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

In the Matter of	)	
	)	
Expanding Flexible Use of the 12.2-12.7 GHz Band	)	WT Docket No. 20-443
	)	
Expanding Use of the 12.7-13.25 GHz Band for Mobile Broadband or Other Expanded Use	)	GN Docket No. 22-352
	)	

REPORT AND ORDER AND FURTHER NOTICE OF PROPOSED RULEMAKING AND NOTICE OF PROPOSED RULEMAKING AND ORDER

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By the Commission: Chairwoman Rosenworcel and Commissioners Starks and Simington issuing separate statements.

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I. INTRODUCTION

1. Today's actions put us on the path towards expanding the beneficial use of up to 1,050 megahertz of mid-band spectrum by a diverse set of terrestrial (licensed and possibly unlicensed) and satellite communications systems, promoting technological innovation, and bolstering the growth of the nation's economy. In this item, we take steps to ensure current and future satellite services relied upon by millions of people across the country are preserved and protected in the 12.2-12.7 GHz band (12.2 GHz band)[1] while continuing to develop a pipeline of mid-band spectrum for mobile broadband or other expanded uses essential for connecting everyone, everywhere in the 12.7-13.25 GHz band (12.7 GHz band).[2]

2. In the 12.2 GHz band *Report and Order*, we find that authorizing two-way, high-powered terrestrial mobile service in the 12.2 GHz band would impose a significant risk of harmful interference to existing and emergent services in the band, including satellite services. Such interference could undermine investments made by incumbent licensees and jeopardize their potential to provide new services to underserved communities, including rural communities. Although we decline to authorize two-way, high-powered terrestrial mobile use in these frequencies, in the 12.2 GHz band *Further Notice of Proposed Rulemaking* we further investigate the potential to expand terrestrial fixed use or to permit unlicensed use in these 500 megahertz of mid-band spectrum.

[1] In order to distinguish references to the bands in this item, we refer to the 12.2-12.7 GHz band as the 12.2 GHz band throughout. *See Expanding Flexible Use of the 12.2-12.7 GHz Band*, WT Docket Nos. 20-443 et al., Notice of Proposed Rulemaking, 36 FCC Rcd 606 (2021) *(12.2 Notice*).

[2] In order to distinguish references to the bands in this item, we refer to the 12.7-13.25 GHz band as the 12.7 GHz band throughout. *See In the Matter of Expanding Use of the 12.7-13.25 GHz Band for Mobile Broadband or Other Expanded Use*, GN Docket No. 22-352, Notice of Inquiry, FCC 22-80, 2022 WL 16634851 (Oct. 28, 2022) (*12.7 NOI*).

3. To further our efforts to make spectrum available for terrestrial mobile service, in the 12.7 GHz band *Notice of Proposed Rulemaking,* we propose to repurpose some or all of the 550 megahertz of mid-band spectrum for mobile broadband or other expanded use. The record demonstrates substantial support for repurposing these mid-band frequencies for next-generation wireless technologies including 5G, 5G Advanced, and 6G services that will depend on extremely high data rates, and the reliability, low latency, and capacity that the 12.7 GHz band spectrum can provide.[3] Accordingly, in this *Notice of Proposed Rulemaking*, we seek comment on various proposed means for transitioning some or all of the 12.7 GHz band to mobile broadband and other expanded use, as well as on alternative changes to the Commission's rules that could promote use of the band on a shared basis. To improve the data on which to base our decisions regarding the future structure of the 12.7 GHz band, we adopt a 12.7 GHz band *Order* directing fixed and mobile Broadcast Auxiliary Services (BAS) and Cable Television Relay Services (CARS) licensees that use the 12.7 GHz band to certify the accuracy of the information reflected on their licenses.

