 2020 *Ex Parte* at 5-6.

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.

383. 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.[833] 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.[834] But if a low elevation angle is unavoidable, an operator may be able to use technical solutions to achieve the necessary reliability.[835] It is understood that low elevation angles may be needed during infrequent events such as the loss of a satellite.

384. 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.

385. 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.

---

[833] *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).

[834] *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.

[835] *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).

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.

386. While the C-Band Alliance contends that the critical nature of TT&C operations warrants a coordination zone of 150 km around all sites;[836] others argue that this distance is overly conservative.[837] 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.[838] 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.[839] T-Mobile supports coordination of TT&C on a 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.[840]

387. 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

388. 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 more 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.

389. To provide protection from potential receiver overload, we will require base stations and mobiles to meet a PFD limit of -16 dBW/m^2/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

[836] C-Band Alliance July 19 PN Comments at 29; *see also* Intelsat Feb. 21, 2020 *Ex Parte* at 3 (asserting that a coordination distance of at least 100 km is needed).

[837] AT&T May 23, 2019 *Ex Parte* at 5, 15-16; Wireless Internet Service Providers Association Aug. 21, 2019 *Ex Parte* at 3.

[838] AT&T May 23, 2019 *Ex Parte* at 5, 15-16.

[839] Ericsson May 31, 2018 Comments at 5.

[840] T-Mobile Comments at 34.

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. Intelsat now claims that the protected bandwidth on both sides of the TT&C's telemetry signal must be at least 25 megahertz.[841] But given that TT&Cs typically use a channel bandwidth of 400 to 800 kilohertz, we find this claim to be excessive. 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

390. The nearby 4.2-4.4 GHz band is allocated to Aeronautical Radionavigation and aeronautical mobile (route) services worldwide.[842] This band is home to radio altimeters and 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.

391. 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 minimum guard band requirement discussed in initial comments by Boeing and ASRC.[843]

392. A set of preliminary test results prepared by the Aerospace Vehicle Systems Institute was provided to the Commission after the comment and reply 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 PSD 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."[844] AVSI noted that as the amount of active spectrum increased above 3.9 GHz, the acceptable levels of PSD began to decrease.

---

[841] Intelsat Feb. 21, 2020 *Ex Parte* at 3.

[842] 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.

[843] *See* Boeing Reply at 5-6; Aviation Spectrum Resources Comments 5-6.

[844] *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).

393. T-Mobile commissioned a study by Alion to review the AVSI report and they raised several concerns.[845] 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.[846] Alion questioned the interference margin assumptions,[847] 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."[848]

394. In subsequent filings, the AVSI again claims that some receivers may be susceptible to performance degradation, but expressly recognizes that "further analysis is required to consider more sophisticated propagation models and other coupling paths and, as appropriate, to characterize statistical likelihood of interference levels."[849]

395. We agree with T-Mobile and Alion that the AVSI study does not demonstrate that harmful interference would likely result under reasonable scenarios (or even reasonably "foreseeable" scenarios to use the parlance of AVSI). We find the limits we set for the 3.7 GHz Service are sufficient to protect aeronautical services in the 4.2-4.4 GHz band. Specifically, the technical rules on power and emission limits we set for the 3.7 GHz Service and the spectral separation of 220 megahertz should offer all due protection to services in the 4.2-4.4 GHz band. We nonetheless agree with AVSI that further analysis is warranted on why there may even be a potential for some interference given that well-designed equipment should not ordinarily receive any significant interference (let alone harmful interference) given these circumstances. As such, we encourage AVSI and others to participate in the multi-stakeholder group that we expect industry will set up—and as requested by AVSI itself.[850] We expect the aviation industry to take account of the RF environment that is evolving below the 3980 MHz band edge and take appropriate action, if necessary, to ensure protection of such devices.

10. Coexistence with the Citizens Broadband Radio Service

396. 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 3.55-3.7

[845] Letter from Steve B. Sharkey, Vice President, T-Mobile, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 2 and Attach. at 2 (T-Mobile Jan. 22, 2020 *Ex Parte*).

[846] *Id.*, Attach. at 8.

[847] *Id.*, Attach. at 4 ("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.").

[848] *Id.*, Attach. at 7.

[849] Aerospace Vehicle Systems Institute Feb. 19, 2020 *Ex Parte* at 12; Aerospace Vehicle Systems Institute Feb. 4, 2020 *Ex Parte*, "AFE 76s2 Report: Effect of Out-of-Band Interference Signals on Radio Altimeters, Issue 1.0" attachment to letter of Dr. David Redman; Aviation Spectrum Resources, Inc. Feb. 19, 2020 *Ex Parte*.

[850] Aerospace Vehicle Systems Institute Feb. 19, 2020 *Ex Parte* at 4.

GHz band,[851] 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." [852] 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."[853] Further, we deny requests that we require coordination between Citizens Broadband Radio Service and 3.7 GHz Service operations, but we encourage parties to explore synchronization of TDD operations to minimize interference between these adjacent services.[854]

397. 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.[855] 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

398. *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,[856] we previously sought specific comment on how we might "further reduce the information collection burden for small

[851] Federated Wireless Reply at 7; Letter from Jennifer M. McCarthy, Vice President, Legal Advocacy, Federated Wireless, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 2 (filed Oct. 31, 2019); Dynamic Spectrum Alliance Comments at 6.

[852] Ericsson Comments at 6-7.

[853] *Id.*

[854] Charter Feb. 20, 2020 *Ex Parte* at 1-2; Letter from Aryeh B. Fishman, Associate General Counsel, Regulatory Legal Affairs, Edison Electric Institute, Liz Sachs, Counsel, Enterprise Wireless Association, Frank Korinek, Director of Government Affairs, Motorola Solutions, Inc., James Crandall, Associate, American Petroleum Institute, and Brett Kilbourne, Vice President, Policy, and General Counsel, Utilities Technology Council (Industrial Internet of Things ("IIoT") Coalition), to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 1 (filed Feb. 14, 2020); Letter from Jennifer M. McCarthy, Vice President, Legal Advocacy, Federated Wireless, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 2 (filed Feb. 5, 2020).

[855] Verizon Nov. 12, 2019 *Ex Parte* at 2.

[856] Pub. L. No. 107-198.

business concerns with fewer than 25 employees."[857] 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 B.

399. *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).

400. *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."[858] The FRFA concerning the impact of the rule changes contained in the *Report and Order* is attached as Appendix B.

401. *Ex Parte Presentations*.—This proceeding shall be treated as a "permit-but-disclose" proceeding in accordance with the Commission's *ex parte* rules.[859] 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.

402. *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.

[857] 44 U.S.C. § 3506(c)(4).

[858] 5 U.S.C. §§ 601 *et seq*.

[859] 47 CFR §§ 1.1200 *et seq.*

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

- All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th St., SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes and boxes must be disposed of before entering the building.
- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9050 Junction Drive, Annapolis Junction, MD 20701.
- U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554.

404. 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).

405. *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

406. Accordingly, IT IS ORDERED that, pursuant to sections 1, 2, 4(i), 4(j), 5(c), 201, 302, 303, 304, 307(e), 309, 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), 309, and 316, this *Report and Order* IS HEREBY ADOPTED.

407. 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 25.138(a)-(b); 25.147(a)-(c); 27.14(w)(1-4); 27.1412(b)(3)(i); 27.1412(c); 27.1412(c)(2); 27.1412(d)(1)-(2); 27.1412(f)-(h); 27.1413(a)(2)-(3); 27.1413(c)(3); 27.1413(c)(7); 27.1412(b)(3)(i); 27.1412(c); 27.1413(a)(2)-(3); 27.1413(b); 27.1413(c)(3)(i); 27.1414(b)(3); 27.1414(b)(4)(i); 27.1414(b)(4)(iii); 27.1414(c)(1)-(3); 27.1412(d)(1)-(2); 27.1412(f); 27.1412(g); 27.1414(c)(3)(ii); 27.1414(c)(6)-(7); 27.1414(b)(4)(iii); 27.1414(c)(1)-(2); 27.1415; 27.1415(a); 27.1416(a); 27.1417; 27.1419; 27.1421; 27.1422(c); 27.1424; 101.101(2) 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 Sections 25.138(a)-(b); 25.147(a)-(c); 27.14(w)(1-4); 27.1412(b)(3)(i); 27.1412(c); 27.1412(c)(2); 27.1412(d)(1)-(2); 27.1412(f)-(h); 27.1413(a)(2)-(3); 27.1413(c)(3); 27.1413(c)(7); 27.1412(b)(3)(i); 27.1412(c); 27.1413(a)(2)-(3); 27.1413(b); 27.1413(c)(3)(i); 27.1414(b)(3); 27.1414(b)(4)(i); 27.1414(b)(4)(iii); 27.1414(c)(1)-(3); 27.1412(d)(1)-(2); 27.1412(f); 27.1412(g); 27.1414(c)(3)(ii); 27.1414(c)(6)-(7); 27.1414(b)(4)(iii); 27.1414(c)(1)-(2); 27.1415; 27.1415(a); 27.1416(a); 27.1417; 27.1419; 27.1421; 27.1422(c); 27.1424; 101.101(2) to be revised accordingly.

408. IT IS FURTHER ORDERED that the freeze on applications for new FSS earth stations in the 3.7-4.2 GHz band outside of the contiguous United States and on applications for new point-to-point microwave Fixed Service sites outside of the contiguous United States will be lifted on the date of publication of this *Report and Order* in the Federal Register.

409. 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 paragraphs 123-125, 321, 323, 325, these modification conditions will be effective 60 days after publication of this *Report and Order 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 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.

410. 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*.

411. 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.

412. 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).

413. 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.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A

Final 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 § 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, of this chapter); 1.6 GHz Service (part 27, subpart J); 24 GHz Service and Digital Electronic Message Services (part 101, subpart G, of this chapter); 218-219 MHz Service (part 95, subpart F, of this chapter); 220-222 MHz Service, excluding public safety licenses (part 90, subpart T, of this chapter); 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, of this chapter); Broadband Personal Communications Service (part 24, subpart E, of this chapter); Broadband Radio Service (part 27, subpart M); Cellular Radiotelephone Service (part 22, subpart H); Citizens Broadband Radio Service (part 96, subpart C, of this chapter); 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, of this chapter); Upper Microwave Flexible Use Service (part 30 of this chapter); and Wireless Communications Service (part 27, subpart D).

* * * * *

3. Amend § 1.9005 by removing the word "and" at the end of paragraph (kk); removing the period at the end of paragraph (ll) and adding "; and" in its place; and adding paragraph (mm).

The addition reads 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. Amend § 2.106 by revising page 41 of the Table of Frequency Allocations and adding footnote NG182 and revising footnote NG457A in the list of Non-Federal Government (NG) Footnotes to read as follows:

§ 2.106 Table of Frequency Allocations.

* * * * *

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 5.435	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)
			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	3700-4000 FIXED MOBILE except aeronautical mobile NG182 NG457A	Wireless Communications (27)
				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 5.149 5.339 5.443			US113 US245 US342	4800-4940 US113 US342	
			4940-4990 5.339 US342 US385 G122	4940-4990 FIXED MOBILE except aeronautical mobile 5.339 US342 US385	Public Safety Land Mobile (90Y)
4990-5000 FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY Space research (passive) 5.149			4990-5000 RADIO ASTRONOMY US74 Space research (passive) US246		

* * * * *

NON-FEDERAL GOVERNMENT (NG) FOOTNOTES

* * * * *

NG182 In the band 3700-4200 MHz, the following provisions shall apply:

(a) Except as provided in paragraph (c)(1) of this footnote, 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 4000-4200 MHz. 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 3700-4000 MHz is also allocated to the fixed-satellite service (space-to-Earth) on a primary basis.

(c) In the contiguous United States, i.e., the contiguous 48 states and the District of Columbia as defined by Partial Economic Areas Nos. 1-41, 43-211, 213-263, 265-297, 299-359, and 361-411, which includes areas within 12 nautical miles of the U.S. Gulf coastline (*see* § 27.6(m) of this chapter), the following provisions apply:

(1) Incumbent use of the fixed-satellite service (space-to-Earth) in the band 3700-4000 MHz is subject to the provisions of §§ 25.138, 25.147, 25.203(n) and part 27, subpart O, of this chapter;

(2) Fixed service licensees authorized as of April 19, 2018, pursuant to part 101 of this chapter, must self-relocate their point-to-point links out of the band 3700-4200 MHz by December 5, 2023;

(3) In the band 3980-4000 MHz, no new fixed or 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 § 25.103 by adding the definition of "Contiguous United States (CONUS)" in alphabetical order to read as follows:

§ 25.103 Definitions.

* * * * *

Contiguous United States (CONUS). For purposes of subparts B and C of this part, the contiguous United States consists of the contiguous 48 states and the District of Columbia as defined by Partial Economic Areas Nos. 1-41, 43-211, 213-263, 265-297, 299-359, and 361-411, which includes areas within 12 nautical miles of the U.S. Gulf coastline. In this context, the rest of the United States includes the Honolulu, Anchorage, Kodiak, Fairbanks, Juneau, Puerto Rico, Guam-Northern Mariana Islands, U.S. Virgin Islands, American Samoa, and the Gulf of Mexico PEAs (Nos. 42, 212, 264, 298, 360, 412-416). *See* § 27.6(m) of this chapter.

* * * * *

8. Amend § 25.109 by adding paragraph (e) to read as follows:

§ 25.109 Cross-reference.

* * * * *

(e) Space and earth stations in the 3700-4200 MHz band may be subject to transition rules in part 27 of this chapter.

9. Add § 25.138 to read as follows:

§ 25.138 Earth Stations in the 3.7-4.2 GHz band.

(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 § 27.1412 of this chapter 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 station licenses and registrations that meet the criteria in paragraph (c) of this section 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.

10. Add § 25.147 to read as follows:

§ 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.

(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.

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

§ 25.203 Choice of sites and frequencies.

* * * * *

(n) From December 5, 2021 until December 5, 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 in the 3.7-4.0 GHz band.

PART 27 – MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

12. 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.

13. Amend § 27.1 by adding paragraph (b)(15) and revising paragraph (c) to read as follows:

§ 27.1 Basis and purpose.

* * * * *

(b) * * *

(15) 3700-3980 MHz.

(c) *Scope.* The rules in this part apply only to stations authorized under this part or authorized under another part of this chapter on frequencies or bands transitioning to authorizations under this part.

14. Amend § 27.4 by adding in alphabetical order the definition for "3.7 GHz Service" to read as follows:

§ 27.4 Terms and definitions.

3.7 GHz Service. A radiocommunication service licensed under this part for the frequency bands specified in § 27.5(m) (3700-3980 MHz band).

* * * * *

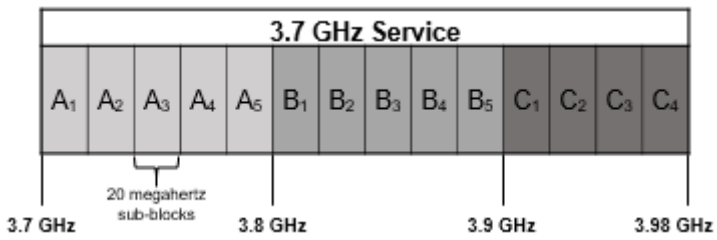
15. Amend § 27.5 by adding paragraph (m) to read as follows:

§ 27.5 Frequencies.

* * * * *

(m) *3700-3980 MHz band*. The 3.7 GHz Service is comprised of Block A (3700-3800 MHz); Block B (3800-3900 MHz); and Block C (3900-3980 MHz). These blocks are licensed as 14 individual 20 megahertz sub-blocks available for assignment in the contiguous United States on a Partial Economic Area basis, *see* § 27.6(m), as follows:

Figure 1 to Paragraph (m)



16. Amend § 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 appendix A to this subpart (*see Wireless Telecommunications Bureau Provides Details About Partial Economic Areas*, DA 14-759, Public Notice, released June 2, 2014, for more information). The 3.7 GHz Service will be licensed in the contiguous United States, i.e., the contiguous 48 states and the District of Columbia as defined by Partial Economic Areas Nos. 1-41, 43-211, 213-263, 265-297, 299-359, and 361-411. The service areas of PEAs that border the U.S. coastline

of the Gulf of Mexico extend 12 nautical miles from the U.S. Gulf coastline. The 3.7 GHz Service will not be licensed for the following PEAs:

Table 3 to Paragraph (m)

PEA Number	PEA Name
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

17. Add appendix A to subpart A of part 27 to read as follows:

Appendix A to subpart A of part 27 – List of partial economic areas with corresponding counties.

PEA Number	Federal Information Processing System Number	County Name	State
1	09001	Fairfield	CT
1	09003	Hartford	CT
1	09005	Litchfield	CT
1	09007	Middlesex	CT
1	09009	New Haven	CT
1	09011	New London	CT
1	09013	Tolland	CT
1	09015	Windham	CT
1	34003	Bergen	NJ
1	34013	Essex	NJ
1	34017	Hudson	NJ
1	34019	Hunterdon	NJ
1	34021	Mercer	NJ
1	34023	Middlesex	NJ
1	34025	Monmouth	NJ
1	34027	Morris	NJ
1	34029	Ocean	NJ
1	34031	Passaic	NJ
1	34035	Somerset	NJ
1	34037	Sussex	NJ
1	34039	Union	NJ
1	34041	Warren	NJ
1	36005	Bronx	NY
1	36027	Dutchess	NY
1	36047	Kings	NY
1	36059	Nassau	NY
1	36061	New York	NY
1	36071	Orange	NY
1	36079	Putnam	NY
1	36081	Queens	NY
1	36085	Richmond	NY
1	36087	Rockland	NY
1	36103	Suffolk	NY
1	36105	Sullivan	NY
1	36111	Ulster	NY
1	36119	Westchester	NY
1	42025	Carbon	PA
1	42069	Lackawanna	PA
1	42077	Lehigh	PA
1	42079	Luzerne	PA
1	42089	Monroe	PA
1	42095	Northampton	PA
2	06029	Kern	CA
2	06037	Los Angeles	CA
2	06059	Orange	CA
2	06065	Riverside	CA
2	06071	San Bernardino	CA
2	06079	San Luis Obispo	CA
2	06083	Santa Barbara	CA
2	06111	Ventura	CA

PEA Number	Federal Information Processing System Number	County Name	State
3	17031	Cook	IL
3	17043	DuPage	IL
3	17063	Grundy	IL
3	17089	Kane	IL
3	17091	Kankakee	IL
3	17093	Kendall	IL
3	17097	Lake	IL
3	17111	McHenry	IL
3	17197	Will	IL
3	18091	La Porte	IN
3	18089	Lake	IN
3	18127	Porter	IN
4	06001	Alameda	CA
4	06013	Contra Costa	CA
4	06041	Marin	CA
4	06053	Monterey	CA
4	06055	Napa	CA
4	06075	San Francisco	CA
4	06077	San Joaquin	CA
4	06081	San Mateo	CA
4	06085	Santa Clara	CA
4	06087	Santa Cruz	CA
4	06095	Solano	CA
4	06097	Sonoma	CA
4	06099	Stanislaus	CA
5	11001	District of Columbia	DC
5	24003	Anne Arundel	MD
5	24005	Baltimore	MD
5	24510	Baltimore City	MD
5	24009	Calvert	MD
5	24011	Caroline	MD
5	24013	Carroll	MD
5	24017	Charles	MD
5	24019	Dorchester	MD
5	24025	Harford	MD
5	24027	Howard	MD
5	24029	Kent	MD
5	24031	Montgomery	MD
5	24033	Prince George's	MD
5	24035	Queen Anne's	MD
5	24037	St. Mary's	MD
5	24041	Talbot	MD
5	51510	Alexandria City	VA
5	51013	Arlington	VA
5	51059	Fairfax	VA
5	51600	Fairfax City	VA
5	51610	Falls Church City	VA
5	51107	Loudoun	VA
5	51683	Manassas City	VA
5	51685	Manassas Park City	VA
5	51153	Prince William	VA
6	10001	Kent	DE
6	10003	New Castle	DE
6	24015	Cecil	MD
6	34001	Atlantic	NJ
6	34005	Burlington	NJ
6	34007	Camden	NJ
6	34009	Cape May	NJ
6	34011	Cumberland	NJ
6	34015	Gloucester	NJ
6	34033	Salem	NJ
6	42011	Berks	PA
6	42017	Bucks	PA
6	42029	Chester	PA
6	42045	Delaware	PA
6	42071	Lancaster	PA
6	42091	Montgomery	PA
6	42101	Philadelphia	PA
7	25001	Barnstable	MA
7	25005	Bristol	MA
7	25007	Dukes	MA
7	25009	Essex	MA
7	25017	Middlesex	MA
7	25019	Nantucket	MA
7	25021	Norfolk	MA
7	25023	Plymouth	MA
7	25025	Suffolk	MA
7	25027	Worcester	MA
7	44001	Bristol	RI
7	44003	Kent	RI
7	44005	Newport	RI
7	44007	Providence	RI
7	44009	Washington	RI
8	48085	Collin	TX
8	48113	Dallas	TX
8	48121	Denton	TX
8	48139	Ellis	TX
8	48181	Grayson	TX
8	48221	Hood	TX
8	48251	Johnson	TX
8	48257	Kaufman	TX
8	48367	Parker	TX
8	48397	Rockwall	TX
8	48439	Tarrant	TX

PEA Number	Federal Information Processing System Number	County Name	State
8	48497	Wise	TX
9	12011	Broward	FL
9	12043	Glades	FL
9	12051	Hendry	FL
9	12061	Indian River	FL
9	12085	Martin	FL
9	12086	Miami-Dade	FL
9	12087	Monroe	FL
9	12093	Okeechobee	FL
9	12099	Palm Beach	FL
9	12111	St. Lucie	FL
10	48039	Brazoria	TX
10	48071	Chambers	TX
10	48157	Fort Bend	TX
10	48167	Galveston	TX
10	48201	Harris	TX
10	48291	Liberty	TX
10	48339	Montgomery	TX
10	48473	Waller	TX
11	13011	Banks	GA
11	13013	Barrow	GA
11	13035	Butts	GA
11	13057	Cherokee	GA
11	13059	Clarke	GA
11	13063	Clayton	GA
11	13067	Cobb	GA
11	13085	Dawson	GA
11	13089	DeKalb	GA
11	13097	Douglas	GA
11	13105	Elbert	GA
11	13113	Fayette	GA
11	13117	Forsyth	GA
11	13119	Franklin	GA
11	13121	Fulton	GA
11	13133	Greene	GA
11	13135	Gwinnett	GA
11	13137	Habersham	GA
11	13139	Hall	GA
11	13147	Hart	GA
11	13151	Henry	GA
11	13157	Jackson	GA
11	13159	Jasper	GA
11	13187	Lumpkin	GA
11	13195	Madison	GA
11	13211	Morgan	GA
11	13217	Newton	GA
11	13219	Oconee	GA
11	13221	Oglethorpe	GA
11	13223	Paulding	GA
11	13241	Rabun	GA
11	13247	Rockdale	GA
11	13257	Stephens	GA
11	13265	Taliaferro	GA
11	13297	Walton	GA
11	13311	White	GA
12	26049	Genesee	MI
12	26087	Lapeer	MI
12	26093	Livingston	MI
12	26099	Macomb	MI
12	26125	Oakland	MI
12	26155	Shiawassee	MI
12	26147	St. Clair	MI
12	26161	Washtenaw	MI
12	26163	Wayne	MI
13	12009	Brevard	FL
13	12017	Citrus	FL
13	12035	Flagler	FL
13	12049	Hardee	FL
13	12055	Highlands	FL
13	12069	Lake	FL
13	12083	Marion	FL
13	12095	Orange	FL
13	12097	Osceola	FL
13	12105	Polk	FL
13	12117	Seminole	FL
13	12119	Sumter	FL
13	12127	Volusia	FL
14	39007	Ashtabula	OH
14	39019	Carroll	OH
14	39029	Columbiana	OH
14	39035	Cuyahoga	OH
14	39043	Erie	OH
14	39055	Geauga	OH
14	39077	Huron	OH
14	39085	Lake	OH
14	39093	Lorain	OH
14	39099	Mahoning	OH
14	39103	Medina	OH
14	39133	Portage	OH
14	39151	Stark	OH
14	39153	Summit	OH
14	39155	Trumbull	OH
14	42085	Mercer	PA
15	04013	Maricopa	AZ

PEA Number	Federal Information Processing System Number	County Name	State
16	53009	Clallam	WA
16	53031	Jefferson	WA
16	53033	King	WA
16	53035	Kitsap	WA
16	53053	Pierce	WA
16	53061	Snohomish	WA
17	27003	Anoka	MN
17	27009	Benton	MN
17	27019	Carver	MN
17	27025	Chisago	MN
17	27037	Dakota	MN
17	27053	Hennepin	MN
17	27123	Ramsey	MN
17	27139	Scott	MN
17	27141	Sherburne	MN
17	27145	Stearns	MN
17	27163	Washington	MN
17	27171	Wright	MN
17	55109	St. Croix	WI
18	06073	San Diego	CA
19	41003	Benton	OR
19	41005	Clackamas	OR
19	41007	Clatsop	OR
19	41009	Columbia	OR
19	41041	Lincoln	OR
19	41043	Linn	OR
19	41047	Marion	OR
19	41051	Multnomah	OR
19	41053	Polk	OR
19	41057	Tillamook	OR
19	41067	Washington	OR
19	41071	Yamhill	OR
19	53011	Clark	WA
19	53015	Cowlitz	WA
19	53069	Wahkiakum	WA
20	08001	Adams	CO
20	08005	Arapahoe	CO
20	08013	Boulder	CO
20	08014	Broomfield	CO
20	08031	Denver	CO
20	08035	Douglas	CO
20	08047	Gilpin	CO
20	08059	Jefferson	CO
21	12053	Hernando	FL
21	12057	Hillsborough	FL
21	12101	Pasco	FL
21	12103	Pinellas	FL
22	06005	Amador	CA
22	06007	Butte	CA
22	06011	Colusa	CA
22	06017	El Dorado	CA
22	06021	Glenn	CA
22	06057	Nevada	CA
22	06061	Placer	CA
22	06067	Sacramento	CA
22	06101	Sutter	CA
22	06113	Yolo	CA
22	06115	Yuba	CA
23	42003	Allegheny	PA
23	42005	Armstrong	PA
23	42007	Beaver	PA
23	42019	Butler	PA
23	42063	Indiana	PA
23	42073	Lawrence	PA
23	42125	Washington	PA
23	42129	Westmoreland	PA
24	17005	Bond	IL
24	17027	Clinton	IL
24	17121	Marion	IL
24	17133	Monroe	IL
24	17163	St. Clair	IL
24	29071	Franklin	MO
24	29099	Jefferson	MO
24	29183	St. Charles	MO
24	29189	St. Louis	MO
24	29510	St. Louis City	MO
25	21015	Boone	KY
25	21023	Bracken	KY
25	21037	Campbell	KY
25	21077	Gallatin	KY
25	21081	Grant	KY
25	21117	Kenton	KY
25	21135	Lewis	KY
25	21161	Mason	KY
25	21191	Pendleton	KY
25	39001	Adams	OH
25	39015	Brown	OH
25	39017	Butler	OH
25	39025	Clermont	OH
25	39027	Clinton	OH
25	39061	Hamilton	OH
25	39071	Highland	OH
25	39165	Warren	OH
26	04015	Mohave	AZ

PEA Number	Federal Information Processing System Number	County Name	State
26	32003	Clark	NV
27	49011	Davis	UT
27	49035	Salt Lake	UT
27	49045	Tooele	UT
27	49049	Utah	UT
27	49057	Weber	UT
28	48013	Atascosa	TX
28	48029	Bexar	TX
28	48091	Comal	TX
28	48187	Guadalupe	TX
29	12001	Alachua	FL
29	12003	Baker	FL
29	12007	Bradford	FL
29	12019	Clay	FL
29	12023	Columbia	FL
29	12029	Dixie	FL
29	12031	Duval	FL
29	12041	Gilchrist	FL
29	12047	Hamilton	FL
29	12067	Lafayette	FL
29	12075	Levy	FL
29	12089	Nassau	FL
29	12107	Putnam	FL
29	12109	St. Johns	FL
29	12121	Suwannee	FL
29	12125	Union	FL
30	20091	Johnson	KS
30	20209	Wyandotte	KS
30	29037	Cass	MO
30	29047	Clay	MO
30	29095	Jackson	MO
30	29165	Platte	MO
30	29177	Ray	MO
31	18011	Boone	IN
31	18035	Delaware	IN
31	18057	Hamilton	IN
31	18063	Hendricks	IN
31	18081	Johnson	IN
31	18095	Madison	IN
31	18097	Marion	IN
32	21047	Christian	KY
32	47021	Cheatham	TN
32	47037	Davidson	TN
32	47043	Dickson	TN
32	47125	Montgomery	TN
32	47147	Robertson	TN
32	47149	Rutherford	TN
32	47165	Sumner	TN
32	47187	Williamson	TN
32	47189	Wilson	TN
33	37053	Currituck	NC
33	51550	Chesapeake City	VA
33	51620	Franklin City	VA
33	51073	Gloucester	VA
33	51650	Hampton City	VA
33	51093	Isle of Wight	VA
33	51095	James City	VA
33	51115	Mathews	VA
33	51700	Newport News City	VA
33	51710	Norfolk City	VA
33	51735	Poquoson City	VA
33	51740	Portsmouth City	VA
33	51175	Southampton	VA
33	51800	Suffolk City	VA
33	51181	Surry	VA
33	51810	Virginia Beach City	VA
33	51830	Williamsburg City	VA
33	51199	York	VA
34	06019	Fresno	CA
34	06031	Kings	CA
34	06039	Madera	CA
34	06107	Tulare	CA
35	48209	Hays	TX
35	48331	Milam	TX
35	48453	Travis	TX
35	48491	Williamson	TX
36	22051	Jefferson Parish	LA
36	22057	Lafourche Parish	LA
36	22071	Orleans Parish	LA
36	22075	Plaquemines Parish	LA
36	22087	St. Bernard Parish	LA
36	22089	St. Charles Parish	LA
36	22093	St. James Parish	LA
36	22095	St. John the Baptist Parish	LA
36	22103	St. Tammany Parish	LA
36	22105	Tangipahoa Parish	LA
36	22109	Terrebonne Parish	LA
36	22117	Washington Parish	LA
36	28109	Pearl River	MS
37	39041	Delaware	OH

PEA Number	Federal Information Processing System Number	County Name	State
37	39045	Fairfield	OH
37	39049	Franklin	OH
37	39097	Madison	OH
37	39129	Pickaway	OH
38	55079	Milwaukee	WI
38	55089	Ozaukee	WI
38	55131	Washington	WI
38	55133	Waukesha	WI
39	40017	Canadian	OK
39	40027	Cleveland	OK
39	40031	Comanche	OK
39	40051	Grady	OK
39	40081	Lincoln	OK
39	40083	Logan	OK
39	40087	McClain	OK
39	40109	Oklahoma	OK
39	40125	Pottawatomie	OK
40	01015	Calhoun	AL
40	01073	Jefferson	AL
40	01117	Shelby	AL
40	01115	St. Clair	AL
40	01121	Talladega	AL
40	01125	Tuscaloosa	AL
40	01127	Walker	AL
41	36011	Cayuga	NY
41	36017	Chenango	NY
41	36023	Cortland	NY
41	36025	Delaware	NY
41	36043	Herkimer	NY
41	36053	Madison	NY
41	36065	Oneida	NY
41	36067	Onondaga	NY
41	36075	Oswego	NY
41	36077	Otsego	NY
41	36097	Schuyler	NY
41	36109	Tompkins	NY
42	15001	Hawaii	HI
42	15003	Honolulu	HI
42	15005	Kalawao	HI
42	15007	Kauai	HI
42	15009	Maui	HI
43	37071	Gaston	NC
43	37119	Mecklenburg	NC
43	37179	Union	NC
44	36037	Genesee	NY
44	36051	Livingston	NY
44	36055	Monroe	NY
44	36069	Ontario	NY
44	36073	Orleans	NY
44	36099	Seneca	NY
44	36101	Steuben	NY
44	36117	Wayne	NY
44	36121	Wyoming	NY
44	36123	Yates	NY
45	37063	Durham	NC
45	37135	Orange	NC
45	37183	Wake	NC
46	05005	Baxter	AR
46	05009	Boone	AR
46	05015	Carroll	AR
46	05023	Cleburne	AR
46	05029	Conway	AR
46	05045	Faulkner	AR
46	05049	Fulton	AR
46	05063	Independence	AR
46	05065	Izard	AR
46	05067	Jackson	AR
46	05069	Jefferson	AR
46	05071	Johnson	AR
46	05085	Lonoke	AR
46	05089	Marion	AR
46	05101	Newton	AR
46	05105	Perry	AR
46	05115	Pope	AR
46	05117	Prairie	AR
46	05119	Pulaski	AR
46	05125	Saline	AR
46	05129	Searcy	AR
46	05135	Sharp	AR
46	05137	Stone	AR
46	05141	Van Buren	AR
46	05145	White	AR
46	05147	Woodruff	AR
46	05149	Yell	AR
47	48061	Cameron	TX
47	48215	Hidalgo	TX
47	48427	Starr	TX
47	48489	Willacy	TX
48	42001	Adams	PA
48	42041	Cumberland	PA
48	42043	Dauphin	PA
48	42067	Juniata	PA
48	42075	Lebanon	PA
48	42099	Perry	PA

PEA Number	Federal Information Processing System Number	County Name	State
48	42133	York	PA
49	36001	Albany	NY
49	36021	Columbia	NY
49	36035	Fulton	NY
49	36039	Greene	NY
49	36041	Hamilton	NY
49	36057	Montgomery	NY
49	36083	Rensselaer	NY
49	36091	Saratoga	NY
49	36093	Schenectady	NY
49	36095	Schoharie	NY
49	36113	Warren	NY
49	36115	Washington	NY
50	37149	Polk	NC
50	45007	Anderson	SC
50	45021	Cherokee	SC
50	45045	Greenville	SC
50	45073	Oconee	SC
50	45077	Pickens	SC
50	45083	Spartanburg	SC
50	45087	Union	SC
51	18019	Clark	IN
51	18043	Floyd	IN
51	18077	Jefferson	IN
51	18143	Scott	IN
51	21029	Bullitt	KY
51	21041	Carroll	KY
51	21103	Henry	KY
51	21111	Jefferson	KY
51	21185	Oldham	KY
51	21211	Shelby	KY
51	21223	Trimble	KY
52	21019	Boyd	KY
52	21043	Carter	KY
52	21063	Elliott	KY
52	21089	Greenup	KY
52	39053	Gallia	OH
52	39087	Lawrence	OH
52	39105	Meigs	OH
52	39167	Washington	OH
52	54005	Boone	WV
52	54007	Braxton	WV
52	54011	Cabell	WV
52	54013	Calhoun	WV
52	54015	Clay	WV
52	54019	Fayette	WV
52	54021	Gilmer	WV
52	54035	Jackson	WV
52	54039	Kanawha	WV
52	54043	Lincoln	WV
52	54045	Logan	WV
52	54053	Mason	WV
52	54067	Nicholas	WV
52	54073	Pleasants	WV
52	54079	Putnam	WV
52	54081	Raleigh	WV
52	54085	Ritchie	WV
52	54087	Roane	WV
52	54089	Summers	WV
52	54099	Wayne	WV
52	54101	Webster	WV
52	54105	Wirt	WV
52	54107	Wood	WV
52	54109	Wyoming	WV
53	04003	Cochise	AZ
53	04019	Pima	AZ
53	04023	Santa Cruz	AZ
54	36029	Erie	NY
54	36063	Niagara	NY
55	01033	Colbert	AL
55	01049	DeKalb	AL
55	01055	Etowah	AL
55	01059	Franklin	AL
55	01071	Jackson	AL
55	01077	Lauderdale	AL
55	01079	Lawrence	AL
55	01083	Limestone	AL
55	01089	Madison	AL
55	01095	Marshall	AL
55	01103	Morgan	AL
55	47103	Lincoln	TN
56	26005	Allegan	MI
56	26015	Barry	MI
56	26023	Branch	MI
56	26025	Calhoun	MI
56	26067	Ionia	MI
56	26077	Kalamazoo	MI
56	26107	Mecosta	MI
56	26117	Montcalm	MI
56	26121	Muskegon	MI
56	26123	Newaygo	MI
56	26127	Oceana	MI
56	26159	Van Buren	MI
57	51036	Charles City	VA

PEA Number	Federal Information Processing System Number	County Name	State
57	51041	Chesterfield	VA
57	51057	Essex	VA
57	51075	Goochland	VA
57	51085	Hanover	VA
57	51087	Henrico	VA
57	51097	King and Queen	VA
57	51101	King William	VA
57	51103	Lancaster	VA
57	51119	Middlesex	VA
57	51127	New Kent	VA
57	51133	Northumberland	VA
57	51145	Powhatan	VA
57	51159	Richmond	VA
57	51760	Richmond City	VA
58	17023	Clark	IL
58	18007	Benton	IN
58	18015	Carroll	IN
58	18017	Cass	IN
58	18021	Clay	IN
58	18023	Clinton	IN
58	18045	Fountain	IN
58	18055	Greene	IN
58	18067	Howard	IN
58	18093	Lawrence	IN
58	18103	Miami	IN
58	18105	Monroe	IN
58	18107	Montgomery	IN
58	18109	Morgan	IN
58	18117	Orange	IN
58	18119	Owen	IN
58	18121	Parke	IN
58	18133	Putnam	IN
58	18153	Sullivan	IN
58	18157	Tippecanoe	IN
58	18159	Tipton	IN
58	18165	Vermillion	IN
58	18167	Vigo	IN
58	18171	Warren	IN
58	18181	White	IN
59	05035	Crittenden	AR
59	47157	Shelby	TN
59	47167	Tipton	TN
60	33001	Belknap	NH
60	33011	Hillsborough	NH
60	33013	Merrimack	NH
60	33015	Rockingham	NH
60	33017	Strafford	NH

PEA Number	Federal Information Processing System Number	County Name	State
61	39039	Defiance	OH
61	39051	Fulton	OH
61	39063	Hancock	OH
61	39065	Hardin	OH
61	39069	Henry	OH
61	39095	Lucas	OH
61	39123	Ottawa	OH
61	39125	Paulding	OH
61	39143	Sandusky	OH
61	39147	Seneca	OH
61	39171	Williams	OH
61	39173	Wood	OH
61	39175	Wyandot	OH
62	39021	Champaign	OH
62	39023	Clark	OH
62	39057	Greene	OH
62	39109	Miami	OH
62	39113	Montgomery	OH
62	39135	Preble	OH
63	40021	Cherokee	OK
63	40037	Creek	OK
63	40097	Mayes	OK
63	40113	Osage	OK
63	40131	Rogers	OK
63	40143	Tulsa	OK
63	40145	Wagoner	OK
64	18039	Elkhart	IN
64	18049	Fulton	IN
64	18085	Kosciusko	IN
64	18087	Lagrange	IN
64	18099	Marshall	IN
64	18131	Pulaski	IN
64	18141	St. Joseph	IN
64	18149	Starke	IN
64	26021	Berrien	MI
64	26027	Cass	MI
64	26149	St. Joseph	MI
65	12021	Collier	FL
65	12071	Lee	FL
66	26037	Clinton	MI
66	26045	Eaton	MI
66	26059	Hillsdale	MI
66	26065	Ingham	MI
66	26075	Jackson	MI
66	26091	Lenawee	MI
66	26115	Monroe	MI
67	12015	Charlotte	FL

PEA Number	Federal Information Processing System Number	County Name	State
67	12027	DeSoto	FL
67	12081	Manatee	FL
67	12115	Sarasota	FL
68	26081	Kent	MI
68	26139	Ottawa	MI
69	25003	Berkshire	MA
69	25011	Franklin	MA
69	25013	Hampden	MA
69	25015	Hampshire	MA
69	50003	Bennington	VT
70	06015	Del Norte	CA
70	41011	Coos	OR
70	41015	Curry	OR
70	41019	Douglas	OR
70	41029	Jackson	OR
70	41033	Josephine	OR
70	41039	Lane	OR
71	47001	Anderson	TN
71	47009	Blount	TN
71	47013	Campbell	TN
71	47093	Knox	TN
71	47105	Loudon	TN
71	47129	Morgan	TN
71	47145	Roane	TN
71	47151	Scott	TN
71	47173	Union	TN
72	12005	Bay	FL
72	12013	Calhoun	FL
72	12037	Franklin	FL
72	12039	Gadsden	FL
72	12045	Gulf	FL
72	12063	Jackson	FL
72	12065	Jefferson	FL
72	12073	Leon	FL
72	12077	Liberty	FL
72	12079	Madison	FL
72	12123	Taylor	FL
72	12129	Wakulla	FL
72	13087	Decatur	GA
72	13099	Early	GA
72	13131	Grady	GA
72	13201	Miller	GA
72	13253	Seminole	GA
72	13275	Thomas	GA
73	48141	El Paso	TX
74	13047	Catoosa	GA
74	13083	Dade	GA
74	13295	Walker	GA
74	47007	Bledsoe	TN
74	47011	Bradley	TN
74	47065	Hamilton	TN
74	47115	Marion	TN
74	47107	McMinn	TN
74	47121	Meigs	TN
74	47123	Monroe	TN
74	47139	Polk	TN
74	47143	Rhea	TN
74	47153	Sequatchie	TN
75	35001	Bernalillo	NM
75	35043	Sandoval	NM
76	06003	Alpine	CA
76	06027	Inyo	CA
76	06035	Lassen	CA
76	06051	Mono	CA
76	06063	Plumas	CA
76	06091	Sierra	CA
76	32510	Carson City	NV
76	32001	Churchill	NV
76	32005	Douglas	NV
76	32007	Elko	NV
76	32011	Eureka	NV
76	32013	Humboldt	NV
76	32015	Lander	NV
76	32019	Lyon	NV
76	32027	Pershing	NV
76	32029	Storey	NV
76	32031	Washoe	NV
76	32033	White Pine	NV
77	23001	Androscoggin	ME
77	23005	Cumberland	ME
77	23007	Franklin	ME
77	23013	Knox	ME
77	23015	Lincoln	ME
77	23017	Oxford	ME
77	23023	Sagadahoc	ME
77	23031	York	ME
78	37001	Alamance	NC
78	37081	Guilford	NC
78	37151	Randolph	NC
79	28001	Adams	MS
79	28005	Amite	MS
79	28021	Claiborne	MS
79	28023	Clarke	MS
79	28029	Copiah	MS

PEA Number	Federal Information Processing System Number	County Name	State
79	28031	Covington	MS
79	28035	Forrest	MS
79	28037	Franklin	MS
79	28041	Greene	MS
79	28061	Jasper	MS
79	28063	Jefferson	MS
79	28065	Jefferson Davis	MS
79	28067	Jones	MS
79	28069	Kemper	MS
79	28073	Lamar	MS
79	28075	Lauderdale	MS
79	28077	Lawrence	MS
79	28079	Leake	MS
79	28085	Lincoln	MS
79	28091	Marion	MS
79	28099	Neshoba	MS
79	28101	Newton	MS
79	28111	Perry	MS
79	28113	Pike	MS
79	28123	Scott	MS
79	28127	Simpson	MS
79	28129	Smith	MS
79	28147	Walthall	MS
79	28153	Wayne	MS
80	19155	Pottawattamie	IA
80	31055	Douglas	NE
80	31153	Sarpy	NE
81	26001	Alcona	MI
81	26011	Arenac	MI
81	26017	Bay	MI
81	26035	Clare	MI
81	26051	Gladwin	MI
81	26057	Gratiot	MI
81	26063	Huron	MI
81	26069	Iosco	MI
81	26073	Isabella	MI
81	26111	Midland	MI
81	26129	Ogemaw	MI
81	26145	Saginaw	MI
81	26151	Sanilac	MI
81	26157	Tuscola	MI
82	22005	Ascension Parish	LA
82	22007	Assumption Parish	LA
82	22033	East Baton Rouge Parish	LA
82	22047	Iberville Parish	LA
82	22063	Livingston Parish	LA
82	22121	West Baton Rouge Parish	LA
83	18001	Adams	IN
83	18003	Allen	IN
83	18009	Blackford	IN
83	18033	De Kalb	IN
83	18053	Grant	IN
83	18069	Huntington	IN
83	18075	Jay	IN
83	18113	Noble	IN
83	18151	Steuben	IN
83	18169	Wabash	IN
83	18179	Wells	IN
83	18183	Whitley	IN
84	01003	Baldwin	AL
84	01025	Clarke	AL
84	01035	Conecuh	AL
84	01053	Escambia	AL
84	01097	Mobile	AL
84	01099	Monroe	AL
84	01129	Washington	AL
84	01131	Wilcox	AL
85	45015	Berkeley	SC
85	45019	Charleston	SC
85	45029	Colleton	SC
85	45035	Dorchester	SC
86	21005	Anderson	KY
86	21011	Bath	KY
86	21017	Bourbon	KY
86	21049	Clark	KY
86	21067	Fayette	KY
86	21069	Fleming	KY
86	21073	Franklin	KY
86	21097	Harrison	KY
86	21113	Jessamine	KY
86	21165	Menifee	KY
86	21167	Mercer	KY
86	21173	Montgomery	KY
86	21181	Nicholas	KY
86	21187	Owen	KY
86	21201	Robertson	KY
86	21205	Rowan	KY
86	21209	Scott	KY
86	21239	Woodford	KY
87	12033	Escambia	FL
87	12091	Okaloosa	FL
87	12113	Santa Rosa	FL
87	12131	Walton	FL

PEA Number	Federal Information Processing System Number	County Name	State
88	24001	Allegany	MD
88	24021	Frederick	MD
88	24023	Garrett	MD
88	24043	Washington	MD
88	42055	Franklin	PA
88	42057	Fulton	PA
88	54057	Mineral	WV
89	45063	Lexington	SC
89	45079	Richland	SC
90	22025	Catahoula Parish	LA
90	22029	Concordia Parish	LA
90	22065	Madison Parish	LA
90	22107	Tensas Parish	LA
90	28007	Attala	MS
90	28049	Hinds	MS
90	28051	Holmes	MS
90	28089	Madison	MS
90	28121	Rankin	MS
90	28149	Warren	MS
90	28163	Yazoo	MS
91	08041	El Paso	CO
91	08119	Teller	CO
92	17019	Champaign	IL
92	17025	Clay	IL
92	17029	Coles	IL
92	17035	Cumberland	IL
92	17041	Douglas	IL
92	17045	Edgar	IL
92	17049	Effingham	IL
92	17051	Fayette	IL
92	17053	Ford	IL
92	17079	Jasper	IL
92	17115	Macon	IL
92	17139	Moultrie	IL
92	17147	Piatt	IL
92	17173	Shelby	IL
92	17183	Vermilion	IL
93	22001	Acadia Parish	LA
93	22039	Evangeline Parish	LA
93	22045	Iberia Parish	LA
93	22055	Lafayette Parish	LA
93	22097	St. Landry Parish	LA
93	22099	St. Martin Parish	LA
93	22101	St. Mary Parish	LA
93	22113	Vermilion Parish	LA
94	48027	Bell	TX
94	48099	Coryell	TX
94	48145	Falls	TX
94	48309	McLennan	TX
95	21025	Breathitt	KY
95	21065	Estill	KY
95	21071	Floyd	KY
95	21109	Jackson	KY
95	21115	Johnson	KY
95	21119	Knott	KY
95	21127	Lawrence	KY
95	21129	Lee	KY
95	21133	Letcher	KY
95	21153	Magoffin	KY
95	21159	Martin	KY
95	21175	Morgan	KY
95	21189	Owsley	KY
95	21193	Perry	KY
95	21195	Pike	KY
95	21197	Powell	KY
95	21237	Wolfe	KY
95	51021	Bland	VA
95	51027	Buchanan	VA
95	51051	Dickenson	VA
95	51105	Lee	VA
95	51720	Norton City	VA
95	51167	Russell	VA
95	51185	Tazewell	VA
95	51195	Wise	VA
95	54047	McDowell	WV
95	54055	Mercer	WV
95	54059	Mingo	WV
96	21001	Adair	KY
96	21013	Bell	KY
96	21021	Boyle	KY
96	21045	Casey	KY
96	21051	Clay	KY
96	21053	Clinton	KY
96	21079	Garrard	KY
96	21087	Green	KY
96	21095	Harlan	KY
96	21121	Knox	KY
96	21125	Laurel	KY
96	21131	Leslie	KY
96	21137	Lincoln	KY
96	21151	Madison	KY
96	21147	McCreary	KY
96	21199	Pulaski	KY
96	21203	Rockcastle	KY