II. BACKGROUND

A. 12.2 GHz Band—500 megahertz

4. The 12.2 GHz band is allocated on a primary basis for non-Federal use for Broadcasting Satellite Service (BSS) (referred to domestically as Direct Broadcast Satellite (DBS)), Fixed Satellite Service (FSS) (space-to-Earth) limited to non-geostationary orbit systems (NGSO FSS), and Fixed Service.[4] While the three services are co-primary, NGSO FSS and Fixed Service are allocated on a non-harmful interference basis to DBS.[5] Currently there are three services operating in the band: DBS providers operating under the primary BSS allocation, NGSO FSS licensees operating under the co-

[3] *See* Ericsson Comments at 5; Qualcomm Comments at 3, 7. Qualcomm notes that next generation technology advancements such as active Antenna Systems (AAS) and Giga-MIMO will compensate for attenuation in such high frequency bands. Qualcomm Comments at 5; *see also* Nokia Comments at 2-3.

[4] *See* 47 CFR § 2.106, United States Table of Frequency Allocations, non-Federal Table for the band 12.2-12.7 GHz. NGSO FSS (space-to-Earth) operations are authorized pursuant to international footnote 5.487A, which provides additional allocations including in Region 2 as follows:

> [The 12.2-12.7 GHz is] allocated to the fixed-satellite service (space-to-Earth) on a primary basis, limited to non-geostationary systems and subject to application of the provisions of [ITU Radio Regulations] No. 9.12 for coordination with other non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the broadcasting-satellite service operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the [ITU Radiocommunication] Bureau of the complete coordination or notification information, as appropriate, for the non-geostationary-satellite systems in the fixed-satellite service and of the complete coordination or notification information, as appropriate, for the geostationary-satellite networks, and [international footnote] No. 5.43A does not apply. Non-geostationary-satellite systems in the fixed-satellite service in the [12 GHz band] shall be operated in such a way that any unacceptable interference that may occur during their operation shall be rapidly eliminated.

47 CFR § 2.106, n.5.487A. When an international footnote is applicable without modification to non-Federal operations, the Commission places the footnote on the non-Federal Table. *See* 47 CFR § 2.105(d)(5).

[5] *See* 47 CFR § 2.106, n.5.490 (International Footnote). In Region 2, in the 12.2-12.7 GHz band, existing and future terrestrial radiocommunication services shall not cause harmful interference to the space services operating in conformity with the broadcasting satellite Plan for Region 2 contained in Appendix 30. "Harmful Interference" is defined under the Commission's rules as "[i]nterference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with the ITU Radio Regulations." 47 CFR § 2.1(c). *See* also Annex to the Constitution of the ITU, 1003 (defining harmful interference).

primary NGSO FSS allocation, and Multi-Channel Video and Data Distribution Service (MVDDS) licensees operating under the co-primary Fixed Service allocation.[6]

5. While DBS service began in 1994, and NGSO FSS systems were authorized in the early 2000s, the Commission permitted MVDDS to operate in the 12.2 GHz band starting in 2004 under technical rules to ensure that MVDDS stations do not cause harmful interference to DBS or earlier-in-time NGSO FSS fixed subscriber receivers.[7] To that end, MVDDS service was limited to a relatively low power, one-way, digital fixed non-broadcast service, including one-way direct-to-home/office wireless service with each proposed transmitter subject to detailed prior coordination requirements.[8] In April 2016, a coalition of MVDDS licensees filed a Petition for Rulemaking requesting reforms to the 12.2 GHz band rules, including permitting MVDDS licensees to use the band for two-way mobile broadband services.[9]

6. Later in 2016, the International Bureau opened a processing round to accept NGSO FSS applications and petitions for market access in several frequency bands[10] and the Commission reformed its NGSO FSS rules.[11] In 2017, the Commission granted the first of the new generation NGSO FSS requests—a petition for market access by WorldVu Satellites Limited (OneWeb) for a planned Low Earth Orbit (LEO) NGSO FSS satellite system of 720 satellites authorized by the United Kingdom in the 10.7-12.7 GHz Band (in addition to several other bands).[12] The Commission concluded that "the pendency of the MVDDS 5G Coalition's Petition for Rulemaking was not a sufficient reason to delay or deny these requests to use the band under the existing NGSO FSS allocation and service rules."[13] In granting this request, however, the Commission conditioned access to the 12 GHz band on the outcome of the

[6] 47 CFR § 101.147(a) n.31.