PEA Number	Federal Information Processing System Number	County Name	State
96	21207	Russell	KY
96	21217	Taylor	KY
96	21231	Wayne	KY
96	21235	Whitley	KY
96	47025	Claiborne	TN
97	19143	Osceola	IA
97	27013	Blue Earth	MN
97	27015	Brown	MN
97	27023	Chippewa	MN
97	27033	Cottonwood	MN
97	27043	Faribault	MN
97	27047	Freeborn	MN
97	27063	Jackson	MN
97	27067	Kandiyohi	MN
97	27073	Lac qui Parle	MN
97	27079	Le Sueur	MN
97	27081	Lincoln	MN
97	27083	Lyon	MN
97	27091	Martin	MN
97	27085	McLeod	MN
97	27093	Meeker	MN
97	27101	Murray	MN
97	27103	Nicollet	MN
97	27105	Nobles	MN
97	27127	Redwood	MN
97	27129	Renville	MN
97	27131	Rice	MN
97	27143	Sibley	MN
97	27147	Steele	MN
97	27161	Waseca	MN
97	27165	Watonwan	MN
97	27173	Yellow Medicine	MN
98	47019	Carter	TN
98	47059	Greene	TN
98	47073	Hawkins	TN
98	47163	Sullivan	TN
98	47171	Unicoi	TN
98	47179	Washington	TN
98	51520	Bristol City	VA
98	51169	Scott	VA
98	51173	Smyth	VA
98	51191	Washington	VA
99	28003	Alcorn	MS
99	28013	Calhoun	MS
99	28017	Chickasaw	MS
99	28019	Choctaw	MS
99	28025	Clay	MS
99	28043	Grenada	MS
99	28057	Itawamba	MS
99	28081	Lee	MS
99	28087	Lowndes	MS
99	28095	Monroe	MS
99	28097	Montgomery	MS
99	28103	Noxubee	MS
99	28105	Oktibbeha	MS
99	28115	Pontotoc	MS
99	28117	Prentiss	MS
99	28139	Tippah	MS
99	28141	Tishomingo	MS
99	28145	Union	MS
99	28155	Webster	MS
99	28159	Winston	MS
99	47071	Hardin	TN
99	47109	McNairy	TN
100	37013	Beaufort	NC
100	37031	Carteret	NC
100	37049	Craven	NC
100	37055	Dare	NC
100	37079	Greene	NC
100	37095	Hyde	NC
100	37103	Jones	NC
100	37107	Lenoir	NC
100	37117	Martin	NC
100	37137	Pamlico	NC
100	37147	Pitt	NC
100	37177	Tyrrell	NC
100	37187	Washington	NC
101	20015	Butler	KS
101	20173	Sedgwick	KS
102	08015	Chaffee	CO
102	08019	Clear Creek	CO
102	08027	Custer	CO
102	08029	Delta	CO
102	08037	Eagle	CO
102	08043	Fremont	CO
102	08045	Garfield	CO
102	08049	Grand	CO
102	08051	Gunnison	CO
102	08053	Hinsdale	CO
102	08057	Jackson	CO
102	08065	Lake	CO
102	08077	Mesa	CO
102	08081	Moffat	CO
102	08085	Montrose	CO

PEA Number	Federal Information Processing System Number	County Name	State
102	08091	Ouray	CO
102	08093	Park	CO
102	08097	Pitkin	CO
102	08103	Rio Blanco	CO
102	08107	Routt	CO
102	08113	San Miguel	CO
102	08117	Summit	CO
103	51043	Clarke	VA
103	51061	Fauquier	VA
103	51069	Frederick	VA
103	51139	Page	VA
103	51157	Rappahannock	VA
103	51171	Shenandoah	VA
103	51187	Warren	VA
103	51840	Winchester City	VA
103	54003	Berkeley	WV
103	54023	Grant	WV
103	54027	Hampshire	WV
103	54031	Hardy	WV
103	54037	Jefferson	WV
103	54065	Morgan	WV
103	54083	Randolph	WV
103	54093	Tucker	WV
104	08069	Larimer	CO
104	08123	Weld	CO
105	13073	Columbia	GA
105	13181	Lincoln	GA
105	13189	McDuffie	GA
105	13245	Richmond	GA
105	13317	Wilkes	GA
105	45003	Aiken	SC
105	45037	Edgefield	SC
106	39009	Athens	OH
106	39047	Fayette	OH
106	39059	Guernsey	OH
106	39073	Hocking	OH
106	39079	Jackson	OH
106	39115	Morgan	OH
106	39119	Muskingum	OH
106	39121	Noble	OH
106	39127	Perry	OH
106	39131	Pike	OH
106	39141	Ross	OH
106	39145	Scioto	OH
106	39163	Vinton	OH
107	23003	Aroostook	ME
107	23009	Hancock	ME
107	23011	Kennebec	ME
107	23019	Penobscot	ME
107	23021	Piscataquis	ME
107	23025	Somerset	ME
107	23027	Waldo	ME
107	23029	Washington	ME
108	19049	Dallas	IA
108	19153	Polk	IA
108	19181	Warren	IA
109	37065	Edgecombe	NC
109	37069	Franklin	NC
109	37077	Granville	NC
109	37083	Halifax	NC
109	37127	Nash	NC
109	37131	Northampton	NC
109	37145	Person	NC
109	37181	Vance	NC
109	37185	Warren	NC
109	37195	Wilson	NC
110	21075	Fulton	KY
110	21105	Hickman	KY
110	47005	Benton	TN
110	47017	Carroll	TN
110	47023	Chester	TN
110	47033	Crockett	TN
110	47039	Decatur	TN
110	47045	Dyer	TN
110	47047	Fayette	TN
110	47053	Gibson	TN
110	47069	Hardeman	TN
110	47075	Haywood	TN
110	47077	Henderson	TN
110	47079	Henry	TN
110	47095	Lake	TN
110	47097	Lauderdale	TN
110	47113	Madison	TN
110	47131	Obion	TN
110	47183	Weakley	TN
111	05007	Benton	AR
111	05087	Madison	AR
111	05143	Washington	AR
111	29119	McDonald	MO
111	40001	Adair	OK
111	40041	Delaware	OK
112	21003	Allen	KY
112	21009	Barren	KY
112	21031	Butler	KY

PEA Number	Federal Information Processing System Number	County Name	State
112	21057	Cumberland	KY
112	21061	Edmonson	KY
112	21099	Hart	KY
112	21141	Logan	KY
112	21169	Metcalfe	KY
112	21171	Monroe	KY
112	21213	Simpson	KY
112	21219	Todd	KY
112	21227	Warren	KY
112	47027	Clay	TN
112	47035	Cumberland	TN
112	47049	Fentress	TN
112	47087	Jackson	TN
112	47111	Macon	TN
112	47133	Overton	TN
112	47137	Pickett	TN
112	47141	Putnam	TN
112	47169	Trousdale	TN
113	42031	Clarion	PA
113	42039	Crawford	PA
113	42049	Erie	PA
113	42053	Forest	PA
113	42121	Venango	PA
113	42123	Warren	PA
114	42051	Fayette	PA
114	42059	Greene	PA
114	54001	Barbour	WV
114	54017	Doddridge	WV
114	54033	Harrison	WV
114	54041	Lewis	WV
114	54049	Marion	WV
114	54061	Monongalia	WV
114	54077	Preston	WV
114	54091	Taylor	WV
114	54097	Upshur	WV
115	37021	Buncombe	NC
115	37087	Haywood	NC
115	37089	Henderson	NC
115	37099	Jackson	NC
115	37115	Madison	NC
115	37173	Swain	NC
115	37175	Transylvania	NC
116	17007	Boone	IL
116	17201	Winnebago	IL
116	55105	Rock	WI
117	13045	Carroll	GA
117	13077	Coweta	GA
117	13143	Haralson	GA
117	13149	Heard	GA
117	13171	Lamar	GA
117	13199	Meriwether	GA
117	13231	Pike	GA
117	13255	Spalding	GA
117	13263	Talbot	GA
117	13285	Troup	GA
117	13293	Upson	GA
118	18005	Bartholomew	IN
118	18013	Brown	IN
118	18031	Decatur	IN
118	18041	Fayette	IN
118	18059	Hancock	IN
118	18065	Henry	IN
118	18071	Jackson	IN
118	18079	Jennings	IN
118	18135	Randolph	IN
118	18139	Rush	IN
118	18145	Shelby	IN
118	18161	Union	IN
118	18177	Wayne	IN
119	53005	Benton	WA
119	53021	Franklin	WA
119	53077	Yakima	WA
120	05027	Columbia	AR
120	05073	Lafayette	AR
120	22013	Bienville Parish	LA
120	22015	Bossier Parish	LA
120	22017	Caddo Parish	LA
120	22027	Claiborne Parish	LA
120	22119	Webster Parish	LA
120	22127	Winn Parish	LA
121	42009	Bedford	PA
121	42013	Blair	PA
121	42021	Cambria	PA
121	42061	Huntingdon	PA
121	42087	Mifflin	PA
121	42111	Somerset	PA
122	55025	Dane	WI
123	39005	Ashland	OH
123	39033	Crawford	OH
123	39067	Harrison	OH
123	39075	Holmes	OH
123	39139	Richland	OH
123	39157	Tuscarawas	OH
123	39169	Wayne	OH

PEA Number	Federal Information Processing System Number	County Name	State
124	53027	Grays Harbor	WA
124	53041	Lewis	WA
124	53045	Mason	WA
124	53049	Pacific	WA
124	53067	Thurston	WA
125	17013	Calhoun	IL
125	17083	Jersey	IL
125	17117	Macoupin	IL
125	17119	Madison	IL
125	29073	Gasconade	MO
125	29113	Lincoln	MO
125	29139	Montgomery	MO
125	29163	Pike	MO
125	29219	Warren	MO
126	04007	Gila	AZ
126	04009	Graham	AZ
126	04011	Greenlee	AZ
126	04021	Pinal	AZ
127	18027	Daviess	IN
127	18037	Dubois	IN
127	18051	Gibson	IN
127	18083	Knox	IN
127	18101	Martin	IN
127	18123	Perry	IN
127	18125	Pike	IN
127	18129	Posey	IN
127	18147	Spencer	IN
127	18163	Vanderburgh	IN
127	18173	Warrick	IN
128	13009	Baldwin	GA
128	13021	Bibb	GA
128	13023	Bleckley	GA
128	13091	Dodge	GA
128	13153	Houston	GA
128	13169	Jones	GA
128	13225	Peach	GA
128	13235	Pulaski	GA
128	13289	Twiggs	GA
128	13315	Wilcox	GA
128	13319	Wilkinson	GA
129	17001	Adams	IL
129	17009	Brown	IL
129	17017	Cass	IL
129	17021	Christian	IL
129	17061	Greene	IL
129	17107	Logan	IL
129	17129	Menard	IL
129	17135	Montgomery	IL
129	17137	Morgan	IL
129	17149	Pike	IL
129	17167	Sangamon	IL
129	17169	Schuyler	IL
129	17171	Scott	IL
130	53063	Spokane	WA
131	37037	Chatham	NC
131	37085	Harnett	NC
131	37101	Johnston	NC
131	37105	Lee	NC
131	37163	Sampson	NC
132	48007	Aransas	TX
132	48025	Bee	TX
132	48355	Nueces	TX
132	48391	Refugio	TX
132	48409	San Patricio	TX
133	48005	Angelina	TX
133	48161	Freestone	TX
133	48225	Houston	TX
133	48289	Leon	TX
133	48293	Limestone	TX
133	48313	Madison	TX
133	48347	Nacogdoches	TX
133	48373	Polk	TX
133	48395	Robertson	TX
133	48403	Sabine	TX
133	48405	San Augustine	TX
133	48407	San Jacinto	TX
133	48419	Shelby	TX
133	48455	Trinity	TX
133	48471	Walker	TX
134	39031	Coshocton	OH
134	39083	Knox	OH
134	39089	Licking	OH
134	39091	Logan	OH
134	39101	Marion	OH
134	39117	Morrow	OH
134	39159	Union	OH
135	48199	Hardin	TX
135	48241	Jasper	TX
135	48245	Jefferson	TX
135	48351	Newton	TX
135	48361	Orange	TX
135	48457	Tyler	TX
136	42035	Clinton	PA
136	42037	Columbia	PA

PEA Number	Federal Information Processing System Number	County Name	State
136	42081	Lycoming	PA
136	42093	Montour	PA
136	42097	Northumberland	PA
136	42109	Snyder	PA
136	42113	Sullivan	PA
136	42119	Union	PA
136	42131	Wyoming	PA
137	27049	Goodhue	MN
137	55005	Barron	WI
137	55013	Burnett	WI
137	55017	Chippewa	WI
137	55033	Dunn	WI
137	55035	Eau Claire	WI
137	55091	Pepin	WI
137	55093	Pierce	WI
137	55095	Polk	WI
137	55107	Rusk	WI
137	55113	Sawyer	WI
137	55129	Washburn	WI
138	50001	Addison	VT
138	50005	Caledonia	VT
138	50007	Chittenden	VT
138	50011	Franklin	VT
138	50013	Grand Isle	VT
138	50015	Lamoille	VT
138	50019	Orleans	VT
138	50021	Rutland	VT
138	50023	Washington	VT
139	05001	Arkansas	AR
139	05003	Ashley	AR
139	05011	Bradley	AR
139	05013	Calhoun	AR
139	05017	Chicot	AR
139	05019	Clark	AR
139	05025	Cleveland	AR
139	05039	Dallas	AR
139	05041	Desha	AR
139	05043	Drew	AR
139	05051	Garland	AR
139	05053	Grant	AR
139	05057	Hempstead	AR
139	05059	Hot Spring	AR
139	05061	Howard	AR
139	05079	Lincoln	AR
139	05095	Monroe	AR
139	05097	Montgomery	AR
139	05099	Nevada	AR
139	05103	Ouachita	AR
139	05109	Pike	AR
139	05139	Union	AR
140	51033	Caroline	VA
140	51047	Culpeper	VA
140	51630	Fredericksburg City	VA
140	51099	King George	VA
140	51113	Madison	VA
140	51137	Orange	VA
140	51177	Spotsylvania	VA
140	51179	Stafford	VA
140	51193	Westmoreland	VA
141	27001	Aitkin	MN
141	27007	Beltrami	MN
141	27021	Cass	MN
141	27029	Clearwater	MN
141	27035	Crow Wing	MN
141	27041	Douglas	MN
141	27051	Grant	MN
141	27057	Hubbard	MN
141	27059	Isanti	MN
141	27065	Kanabec	MN
141	27095	Mille Lacs	MN
141	27097	Morrison	MN
141	27115	Pine	MN
141	27121	Pope	MN
141	27149	Stevens	MN
141	27151	Swift	MN
141	27153	Todd	MN
141	27159	Wadena	MN
142	06009	Calaveras	CA
142	06043	Mariposa	CA
142	06047	Merced	CA
142	06069	San Benito	CA
142	06109	Tuolumne	CA
143	33003	Carroll	NH
143	33005	Cheshire	NH
143	33007	Coos	NH
143	33009	Grafton	NH
143	33019	Sullivan	NH
143	50009	Essex	VT
143	50017	Orange	VT
143	50025	Windham	VT
143	50027	Windsor	VT
144	48063	Camp	TX
144	48119	Delta	TX
144	48147	Fannin	TX

PEA Number	Federal Information Processing System Number	County Name	State
144	48159	Franklin	TX
144	48223	Hopkins	TX
144	48231	Hunt	TX
144	48277	Lamar	TX
144	48379	Rains	TX
144	48387	Red River	TX
144	48449	Titus	TX
144	48459	Upshur	TX
144	48467	Van Zandt	TX
144	48499	Wood	TX
145	47003	Bedford	TN
145	47015	Cannon	TN
145	47031	Coffee	TN
145	47041	DeKalb	TN
145	47051	Franklin	TN
145	47055	Giles	TN
145	47061	Grundy	TN
145	47117	Marshall	TN
145	47119	Maury	TN
145	47127	Moore	TN
145	47159	Smith	TN
145	47175	Van Buren	TN
145	47177	Warren	TN
145	47185	White	TN
146	37019	Brunswick	NC
146	37047	Columbus	NC
146	37129	New Hanover	NC
146	37141	Pender	NC
147	10005	Sussex	DE
147	24039	Somerset	MD
147	24045	Wicomico	MD
147	24047	Worcester	MD
147	51001	Accomack	VA
147	51131	Northampton	VA
148	53029	Island	WA
148	53055	San Juan	WA
148	53057	Skagit	WA
148	53073	Whatcom	WA
149	28039	George	MS
149	28045	Hancock	MS
149	28047	Harrison	MS
149	28059	Jackson	MS
149	28131	Stone	MS
150	29029	Camden	MO
150	29059	Dallas	MO
150	29065	Dent	MO
150	29085	Hickory	MO
150	29105	Laclede	MO
150	29125	Maries	MO
150	29131	Miller	MO
150	29141	Morgan	MO
150	29149	Oregon	MO
150	29161	Phelps	MO
150	29167	Polk	MO
150	29169	Pulaski	MO
150	29203	Shannon	MO
150	29215	Texas	MO
150	29225	Webster	MO
150	29229	Wright	MO
151	37067	Forsyth	NC
151	37169	Stokes	NC
152	48183	Gregg	TX
152	48203	Harrison	TX
152	48423	Smith	TX
153	55027	Dodge	WI
153	55039	Fond du Lac	WI
153	55047	Green Lake	WI
153	55055	Jefferson	WI
153	55127	Walworth	WI
154	45033	Dillon	SC
154	45043	Georgetown	SC
154	45051	Horry	SC
154	45067	Marion	SC
155	55015	Calumet	WI
155	55087	Outagamie	WI
155	55139	Winnebago	WI
156	16001	Ada	ID
157	04012	La Paz	AZ
157	04027	Yuma	AZ
157	06025	Imperial	CA
158	30029	Flathead	MT
158	30039	Granite	MT
158	30047	Lake	MT
158	30049	Lewis and Clark	MT
158	30053	Lincoln	MT
158	30061	Mineral	MT
158	30063	Missoula	MT
158	30077	Powell	MT
158	30081	Ravalli	MT
158	30089	Sanders	MT
159	13007	Baker	GA
159	13017	Ben Hill	GA
159	13019	Berrien	GA
159	13027	Brooks	GA

PEA Number	Federal Information Processing System Number	County Name	State
159	13037	Calhoun	GA
159	13061	Clay	GA
159	13071	Colquitt	GA
159	13075	Cook	GA
159	13101	Echols	GA
159	13155	Irwin	GA
159	13173	Lanier	GA
159	13185	Lowndes	GA
159	13205	Mitchell	GA
159	13243	Randolph	GA
159	13273	Terrell	GA
159	13277	Tift	GA
159	13287	Turner	GA
159	13321	Worth	GA
160	48015	Austin	TX
160	48051	Burleson	TX
160	48057	Calhoun	TX
160	48089	Colorado	TX
160	48123	DeWitt	TX
160	48149	Fayette	TX
160	48175	Goliad	TX
160	48239	Jackson	TX
160	48285	Lavaca	TX
160	48321	Matagorda	TX
160	48469	Victoria	TX
160	48477	Washington	TX
160	48481	Wharton	TX
161	17003	Alexander	IL
161	17055	Franklin	IL
161	17059	Gallatin	IL
161	17065	Hamilton	IL
161	17069	Hardin	IL
161	17077	Jackson	IL
161	17081	Jefferson	IL
161	17087	Johnson	IL
161	17145	Perry	IL
161	17151	Pope	IL
161	17153	Pulaski	IL
161	17157	Randolph	IL
161	17165	Saline	IL
161	17181	Union	IL
161	17189	Washington	IL
161	17199	Williamson	IL
162	18025	Crawford	IN
162	18061	Harrison	IN
162	18175	Washington	IN
162	21027	Breckinridge	KY
162	21085	Grayson	KY
162	21093	Hardin	KY
162	21123	Larue	KY
162	21155	Marion	KY
162	21163	Meade	KY
162	21179	Nelson	KY
162	21215	Spencer	KY
162	21229	Washington	KY
163	19163	Scott	IA
163	17073	Henry	IL
163	17161	Rock Island	IL
164	01001	Autauga	AL
164	01051	Elmore	AL
164	01101	Montgomery	AL
165	01017	Chambers	AL
165	01019	Cherokee	AL
165	01029	Cleburne	AL
165	01111	Randolph	AL
165	13015	Bartow	GA
165	13055	Chattooga	GA
165	13115	Floyd	GA
165	13233	Polk	GA
166	06049	Modoc	CA
166	06089	Shasta	CA
166	06093	Siskiyou	CA
166	06103	Tehama	CA
166	41035	Klamath	OR
167	51005	Alleghany	VA
167	51015	Augusta	VA
167	51017	Bath	VA
167	51530	Buena Vista City	VA
167	51580	Covington City	VA
167	51660	Harrisonburg City	VA
167	51091	Highland	VA
167	51678	Lexington City	VA
167	51163	Rockbridge	VA
167	51165	Rockingham	VA
167	51790	Staunton City	VA
167	51820	Waynesboro City	VA
167	54025	Greenbrier	WV
167	54071	Pendleton	WV
167	54075	Pocahontas	WV
168	17143	Peoria	IL
168	17179	Tazewell	IL
168	17203	Woodford	IL
169	37061	Duplin	NC
169	37133	Onslow	NC

PEA Number	Federal Information Processing System Number	County Name	State
169	37191	Wayne	NC
170	01005	Barbour	AL
170	01031	Coffee	AL
170	01039	Covington	AL
170	01045	Dale	AL
170	01061	Geneva	AL
170	01067	Henry	AL
170	01069	Houston	AL
170	12059	Holmes	FL
170	12133	Washington	FL
170	13239	Quitman	GA
171	05033	Crawford	AR
171	05047	Franklin	AR
171	05083	Logan	AR
171	05127	Scott	AR
171	05131	Sebastian	AR
171	40061	Haskell	OK
171	40077	Latimer	OK
171	40079	Le Flore	OK
171	40135	Sequoyah	OK
172	27017	Carlton	MN
172	27031	Cook	MN
172	27061	Itasca	MN
172	27071	Koochiching	MN
172	27075	Lake	MN
172	27137	St. Louis	MN
172	55031	Douglas	WI
173	51019	Bedford	VA
173	51515	Bedford City	VA
173	51035	Carroll	VA
173	51063	Floyd	VA
173	51067	Franklin	VA
173	51071	Giles	VA
173	51121	Montgomery	VA
173	51155	Pulaski	VA
173	51750	Radford City	VA
173	54063	Monroe	WV
174	29043	Christian	MO
174	29077	Greene	MO
175	28009	Benton	MS
175	28033	DeSoto	MS
175	28071	Lafayette	MS
175	28093	Marshall	MS
175	28107	Panola	MS
175	28119	Quitman	MS
175	28137	Tate	MS
175	28143	Tunica	MS
175	28161	Yalobusha	MS
176	19015	Boone	IA
176	19025	Calhoun	IA
176	19027	Carroll	IA
176	19047	Crawford	IA
176	19073	Greene	IA
176	19075	Grundy	IA
176	19079	Hamilton	IA
176	19083	Hardin	IA
176	19091	Humboldt	IA
176	19127	Marshall	IA
176	19161	Sac	IA
176	19169	Story	IA
176	19171	Tama	IA
176	19187	Webster	IA
176	19197	Wright	IA
177	13029	Bryan	GA
177	13051	Chatham	GA
177	13103	Effingham	GA
178	20003	Anderson	KS
178	20011	Bourbon	KS
178	20059	Franklin	KS
178	20107	Linn	KS
178	20121	Miami	KS
178	29013	Bates	MO
178	29015	Benton	MO
178	29039	Cedar	MO
178	29083	Henry	MO
178	29101	Johnson	MO
178	29107	Lafayette	MO
178	29159	Pettis	MO
178	29195	Saline	MO
178	29185	St. Clair	MO
178	29217	Vernon	MO
179	19007	Appanoose	IA
179	19051	Davis	IA
179	19057	Des Moines	IA
179	19087	Henry	IA
179	19099	Jasper	IA
179	19101	Jefferson	IA
179	19107	Keokuk	IA
179	19111	Lee	IA
179	19123	Mahaska	IA
179	19125	Marion	IA
179	19135	Monroe	IA
179	19157	Poweshiek	IA
179	19177	Van Buren	IA

PEA Number	Federal Information Processing System Number	County Name	State
179	19179	Wapello	IA
179	17067	Hancock	IL
179	17071	Henderson	IL
179	29045	Clark	MO
179	29199	Scotland	MO
180	04005	Coconino	AZ
180	04025	Yavapai	AZ
181	05081	Little River	AR
181	05091	Miller	AR
181	05113	Polk	AR
181	05133	Sevier	AR
181	40013	Bryan	OK
181	40023	Choctaw	OK
181	40089	McCurtain	OK
181	40127	Pushmataha	OK
181	48037	Bowie	TX
181	48067	Cass	TX
181	48315	Marion	TX
181	48343	Morris	TX
182	19103	Johnson	IA
182	19113	Linn	IA
183	29019	Boone	MO
183	29027	Callaway	MO
183	29051	Cole	MO
183	29053	Cooper	MO
183	29089	Howard	MO
183	29135	Moniteau	MO
183	29151	Osage	MO
184	22021	Caldwell Parish	LA
184	22035	East Carroll Parish	LA
184	22041	Franklin Parish	LA
184	22049	Jackson Parish	LA
184	22061	Lincoln Parish	LA
184	22067	Morehouse Parish	LA
184	22073	Ouachita Parish	LA
184	22083	Richland Parish	LA
184	22111	Union Parish	LA
184	22123	West Carroll Parish	LA
185	26013	Baraga	MI
185	26043	Dickinson	MI
185	26053	Gogebic	MI
185	26061	Houghton	MI
185	26071	Iron	MI
185	26083	Keweenaw	MI
185	26103	Marquette	MI
185	26109	Menominee	MI
185	26131	Ontonagon	MI
185	55037	Florence	WI
185	55051	Iron	WI
185	55075	Marinette	WI
185	55078	Menominee	WI
185	55083	Oconto	WI
185	55115	Shawano	WI
186	45023	Chester	SC
186	45057	Lancaster	SC
186	45091	York	SC
187	16005	Bannock	ID
187	16011	Bingham	ID
187	16019	Bonneville	ID
187	16033	Clark	ID
187	16043	Fremont	ID
187	16051	Jefferson	ID
187	16065	Madison	ID
187	16077	Power	ID
187	16081	Teton	ID
188	36003	Allegany	NY
188	36009	Cattaraugus	NY
188	36013	Chautauqua	NY
188	42083	McKean	PA
188	42105	Potter	PA
189	22003	Allen Parish	LA
189	22009	Avoyelles Parish	LA
189	22011	Beauregard Parish	LA
189	22043	Grant Parish	LA
189	22059	La Salle Parish	LA
189	22079	Rapides Parish	LA
189	22115	Vernon Parish	LA
190	30019	Daniels	MT
190	30021	Dawson	MT
190	30031	Gallatin	MT
190	30033	Garfield	MT
190	30037	Golden Valley	MT
190	30057	Madison	MT
190	30055	McCone	MT
190	30065	Musselshell	MT
190	30067	Park	MT
190	30069	Petroleum	MT
190	30083	Richland	MT
190	30085	Roosevelt	MT
190	30091	Sheridan	MT
190	30095	Stillwater	MT
190	30097	Sweet Grass	MT
190	30105	Valley	MT
190	30111	Yellowstone	MT

PEA Number	Federal Information Processing System Number	County Name	State
191	51007	Amelia	VA
191	51025	Brunswick	VA
191	51029	Buckingham	VA
191	51037	Charlotte	VA
191	51570	Colonial Heights City	VA
191	51049	Cumberland	VA
191	51053	Dinwiddie	VA
191	51595	Emporia City	VA
191	51081	Greensville	VA
191	51670	Hopewell City	VA
191	51111	Lunenburg	VA
191	51117	Mecklenburg	VA
191	51135	Nottoway	VA
191	51730	Petersburg City	VA
191	51147	Prince Edward	VA
191	51149	Prince George	VA
191	51183	Sussex	VA
192	37051	Cumberland	NC
193	20005	Atchison	KS
193	20043	Doniphan	KS
193	20045	Douglas	KS
193	20103	Leavenworth	KS
193	29003	Andrew	MO
193	29021	Buchanan	MO
194	42023	Cameron	PA
194	42027	Centre	PA
194	42033	Clearfield	PA
194	42047	Elk	PA
194	42065	Jefferson	PA
195	16009	Benewah	ID
195	16017	Bonner	ID
195	16021	Boundary	ID
195	16035	Clearwater	ID
195	16049	Idaho	ID
195	16055	Kootenai	ID
195	16057	Latah	ID
195	16061	Lewis	ID
195	16069	Nez Perce	ID
195	16079	Shoshone	ID
196	29017	Bollinger	MO
196	29023	Butler	MO
196	29031	Cape Girardeau	MO
196	29035	Carter	MO
196	29093	Iron	MO
196	29123	Madison	MO
196	29133	Mississippi	MO
196	29143	New Madrid	MO
196	29157	Perry	MO
196	29179	Reynolds	MO
196	29181	Ripley	MO
196	29201	Scott	MO
196	29207	Stoddard	MO
196	29223	Wayne	MO
197	39013	Belmont	OH
197	39081	Jefferson	OH
197	39111	Monroe	OH
197	54009	Brooke	WV
197	54029	Hancock	WV
197	54051	Marshall	WV
197	54069	Ohio	WV
197	54095	Tyler	WV
197	54103	Wetzel	WV
198	05021	Clay	AR
198	05031	Craighead	AR
198	05055	Greene	AR
198	05075	Lawrence	AR
198	05093	Mississippi	AR
198	05111	Poinsett	AR
198	05121	Randolph	AR
198	29069	Dunklin	MO
198	29155	Pemiscot	MO
199	13111	Fannin	GA
199	13123	Gilmer	GA
199	13129	Gordon	GA
199	13213	Murray	GA
199	13227	Pickens	GA
199	13281	Towns	GA
199	13291	Union	GA
199	13313	Whitfield	GA
200	37033	Caswell	NC
200	37157	Rockingham	NC
200	51590	Danville City	VA
200	51089	Henry	VA
200	51690	Martinsville City	VA
200	51141	Patrick	VA
200	51143	Pittsylvania	VA
201	48019	Bandera	TX
201	48127	Dimmit	TX
201	48163	Frio	TX
201	48171	Gillespie	TX
201	48259	Kendall	TX
201	48265	Kerr	TX
201	48283	La Salle	TX
201	48323	Maverick	TX

PEA Number	Federal Information Processing System Number	County Name	State
201	48325	Medina	TX
201	48385	Real	TX
201	48463	Uvalde	TX
201	48507	Zavala	TX
202	01113	Russell	AL
202	13053	Chattahoochee	GA
202	13145	Harris	GA
202	13197	Marion	GA
202	13215	Muscogee	GA
202	13259	Stewart	GA
202	13307	Webster	GA
203	26009	Antrim	MI
203	26019	Benzie	MI
203	26055	Grand Traverse	MI
203	26079	Kalkaska	MI
203	26085	Lake	MI
203	26089	Leelanau	MI
203	26101	Manistee	MI
203	26105	Mason	MI
203	26113	Missaukee	MI
203	26133	Osceola	MI
203	26165	Wexford	MI
204	21055	Crittenden	KY
204	21059	Daviess	KY
204	21091	Hancock	KY
204	21101	Henderson	KY
204	21107	Hopkins	KY
204	21149	McLean	KY
204	21177	Muhlenberg	KY
204	21183	Ohio	KY
204	21225	Union	KY
204	21233	Webster	KY
205	06023	Humboldt	CA
205	06033	Lake	CA
205	06045	Mendocino	CA
205	06105	Trinity	CA
206	53001	Adams	WA
206	53007	Chelan	WA
206	53017	Douglas	WA
206	53025	Grant	WA
206	53037	Kittitas	WA
206	53047	Okanogan	WA
207	13003	Atkinson	GA
207	13005	Bacon	GA
207	13025	Brantley	GA
207	13039	Camden	GA
207	13049	Charlton	GA
207	13065	Clinch	GA
207	13069	Coffee	GA
207	13127	Glynn	GA
207	13191	McIntosh	GA
207	13229	Pierce	GA
207	13299	Ware	GA
208	37097	Iredell	NC
208	37159	Rowan	NC
209	55009	Brown	WI
209	55029	Door	WI
209	55061	Kewaunee	WI
210	36007	Broome	NY
210	36107	Tioga	NY
210	42115	Susquehanna	PA
211	40005	Atoka	OK
211	40019	Carter	OK
211	40029	Coal	OK
211	40033	Cotton	OK
211	40049	Garvin	OK
211	40063	Hughes	OK
211	40067	Jefferson	OK
211	40069	Johnston	OK
211	40085	Love	OK
211	40095	Marshall	OK
211	40099	Murray	OK
211	40107	Okfuskee	OK
211	40123	Pontotoc	OK
211	40133	Seminole	OK
211	40137	Stephens	OK
212	02020	Anchorage Borough	AK
213	41013	Crook	OR
213	41017	Deschutes	OR
213	41027	Hood River	OR
213	41031	Jefferson	OR
213	41037	Lake	OR
213	41055	Sherman	OR
213	41065	Wasco	OR
213	53039	Klickitat	WA
213	53059	Skamania	WA
214	31109	Lancaster	NE
215	37003	Alexander	NC
215	37023	Burke	NC
215	37035	Catawba	NC
216	20021	Cherokee	KS
216	20037	Crawford	KS
216	29011	Barton	MO
216	29097	Jasper	MO

PEA Number	Federal Information Processing System Number	County Name	State
216	29145	Newton	MO
216	40115	Ottawa	OK
217	48303	Lubbock	TX
218	55073	Marathon	WI
218	55097	Portage	WI
218	55141	Wood	WI
219	19019	Buchanan	IA
219	19021	Buena Vista	IA
219	19023	Butler	IA
219	19033	Cerro Gordo	IA
219	19037	Chickasaw	IA
219	19041	Clay	IA
219	19059	Dickinson	IA
219	19063	Emmet	IA
219	19065	Fayette	IA
219	19067	Floyd	IA
219	19069	Franklin	IA
219	19081	Hancock	IA
219	19109	Kossuth	IA
219	19131	Mitchell	IA
219	19147	Palo Alto	IA
219	19151	Pocahontas	IA
219	19189	Winnebago	IA
219	19195	Worth	IA
220	48135	Ector	TX
220	48329	Midland	TX
221	48247	Jim Hogg	TX
221	48479	Webb	TX
221	48505	Zapata	TX
222	47029	Cocke	TN
222	47057	Grainger	TN
222	47063	Hamblen	TN
222	47067	Hancock	TN
222	47089	Jefferson	TN
222	47155	Sevier	TN
223	19061	Dubuque	IA
223	19097	Jackson	IA
223	17085	Jo Daviess	IL
223	55043	Grant	WI
223	55045	Green	WI
223	55049	Iowa	WI
223	55065	Lafayette	WI
224	17015	Carroll	IL
224	17037	DeKalb	IL
224	17103	Lee	IL
224	17141	Ogle	IL
224	17177	Stephenson	IL

PEA Number	Federal Information Processing System Number	County Name	State
225	27055	Houston	MN
225	55053	Jackson	WI
225	55063	La Crosse	WI
225	55081	Monroe	WI
225	55121	Trempealeau	WI
225	55123	Vernon	WI
226	39003	Allen	OH
226	39011	Auglaize	OH
226	39107	Mercer	OH
226	39137	Putnam	OH
226	39161	Van Wert	OH
227	36045	Jefferson	NY
227	36049	Lewis	NY
227	36089	St. Lawrence	NY
228	51023	Botetourt	VA
228	51045	Craig	VA
228	51161	Roanoke	VA
228	51770	Roanoke City	VA
228	51775	Salem City	VA
229	32009	Esmeralda	NV
229	32017	Lincoln	NV
229	32021	Mineral	NV
229	32023	Nye	NV
229	49001	Beaver	UT
229	49017	Garfield	UT
229	49021	Iron	UT
229	49031	Piute	UT
229	49053	Washington	UT
230	37017	Bladen	NC
230	37093	Hoke	NC
230	37155	Robeson	NC
230	37165	Scotland	NC
231	31003	Antelope	NE
231	31011	Boone	NE
231	31021	Burt	NE
231	31023	Butler	NE
231	31025	Cass	NE
231	31037	Colfax	NE
231	31039	Cuming	NE
231	31053	Dodge	NE
231	31119	Madison	NE
231	31125	Nance	NE
231	31139	Pierce	NE
231	31141	Platte	NE
231	31143	Polk	NE
231	31155	Saunders	NE
231	31167	Stanton	NE

PEA Number	Federal Information Processing System Number	County Name	State
231	31177	Washington	NE
231	31179	Wayne	NE
232	20013	Brown	KS
232	20031	Coffey	KS
232	20085	Jackson	KS
232	20087	Jefferson	KS
232	20139	Osage	KS
232	20177	Shawnee	KS
233	37045	Cleveland	NC
233	37109	Lincoln	NC
233	37161	Rutherford	NC
234	37057	Davidson	NC
234	37059	Davie	NC
234	37197	Yadkin	NC
235	48375	Potter	TX
235	48381	Randall	TX
236	31001	Adams	NE
236	31015	Boyd	NE
236	31017	Brown	NE
236	31019	Buffalo	NE
236	31035	Clay	NE
236	31041	Custer	NE
236	31047	Dawson	NE
236	31071	Garfield	NE
236	31077	Greeley	NE
236	31079	Hall	NE
236	31081	Hamilton	NE
236	31089	Holt	NE
236	31093	Howard	NE
236	31103	Keya Paha	NE
236	31115	Loup	NE
236	31121	Merrick	NE
236	31129	Nuckolls	NE
236	31149	Rock	NE
236	31163	Sherman	NE
236	31175	Valley	NE
236	31181	Webster	NE
236	31183	Wheeler	NE
237	13031	Bulloch	GA
237	13043	Candler	GA
237	13109	Evans	GA
237	13179	Liberty	GA
237	13183	Long	GA
237	13251	Screven	GA
237	13267	Tattnall	GA
237	13305	Wayne	GA
238	45031	Darlington	SC
238	45041	Florence	SC
238	45089	Williamsburg	SC
239	37025	Cabarrus	NC
239	37167	Stanly	NC
240	51003	Albemarle	VA
240	51540	Charlottesville City	VA
240	51065	Fluvanna	VA
240	51079	Greene	VA
240	51109	Louisa	VA
240	51125	Nelson	VA
241	13001	Appling	GA
241	13107	Emanuel	GA
241	13141	Hancock	GA
241	13161	Jeff Davis	GA
241	13167	Johnson	GA
241	13175	Laurens	GA
241	13209	Montgomery	GA
241	13237	Putnam	GA
241	13271	Telfair	GA
241	13279	Toombs	GA
241	13283	Treutlen	GA
241	13303	Washington	GA
241	13309	Wheeler	GA
242	22019	Calcasieu Parish	LA
242	22023	Cameron Parish	LA
242	22053	Jefferson Davis Parish	LA
243	17127	Massac	IL
243	21007	Ballard	KY
243	21033	Caldwell	KY
243	21035	Calloway	KY
243	21039	Carlisle	KY
243	21083	Graves	KY
243	21139	Livingston	KY
243	21143	Lyon	KY
243	21157	Marshall	KY
243	21145	McCracken	KY
244	20017	Chase	KS
244	20027	Clay	KS
244	20041	Dickinson	KS
244	20061	Geary	KS
244	20111	Lyon	KS
244	20117	Marshall	KS
244	20127	Morris	KS
244	20131	Nemaha	KS
244	20149	Pottawatomie	KS
244	20161	Riley	KS

PEA Number	Federal Information Processing System Number	County Name	State
244	20197	Wabaunsee	KS
244	20201	Washington	KS
245	29009	Barry	MO
245	29057	Dade	MO
245	29067	Douglas	MO
245	29091	Howell	MO
245	29109	Lawrence	MO
245	29153	Ozark	MO
245	29209	Stone	MO
245	29213	Taney	MO
246	01027	Clay	AL
246	01037	Coosa	AL
246	01081	Lee	AL
246	01087	Macon	AL
246	01123	Tallapoosa	AL
247	16027	Canyon	ID
247	16039	Elmore	ID
247	16073	Owyhee	ID
248	45027	Clarendon	SC
248	45055	Kershaw	SC
248	45061	Lee	SC
248	45085	Sumter	SC
249	48041	Brazos	TX
249	48185	Grimes	TX
250	35013	Dona Ana	NM
250	35051	Sierra	NM
251	20007	Barber	KS
251	20009	Barton	KS
251	20033	Comanche	KS
251	20047	Edwards	KS
251	20051	Ellis	KS
251	20053	Ellsworth	KS
251	20097	Kiowa	KS
251	20115	Marion	KS
251	20113	McPherson	KS
251	20135	Ness	KS
251	20145	Pawnee	KS
251	20151	Pratt	KS
251	20159	Rice	KS
251	20165	Rush	KS
251	20167	Russell	KS
251	20169	Saline	KS
251	20185	Stafford	KS
251	20195	Trego	KS
252	19035	Cherokee	IA
252	19093	Ida	IA
252	19133	Monona	IA
252	19141	O'Brien	IA
252	19149	Plymouth	IA
252	19167	Sioux	IA
252	19193	Woodbury	IA
252	46127	Union	SD
253	55001	Adams	WI
253	55021	Columbia	WI
253	55023	Crawford	WI
253	55057	Juneau	WI
253	55077	Marquette	WI
253	55103	Richland	WI
253	55111	Sauk	WI
254	55003	Ashland	WI
254	55007	Bayfield	WI
254	55019	Clark	WI
254	55041	Forest	WI
254	55067	Langlade	WI
254	55069	Lincoln	WI
254	55085	Oneida	WI
254	55099	Price	WI
254	55119	Taylor	WI
254	55125	Vilas	WI
255	28011	Bolivar	MS
255	28015	Carroll	MS
255	28027	Coahoma	MS
255	28053	Humphreys	MS
255	28055	Issaquena	MS
255	28083	Leflore	MS
255	28125	Sharkey	MS
255	28133	Sunflower	MS
255	28135	Tallahatchie	MS
255	28151	Washington	MS
256	51009	Amherst	VA
256	51011	Appomattox	VA
256	51031	Campbell	VA
256	51083	Halifax	VA
256	51680	Lynchburg City	VA
257	56001	Albany	WY
257	56005	Campbell	WY
257	56009	Converse	WY
257	56011	Crook	WY
257	56021	Laramie	WY
257	56027	Niobrara	WY
257	56031	Platte	WY
257	56045	Weston	WY
258	01009	Blount	AL
258	01043	Cullman	AL

PEA Number	Federal Information Processing System Number	County Name	State
258	01057	Fayette	AL
258	01093	Marion	AL
258	01133	Winston	AL
259	35005	Chaves	NM
259	35015	Eddy	NM
259	35025	Lea	NM
259	48165	Gaines	TX
259	48501	Yoakum	TX
260	26007	Alpena	MI
260	26029	Charlevoix	MI
260	26031	Cheboygan	MI
260	26039	Crawford	MI
260	26047	Emmet	MI
260	26119	Montmorency	MI
260	26135	Oscoda	MI
260	26137	Otsego	MI
260	26141	Presque Isle	MI
260	26143	Roscommon	MI
261	27027	Clay	MN
261	38017	Cass	ND
262	45013	Beaufort	SC
262	45049	Hampton	SC
262	45053	Jasper	SC
263	35019	Guadalupe	NM
263	35028	Los Alamos	NM
263	35033	Mora	NM
263	35047	San Miguel	NM
263	35049	Santa Fe	NM
264	02013	Aleutians East Borough	AK
264	02016	Aleutians West Census Area	AK
264	02050	Bethel Census Area	AK
264	02060	Bristol Bay Borough	AK
264	02070	Dillingham Census Area	AK
264	02122	Kenai Peninsula Borough	AK
264	02150	Kodiak Island Borough	AK
264	02164	Lake and Peninsula Borough	AK
264	02170	Matanuska-Susitna Borough	AK
264	02261	Valdez-Cordova Census Area	AK
265	19089	Howard	IA
265	19191	Winneshiek	IA
265	27039	Dodge	MN
265	27045	Fillmore	MN
265	27099	Mower	MN
265	27157	Wabasha	MN
265	27169	Winona	MN
265	55011	Buffalo	WI
266	37009	Ashe	NC
266	37011	Avery	NC
266	37027	Caldwell	NC
266	37189	Watauga	NC
266	47091	Johnson	TN
267	55071	Manitowoc	WI
267	55117	Sheboygan	WI
268	19031	Cedar	IA
268	19045	Clinton	IA
268	19115	Louisa	IA
268	19139	Muscatine	IA
268	17131	Mercer	IL
268	17195	Whiteside	IL
269	55101	Racine	WI
270	17011	Bureau	IL
270	17099	La Salle	IL
270	17105	Livingston	IL
270	17155	Putnam	IL
271	36015	Chemung	NY
271	42015	Bradford	PA
271	42117	Tioga	PA
272	48035	Bosque	TX
272	48049	Brown	TX
272	48083	Coleman	TX
272	48093	Comanche	TX
272	48133	Eastland	TX
272	48143	Erath	TX
272	48193	Hamilton	TX
272	48217	Hill	TX
272	48333	Mills	TX
272	48425	Somervell	TX
273	17039	De Witt	IL
273	17113	McLean	IL
274	16013	Blaine	ID
274	16025	Camas	ID
274	16031	Cassia	ID
274	16047	Gooding	ID
274	16053	Jerome	ID
274	16063	Lincoln	ID
274	16067	Minidoka	ID