[7] *See Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range*, *Amendment of the Commission's Rules to Authorize Subsidiary Terrestrial Use of the 12.2-12.7 GHz Band by Direct Broadcast Satellite Licensees and Their Affiliates; and Applications of Broadwave USA, PDC Broadband Corporation, and Satellite Receivers, Ltd. to Provide A Fixed Service in the 12.2-12.7 GHz Band*, ET Docket No. 98-206, First Report and Order and Further Notice of Proposed Rule Making, 16 FCC Rcd 4096, 4177, para. 213 (2000) (*First Report and Order and FNPRM).*

[8] *See* 47 CFR § 101.1407 (two-way services can be provided using spectrum in other bands for the return link). *See also Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range*, Memorandum Opinion and Order and Second Report and Order, 17 FCC Rcd 9614 (2002) (*MVDDS Second Report and Order*) (*aff'd Northpoint Technology, LTD et al. v. FCC*, 414 F.3d 61 (D.C. Cir. 2005)).

[9] Petition of MVDDS 5G Coalition Petition for Rulemaking, RM-11768 (filed Apr. 26, 2016), https://www.fcc.gov/ecfs/document/60001658886/1 (MVDDS 5G Coalition Petition). *See also Petition for Rulemakings Filed*, Public Notice, Report No. 3042 (May 9, 2016) (Petition Public Notice).

[10] *See Satellite Policy Branch Information; OneWeb Petition Accepted for Filing (IBFS File No. SAT-LOI-20160428-00041), Cut-Off Established for Additional NGSO-Like Satellite Applications or Petitions for Operations in the 10.7-12.7 GHz, 14.0-14.5 GHz, 17.8-18.6 GHz, 18.8-19.3 GHz, 27.5-28.35 GHz, 28.35-29.1 GHz, and 29.5-30.0 GHz Bands*, Public Notice, 31 FCC Rcd 7666 (IB July 15, 2016).

[11] In September 2017, the Commission adopted the *NGSO FSS Report and Order*, updating several rules and policies governing NGSO FSS systems. *See Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd 7809 (2017) (*NGSO FSS Report and Order*).

[12] *See WorldVu Satellites Limited, Petition for Declaratory Ruling Granting Access to the U.S. Market for the OneWeb NGSO FSS System*, Order and Declaratory Ruling, 32 FCC Rcd 5366 (2017) (*OneWeb Order*).

[13] *Id.* at 5369, para. 6.

MVDDS 5G Coalition's Petition and any other rulemaking initiated on the Commission's own motion.[14] The Commission also agreed with comments of the MVDDS 5G Coalition that MVDDS should not have to protect any NGSO FSS earth stations in motion operations in the band, if authorized in the future, because such operations had not been contemplated under the longstanding first-in-time MVDDS/NGSO FSS sharing approach.[15] The NGSO FSS Report and Order adopted, among other things, spectrum sharing rules and a more flexible milestone schedule for NGSO FSS systems.[16] The Commission subsequently granted five additional NGSO FSS requests to use bands that include the 12.2 GHz band (among others).[17]

7. NGSO FSS systems have continued to deploy. In particular, SpaceX received modified authority for its first generation (Gen 1) system to decrease the altitude from the 1,100-1,300 km to the 540-570 km range for 2,814 satellites as well as approval of its updated orbital debris mitigation plan.[18] To date, SpaceX has deployed approximately 4,000 satellites.[19] We also recently issued a partial grant to SpaceX to begin deploying its second generation (Gen 2) system, with a grant approving up to 7,500 satellites to operate in the Ka- and Ku-frequency bands.[20] OneWeb also recently received modified authority for its constellation[21] and, to date, it has deployed over 580 satellites.[22] On June 30, 2022, the

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[14] *Id.* at 5378, para. 26 ("This grant of U.S. market access and any earth station licenses granted in the future are subject to modification to bring them into conformance with any rules or policies adopted by the Commission in the future."). *See also id*. at 5369, para. 6 ("Accordingly, any investment made toward operations in this band by OneWeb in the United States assume the risk that operations may be subject to additional conditions or requirements as a result of such Commission actions.").