PEA Number	Federal Information Processing System Number	County Name	State
274	16083	Twin Falls	ID
275	48001	Anderson	TX
275	48213	Henderson	TX
275	48349	Navarro	TX
276	30011	Carter	MT
276	38001	Adams	ND
276	46019	Butte	SD
276	46033	Custer	SD
276	46047	Fall River	SD
276	46063	Harding	SD
276	46081	Lawrence	SD
276	46093	Meade	SD
276	46103	Pennington	SD
276	46105	Perkins	SD
277	20035	Cowley	KS
277	20049	Elk	KS
277	20073	Greenwood	KS
277	20077	Harper	KS
277	20079	Harvey	KS
277	20095	Kingman	KS
277	20155	Reno	KS
277	20191	Sumner	KS
278	20001	Allen	KS
278	20019	Chautauqua	KS
278	20099	Labette	KS
278	20125	Montgomery	KS
278	20133	Neosho	KS
278	20205	Wilson	KS
278	20207	Woodson	KS
278	40035	Craig	OK
278	40105	Nowata	OK
278	40147	Washington	OK
279	16041	Franklin	ID
279	16071	Oneida	ID
279	49003	Box Elder	UT
279	49005	Cache	UT
280	20025	Clark	KS
280	20055	Finney	KS
280	20057	Ford	KS
280	20067	Grant	KS
280	20069	Gray	KS
280	20071	Greeley	KS
280	20075	Hamilton	KS
280	20081	Haskell	KS
280	20083	Hodgeman	KS
280	20093	Kearny	KS
280	20101	Lane	KS
280	20119	Meade	KS
280	20129	Morton	KS
280	20171	Scott	KS
280	20175	Seward	KS
280	20187	Stanton	KS
280	20189	Stevens	KS
280	20203	Wichita	KS
280	40007	Beaver	OK
280	40025	Cimarron	OK
280	40139	Texas	OK
281	40091	McIntosh	OK
281	40101	Muskogee	OK
281	40111	Okmulgee	OK
281	40121	Pittsburg	OK
282	17057	Fulton	IL
282	17095	Knox	IL
282	17123	Marshall	IL
282	17125	Mason	IL
282	17109	McDonough	IL
282	17175	Stark	IL
282	17187	Warren	IL
283	36019	Clinton	NY
283	36031	Essex	NY
283	36033	Franklin	NY
284	45001	Abbeville	SC
284	45047	Greenwood	SC
284	45059	Laurens	SC
284	45065	McCormick	SC
285	04001	Apache	AZ
285	35006	Cibola	NM
285	35031	McKinley	NM
286	46099	Minnehaha	SD
287	55059	Kenosha	WI
288	48059	Callahan	TX
288	48253	Jones	TX
288	48441	Taylor	TX
289	49007	Carbon	UT
289	49013	Duchesne	UT
289	49015	Emery	UT
289	49019	Grand	UT
289	49029	Morgan	UT
289	49043	Summit	UT
289	49047	Uintah	UT
289	49051	Wasatch	UT
289	49055	Wayne	UT
290	27011	Big Stone	MN
290	27117	Pipestone	MN

PEA Number	Federal Information Processing System Number	County Name	State
290	27133	Rock	MN
290	27155	Traverse	MN
290	46005	Beadle	SD
290	46011	Brookings	SD
290	46025	Clark	SD
290	46029	Codington	SD
290	46039	Deuel	SD
290	46051	Grant	SD
290	46057	Hamlin	SD
290	46077	Kingsbury	SD
290	46079	Lake	SD
290	46097	Miner	SD
290	46101	Moody	SD
290	46109	Roberts	SD
290	46111	Sanborn	SD
291	37123	Montgomery	NC
291	37125	Moore	NC
291	37153	Richmond	NC
292	08101	Pueblo	CO
293	21221	Trigg	KY
293	47081	Hickman	TN
293	47083	Houston	TN
293	47085	Humphreys	TN
293	47099	Lawrence	TN
293	47101	Lewis	TN
293	47135	Perry	TN
293	47161	Stewart	TN
293	47181	Wayne	TN
294	19013	Black Hawk	IA
294	19017	Bremer	IA
295	40071	Kay	OK
295	40103	Noble	OK
295	40117	Pawnee	OK
295	40119	Payne	OK
296	42107	Schuylkill	PA
297	41001	Baker	OR
297	41021	Gilliam	OR
297	41023	Grant	OR
297	41049	Morrow	OR
297	41059	Umatilla	OR
297	41061	Union	OR
297	41063	Wallowa	OR
297	41069	Wheeler	OR
298	02068	Denali Borough	AK
298	02090	Fairbanks North Star Borough	AK
298	02180	Nome Census Area	AK
298	02185	North Slope Borough	AK
298	02188	Northwest Arctic Borough	AK
298	02240	Southeast Fairbanks Census Area	AK
298	02270	Wade Hampton Census Area	AK
298	02290	Yukon-Koyukuk Census Area	AK
299	29001	Adair	MO
299	29025	Caldwell	MO
299	29033	Carroll	MO
299	29049	Clinton	MO
299	29061	Daviess	MO
299	29063	DeKalb	MO
299	29079	Grundy	MO
299	29081	Harrison	MO
299	29103	Knox	MO
299	29117	Livingston	MO
299	29129	Mercer	MO
299	29171	Putnam	MO
299	29197	Schuyler	MO
299	29211	Sullivan	MO
300	01011	Bullock	AL
300	01013	Butler	AL
300	01041	Crenshaw	AL
300	01047	Dallas	AL
300	01085	Lowndes	AL
300	01105	Perry	AL
300	01109	Pike	AL
301	27109	Olmsted	MN
302	40003	Alfalfa	OK
302	40011	Blaine	OK
302	40015	Caddo	OK
302	40047	Garfield	OK
302	40053	Grant	OK
302	40073	Kingfisher	OK
302	40093	Major	OK
302	40151	Woods	OK
303	30005	Blaine	MT
303	30013	Cascade	MT
303	30015	Chouteau	MT
303	30035	Glacier	MT
303	30041	Hill	MT
303	30051	Liberty	MT
303	30073	Pondera	MT

PEA Number	Federal Information Processing System Number	County Name	State
303	30099	Teton	MT
303	30101	Toole	MT
304	37171	Surry	NC
304	37193	Wilkes	NC
305	40009	Beckham	OK
305	40039	Custer	OK
305	40043	Dewey	OK
305	40045	Ellis	OK
305	40055	Greer	OK
305	40057	Harmon	OK
305	40059	Harper	OK
305	40065	Jackson	OK
305	40075	Kiowa	OK
305	40129	Roger Mills	OK
305	40149	Washita	OK
305	40153	Woodward	OK
306	48077	Clay	TX
306	48485	Wichita	TX
307	19119	Lyon	IA
307	31027	Cedar	NE
307	31107	Knox	NE
307	46009	Bon Homme	SD
307	46027	Clay	SD
307	46061	Hanson	SD
307	46067	Hutchinson	SD
307	46083	Lincoln	SD
307	46087	McCook	SD
307	46125	Turner	SD
307	46135	Yankton	SD
308	13079	Crawford	GA
308	13081	Crisp	GA
308	13093	Dooly	GA
308	13193	Macon	GA
308	13207	Monroe	GA
308	13249	Schley	GA
308	13261	Sumter	GA
308	13269	Taylor	GA
309	37015	Bertie	NC
309	37029	Camden	NC
309	37041	Chowan	NC
309	37073	Gates	NC
309	37091	Hertford	NC
309	37139	Pasquotank	NC
309	37143	Perquimans	NC
310	29055	Crawford	MO
310	29187	St. Francois	MO
310	29186	Ste. Genevieve	MO
310	29221	Washington	MO
311	08003	Alamosa	CO
311	08009	Baca	CO
311	08011	Bent	CO
311	08017	Cheyenne	CO
311	08021	Conejos	CO
311	08023	Costilla	CO
311	08025	Crowley	CO
311	08055	Huerfano	CO
311	08061	Kiowa	CO
311	08071	Las Animas	CO
311	08079	Mineral	CO
311	08089	Otero	CO
311	08099	Prowers	CO
311	08105	Rio Grande	CO
311	08109	Saguache	CO
311	35007	Colfax	NM
312	35045	San Juan	NM
313	48021	Bastrop	TX
313	48055	Caldwell	TX
313	48287	Lee	TX
314	48073	Cherokee	TX
314	48365	Panola	TX
314	48401	Rusk	TX
315	30003	Big Horn	MT
315	30009	Carbon	MT
315	30017	Custer	MT
315	30025	Fallon	MT
315	30075	Powder River	MT
315	30079	Prairie	MT
315	30087	Rosebud	MT
315	30103	Treasure	MT
315	56003	Big Horn	WY
315	56019	Johnson	WY
315	56029	Park	WY
315	56033	Sheridan	WY
316	16007	Bear Lake	ID
316	16029	Caribou	ID
316	49009	Daggett	UT
316	49033	Rich	UT
316	56007	Carbon	WY
316	56023	Lincoln	WY
316	56035	Sublette	WY
316	56037	Sweetwater	WY
316	56041	Uinta	WY
317	31059	Fillmore	NE
317	31067	Gage	NE

PEA Number	Federal Information Processing System Number	County Name	State
317	31095	Jefferson	NE
317	31097	Johnson	NE
317	31127	Nemaha	NE
317	31131	Otoe	NE
317	31133	Pawnee	NE
317	31147	Richardson	NE
317	31151	Saline	NE
317	31159	Seward	NE
317	31169	Thayer	NE
317	31185	York	NE
318	27069	Kittson	MN
318	27077	Lake of the Woods	MN
318	27089	Marshall	MN
318	27113	Pennington	MN
318	27125	Red Lake	MN
318	27135	Roseau	MN
318	38005	Benson	ND
318	38019	Cavalier	ND
318	38027	Eddy	ND
318	38063	Nelson	ND
318	38067	Pembina	ND
318	38071	Ramsey	ND
318	38079	Rolette	ND
318	38091	Steele	ND
318	38095	Towner	ND
318	38097	Traill	ND
318	38099	Walsh	ND
319	13095	Dougherty	GA
319	13177	Lee	GA
320	48235	Irion	TX
320	48413	Schleicher	TX
320	48435	Sutton	TX
320	48451	Tom Green	TX
321	18029	Dearborn	IN
321	18047	Franklin	IN
321	18115	Ohio	IN
321	18137	Ripley	IN
321	18155	Switzerland	IN
322	38009	Bottineau	ND
322	38013	Burke	ND
322	38023	Divide	ND
322	38049	McHenry	ND
322	38053	McKenzie	ND
322	38061	Mountrail	ND
322	38075	Renville	ND
322	38101	Ward	ND
322	38105	Williams	ND

PEA Number	Federal Information Processing System Number	County Name	State
323	35003	Catron	NM
323	35053	Socorro	NM
323	35057	Torrance	NM
323	35061	Valencia	NM
324	42103	Pike	PA
324	42127	Wayne	PA
325	38015	Burleigh	ND
325	38059	Morton	ND
326	27005	Becker	MN
326	27087	Mahnomen	MN
326	27107	Norman	MN
326	27111	Otter Tail	MN
326	27167	Wilkin	MN
327	45017	Calhoun	SC
327	45075	Orangeburg	SC
328	04017	Navajo	AZ
329	48047	Brooks	TX
329	48131	Duval	TX
329	48249	Jim Wells	TX
329	48261	Kenedy	TX
329	48273	Kleberg	TX
329	48297	Live Oak	TX
329	48311	McMullen	TX
330	17033	Crawford	IL
330	17047	Edwards	IL
330	17101	Lawrence	IL
330	17159	Richland	IL
330	17185	Wabash	IL
330	17191	Wayne	IL
330	17193	White	IL
331	48079	Cochran	TX
331	48189	Hale	TX
331	48219	Hockley	TX
331	48279	Lamb	TX
331	48305	Lynn	TX
331	48437	Swisher	TX
331	48445	Terry	TX
332	37007	Anson	NC
332	45025	Chesterfield	SC
332	45069	Marlboro	SC
333	39037	Darke	OH
333	39149	Shelby	OH
334	48011	Armstrong	TX
334	48065	Carson	TX
334	48075	Childress	TX
334	48087	Collingsworth	TX
334	48101	Cottle	TX

PEA Number	Federal Information Processing System Number	County Name	State
334	48129	Donley	TX
334	48179	Gray	TX
334	48191	Hall	TX
334	48195	Hansford	TX
334	48211	Hemphill	TX
334	48233	Hutchinson	TX
334	48295	Lipscomb	TX
334	48357	Ochiltree	TX
334	48393	Roberts	TX
334	48483	Wheeler	TX
335	22031	De Soto Parish	LA
335	22069	Natchitoches Parish	LA
335	22081	Red River Parish	LA
335	22085	Sabine Parish	LA
336	27119	Polk	MN
336	38035	Grand Forks	ND
337	48097	Cooke	TX
337	48237	Jack	TX
337	48337	Montague	TX
337	48363	Palo Pinto	TX
338	08007	Archuleta	CO
338	08033	Dolores	CO
338	08067	La Plata	CO
338	08083	Montezuma	CO
338	08111	San Juan	CO
339	31007	Banner	NE
339	31013	Box Butte	NE
339	31033	Cheyenne	NE
339	31045	Dawes	NE
339	31105	Kimball	NE
339	31123	Morrill	NE
339	31157	Scotts Bluff	NE
339	31165	Sioux	NE
339	56015	Goshen	WY
340	35009	Curry	NM
340	35011	DeBaca	NM
340	35021	Harding	NM
340	35037	Quay	NM
340	35041	Roosevelt	NM
340	35059	Union	NM
341	35027	Lincoln	NM
341	35035	Otero	NM
342	46003	Aurora	SD
342	46015	Brule	SD
342	46017	Buffalo	SD
342	46023	Charles Mix	SD
342	46035	Davison	SD
342	46043	Douglas	SD
342	46053	Gregory	SD
342	46059	Hand	SD
342	46065	Hughes	SD
342	46069	Hyde	SD
342	46073	Jerauld	SD
342	46085	Lyman	SD
342	46117	Stanley	SD
342	46119	Sully	SD
342	46123	Tripp	SD
343	48043	Brewster	TX
343	48103	Crane	TX
343	48105	Crockett	TX
343	48243	Jeff Davis	TX
343	48301	Loving	TX
343	48371	Pecos	TX
343	48377	Presidio	TX
343	48383	Reagan	TX
343	48389	Reeves	TX
343	48443	Terrell	TX
343	48461	Upton	TX
343	48475	Ward	TX
343	48495	Winkler	TX
344	01007	Bibb	AL
344	01021	Chilton	AL
344	01065	Hale	AL
345	45039	Fairfield	SC
345	45071	Newberry	SC
345	45081	Saluda	SC
346	37039	Cherokee	NC
346	37043	Clay	NC
346	37075	Graham	NC
346	37113	Macon	NC
347	22037	East Feliciana Parish	LA
347	22077	Pointe Coupee Parish	LA
347	22091	St. Helena Parish	LA
347	22125	West Feliciana Parish	LA
347	28157	Wilkinson	MS
348	46013	Brown	SD
348	46021	Campbell	SD
348	46037	Day	SD
348	46041	Dewey	SD
348	46045	Edmunds	SD
348	46049	Faulk	SD
348	46091	Marshall	SD

PEA Number	Federal Information Processing System Number	County Name	State
348	46089	McPherson	SD
348	46107	Potter	SD
348	46115	Spink	SD
348	46129	Walworth	SD
348	46137	Ziebach	SD
349	37111	McDowell	NC
349	37121	Mitchell	NC
349	37199	Yancey	NC
350	05037	Cross	AR
350	05077	Lee	AR
350	05107	Phillips	AR
350	05123	St. Francis	AR
351	30109	Wibaux	MT
351	38007	Billings	ND
351	38011	Bowman	ND
351	38025	Dunn	ND
351	38029	Emmons	ND
351	38033	Golden Valley	ND
351	38037	Grant	ND
351	38041	Hettinger	ND
351	38043	Kidder	ND
351	38047	Logan	ND
351	38051	McIntosh	ND
351	38055	McLean	ND
351	38057	Mercer	ND
351	38065	Oliver	ND
351	38085	Sioux	ND
351	38087	Slope	ND
351	38089	Stark	ND
351	46031	Corson	SD
352	48177	Gonzales	TX
352	48255	Karnes	TX
352	48493	Wilson	TX
353	17075	Iroquois	IL
353	18073	Jasper	IN
353	18111	Newton	IN
354	55135	Waupaca	WI
354	55137	Waushara	WI
355	56025	Natrona	WY
356	53019	Ferry	WA
356	53043	Lincoln	WA
356	53051	Pend Oreille	WA
356	53065	Stevens	WA
357	35039	Rio Arriba	NM
357	35055	Taos	NM
358	48031	Blanco	TX
358	48053	Burnet	TX
358	48299	Llano	TX
359	08075	Logan	CO
359	08087	Morgan	CO
359	08095	Phillips	CO
359	08121	Washington	CO
359	08125	Yuma	CO
359	31057	Dundy	NE
360	02100	Haines Borough	AK
360	02105	Hoonah-Angoon Census Area	AK
360	02110	Juneau Borough	AK
360	02130	Ketchikan Gateway Borough	AK
360	02195	Petersburg	AK
360	02198	Prince of Wales-Hyder	AK
360	02220	Sitka Borough	AK
360	02230	Skagway Municipality	AK
360	02275	Wrangell	AK
360	02282	Yakutat Borough	AK
361	49023	Juab	UT
361	49027	Millard	UT
361	49039	Sanpete	UT
361	49041	Sevier	UT
362	16003	Adams	ID
362	16015	Boise	ID
362	16045	Gem	ID
362	16075	Payette	ID
362	16085	Valley	ID
362	16087	Washington	ID
363	48003	Andrews	TX
363	48033	Borden	TX
363	48115	Dawson	TX
363	48173	Glasscock	TX
363	48227	Howard	TX
363	48317	Martin	TX
364	30001	Beaverhead	MT
364	30007	Broadwater	MT
364	30023	Deer Lodge	MT
364	30043	Jefferson	MT
364	30093	Silver Bow	MT
365	40141	Tillman	OK
365	48009	Archer	TX
365	48023	Baylor	TX
365	48155	Foard	TX
365	48197	Hardeman	TX
365	48429	Stephens	TX

PEA Number	Federal Information Processing System Number	County Name	State
365	48447	Throckmorton	TX
365	48487	Wilbarger	TX
365	48503	Young	TX
366	53003	Asotin	WA
366	53023	Garfield	WA
366	53075	Whitman	WA
367	29007	Audrain	MO
367	29137	Monroe	MO
367	29175	Randolph	MO
367	29205	Shelby	MO
368	20029	Cloud	KS
368	20039	Decatur	KS
368	20065	Graham	KS
368	20089	Jewell	KS
368	20105	Lincoln	KS
368	20123	Mitchell	KS
368	20137	Norton	KS
368	20141	Osborne	KS
368	20143	Ottawa	KS
368	20147	Phillips	KS
368	20153	Rawlins	KS
368	20157	Republic	KS
368	20163	Rooks	KS
368	20183	Smith	KS
369	19003	Adams	IA
369	19071	Fremont	IA
369	19129	Mills	IA
369	19137	Montgomery	IA
369	19145	Page	IA
369	19173	Taylor	IA
369	29005	Atchison	MO
370	19011	Benton	IA
370	19095	Iowa	IA
370	19183	Washington	IA
371	37005	Alleghany	NC
371	51640	Galax City	VA
371	51077	Grayson	VA
371	51197	Wythe	VA
372	08039	Elbert	CO
372	08063	Kit Carson	CO
372	08073	Lincoln	CO
372	20023	Cheyenne	KS
372	20063	Gove	KS
372	20109	Logan	KS
372	20179	Sheridan	KS
372	20181	Sherman	KS
372	20193	Thomas	KS
372	20199	Wallace	KS
373	53013	Columbia	WA
373	53071	Walla Walla	WA
374	08115	Sedgwick	CO
374	31005	Arthur	NE
374	31009	Blaine	NE
374	31029	Chase	NE
374	31049	Deuel	NE
374	31069	Garden	NE
374	31091	Hooker	NE
374	31101	Keith	NE
374	31111	Lincoln	NE
374	31113	Logan	NE
374	31117	McPherson	NE
374	31135	Perkins	NE
374	31171	Thomas	NE
375	35017	Grant	NM
375	35023	Hidalgo	NM
375	35029	Luna	NM
376	48111	Dallam	TX
376	48117	Deaf Smith	TX
376	48205	Hartley	TX
376	48341	Moore	TX
376	48359	Oldham	TX
376	48421	Sherman	TX
377	01023	Choctaw	AL
377	01063	Greene	AL
377	01091	Marengo	AL
377	01119	Sumter	AL
378	13033	Burke	GA
378	13125	Glascock	GA
378	13163	Jefferson	GA
378	13165	Jenkins	GA
378	13301	Warren	GA
379	26033	Chippewa	MI
379	26095	Luce	MI
379	26097	Mackinac	MI
380	26003	Alger	MI
380	26041	Delta	MI
380	26153	Schoolcraft	MI
381	48137	Edwards	TX
381	48271	Kinney	TX
381	48465	Val Verde	TX
382	56013	Fremont	WY
382	56017	Hot Springs	WY
382	56043	Washakie	WY
383	19039	Clarke	IA

PEA Number	Federal Information Processing System Number	County Name	State
383	19053	Decatur	IA
383	19117	Lucas	IA
383	19159	Ringgold	IA
383	19175	Union	IA
383	19185	Wayne	IA
384	19005	Allamakee	IA
384	19043	Clayton	IA
384	19055	Delaware	IA
385	29111	Lewis	MO
385	29127	Marion	MO
385	29173	Ralls	MO
386	45005	Allendale	SC
386	45009	Bamberg	SC
386	45011	Barnwell	SC
387	38003	Barnes	ND
387	38021	Dickey	ND
387	38039	Griggs	ND
387	38045	LaMoure	ND
387	38073	Ransom	ND
387	38077	Richland	ND
387	38081	Sargent	ND
388	19009	Audubon	IA
388	19029	Cass	IA
388	19085	Harrison	IA
388	19165	Shelby	IA
389	31061	Franklin	NE
389	31063	Frontier	NE
389	31065	Furnas	NE
389	31073	Gosper	NE
389	31083	Harlan	NE
389	31085	Hayes	NE
389	31087	Hitchcock	NE
389	31099	Kearney	NE
389	31137	Phelps	NE
389	31145	Red Willow	NE
390	48151	Fisher	TX
390	48335	Mitchell	TX
390	48353	Nolan	TX
390	48415	Scurry	TX
391	41025	Harney	OR
391	41045	Malheur	OR
392	29075	Gentry	MO
392	29087	Holt	MO
392	29147	Nodaway	MO
392	29227	Worth	MO
393	29041	Chariton	MO
393	29115	Linn	MO
393	29121	Macon	MO
394	46007	Bennett	SD
394	46055	Haakon	SD
394	46071	Jackson	SD
394	46075	Jones	SD
394	46095	Mellette	SD
394	46113	Shannon	SD
394	46121	Todd	SD
395	38031	Foster	ND
395	38069	Pierce	ND
395	38083	Sheridan	ND
395	38093	Stutsman	ND
395	38103	Wells	ND
396	19001	Adair	IA
396	19077	Guthrie	IA
396	19121	Madison	IA
397	01075	Lamar	AL
397	01107	Pickens	AL
398	31043	Dakota	NE
398	31051	Dixon	NE
398	31173	Thurston	NE
399	48281	Lampasas	TX
399	48411	San Saba	TX
400	48017	Bailey	TX
400	48069	Castro	TX
400	48369	Parmer	TX
401	48045	Briscoe	TX
401	48107	Crosby	TX
401	48125	Dickens	TX
401	48153	Floyd	TX
401	48169	Garza	TX
401	48263	Kent	TX
401	48345	Motley	TX
402	48095	Concho	TX
402	48267	Kimble	TX
402	48319	Mason	TX
402	48307	McCulloch	TX
402	48327	Menard	TX
403	30027	Fergus	MT
403	30045	Judith Basin	MT
403	30059	Meagher	MT
403	30071	Phillips	MT
403	30107	Wheatland	MT
404	49025	Kane	UT
404	49037	San Juan	UT
405	56039	Teton	WY
406	19105	Jones	IA

PEA Number	Federal Information Processing System Number	County Name	State
407	16023	Butte	ID
407	16037	Custer	ID
407	16059	Lemhi	ID
408	48081	Coke	TX
408	48399	Runnels	TX
408	48431	Sterling	TX
409	48207	Haskell	TX
409	48269	King	TX
409	48275	Knox	TX
409	48417	Shackelford	TX
409	48433	Stonewall	TX
410	31031	Cherry	NE
410	31075	Grant	NE
410	31161	Sheridan	NE
411	48109	Culberson	TX
411	48229	Hudspeth	TX
412	72001	Adjuntas	PR
412	72003	Aguada	PR
412	72005	Aguadilla	PR
412	72007	Aguas Buenas	PR
412	72009	Aibonito	PR
412	72011	Anasco	PR
412	72013	Arecibo	PR
412	72015	Arroyo	PR
412	72017	Barceloneta	PR
412	72019	Barranquitas	PR
412	72021	Bayamon	PR
412	72023	Cabo Rojo	PR
412	72025	Caguas	PR
412	72027	Camuy	PR
412	72029	Canovanas	PR
412	72031	Carolina	PR
412	72033	Catano	PR
412	72035	Cayey	PR
412	72037	Ceiba	PR
412	72039	Ciales	PR
412	72041	Cidra	PR
412	72043	Coamo	PR
412	72045	Comerio	PR
412	72047	Corozal	PR
412	72049	Culebra	PR
412	72051	Dorado	PR
412	72053	Fajardo	PR
412	72054	Florida	PR
412	72055	Guanica	PR
412	72057	Guayama	PR
412	72059	Guayanilla	PR
412	72061	Guaynabo	PR
412	72063	Gurabo	PR
412	72065	Hatillo	PR
412	72067	Hormigueros	PR
412	72069	Humacao	PR
412	72071	Isabela	PR
412	72073	Jayuya	PR
412	72075	Juana Diaz	PR
412	72077	Juncos	PR
412	72079	Lajas	PR
412	72081	Lares	PR
412	72083	Las Marias	PR
412	72085	Las Piedras	PR
412	72087	Loiza	PR
412	72089	Luquillo	PR
412	72091	Manati	PR
412	72093	Maricao	PR
412	72095	Maunabo	PR
412	72097	Mayaguez	PR
412	72099	Moca	PR
412	72101	Morovis	PR
412	72103	Naguabo	PR
412	72105	Naranjito	PR
412	72107	Orocovis	PR
412	72109	Patillas	PR
412	72111	Penuelas	PR
412	72113	Ponce	PR
412	72115	Quebradillas	PR
412	72117	Rincon	PR
412	72119	Rio Grande	PR
412	72121	Sabana Grande	PR
412	72123	Salinas	PR
412	72125	San German	PR
412	72127	San Juan	PR
412	72129	San Lorenzo	PR
412	72131	San Sebastian	PR
412	72133	Santa Isabel	PR
412	72135	Toa Alta	PR
412	72137	Toa Baja	PR
412	72139	Trujillo Alto	PR
412	72141	Utuado	PR
412	72143	Vega Alta	PR
412	72145	Vega Baja	PR
412	72147	Vieques	PR
412	72149	Villalba	PR
412	72151	Yabucoa	PR
412	72153	Yauco	PR

PEA Number	Federal Information Processing System Number	County Name	State
413	66010	Guam	GU
413	69085	Northern Islands	MP
413	69100	Rota	MP
413	69110	Saipan	MP
413	69120	Tinian	MP
414	78010	St. Croix	VI
414	78020	St. John	VI
414	78030	St. Thomas	VI
415	60010	Eastern District	AS
415	60020	Manu'a District	AS
415	60030	Rose Island	AS
415	60040	Swains Island	AS
415	60050	Western District	AS
416	99023	Gulf of Mexico Central and East	GM
416	99001	Gulf of Mexico West	GM

18. Amend § 27.11 by adding paragraph (l) to read as follows:

§ 27.11 Initial authorization.