[15] *Id.* at 5370, para. 8.

[16] *See NGSO FSS Report and Order*, 32 FCC Rcd at 7821-31, paras. 37-68.

[17] *Space Norway AS, Petition for a Declaratory Ruling Granting Access to the U.S. Market for the Arctic Satellite Broadband Mission*, Order and Declaratory Ruling, 32 FCC Rcd 9649 (2018) (*Space Norway Order*); *Karousel Satellite LLC, Application for Authority to Launch and Operate a Non-Geostationary Earth Orbit Satellite System in the Fixed Satellite Service*, Memorandum Opinion, Order and Authorization, 33 FCC Rcd 8485 (2018) (*Karousel Order*), *Space Exploration Holdings, LLC Application For Approval for Orbital Deployment and Operating Authority for the SpaceX NGSO Satellite System*, Memorandum Opinion Order and Authorization, 33 FCC Rcd 3391 (2018) (*SpaceX Order*), *Kepler Communications Inc. Petition for Declaratory Ruling to Grant Access to the U.S. Market for Kepler's NGSO FSS System*, Order, 33 FCC Rcd 11453, (2018) (*Kepler Order*), *Theia Holdings A, Inc. Request for Authority to Launch and Operate a Non-Geostationary Satellite Orbit System in the Fixed-Satellite Service, Mobile-Satellite Service, and Earth-Exploration Satellite Service*, Memorandum, Opinion and Authorization, 34 FCC Rcd 3526 (2019) (*Theia Order*).

[18] *Space Exploration Holdings, LLC, Request for Modification of the Authorization for the SpaceX NGSO Satellite System*, Order and Authorization, 36 FCC Rcd 7995 (2021).

[19] *See, e.g.*, Mike Wall, SpaceX launches 56 Starlink satellites, lands rocket at sea, space.com ("SpaceX has now lofted more than 4,200 Starlink satellites overall, according to astrophysicist and satellite tracker Jonathan McDowell.") (Mar. 29, 2023), https://www.space.com/spacex-starlink-group-5-10-launch#:~:text=SpaceX%20launched%20another%20big%20batch,p.m.%20EDT%20(2001%20GMT).

[20] *Space Exploration Holdings, LLC*, *Request for Orbital Deployment and Operating Authority for the SpaceX Gen2 NGSO Satellite System*, IBFS File No. SAT-LOA-20200526-00055 and SAT-AMD-20210818-00105, Order and Authorization, FCC 22-91, 2022 WL 17413767, at *54, para. 135(ii) (Dec. 1, 2022) (*SpaceX Gen2 Order*) (stating that the "authorization is subject to modification to bring it into conformance with any rules or policies adopted by the Commission in the future. [And, that]…any investments made toward operations in the bands authorized [by the] Order by SpaceX in the United States assume the risk that operations may be subject to additional conditions or requirements as a result of any future Commission actions…[including, but not limited to]…any conditions or requirements resulting from any action in the proceedings associated with…WTB Docket 20-443…").

[21] *WorldVu Satellites Limited, Petition for Declaratory Ruling to Modify the U.S. Market Access Grant for the OneWeb Ku-band and Ka-Band NGSO FSS System*, Order and Declaratory Ruling, DA 22-970 (IB, rel. Sept. 16,

(continued….)

International Bureau authorized SpaceX and Kepler to serve earth stations in motion (ESIMs) in the 12.2 GHz band on an unprotected, non-harmful interference basis.[23]

8. On January 15, 2021, the Commission released a Notice of Proposed Rulemaking (*12.2 Notice*) to allow interested parties to address whether it could add a mobile allocation and make other changes to expand terrestrial use of the 12.2 GHz band without causing harmful interference to incumbent licensees and, if so, whether such action would promote or hinder the delivery of next-generation services in the 12.2 GHz band given the existing and emergent services offered by incumbent licensees.[24]

B. 12.7 GHz Band—550 megahertz

9. In the United States, the 12.7 GHz band is allocated on a primary basis for non-Federal use to Fixed Service (FS), FSS (Earth-to-space), and the Mobile Service (MS).[25] The band is shared among Fixed Microwave Services (FS—part 101), fixed and mobile BAS (part 74), fixed and mobile CARS(part 78), and Fixed Satellite Services (FSS—part 25).[26] The 12.75-13.25 GHz band has only limited Federal use. Specifically, the National Aeronautics and Space Administration (NASA) operates a

(Continued from previous page)
2022) (petition to modify grant of U.S. market access granted in part and deferred in part to approve minor adjustments to number of satellites per plane without exceeding previously-approved total of 720 satellites).

[22] *See, e.g.*, Letter from Kimberly M. Baum, Vice President, Spectrum Engineering & Strategy, WorldVu Satellites Limited, to Marlene H. Dortch, Secretary, FCC, WT Docket Nos. 20-443 *et al*. at 1 (filed Mar. 20, 2023); https://oneweb.net/resources/oneweb-confirms-successful-deployment-40-satellites-launched-spacex-1 ("OneWeb confirms successful deployment of 40 satellites launched with SpaceX. Launch 17 brings the total OneWeb constellation to 582 satellites. Third launch with SpaceX makes penultimate mission to achieving global coverage.").

[23] *SpaceX Services, Inc. Application for Blanket Authorization of Next- Generation Ku-Band Earth Stations in Motion et al.; Kepler Communications Inc. Application for Blanket Authorization of Ku-Band Earth Stations on Vessels*, Order and Authorization, DA 22-695 (IB June 30, 2022) (*ESIMs Authorizations*). DISH and RS Access had argued that granting these applications would constrain the Commission's decision-making in the instant 12.2 GHz band rulemaking proceeding by injecting new ESIM encumbrances into the 12.2 GHz band. *ESIMs Authorizations* at 11-12, para. 22. DISH and RS Access also argued that authorizing ESIMs in the band on an unprotected basis would likely result in primary users in the band being required to assume the costs to prevent service interruptions to SpaceX customers. *Id*. at 11, para. 18. The International Bureau found that granting the applications served the public interest but also recognized that the introduction of a potentially significant number of additional end users in motion could affect the 12 GHz spectrum environment. Therefore the Bureau imposed conditions to ensure grant of those applications would not materially impact the outcome of the 12 GHz rulemaking proceeding. *ESIMs Authorizations* at 12-13, paras. 23-27. The Bureau imposed conditions on the grants related to the 12.2 GHz band including: (1) requiring operations to be on a non-interference basis; (2) subjecting the operations to the outcome of any future rulemaking including the instant 12.2 GHz band GHz proceeding, with the understanding that the presence of ESIMs is not anticipated to materially affect the analysis therein, and subject to modification to conform to any rules or policies adopted, including in the instant 12.2 GHz band proceeding, and assumption of this risk; (3) subjecting the grant to the applicants' representations, including that their NGSO systems have been engineered to achieve a high degree of flexibility to facilitate spectrum sharing with other authorized satellite and terrestrial systems. *Id*. In addition, the Bureau explained that its case-by-case analysis was limited to the applications before it and have no broader applicability. *See id*.

[24] *12.2 Notice,* 36 FCC Rcd at 614, para. 2.

[25] 47 CFR § 2.106. The international and domestic allocations are similar for the 12.75-13.25 GHz band in most respects. However, space-to-Earth transmissions are permitted at 12.7-12.75 GHz in ITU Regions 1 and 3 but not in Region 2. 47 CFR § 2.106, International Table. Domestically, Footnote NG52 of the U.S. Table precludes most GSO FSS systems from using the band for domestic services and limits the deployment of FSS earth stations in the band. *Id.* at n.NG52.