* * * * *

(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 sub-blocks specified in § 27.5(m).

19. Amend § 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.

20. Amend § 27.14 by revising the first sentence of paragraphs (a) and (k) and adding paragraph (v) 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 (v) 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. * * *

* * * * *

(v) 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.

21. Amend § 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 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.

22. Amend § 27.53 by adding paragraph (l) to read as follows:

§ 27.53 Emission limits.

* * * * *

(l) *3.7 GHz Service*. The following emission limits apply to stations transmitting in the 3700-3980 MHz band:

(1) For base station 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. Compliance with this paragraph (l)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(2) For mobile 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. Compliance with this paragraph (l)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be either one percent of the emission bandwidth of the fundamental emission of the transmitter or 350 kHz. In the

bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

* * * * *

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

§ 27.55 Power strength limits.

* * * * *

(d) *Power flux density for stations operating in the 3700-3980 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/m^2/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.

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

§ 27.57 International coordination.

* * * * *

(c) Operation in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, 2180-2200 MHz, and 3700-3980 MHz bands is subject to international agreements with Mexico and Canada.

25. Amend § 27.75 by adding paragraph (a)(3) to read as follows:

§ 27.75 Basic interoperability requirement.

(a) * * *

(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.

* * * * *

26. Add subpart O to read as follows:

Subpart O—3.7 GHz Service (3700-3980 MHz)

Sec.

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 Lump sum payment for earth station opt out.
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, 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.

§ 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 C-band 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*. For purposes of determining eligibility to receive reimbursement for relocation costs incurred as a result of the transition of FSS operations to the 4000-4200 MHz band, an eligible space station operators may receive reimbursement for relocation costs incurred as a result of the transition of FSS operations to the 4000-4200 MHz 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 § 25.138(c) of this chapter. 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 this subpart, contiguous United States consists of the contiguous 48 states and the District of Columbia as defined by Partial Economic Areas Nos. 1-41, 43-211, 213-263, 265-297, 299-359, and 361-411, which includes areas within 12 nautical miles of the U.S. Gulf coastline (*see* § 27.6(m)). In this context, the rest of the United States includes the Honolulu, Anchorage, Kodiak, Fairbanks, Juneau, Puerto Rico, Guam-Northern Mariana Islands, U.S. Virgin Islands, American Samoa, and the Gulf of Mexico PEAs.

(7) *Relocation Payment Clearinghouse*. A Relocation Payment Clearinghouse is a neutral, independent third-party to administer the cost management for the transition of the 3700-4000 MHz band from the Fixed Satellite Service and Fixed Service to the 3.7 GHz Service.

(8) *Relocation Coordinator.* A Relocation Coordinator is a third party that will ensure that all incumbent space station operators are relocating in a timely matter, and that is selected consistent with § 27.1413. The Relocation Coordinator will have technical experience in understanding and working on

earth stations and will manage the migration and filtering of incumbent earth stations of eligible space station operators that decline accelerated relocation payment.

§ 27.1412 Transition Plan.

(a) *Relocation deadlines*. Eligible space station operators are responsible for all necessary actions to clear their 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 (unless the incumbent earth station opts out of the formal relocation process, per paragraph (e) of this section), as of December 5, 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 December 5, 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 December 5, 2021 (see § 27.6(m)). 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 December 5, 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 December 5, 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 December 5, 2023.

(3) *Transition delays*. 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) *Responsibility for meeting accelerated relocation deadlines*. 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 May 29, 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 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 June 12, 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. Eligible space station operators must make any necessary updates or resolve any deficiencies in their individual Transition Plans by August 14, 2020.

(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 stations 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) 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 space station operator to file the information needed for such a plan with the Relocation Coordinator.

(i) 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 that ensure all earth station relocation is completed no later than the relocation deadline.

(ii) 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 within the contiguous United

States may opt out of the formal relocation process and accept a lump sum payment equal to the estimated reasonable transition costs of earth station migration and filtering, as determined by the Wireless Telecommunications Bureau, in lieu of actual relocation costs. Such an incumbent earth station is responsible for coordinating with the relevant space station operator as necessary and performing all relocation actions on its own, including switching to alternative transmission mechanisms such as fiber, and it will not receive further reimbursement for any costs exceeding the lump sum payment. An incumbent earth station electing to opt out must inform the appropriate space station operator(s) and the Relocation Coordinator that earth station migration and filtering will not be necessary for the relevant earth station site and must coordinate with operators to avoid any disruption of video and radio programming.

(f) *Space station status reports*. On a quarterly basis, beginning December 31, 2020: Each eligible space station operator must provide a status report of its clearing efforts. Eligible space station operators may file joint status reports.

(g) *Certification of accelerated relocation*. Each eligible space station operator must file a timely certification that it has completed the necessary clearing actions to satisfy each accelerated relocation deadline. The certification must be filed once the eligible space station operator completes its obligations but no later than the applicable accelerated relocation deadline. The Wireless Telecommunication Bureau will prescribe the form of such certification.

(1) The Bureau, Clearinghouse, and relevant stakeholders will have the opportunity to review the Certification of Accelerated Relocation and identify potential deficiencies. The Wireless Telecommunications Bureau will prescribe the form of any challenges by relevant stakeholders as to the validity of the certification and will establish the process for how such challenges will impact the incremental decreases in the accelerated relocation payment as set- forth in section 27.1422(d).

(2) If credible challenges as to the space station operator's satisfaction of the relevant deadline are made, the Bureau will issue a public notice identifying such challenges and will render a final decision as to the validity of the certification no later than 60 days from its filing. Absent notice from the Bureau of

any such deficiencies within 30 days of the filing of the certification, the Certification of Accelerated Relocation will be deemed validated.

(h) *Delegated authority*. 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.

§ 27.1413 Relocation Coordinator.

(a) *Search committee.* If eligible space station operators elect to receive accelerated relocation payments no later than May 29, 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%).

(i) The search committee shall notify the Commission of its choice of Relocation Coordinator.

(ii) 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;

(iii) 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) If eligible space station operators select a Relocation Coordinator, they shall be responsible for paying its costs.

(3) In the event that the search committee fails to select a Relocation Coordinator and to notify the Commission by July 31, 2020, or in the case that at least 80% of accelerated relocation payments are not accepted (and thus accelerated relocation is not triggered):

(i) The search committee will be dissolved without further action by the Commission.

(ii) The Commission will initiate a procurement of a Relocation Coordinator to facilitate the transition. Specifically, the Office of the Managing Director will initiate the procurement, and the Wireless Telecommunications Bureau will take all other necessary actions to meet the accelerated relocation deadlines (to the extent applicable to any given operator) and the relocation deadline.

(iii) 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) Coordinating 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.

(i) May require each associated space station operator to file the information needed for such a plan with the Relocation Coordinator.

(ii) 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) Be responsible for receiving notice from earth station operators or other satellite customers of any disputes related to comparability of facilities, workmanship, or preservation of service during the transition and shall subsequently notify the Wireless Telecommunications Bureau of the dispute and provide recommendations for resolution.

(6) 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 § 1.2105(c)(5)(i) of this chapter whenever the prohibition in § 1.2105(c) of this chapter applies to competitive bidding for licenses in the 3.7 GHz Service.

(7) Incumbent space station operators must cooperate in good faith with the Relocation Coordinator throughout the transition.

(d) *Status reports.* On a quarterly basis, beginning December 31, 2020, the Relocation Coordinator must provide a report on the overall status of clearing efforts.

(e) *Document requests*. The Wireless Telecommunications 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.

§ 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 nine entities: ACA Connects, Intelsat, SES, Eutelsat S.A., National Association Broadcasters, National Cable Television Association, CTIA, Competitive Carriers Association, and WISPA.

(2) The search committee shall convene no later than **[**INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**]** and shall notify the Commission of the detailed selection criteria for the position of Relocation Payment Clearinghouse no later than June 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 has published criteria, outlining submission requirements, and providing the 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 July 31, 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 July 31, 2020, two of the nine members of the search committee will be dropped therefrom by lot, and the remaining seven members of the search committee shall select a Clearinghouse by majority vote by August 14, 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 collecting and distributing relocation and accelerated relocation payments, auditing incoming and outgoing estimates, mitigating cost disputes among parties, and generally acting as clearinghouse.

(3) The search committee 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:

(i) Engage in strategic planning and adopt goals and metrics to evaluate its performance;

(ii) Adopt internal controls for its operations;

(iii) Utilize enterprise risk management practices; and

(iv) 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.

(i) When the prohibition in § 1.2105(c) of this chapter 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 § 1.2105(c)(5)(i) of this chapter.

(ii) The Relocation Payment Clearinghouse should 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, National Institute of Standards and Technology publications, and Office of Management and Budget guidance.

(iii) The Relocation Payment Clearinghouse must 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 provide quarterly reports that detail the status of reimbursement funds available for clearing obligations, the relocation and accelerated relocation payments issued, the amounts collected from overlay licensees, and any certifications filed by incumbents. The reports must account for all funds spent to transition the 3.7 GHz Service Band, including the Relocation Payment Clearinghouse's own expenses, e.g., salaries and fees paid to law firms, accounting firms, and other consultants. The report shall include descriptions of any disputes and the manner in which they were resolved.

(2) The Relocation Payment 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

(3) The Relocation Clearing House shall provide to the Wireless Telecommunications Bureau additional information upon request.

§ 27. 1415 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.

§ 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) *Payment procedures.* 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.

§ 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, consistent with § 27.1418. 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.

§ 27.1418 Payment obligations.

(a) Each eligible space station operator is responsible for the payment of its own satellite transition costs until the auction winners have been announced.

(b) Licensees in the 3.7 GHz Service shall pay their *pro rata* share of:

(1) The reasonable costs of the Relocation Payment Clearinghouse and, in the event the Wireless Telecommunications Bureau selects the Relocation Coordinator, the services of the Relocation Coordinator and its staff;

(2) 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;

(3) Any lump sum payments, if elected by incumbent earth station operators in lieu of actual relocation costs; and

(4) 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 selected and established by the Wireless Telecommunications Bureau, the 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.

(c) 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, and 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.

(d) If 3.7 GHz band license is relinquished to the Commission prior to all relocation cost reimbursements and accelerated relocation payments being paid, the remaining payments will be distributed among other similarly situated 3.7 GHz band licensees. If a new license is issued for the previously relinquished rights prior to final payments becoming due, the new 3.7 GHz band licensee will be responsible for the same *pro rata* share of relocation costs and accelerated relocation payments as the initial 3.7 GHz band license. If a 3.7 GHz band licensee sells its rights on the secondary market, the new 3.7 GHz band licensee will be obligated to fulfill all payment obligations associated with the license.

§ 27.1419 Lump sum payment for earth station opt out.

The Wireless Telecommunications Bureau shall announce a lump sum that will be available per each incumbent earth station that elects to opt out from the formal relocation process, per § 27.1412(e), as well as the process for electing lump sum payments. Incumbent earth station owners must make the lump sum payment election no later than 30 days after the Bureau announces the lump sum payment amounts, and must indicate whether each incumbent earth station for which it elects the lump sum payment will be transitioned to the upper 200 megahertz in order to maintain C-band services or will discontinue C-band services.

§ 27.1420 Cost-sharing formula.

(a) For space station transition and Relocation Payment Clearinghouse costs, and in the event the Wireless Telecommunications Bureau selects a Relocation Coordinator pursuant to § 27.1413(a), Relocation Coordinator 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*). Mathematically, this is represented as:

$$RO = \left(\frac{\sum_{i \in I} P_i}{\sum_{j=1}^{N} P_j}\right) \times RC$$

(b) 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 identified in § 27.1412(a) will be used, except *I* is the set of licenses a bidder won in the PEA, *N* is the total blocks sold in the PEA and *RC* is the PEA-specific earth station and fixed service relocation costs.

(c) For the Phase I accelerated relocation payments, the *pro rata* share of each flexible use licensee of the 3.7 to 3.8 MHz in the 46 PEAs that are cleared by December 5, 2021, will be the sum of the final clock phase prices (*P*) that the licensee won divided by the total final clock phase prices for all *M* license blocks sold in those 46 PEAs. To determine a licensee's *RO* the *pro rata* share would then be multiplied by the total accelerated relocation payment due for Phase I, *A1*. Mathematically, this is represented as:

$$RO = \left(\frac{\sum_{i \in I} P_i}{\sum_{j=1}^{M} P_j}\right) \times A1$$

(d) For Phase II accelerated relocation payments, the *pro rata* share of each flexible use licensee will be the sum of the final clock phase prices (*P*) that the licensee won in the entire auction, divided by the total final clock phase prices for all *N* license blocks sold in the auction. To determine a licensee's *RO* the *pro rata* share would then be multiplied by the total accelerated relocation payment due for Phase II,

A2. Mathematically, this is represented as:

$$RO = \left(\frac{\sum_{i \in I} P_i}{\sum_{j=1}^{N} P_j}\right) \times A2$$

§ 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.

(1) 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.

(2) 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.

(3) 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.

(1) 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.

(2) 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.

(3) 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.

§ 27.1422 Accelerated relocation payment.

(a) Eligible space station operators that meet the applicable early-clearing benchmark(s), as confirmed in their Certification of Accelerated Relocation set-forth in § 27.1412(g), will be eligible for their respective accelerated relocation payment.

(b) The Relocation Payment Clearinghouse will distribute the accelerated relocation payments accordingly:

Table 1 to Paragraph (b)

Accelerated Relocation Payment by Operator

	Payment	Phase I Payment	Phase II Payment
Intelsat	$ 4,865,366,000	$ 1,197,842,000	$ 3,667,524,000
SES	$ 3,968,133,000	$ 976,945,000	$ 2,991,188,000
Eutelsat	$ 506,978,000	$ 124,817,000	$ 382,161,000
Telesat	$ 344,400,000	$ 84,790,000	$ 259,610,000
Star One	$ 15,124,000	$ 3,723,000	$ 11,401,000
Totals	$ 9,700,001,000	$ 2,388,117,000	$ 7,311,884,000

(c) The Relocation Payment Clearinghouse shall promptly notify 3.7 GHz Service licensees following validation of the Certification of Accelerated Relocations as set-forth in Section 27.1412(g). 3.7 GHz Service 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. The Clearinghouse shall disburse accelerated relocation payments to relevant space station operators within seven days of receiving the payment from overlay licensees.

(d) For eligible space station operators that fail to meet either the Phase I or Phase II benchmarks

as of the relevant accelerated relocation deadline, the accelerated relocation payment will be reduced according to the following schedule of declining accelerated relocation payments for the six months following the relevant deadline:

Table 1 to Paragraph (d)

Date of Completion	Incremental Reduction	Accelerated Relocation Payment
By Deadline	--	100%
1-30 Days Late	5%	95%
31-60 Days Late	5%	90%
61-90 Days Late	10%	80%
91-120 Days Late	10%	70%
121-150 Days Late	20%	50%
151-180 Days Late	20%	30%
181+ Days Late	30%	0%

§ 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/m^2/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/m^2/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 Telemetry, Tracking, and Command (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/m^2/MHz as measured at the TT&C earth station antenna.

§ 27.1424 Agreements between 3.7 GHz Service licensees and C-Band earth station operators.

The PFD limits in § 27.1423 may be modified by the private 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

27. The authority citation for part 101 continues to read as follows:

Authority: 47 U.S.C. 154, 303.

28. Amend § 101.3 by adding a definition for "Contiguous United States" in alphabetical order to read as follows:

§ 101.3 Definitions.

* * * * *

Contiguous United States. For the 3700-4200 MHz band, the contiguous United States consists of the contiguous 48 states and the District of Columbia as defined by Partial Economic Areas Nos. 1-41, 43-211, 213-263, 265-297, 299-359, and 361-411, which includes areas within 12 nautical miles of the U.S. Gulf coastline (*see* § 27.6(m) of this chapter). In this context, the rest of the United States includes the Honolulu, Anchorage, Kodiak, Fairbanks, Juneau, Puerto Rico, Guam-Northern Mariana Islands, U.S. Virgin Islands, American Samoa, and the Gulf of Mexico PEAs (Nos. 42, 212, 264, 298, 360, 412-416).

* * * * *

29. Amend § 101.101 by revising the table heading "Other" and the entry "3700-4200" and adding Note 2 to read as follows:

§ 101.101 Frequency availability.

Frequency band (MHz)	Radio service				
	Common carrier (Part 101)	Private radio (Part 101)	Broadcast auxiliary (Part 74)	Other (Parts 15, 21, 22, 24, 25, 27, 74, 78 & 100)	Notes
* * * * * * *					
3700-4200	CC LTTS	OFS		SAT, ET	(2).
* * * * * * *					

* * * * *

Notes

* * * * *

(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 December 5, 2023, to self-relocate their point-to-point links out of the 3,700-4,200 MHz band. Such licensees may seek reimbursement of their reasonable costs based on the "comparable facilities" standard used for the transition of microwave links out of other bands, *see* § 101.73(d) of this chapter (defining comparable facilities as facilities possessing certain characteristics in terms of throughput, reliability and operating costs) subject to the demonstration requirements and reimbursement administrative provisions administrative provisions in part 27, subpart O, of this chapter.

30. Amend § 101.147 by revising Notes 8, 14, and 25 to paragraph (a) and the heading 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 December 5, 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. Existing licensees as of April 19, 2018, of permanent and temporary point-to-point Fixed Service links in the contiguous United States have until December 5, 2023, to self-relocate their point-to-point links out of the 3,700-4,200 MHz.

* * * * *

(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 December 5, 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*.

* * * * *

31. Amend § 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 December 5, 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),[1] an Initial Regulatory Flexibility Analysis (IRFA) was incorporated in the *Notice of Proposed Rulemaking* (*Notice*) released in July 2018 in this proceeding.[2] 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.[3]

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, space station 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 3.7-4.0 GHz band. The Commission also adopts a process to transition this 280 megahertz of spectrum from incumbent use to new flexible-use by December 5, 2025, with accelerated relocation payment options for space station operators that serve earth stations in the contiguous United States to accelerate this transition in two stages: (1) 100 megahertz

[1] *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).

[2] *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*).

[3] *See* 5 U.S.C. § 604.

(3.7-3.8 GHz) by December 5, 2021 and (2) all 280 megahertz by December 5, 2023. In both cases, the space station operators would clear an additional 20 megahertz to be used as a guard band. The Commission adopts relocation and accelerated relocation payment rules including rules establishing an independent Relocation Payment Clearinghouse to oversee the cost-related aspects of the transition, as well as a Relocation Coordinator to ensure that all incumbent space station operators are relocating in a timely manner and ensure uninterrupted service during and following the transition. 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 address 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 3.7-4.0 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.[4]

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.[5] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[6] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act."[7] A "small business

[4] 5 U.S.C. § 604(a)(3).

[5] *Id.*

[6] *Id.* § 601(6).

[7] *Id.* § 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.[8]

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.[9] 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.[10] These types of small businesses represent 99.9% of all businesses in the United States, which translates to 30.7 million businesses.[11]

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."[12] 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.[13] 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.[14]

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."[15] U.S. Census Bureau data from the 2017 Census of Governments[16] indicate that there were 90,075 local governmental jurisdictions consisting of general purpose governments and special purpose governments in the United States.[17] Of this number, there were

[8] 15 U.S.C. § 632.

[9] *See* 5 U.S.C. § 601(3)-(6).

[10] *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).

[11] *Id.*

[12] 5 U.S.C. § 601(4).

[13] 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. S*ee* 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.

[14] *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.

[15] 5 U.S.C. § 601(5).

[16] *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.

[17] *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 (county,[18] municipal and town or township[19]) with populations of less than 50,000 and 12,040 special purpose governments - independent school districts[20] with enrollment populations of less than 50,000.[21] 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."[22]

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.[23] The appropriate size standard under SBA rules is that such a business is small if it has 1,500 or fewer employees.[24] For this industry, U.S. Census Bureau data for 2012 show that there were 967 firms that operated for the entire year.[25] Of this total, 955 firms had employment of 999 or fewer employees and 12 had employment of 1,000 employees or more.[26] Thus under this category and the associated size standard, the Commission estimates that the majority of wireless telecommunications carriers (except satellite) are small entities.

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."[27] Satellite telecommunications service providers include satellite

(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.

[18] *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.

[19] *See id.* There were 18,729 municipal and 16,097 town and township governments with populations less than 50,000.

[20] *See id.* 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.

[21] 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.

[22] 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.

[23] 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.

[24] 13 CFR § 121.201, NAICS code 517312 (previously 517210).

[25] 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.

[26] *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."

[27] 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.

and earth station operators. The category has a small business size standard of $35 million or less in average annual receipts, under SBA rules.[28] 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.[29] Of this total, 299 firms had annual receipts of less than $25 million.[30] 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 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-

[28] 13 CFR § 121.201, NAICS code 517410.

[29] 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.

[30] *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.

3.98 GHz band.[31] 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.[32] This proposal was modeled on the small business size standards and associated bidding credits that the Commission adopted for a range of other services.[33] 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.[34] 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.[35] 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."[36] In this proceeding, a variety of organizations and associations that in turn represent the

[31] 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.

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

[33] *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).

[34] *NPRM*, 33 FCC Rcd at 6969-70, para. 163.

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

[36] 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).

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."[37]

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.[38] Further, the Commission adopts an open eligibility standard for licenses in the A, B, and C Blocks.[39] 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.[40]

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 regard 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 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

---

[37] 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).

[38] *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).

[39] *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.

[40] *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)).

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.[41] Therefore, the Commission sought comment on an alternative performance benchmark metric for licensees providing IoT-type fixed and mobile services.[42] Based on the record evidence,[43] 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.[44] 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.[45]

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

[41] *NPRM*, 33 FCC Rcd at 6965, para. 154.

[42] *Id.*

[43] 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).

[44] *NPRM,* 33 FCC Rcd at 6967, para. 157.

[45] *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).

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.[46] This approach will promote consistency across services.[47]

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.[48]

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.[49] 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 as of the publication date of the Report and Order. Earth stations registered after the filing freeze is lifted will not be considered incumbent earth stations and will not qualify for reimbursement of relocation costs. Further, any new registered earth stations outside of the contiguous United States may not claim protection from harmful interference from new flexible-use licensees in 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 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

[46] *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).

[47] 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.

[48] *See Wireless Radio Services Renewal Reform FNPRM,* 33 FCC Rcd at 8911-18, paras. 100-23.

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

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 temporary fixed and permanent point-to-point Fixed Service links will have until December 5, 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 December 5, 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.[50] 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.[51] 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.[52] 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 1 Watt (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.[53] 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. For base station OOBE, we apply the part 27 measurement procedures and resolution bandwidth that are used for AWS devices outlined in section

[50] *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).

[51] *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.

[52] *See, e.g.*, 47 CFR § 27.50(d)(1).

[53] *NPRM*, 33 FCC Rcd at 6971-72, paras. 168-171; *see also* 47 CFR § 27.53(h) (AWS emission limits).

27.53(h).[54] 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.

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. We adopt a relaxation of the emission limit within the first five megahertz of the channel edge by varying the resolution bandwidth used when measuring the emission. For emissions within 1 MHz from the channel edge, the minimum resolution bandwidth will be either one percent of the emission bandwidth of the fundamental emission of the transmitter or 350 kHz. In the bands between one and five megahertz removed from the licensee's authorized frequency block, the minimum resolution bandwidth will be 500 kHz. The adopted relaxation will not affect the interference to FSS above 4.0 GHz. The adopted relaxation will be entirely contained within the 20 MHz guard band. The effect on CBRS operations below 3.7 GHz should be minimal.

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.[55] This is consistent with part 27 AWS rules, which generally do not impose antenna height limits on antenna structures.

42. *Service Area Boundary Limit.* The Commission adopts the -76 dBm/m2/MHz power flux density (PFD) 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 also permits licensees operating in adjacent geographic areas to voluntarily agree to higher levels at their common boundaries.

43. *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.

44. *Other Part 27 Rules.* The Commission adopts 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 part 1, subpart BB of the Commission's rules (Disturbance of AM Broadcast Station Antenna Patterns) for operations in the 3.7-3.98 GHz band. The Commission requires client devices to be capable of operating across the entire 3.7-3.98 GHz band. Specifically, the Commission adds 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.

45. *Protection from Out of Band Emissions.* The Commission adopts a 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/m^2/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.

46. *Protection from Receiver Blocking.* The Commission will require base stations and mobiles to meet a PFD limit of -16 dBW/m^2/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

[54] *See* 47 CFR § 27.53(h)(3), (4).

[55] *See id.* § 27.56.

licensee's authorized band of operation.

47. *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.

48. *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 PFD limit of -16 dBW/m^2/MHz, as measured at the TT&C earth station antenna.

49. 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-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

50. 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.[56]

51. 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.

52. To ensure that small entities and all eligible interests are included in the Transition Plans and compensated for the transition to the upper 200 megahertz of the band, the transition obligations the Commission adopts require that, in order for a space station operator to satisfy the clearing benchmarks

[56] 5 U.S.C. § 603(c)(1)-(4).

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 space station 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 space station operator incumbent affected by the transition will have the opportunity to participate.

53. 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. 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.

54. 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.

55. 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.

G. Report to Congress

56. 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.[57] 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.[58]

[57] *See* 5 U.S.C. § 801(a)(1)(A).

[58] *See id.* § 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.)

CONFIDENTIAL APPENDIX D

STATEMENT OF
CHAIRMAN AJIT PAI

Re: *Expanding Flexible Use of the 3.7 to 4.2 GHz Band,* GN Docket No. 18-122

Securing United States leadership in 5G is a national priority. One study pegs 5G's economic potential at three million new jobs, $275 billion in private investment, and $500 billion in new economic growth. You can quibble with the numbers, but there's no question that 5G networks will be an important platform for innovation and investment in the coming years, as were 4G LTE and the mobile app economy it enabled over a decade ago. That explains why countries around the world are jockeying for global leadership in 5G. Whoever sets the pace globally will become the frontrunner in the development of the 5G ecosystem and attract the jobs, growth, and consumer benefits that come with that status. And I want the past to be prologue: I want America's success in 5G to match our leadership in 4G.

That's why the FCC has been pursuing a strategy to Facilitate America's Superiority in 5G Technology—the 5G FAST Plan. By executing that plan, the Commission has already made an unprecedented amount of spectrum available for commercial, flexible wireless use. In the high bands, we have successfully concluded our nation's first two millimeter-wave auctions in the 28 GHz and 24 GHz band, and our ongoing auction of the upper 37 GHz, 39 GHz, and 47 GHz bands will soon come to a successful end. With respect to low-band spectrum, the transition of the 600 MHz band for wireless use is on schedule, notwithstanding many predictions to the contrary. Indeed, mobile network operators are already deploying 5G wireless services in the band.

We have also taken decisive action with respect to mid-band spectrum, which is appealing for 5G as it combines good geographic coverage with good capacity. We've made more spectrum in the 2.5 GHz band available for 5G. We've reformed our rules regarding the 3.5 GHz band to encourage 5G deployment and will be auctioning licenses in that band this summer. We've approved the T-Mobile/Sprint merger, which, as the U.S. District Court for the Southern District of New York recently recognized, will allow critical mid-band spectrum to be used for 5G. And today, we adopt an Order that will repurpose 280 megahertz of new, mid-band spectrum for flexible use, which will help deliver 5G services to consumers across our country and promote our global leadership.

During this proceeding, I made it clear that my decision would be based on four guiding principles. First, the FCC must make available a significant amount of C-band spectrum for 5G. Second, we must do so quickly. Third, we must generate revenue for the federal government. And fourth, we must ensure that the services that are currently delivered using the C-band can continue to be delivered to the American people. The Order we adopt today advances each of these principles.

I'll start with the first two. This item will make a large swath of mid-band spectrum available, and will do so quickly. From Congress to my fellow Commissioners to wireless providers to equipment manufacturers, virtually everyone agrees that we need to act expeditiously to make a large amount of C-band spectrum available for 5G. Among other things, doing so will help close the digital divide, enabling all Americans—whether they live in rural or urban areas—to access new and innovative 5G applications and services.

To ensure that the 280 megahertz of repurposed spectrum from 3.7 GHz to 3.98 GHz is made available for flexible wireless use as quickly as possible, the Order provides for "accelerated relocation payments" for satellite operators if they meet deadlines for clearing C-band spectrum rapidly.

Why are accelerated relocation payments necessary? The answer is simple: speed. We want satellite operators to vacate the lower portion of the C-band quickly. And this transition will be much

faster if we align the incentives of satellite operators with the incentives of wireless providers who want expedited access to that spectrum.

To properly align those incentives, we are giving satellite operators the opportunity to receive accelerated relocation payments of $9.7 billion if they meet our accelerated clearing milestones. Now, some believe that these payments are too small. Others have criticized them as being too large. But as Goldilocks might say, I believe we've gotten it just right. We arrived at this figure by working with our economists and other expert staff to determine the value to auction winners of having satellite operators clear the spectrum in an accelerated timeframe and to approximate the size of payments that would be made in the private marketplace absent holdout and free-rider problems.

Turning to my third principle, I believe that a public auction, run by our outstanding staff here at the FCC, will be the best way to ensure that we generate revenue for the federal government and value for U.S. taxpayers. And that auction will start later this year—on December 8. The Commission has a quarter-century track record of successful and transparent auctions. In fact, as of late last year, the Commission had conducted 93 spectrum auctions that generated over $117 billion in revenue for the U.S. Treasury. That doesn't include the ongoing auction of the 37 GHz, 39 GHz, and 47 GHz bands, which is wrapping up and has already attracted over $7.5 billion in gross bids. And we conduct our auctions in a fair, trusted, and transparent manner that assigns flexible-use licenses quickly and would be difficult, if not impossible, for a private sale to replicate.

With respect to this principle of revenue for the federal government, it's important to make a couple of points about accelerated relocation payments. First, they will be made by wireless carriers, not the FCC and not the American taxpayer. And second, to the extent they impact the proceeds of the auction at all, they are likely to increase those proceeds. That's because without a strong incentive for satellite operators to cooperate, it will take years longer to clear this spectrum, dramatically reducing the value of this spectrum opportunity to wireless bidders. It's like repainting your house before you sell it; yes, there are costs to doing that, but the costs are more than offset by the higher sales price. And our conservative approach here means the costs of accelerated relocation are easily outweighed by the benefits to the Treasury (not to mention the public at large).

As for the fourth principle, the Commission is adopting a transition plan for this band that will ensure that the American people are able to receive C-band services in a continuous and uninterrupted manner. The item lays out a comprehensive and systematic transition process that will ensure that all incumbents are held harmless, including registered earth station operators that will be able to continue serving over 110 million households. And the record is clear that the services provided through the C-band today can be delivered in the future through the upper 200 megahertz of the band.

The substance of today's Order is sound. But as to its timing, there are some who argue that we should wait—indefinitely. They complain that we are refusing to sit on our hands and wait for Congress to legislate. It's at once amusing and astounding that some making this criticism are the very same people who have previously complained that the agency isn't moving quickly enough on mid-band spectrum. Indeed, by now, it's become a tired refrain: Demand action on mid-band spectrum, but vote against putting 2.5 GHz spectrum to work for American consumers. Demand action on mid-band spectrum, but vote against making the 3.5 GHz band a testbed for 5G. Demand action on mid-band spectrum, but vote against letting New T-Mobile put underused spectrum to work in rural America. Demand action on mid-band spectrum, but vote against every single one of the infrastructure reforms needed to enable that spectrum to be used for 5G. Demand action on mid-band spectrum, but vote against the C-band public auction that will help ensure American leadership in 5G. For some, the imperative of criticizing the Commission no matter the issue appears to outweigh the importance of holding positions that bear even a semblance of internal consistency. We see this tactic of diametrically opposed talk and action a lot in

Washington. Some in the Beltway quietly accommodate themselves to it; others gleefully praise it as savvy. But the American people see it for what it is: a pretzel, not a principle.

So let me be clear regarding this tepid call to change course and sit still. For those waiting with bated breath for that favorite Washington catchphrase "the U-turn," I have only one thing to say: You turn if you want to. This Chairman's not for turning. The goal of leading the world in 5G is too urgent, the need to close the digital divide too pressing for us to put off action indefinitely. The time to act is now. And we are acting.

And we should, in part, because the law says we can. The Communications Act requires that the FCC act in the public interest and gives us ample legal authority to move forward with this public auction. Section 316 of the Act allows us to modify the licenses of C-band incumbents. Section 309 of the Act authorizes a public auction of the lower 280 megahertz of the C-band for flexible-use, overlay licenses. Section 303 of the Act gives us the authority to set new technical rules for the band. And section 303(r) of the Act lets us require the winners of the public auction to pay for the relocation of the band's incumbents under our *Emerging Technologies* framework.

Of course, I'm always open to input from Congress. And if Congress passes legislation after our vote today so that revenue from this auction can supplement the $20.4 billion the Commission dedicated to closing the digital divide just last month, I'm all for it. But as the Chairman of the FCC, it would be irresponsible for me to do nothing on a spectrum band vital for 5G in the hopes that a Congress under divided control and in an election year is going to pass C-band legislation addressing the difficult issues ably resolved by this Order.

Our decision today benefited greatly from the extensive comments in the record and feedback from a variety of stakeholders. In particular, I'd like to thank those members of the satellite industry, mobile wireless providers, wireless Internet service providers, cable operators, broadcasters, and content distributors who engaged in these issues in good faith and provided constructive feedback on our proposals. In order for the C-band transition to be a success, we will need to see continued cooperation and constructive engagement from all these stakeholders.

I'd also like to thank all our hardworking FCC staff. This is probably the most complicated proceeding that the Commission has encountered in many years. And we couldn't have gotten to this point without the Herculean efforts of those across the Commission. From the Wireless Telecommunications Bureau, Ken Baker, Steve Buenzow, Peter Daronco, Thomas Derenge, Connie Diaz, Kamran Etemad, Anna Gentry, Jessica Greffenius, Joyce Jones, Susannah Larson, Roger Noel, Matthew Pearl, Paul Powell, Jessica Quinley, Jaclyn Rosen, Blaise Scinto, Dana Shaffer, Max Staloff, Donald Stockdale, Cecilia Sulhoff, Becky Tangren, Jeff Tignor, Brian Wondrack, and Janet Young; from the Office of Economics and Analytics, Valerie Barrish, Erik Beith, Craig Bomberger, Jonathan Campbell, Rita Cookmeyer, Patrick DeGraba, Shabnam Javid, Daniel Habif, Bill Huber, Pramesh Jobanputra, Evan Kwerel, Paul Lafontaine, Giulia McHenry, Eliot Maenner, Tajma Rahimic, Erik Salovaara, Linda Sanderson, Martha Stancill, Sue Sterner, Patrick Sun, and Margaret Wiener; from the Office of Engineering and Technology, Bahman Badipour, Michael Ha, Ira Keltz, Tom Mooring, Nick Oros, Robert Pavlak, Barbara Pavon, and Ronald Repasi; from the International Bureau, Jose Albuquerque, Paul Blais, Jameyanne Fuller, Jennifer Gilsenan, Kerry Murray, Robert Nelson, Jim Schlichting, and Tom Sullivan; from the Office of General Counsel, Deborah Broderson, Michael Carlson, David Horowitz, Thomas Johnson, and William Richardson; from the Office of Communications Business Opportunities, Chana Wilkerson; from the Office of Managing Director, Dan Daly, Sunny Diemert, Dawn DiGiorgio, Jae Seong, Timothy Siekierka, Deena Shetler, and Mark Stephens; and from the Enforcement Bureau, Christopher Killion and Jeremy Marcus.

STATEMENT OF
FCC COMMISSIONER MICHAEL O'RIELLY

Re: *Expanding Flexible Use of the 3.7 to 4.2 GHz Band,* GN Docket No. 18-122

This is a fantastic day, and the timing of today's order is both serendipitous and appropriate. Five years ago, almost to the day, I was sitting at Mobile World Congress discussing the future of the wireless sector with industry leaders. During a series of conversations, it became abundantly clear that the U.S., as a whole, and the Commission, in particular, weren't doing enough to allocate mid-band spectrum for 5G. While industry members all said millimeter wave spectrum was useful and a component of next-generation networks, the critical ingredient was mid-band frequencies with their ideal blend of propagation and capacity. Especially outside of our largest cities, mid-band would be the key to realizing the promise of increased speeds and lower latency, along with the vision of a world where almost every object may be connected to the Internet. From that moment on, I turned my attention to the importance of mid-bands, and more specifically the 3.7 to 4.2 GHz band, otherwise known as the C-Band, discussing it with almost anyone who would listen. But, I did more than just talk or wish or complain.

In the many sessions I have had over the past five years with wireless providers, manufactures, the satellite industry, and the broadcasters and cable operators, which account for the vast majority of C-Band transmissions, I worked hard to get the relevant parties to accept the fundamental concept. That wasn't easy, became quite tense at moments, and took a lot of effort, which ultimately proved fruitful. I also formulated four key principles along the way that would need to be addressed to execute this deal and for this reallocation to be successful. First, a sufficient amount of spectrum has to be repurposed, at least between 200 and 300 megahertz. Second, it must be done quickly. There's not time to drag our proverbial feet, as the wireless industry already needed this spectrum yesterday. Third, the incumbent users of the band must be accommodated, and the satellite licensees must be on board and receive adequate compensation to give up their existing rights. Fourth, the other portion of the C-Band, or 6 GHz, has to be opened for unlicensed use.

I thank Chairman Pai for moving this critical item, when the prior Commission did not, and crafting an order that is generally in line with my first three requirements. While I may have gone down a slightly different path if I had the opportunity, I am pleased that we are clearing 280 megahertz for auction. This landing spot took tremendous effort to achieve, as well as a considerable amount of my time, energy, and patience. But, it was incredibly important because new 5G wireless services are going to need wide channel allocations, and no other band provides as great an opportunity as the C-Band.

I also appreciate that the Chairman has committed to making sure that the auction happens this year. Further, if things go as planned, all incumbents should be fully accommodated, with their concerns addressed. I find it highly unlikely that the Commission would turn off popular broadcast and cable programming should the restructuring of this band not be complete by 2025.

At the same time, we have all had to deal with the back and forth between industry participants and Hill policy makers about incentive payments and the possible distribution of proceeds. This is unfortunate, as many months were wasted debating whether to even provide an incentive payment to the satellite providers. The reality is that to do otherwise would have doomed this project and undermined decades of spectrum policy. Keep in mind, satellite companies provide valuable services to their contractees but are willing to do more with less—with varying degrees of difficulty—to enable the government to meet its 5G objectives. Compensation was therefore always going to part of the equation. In the end, almost everyone came around to this thinking—even if they may not agree with the exact funding level. Further, I believe that we have the authority to compensate incumbents for their reasonable expenses and implement the accelerated relocation payments separate and apart from our auction process

using our *Emerging Technologies* framework.

As for my fourth principle, permitting unlicensed use in the 6 GHz band, we have an open proceeding on that matter, and I have adequate assurances from the Chairman and staff of the Office of Engineering and Technology that staff are concluding their technical analysis and preparing an order for Commission consideration in the not too distant future. While it may not be simultaneous with this item, its forthcoming consideration will prove sufficient for me. Providing more unlicensed spectrum has been a passion of mine and getting 6 GHz across the finish line is worth the wait.

So, here we are voting on an item that represents the culmination of many years of work for me, as well as a huge step forward in the Commission's 5G efforts. I feel a sense of accomplishment and relief at the same time. Not everything in this document is perfect. And, the process probably could have been handled slightly differently, but it worked out in the end. Ultimately, we are finishing on a positive upswing, worthy of our great nation's custom of facing tough tasks head-on. The Chairman should be proud of his leadership and ignore the naysayers' arguments, which will fade over time, as they always do.

I approve.

STATEMENT OF
COMMISSIONER BRENDAN CARR

Re: *Expanding Flexible Use of the 3.7 to 4.2 GHz Band,* GN Docket No. 18-122

I can say it no better than my colleague, so I'll just quote her: "When it comes to mid-band spectrum for 5G I think one thing is clear: we need to move more and move faster." Those who call for more and faster FCC movement on mid-band should celebrate this morning, because the order before us accomplishes precisely those goals. It moves more mid-band spectrum to 5G, and it moves the spectrum at a fast clip.

First, the "more" part. The latest 5G standard is optimized for wide spectrum channels, ideally 100 MHz or more in size. But the mid-band is a crowded neighborhood, with government users and legacy technologies making those wide, clear channels illusive. Recognizing the imperative of mid-band for 5G, this Commission opened a mid-band proceeding in 2017.

Since then, we have taken action. At 3.5 GHz, we ensured mid-band spectrum works in the real world and will now auction it off this summer. With EBS, which had not been assigned in roughly half the country, we are pushing mid-band out into the commercial marketplace. At 2.5 GHz, our decision in Sprint/T-Mobile enables the combined company to build out this valuable mid-band nationwide. At 2 GHz AWS-4, we now have a binding commitment from DISH to build broadband using its mid-band licenses—an intensive use of the spectrum that DISH wasn't planning on absent the transaction and our demands. We are pressing ahead with 5.9 GHz and 6 GHz, as well. And on top of all of that diligent progress on mid-band, today we set up the clearing of 300 MHz of C-band.

It's not just the amount but also the speed that matters. Time is of the essence, because we know what is at stake with 5G. $275 billion of private sector investment, with not a penny of new taxes. Three million jobs. Another half trillion dollars in economic growth. What's more, the country that builds strong 5G first will reap the benefits of early adopter jobs and services. The trillion-dollar club—those companies with market caps above $1 trillion—has just four members: Apple, Microsoft, Amazon, and Google. They're all American, and they all ride on our world-leading mobile networks. That's not a coincidence, and when the next Amazons and Apples are invented, we want them to be invented here; we want the jobs, and services, and opportunities centered here.

Beyond global competitions and unfathomable dollar figures, we act with a sense of urgency because we know what a connection means to American families. Every day that a family lacks adequate Internet access may be a day a doctor's appointment is missed, a picture to loved ones goes unsent, and, yes, homework remains unfinished. But pointing at the digital divide while doing nothing about it isn't leadership; it's policy tourism. Here again, I'm proud to say that this Commission has acted decisively. We examined our authority, we thought creatively about the technology options, and we pressed the parties to their limits to clear this spectrum now.

This has been a tremendously complicated and important policy puzzle to solve. It involves nearly every industry that the Commission regulates, and the outcome was not obvious. The best minds at this agency ground away at this for two years, relying on all of our capabilities: engineering, economics, and law. The Chairman and staff deserve immense credit and our gratitude for, if nothing else, their endurance.

After all of that, I think we landed this item in the perfect spot. We will clear 300 MHz, which is more than incumbents ever thought they could give up and is enough to enable a number of providers to offer truly mobile 5G services. Americans will start benefiting from these services next year with a full

clearing coming in 2023—again, pushing the speedometer to its limit. And we will do all of this using the FCC's tried and true auction process, using rules that are fair and known, and which will result in tens of billions of dollars being returned to the American taxpayer.

You might know that we got it right, ironically, by the grumbles we hear from both sides. You didn't send enough money to the Treasury; you sent too much money to the Treasury. The equipment you're providing to incumbent operators is gold-plated; the equipment you're providing isn't good enough. On mid-band, it's "go, go, go," but when the politics change, it's "slow, slow, slow." And on and on. At the end of a long and difficult road to compromise—and that's certainly the road we've been on—sometimes a little criticism from opposing sides is a sign that you landed in just the right place.

I want to thank my colleagues for agreeing to move up the election and clearing dates so that this spectrum can be used for 5G as quickly as possible. And I want to thank and congratulate everyone in this agency and all of the public commenters who made this landmark decision what it is. In particular, I thank WTB, OEA, OET, IB, OGC, OMD, EB, and the Chairman and his staff for their work on this item. It has my strong support.

STATEMENT OF
COMMISSONER JESSICA ROSENWORCEL
DISSENTING

Re: *Expanding Flexible Use of the 3.7 to 4.2 GHz Band,* GN Docket No. 18-122

Re: *Auction of Flexible-Use Service Licenses 3.7-3.98 GHz Band for Next-Generation Wireless Services, Comment Sought on Competitive Bidding Procedures for Auction 107*, AU Docket No. 20-25

In the United States we have a mid-band spectrum problem that is threatening to slow our ability to build faster 5G wireless networks.