[26] *See* 47 CFR pt. 25 (§§ 25.101-25.702), pt. 74 (§§ 74.600-74.690), pt. 78 (§§ 78.1-78.115), pt. 101 (§§ 101.1-101.1527).

receive-only earth station for its Deep Space Network (DSN) at Goldstone, California, that is authorized to receive transmissions across the entire 12.75-13.25 GHz band.[27]

10. On October 28, 2022, the Commission released its *12.7 GHz Notice of Inquiry* (*12.7 NOI*) to broadly seek information on the current use of the 12.7 GHz band, how the Commission could encourage more efficient and intensive use of the band, and whether the band is suitable for mobile broadband or other expanded use.[28] In response to the 12.7 *NOI*, very few parties have argued that the current balance of incumbents in the 12.7 GHz band should be left unchanged and that the band should remain untouched, and a significant number argue that the band should be used for exclusive, fixed or mobile, flexible high-powered use. Accordingly, in today's *Notice of Proposed Rulemaking*, we seek comment on various proposed means for transitioning some or all of the 12.7 GHz band to mobile broadband and other expanded use. We also seek comment on changes to the Commission's rules that could promote expanded use of the band on a shared basis.

III. REPORT AND ORDER IN WT DOCKET NO. WT 20-443[29]

A. 5G Use of the 12.2-12.7 GHz Band

11. By this Report and Order, we find that it is not in the public interest to add a mobile allocation to permit a two-way terrestrial 5G service in the 12.2 GHz band based on the current record. We find that a new ubiquitous terrestrial 5G service introduced throughout the band would create a significant risk of harmful interference to DBS and NGSO FSS operators. Although we decline to authorize two-way, high-powered terrestrial mobile use we seek further comment in the *Further Notice of Proposed Rulemaking* on how best to maximize use of this 500 megahertz of mid-band spectrum. We take these actions with respect to the 12.2-12.7 GHz band today in conjunction with our related action to issue a *Notice of Proposed Rulemaking* in GN Docket No. 22-352, proposing to expand the use of the 12.7-13.25 GHz band for mobile broadband or other expanded use.[30]

12. In April 2016, the MVDDS 5G Coalition, which included eleven of the twelve MVDDS licensees at that time, filed a Petition for Rulemaking requesting reforms to the 12.2 GHz band rules,[31] including permitting MVDDS licensees to use the band for two-way mobile 5G broadband services.[32] In support of the Petition, the Coalition also provided two Coexistence Studies that it claimed illustrated that a new 5G service could coexist with DBS operators in the band but would be incompatible with NGSO FSS.[33] Subsequently, however, some members of the MVDDS 5G Coalition suggested the possibility of 5G terrestrial use and NGSO FSS sharing in the band.[34]

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[27] *See* 47 CFR § 2.106 & n.US251. *See also infra* note 210.

[28] *See 12.7 NOI.* In the order portion of the *12.7 NOI*, the Commission extended a temporary freeze on 12.7 GHz band applications pending the outcome of GN Docket No. 22-352. *See, e.g., infra* para. 67. When applicable, we refer to the order portion of the *12.7 NOI* as the *12.7 Freeze Extension Order*.

[29] In sections III and IV, record references and citations refer to WT Docket No. 20-443, unless otherwise noted.

[30] *See infra* section V.

[31] *See* MVDDS 5G Coalition Petition. *See also Petition for Rulemakings Filed*, Public Notice, Report No. 3042 (May 9, 2016) (Petition Public Notice).

[32] For brevity and convenience, we refer to terrestrial, 2-way, high-power mobile operations herein as "5G."

[33] MVDDS 5G Coalition Petition Public Notice Comments, Attach. 1, MVDDS 12.2-12.7 GHz Co-Primary Service Coexistence (Coexistence 1) and MVDDS 5G Coalition Petition Public Notice Reply, Appx. A, MVDDS 12.2-12.7 GHZ Co-Primary Service Coexistence II (Coexistence 2) (collectively, Coexistence Studies).

[34] *See e.g.*, Letter from Martha Suarez, President, Dynamic Spectrum Alliance (DSA), to Marlene H. Dortch, Secretary, FCC, Docket No. RM-11768, at 2 (filed Aug. 21, 2020) (DSA Aug. 21, 2020 *Ex Parte*); Letter from Trey Hanbury, Counsel, RS Access, to Marlene H. Dortch, Secretary, FCC, Docket No. RM-11768, at 2-3 (filed Sept. 21, 2020) (RS Access Sept. 21, 2020 *Ex Parte*); Letter from Jeffrey Blum, Executive Vice President, External and

(continued….)