That is a fact that is universally recognized. It's the result of a few forces. For starters, so much of our mid-band airwaves are already used by government agencies or commercial services. That's not true in many other parts of the world where this spectrum has been less broadly deployed and can more easily be repurposed for next-generation wireless networks. In fact, more than two dozen countries have made significant progress in making mid-band airwaves the core of early 5G service and are reaping the benefits. But the United States has fallen behind because instead tackling our own mid-band shortage, we've spent the last three years bringing high-band airwaves to market with a series of auctions of the 24, 28, 37, 39, and 47 GHz bands.

That's why last year I warned in *WIRED* that the Federal Communications Commission needs to pivot from its exclusive focus on high-band spectrum to mid-band airwaves. After all, if we don't the world will move on without us. Why? Because our efforts to date with high-band airwaves at the expense of mid-band spectrum are misguided. High-band airwaves have substantial capacity, but their signals do not travel far. As a result, commercializing them is costly—especially in rural areas. The sheer volume of antenna facilities required to make this service viable will limit deployment to the most populated urban areas. That means our early 5G spectrum policy has only deepened the digital divide.

Along the way, we had no shortage of opportunities to address this problem. We could have held an incentive auction of spectrum in the 2.5 GHz band. We could have held an auction of the 3.5 GHz band early instead of delaying it three years for picayune policy changes. We could have moved faster on our unlicensed proposals in the 5.9 GHz band which have been kicking around this agency for seven years. But we did not. We refused to acknowledge there was even a problem. And when this agency made shortsighted decisions about mid-band spectrum, I called them out.

So now we have today's decision. In this proceeding, the FCC finally accepts what is obvious: we have reached the point where we need to fix our mid-band spectrum problem. We finally recognize our 5G future depends on getting this right. That's the good news.

The not-so-good news is that the C-band may be among the most challenging slices of spectrum that the FCC has ever taken up. It has unique features that were not on congressional radar when this agency was given authority to repurpose spectrum. You can start with the fact that existing incumbents in the 3.7-4.2 GHz band share the full 500 megahertz at the same time. Plus, millions of households across the country rely on this spectrum to receive a wide range of television and radio programming. All of this means that the traditional tools available to us won't work.

With our hands already tied, the FCC tries to fix this problem the wrong way. Specifically, the FCC proposes to clear the C-band for 5G by sunsetting existing operations by 2025 and then offering incumbent satellite operators the option to accelerate their transition in exchange for their reasonable

relocation costs—as much as $5.2 billion—plus a $9.7 billion accelerated relocation payment. Then the FCC proposes to hold a public auction of overlay licenses for new flexible use, including 5G.

There are three things that are fundamentally wrong with this proposal.

First, this decision is wrong on the law. Section 309(j) of the Communications Act sets forth the procedures for this agency to hold a spectrum auction. It requires that all deposits the FCC may require to bid in an auction, as well as all proceeds from the use of an auction, are deposited in the United States Treasury. Consistent with this rule, under the FCC's tried-and-true *Emerging Technologies* framework, the agency may require new entrants to privately negotiate with incumbents and pay their reasonable relocation expenses. This very specific framework has not only been used in the past, it has been blessed by courts that have reviewed our auction proposals.

But that's not the framework we adopt here no matter how this decision tries to dress it up and say otherwise. The *Emerging Technologies* framework is a voluntary and market-based approach to spectrum clearing. It offers new licensees the option to pay for faster access and capitalizes on the fact that a new entrant has better information about the value of relocation and an incumbent has better information about the cost. This asymmetry of information creates incentives for parties to engage in strategic bargaining, increasing the likelihood that a fair and efficient agreement can be reached.

However here, with a legal sleight of hand, the FCC takes what must be voluntary and makes it mandatory. We force C-band auction winners to pay nearly $10 billion to incumbent satellite operators over and above their relocation costs. There is no cite to any legal authority or precedent that allows us to do so.

Moreover, we pluck that amount of payment out of thin air in a manner that does not reflect how market transactions work. That puts what we do here fundamentally at odds with both the *Emerging Technologies* framework and Section 309(j). Indeed, where Congress previously authorized the FCC to require similar payments in the context of an incentive auction, it required the agency to use a competitive reverse auction to facilitate price discovery and then give forward auction participants the choice to pay it.

Nor do we square our decision with the court's finding in *Teledesic LLC v. FCC* that any voluntary incentive payment must be proportionate to the cost of providing replacement facilities. There is no attempt here to explain how the acceleration payment is tied at all to facilitating access to the C-band—beyond placating the largest incumbents.

All of this means that this decision forces auction winners to make an arbitrary payment that reduces the proceeds the government would otherwise realize at auction. Again, this is not what the *Emerging Technologies* framework permits. It's not what is contemplated in Section 309(j) of the Communications Act. The FCC has no legal authority to require any payments to incumbents that extend beyond actual and reasonable relocation costs. Remember that Section 309(j) is explicit that all deposits the FCC may require at auction, as well as all proceeds from the auction, must flow to the United States Treasury. The FCC tries to get around this requirement by suggesting it can create a third category of auction-related payments that are not deposits or proceeds. But by doing so, the FCC is reducing revenues that statutorily must go to the Treasury and is undermining congressional power of the purse. Indeed, if we accept the FCC's argument, it is hard to imagine any limitation on the agency's ability to require payments for any purpose that even loosely can be connected to some spectrum-related goal as a condition of auction participation—and that simply cannot be the case. As a result, it is flat out disingenuous to suggest that authority to make this so-called acceleration payment is established in the *Emerging Technologies* framework. Because it is not.

Second, this decision is wrong on the economics. Comb through this decision and you will not find a rational basis for the nearly $10 billion we are set to give away in this repurposing of the C-band. It's not the result of data-driven decision-making. At best, it's back-of-the envelope math. It looks a lot like an effort to justify backroom deals and promised payoffs. That's not the kind of decision a federal agency should be making. That's a question more appropriately answered by Congress or the markets.

What is most disappointing is that just over a year ago the FCC launched a new Office of Economics and Analytics to tackle the hardest issues before us—just like here with the C-band. A key objective of this office, we were told, was providing independent economic analysis to inform the agency's decisions. But in the first real test of this office's abilities—this proceeding—the economics experts are nowhere to be found.

That's too bad, because it would have been nice to know what they thought about all of the issues raised in this proceeding. Here's an example. Early in the decision, the agency discusses the calculation of the benefits associated with an accelerated transition. We cite one economist who says that for every year of delay in making C-band available, consumer welfare is reduced by $15 billion. Another estimates that one year of delay would reduce the value of repurposing the C-band from seven to eleven percent. But we do no analysis ourselves.

Next, the FCC tackles the relocation costs of the transition. It ticks through all the best guesses in the record. The C-Band Alliance estimates that the total cost to clear 300 megahertz in the contiguous United States would be $2.8 billion. Eutelsat estimates $3.5 billion. ACA puts the number closer to $6.1 billion. So what does the office we set up to do this analysis think? We don't know. Because instead of doing the work ourselves we just go halfsies and pick a range in the middle.

We do the same when it comes to predicting the prices that bidders will pay for licenses to operate on this spectrum. We list the best guesses of the Public Interest Spectrum Coalition, the Brattle Group, the C-Band Alliance, Kerrisdale Capital Management, and American Action Forum and then pick $0.50 per MHz-pop—because we say it is in the middle. We do no analysis of our own.

Finally, its hard to square our economic analysis with our decision to dismiss pre-auction aggregation limits, which could limit 5G competition in the future. Likewise, the performance obligations are divorced from the economic reality that they can be a tool to facilitate faster and more widespread 5G deployment. In fact, we only require carriers to build out this spectrum to 45 percent of the population within 8 years. Good luck with rural deployment because that does not suggest a whole lot of urgency.

Third, this decision is wrong on policy. With today's action the FCC substitutes its will for the will of Congress. By acting unilaterally this the agency is not only exceeding its authority under the law, it is denying the legislative branch the ability to produce a statute that gets us where we want to go on 5G and mid-band spectrum. It also denies us all the ability to take the funds from the auction of these public airwaves and put them to broader public purpose than those contemplated in the existing statute.

Working with Congress we can use the billions of dollars in revenues this auction could raise to do the very infrastructure projects this country so desperately needs.

And what might those involve?

We could start with using this auction as a vehicle for Congress to repeal the provision in the Middle Class Tax Relief and Job Creation Act that requires the FCC to auction off T-band spectrum one year from now. This auction will jeopardize the communications of police and fire officials in New York,

Philadelphia, Pittsburgh, Washington, Chicago, Dallas, Houston, Los Angeles, San Francisco, Boston, and Miami. We should be looking for every implement in our policy toolkit to help prevent this public safety mess, including support from the revenues associated with this spectrum auction.

Next, we could use the billions of dollars raised in auction revenue to do other big things. We could do audacious things. We could start a fund a new initiative to help with rural broadband. We could fund the nation's transition to next-generation 911, which is sorely needed and would benefit public safety in every state. Or we could use some of the revenues to seed a Homework Gap Trust Fund to help our nation's students stuck in the digital divide. It could support wi-fi hotspots for loan in every school library—and virtually eliminate the Homework Gap overnight.

But because we act now, we handicap the funding Congress could secure and risk discounting the value of this auction in the eyes of the Congressional Budget Office. We deny Congress its rightful role setting auction policy. Plus we take a pass on what is truly needed—a legislative overhaul of our system for incentivizing the return of airwaves and the repurposing of the them for a future where we can lead in 5G. For all of these reasons, I dissent.

STATEMENT OF COMMISSIONER GEOFFREY STARKS
DISSENTING

Re: *Expanding Flexible Use of the 3.7 to 4.2 GHz Band,* GN Docket No. 18-122

We live in an age when the demand for wireless service is growing at an almost-exponential pace. It seems like everyone is on their smartphone – on the street, in the subway, and even up here on the dais! But there are less obvious activities taking place too – like the utility connecting sensors throughout its power grid to monitor energy consumption; the manufacturer placing inventory-tracking monitors throughout its factory; or the city installing routers on its buses to provide free Wi-Fi to passengers. This demand will only increase with time, and full deployment of Fifth-Generation wireless service and its capabilities will kick things into high gear.

5G and the applications that will grow from it are critical to our economic future. They promise to change the way we work, increase our health and safety, and create new opportunities for education and entertainment. The number of 5G connections is growing fast around the world. According to one recent study, the number of 5G global connections will reach 1.3 billion by 2025, covering 40 percent of the world's population or approximately 2.7 billion people.

Mid-band spectrum like that at issue in this proceeding is essential to this future. Compared to the millimeter wave spectrum that has been the focus of late, transmissions on mid-band spectrum can travel greater distances and penetrate farther into buildings. Moreover, mid-band spectrum is not only important for 5G, but can also help address the problem of internet inequality by connecting people who live outside the most densely populated urban centers.

While the Commission has been working on other mid-band spectrum bands, none have received as much attention in the last few years as the C-Band. Among other purposes, this band is currently used by fixed satellite service operators to deliver programming to broadcasters and cable operators; however, overall use of the C-Band has been declining for decades as customers take advantage of alternative technologies. The underused nature of the band, combined with its size and proximity to the 3.5 GHz CBRS band, make it an ideal candidate for reallocation for expanded flexible use.

We must seize this great opportunity. But in its haste to make this spectrum available for new wireless terrestrial uses, the majority has over-stretched our legal precedent and entered into a deal that will take money from American taxpayers to placate foreign satellite operators who may not even keep up their end of the bargain. I'm concerned that today's order ultimately will most benefit these satellite operators and the largest wireless carriers, at the expense of both competition and the American taxpayer.

The days of easy spectrum decision-making are over. Low-hanging fruit has already been plucked. While technology continues to make feasible the use of spectrum bands where terrestrial wireless use was previously deemed impossible, there is only so much spectrum to go around. Basic physics dictates that we must reexamine our current spectrum allocations to determine where we can operate more efficiently. For the foreseeable future, spectrum policymaking will likely require progressively more difficult decisions, including the possibility that we will need to relocate entrenched incumbents to make room for new entrants and new technologies.

That's why it is so critical that we get today's order right – incumbents everywhere are watching, assessing whether the FCC proceeds based on a well-established and principled basis, and what it will mean for parties that seek similar arrangements.

As today's decision makes clear, the Commission has broad authority under Section 316 of the

Communications Act to modify existing licenses where doing so would serve the public interest. Nor is the Commission required to have the licensees' consent – all that is necessary is for the agency to find that the modification "serves the public interest, convenience and necessity."[1] And while the agency cannot "fundamentally change" a license under Section 316 of the Communications Act, a modification is permissible where a licensee can continue to provide substantially the same service.[2]

Unfortunately, certain members of the apparently defunct C-Band Alliance have repeatedly dashed our hopes of quickly making C-Band spectrum available for terrestrial wireless use by threatening to sue and overturn any order. They have argued that they deserve not only reasonable reallocation expenses as a result of any C-Band reallocation, but also a windfall of historic proportions. To make matters worse, they also sought to control the process for license reassignment and payments through a private sale or auction, arguing that this is the fastest way to put C-Band spectrum to terrestrial wireless use.

Several months ago, I said "enough," and was the first on the Commission to demand a public auction. I'm glad that my colleagues all agree with me here today and say "yes" to the public auction. A private sale or auction of the C-Band would have been unlawful under Section 309(j) of the Act, which requires the use of a "system of competitive bidding" in which "all proceeds" are deposited in the U.S. Treasury.[3] The private sale or auction proposals, however, would have converted funds that should go to the U.S. Treasury into an unprecedented windfall for a group of private entities. It would have established a terrible precedent for wireless policy by handing control over the licensing process to that same small group of foreign satellite operators. And our experience with conducting public spectrum auctions demonstrates that a public auction will not only ensure a fair distribution of the auction funds but also will quickly make the C-Band spectrum available for terrestrial wireless use.

I'm glad that we have chosen to conduct a public auction. But I must object to the majority's response to the satellite operators' demands. To be clear, I recognize that the threat of litigation and/or bankruptcy is real and could delay the availability of this important spectrum band. I also recognize the *Emerging Technologies* line of cases, in which the Commission created an incentive regime to encourage incumbent licensees to expedite spectrum reallocation efforts.

But those cases make it clear that, while the Commission can require winning bidders to contribute to a fund for the benefit of the incumbent licensees, those mandatory payments are limited to reasonable relocation costs. In those proceedings, any payments to encourage incumbents to expedite their departure from the affected spectrum beyond ordinary relocation costs resulted from voluntary negotiations between the bidders and the incumbents, subject to the Commission's oversight.

In this case, rather than voluntary payments negotiated between private parties, the majority has adopted a scheme of mandatory payments from winning bidders into a fund calculated and divided via a process that remains something of a mystery. Such an approach is not supported by our statutory authority. Section 309(j) of the Act authorizes the Commission to conduct competitive bidding for licenses to operate consistent with the agency's rules. But it does not include any authority to require, in addition, that winning bidders contribute towards a fund that would result in billions of dollars paid to satellite incumbent operators beyond their reasonable relocation costs.

[1] *California Metro Mobile Communications, Inc. v. FCC*, 365 F.3d 38, 45 (D.C. 2004).

[2] *Cmty Television, Inc. v. FCC*, 216 F.3d 1136, 1140-41 (D.C. Cir. 2000).

[3] 47 U.S.C. § 309(j).

The majority points to the Commission's authority to require payment of those costs as support for its mandatory accelerated relocation payment scheme. But the order never cites any authority permitting the Commission to require winning bidders to compensate incumbents above their reasonable costs. Instead, the majority discusses potential issues with a voluntary negotiation scheme and the economic benefits of an accelerated rollout of 5G in the C-Band. While these are worthwhile policy considerations, none of them create new legal authority for the scheme we adopt today.

Instead, the approach in today's order creates a potential spectrum policy headache that I fear we will be addressing for years to come. As I mentioned earlier, the age of "easy" spectrum allocation decisions is over. For the foreseeable future, this agency will have to re-distribute underutilized spectrum away from incumbents – both federal and non-federal -- to make it available for more efficient use. Requiring billions of dollars in mandatory payments to the incumbents here will only encourage demands for similar treatment from similarly situated incumbents. This may not be especially problematic for large, well-funded bidders, but the additional expense of mandatory contributions towards an "accelerated relocation" fund may place bidders with fewer resources at a significant financial disadvantage.

But the issues don't stop with the mandatory nature of the incentive payments. As I noted earlier, the courts have permitted incentive payments that result from negotiations between the new entrants and the incumbent licensees. Such payments, however, must be "proportionate to the cost of providing comparable facilities."[4]

In this case, however, the majority does not even attempt to calculate the additional cost to the satellite operators of an expedited exit from the lower portion of the C-Band. Instead, it bases the incentive payments on an estimate on how much an accelerated relocation would increase the profits of new licensees. Under the order's reasoning, the accelerated payments should be based on the amount that the "overlay licensees themselves would be willing to pay to clear this spectrum early." The order calculates that this value is about $10.52 billion, then determines that the satellite operators should receive $9.7 billion, which it characterizes as "reasonably close" to that amount. As explained above, however, neither our rules nor our caselaw justify such a basis for incentive payments. And even if we accepted that the Commission can both require bidders to make incentive payments unrelated to the cost of accelerated relocation and set the exact amount of those payments, how we arrived at the precise $9.7 billion figure is never explained other than as a "necessarily imprecise" result of a "line-drawing exercise."

Moreover, the order's division of the $9.7 billion amongst some – but not all – of the satellite operators authorized to operate in the C-Band is vaguely explained as based on the "relative contribution that each eligible space station operator is likely to make towards accelerating the transition of the 3.7-3.98 GHz band to flexible use and clearing the 3.98-4.0 GHz band…."[5] Late last week, SES introduced an accounting firm's analysis – attested to by the members of the C-Band Alliance at the time –

[4] *See Teledesic LLC v. FCC*, 275 F.3d 75, 82 (D.C. Cir. 2001); *Amendment to the Commission's Rules Regarding a Plan for Sharing the Costs of Microwave Relocation*, First Report and Order and Further Notice of Proposed Rulemaking, 11 FCC Rcd 8825, ¶ 32 (1996) (when negotiating voluntary accelerated relocation payments, to constitute good faith negotiations, incumbents may only seek premiums for accelerated clearing that are reasonably related to the cost of providing comparable facilities). *See also 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, Including Third Generation Wireless Systems,* Ninth Report and Order, 21 FCC Rcd 4473, 4546 (2006) (in determining whether an incumbent is bargaining in good faith over accelerated relocation payments, the Commission will consider whether the demand for payment is "directly related to relocation" and "proportion[ate]" to "the cost of providing comparable facilities").

[5] Report and Order at para. 227.

describing the 2017 C-band downlink revenue shares for those operators.[6] The order asserts that this filing is the "best evidence" in the record in support of the division of the $9.7 billion in accelerated relocation payments because it reflects the C-Band Alliance members' own understanding of their relative contribution to clearing the spectrum.[7]

But this filing contains no information supporting its findings and does not even discuss all of the operators receiving money under this order. Indeed, Intelsat has responded that this filing merely reflects "a private agreement that was predicated on a completely different structure is legally irrelevant and factually unsupported."[8] Even the order recognizes that there are many variables relevant to each operator's "contribution" to clearing the spectrum, including their number of earth stations, transponder usage, and coverage. While we do consider some of those factors in how we divide the acceleration payments, however, we give the greatest weight by far to the C-Band Alliance report.

I do not believe that we should delegate our statutory responsibilities and provide billions of dollars to foreign satellite operators based primarily on an opaque private agreement between the parties that most stand to benefit from our decision. And even if we ignore those issues, we still have the underlying problem that nothing in the record suggests that the $9.7 billion figure has any relation to the actual additional costs that the satellite operators will incur if they expedite their relocation to meet the deadlines in this decision.

We are told to accept these financial and legal gymnastics because, in the end, this will ensure that the C-Band will be put to terrestrial use as quickly as possible. But, as events in the last few weeks have shown, the foundation of this bargain appears to be crumbling. In the last two weeks, a large investor has acquired a major stake in Intelsat and is pushing the company to seek a larger payout by declining the accelerated relocation payments, declaring bankruptcy and taking the Commission to court.[9] Since then, Intelsat has effectively declared the end of the C-Band Alliance and filed a series of ex partes objecting to the $9.7 billion overall payout as too low, demanding as much as 67 percent of the $9.7 billion and disputing our authority to modify its licenses in the first place.[10] Meanwhile, SES argues that, if anything, it also deserves an increased percentage of the $9.7 billion, and arguing that any adjustment in Intelsat's favor would simply be "placate[ing] disgruntled, financially-troubled companies."[11] Finally, Eutelsat, another former member of the C-Band Alliance has proposed an entirely different calculation model that would award it an additional $1 billion, at the expense of SES.[12] The C-Band Alliance has turned into a circular firing squad.

---

[6] Letter from John Purvis, Chief Legal Office, SES Americom, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Feb. 20, 2020).

[7] Report and Order at para. 228.

[8] Letter from Laura H. Phillips, Counsel, Intelsat US LLC, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Feb. 21, 2020).

[9] Alexandra Scaggs, "David Tepper Wants Intelsat to Fight the FCC on 5G Spectrum Move. Its Stock Surged 26%," Barron's (Feb. 18, 2020), *at* https://www.barrons.com/articles/david-tepper-wants-intelsat-to-fight-the-fcc-on-5g-spectrum-move-its-stock-surged-26-51582064179.

[10] Letter from Laura H. Phillips, Counsel, Intelsat US LLC, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Feb. 21, 2020).

[11] Letter from John Purvis, Chief Legal Officer, SES Americom Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Feb. 20, 2020).

[12] Letter from Carlos M. Nalda, Consultant, Eutelsat S.A., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122, at 5 (filed Feb. 20, 2020).

After years of debate and thousands of pages of comments, it would be ironic if, having compromised on so much, we ended up in the same position that we had so desperately hoped to avoid – stuck in litigation and with any auction on indefinite hold. But that appears to be a very real possibility at this moment.

It didn't have to be this way. We could have followed our precedent and established clear rules and strict deadlines to govern voluntary negotiations that were consistent with our precedent. Even now, Congress is considering bipartisan legislation that would grant us clear authority to auction this spectrum in a manner that would clear away the threat of litigation and direct auction proceeds towards funding rural broadband and next-generation 911 services. I remain hopeful that Congress will provide us guidance and authority to reduce the threat of litigation and empower us to address these critical public policy needs.

One final note. Congress directed the Commission to design auctions that "promot[e] 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."[13] This proceeding not only represents an important opportunity to spur the future deployment of 5G, but also to encourage wireless competition and diversity. As noted earlier, by requiring mandatory payments into an accelerated relocation fund, we may discourage auction participation by smaller, less well-funded bidders. But I'm also disappointed that we are refusing to place reasonable spectrum aggregation limits on the auction. Multiple parties representing small and rural carriers have urged the Commission to consider such limits to protect competition and ensure that a wide variety of applicants have access to the spectrum.[14] The Commission has imposed such limits previously, including in the 3.5 GHz auction Public Notice we adopt today, and other countries have adopted similar measures with success.[15] I believe we should have followed their example.

Finally, while I disagree with much of the reasoning of this order, I would be remiss if I didn't acknowledge the hard work of the Commission staff throughout the building on this proceeding. Thank you all for your continued service.

[13] 47 U.S.C. § 309(j)(3)(B).

[14] *See, e.g.*, Letter from Competitive Carriers Association, NTCA – The Rural Broadband Association, INCOMPAS, Wireless Internet Service Providers Association, and Computer & Communications Industry Association to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Feb. 18, 2020).

[15] *See* Letter from Steve B. Sharkey, T-Mobile, Vice-President, Government Affairs, Technology and Engineering Policy, T-Mobile USA, Inc., to Marlene Dortch, Secretary, FCC, GN Docket 18-122 (filed Feb. 5, 2020) (citing Taiwan, Italy, Canada).