13. On January 15, 2021, the Commission released its *12.2 Notice* to allow interested parties to address whether it could add a mobile allocation and make other changes to expand terrestrial use of the 12.2 GHz band without causing harmful interference to incumbent licensees and, if so, whether such action would promote or hinder the delivery of next-generation services in the 12.2 GHz band given the existing and emergent services offered by incumbent licensees.[35] In the *12.2 Notice*, the Commission stated that it would proceed mindful of the significant investments made by incumbents and that it valued the public interest benefits that could flow from investments made to provide satellite broadband services, particularly in rural and other underserved communities that might be more expensive to serve through other technologies. The Commission initiated the instant 12.2 GHz band proceeding to allow interested parties to address whether additional operations can be accommodated in the band while protecting incumbent operations from harmful interference and to provide an opportunity for the Commission to assess the public interest considerations associated with adding a new mobile allocation.[36] In particular, the Commission sought information on the status of technologies that have been developed or are currently in development that would allow for two-way mobile communications in the 12.2 GHz band; whether standards have been set related to such technologies; whether there are any international agreements on a band plan or air interface for the 12.2 GHz band; and the impact (if any) on international rights for U.S.-licensed systems that might be affected as a result of the U.S. providing for expanded shared use of the band.[37] Comments were due May 7, 2021, reply comments were due July 7, 2021, and interested parties have added many *ex parte* filings to the rulemaking dockets since the comment deadlines.[38]

14. In response to the *12.2 Notice*, several of the MVDDS licensees, and one DBS provider that is also a major MVDDS licensee, contend that 5G terrestrial and incumbent services can coexist in the band, the other DBS provider and the NGSO FSS commenters contend that such coexistence is not yet technically feasible. Multiple technical analyses were submitted into the record that purport to model the potential interference between a new 5G mobile terrestrial service and incumbent satellite services in the band.[39] These models rely on various technical assumptions about which the parties greatly disagree.

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Legislative Affairs, DISH, to Marlene H. Dortch, Secretary, FCC, Docket No. RM-11768, at 4 (filed Nov. 12, 2020) (DISH Nov. 12, 2020 *Ex Parte*) (stating that "since the 2016 studies, developments in the satellite industry indicate that NGSO FSS constellations possess geostationary-like functions and properties that could prove more compatible with 5G services in the 12 GHz Band than the last-generation NGSO earth stations.").

[35] *12.2 Notice*, 36 FCC Rcd at 614, para. 2.

[36] *See, e.g.*, *id.* Additionally, the Commission explained that Section 303(y) provides the Commission with authority to provide for flexible use operations only 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." Balanced Budget Act of 1997, Pub. L. No. 105-33, 111 Stat 251, 268-69 sec. 3005 Flexible Use of Electromagnetic Spectrum (codified at 47 U.S.C. § 303(y)). *See also* 47 CFR §§ 2.106, 27.2, 27.3.

[37] *See 12.2 Notice,* 36 FCC Rcd at 616, para. 21, n.67 (citing Letter from David Goldman, Director of Satellite Policy, SpaceX, to Marlene H. Dortch, Secretary, FCC, Docket No. RM-11768, Attach. A, Questions Necessary to Balance the 12 GHz NPRM, at 3-4 (filed Jan. 6, 2021) (SpaceX Jan. 6, 2021 *Ex Parte*)).

[38] *See Expanding Flexible Use of the 12.2-12.7 GHz Band, et al.*, WT Docket No. 20-443, et. al, Order, 36 FCC Rcd 6534 (WTB 2021); *Expanding Flexible Use of the 12.2-12.7 GHz Band, et. al.*, WT Docket No. 20-443, et. al., Order, 36 FCC Rcd 9531 (WTB 2021); *see generally* WT Docket No. 20-443 and GN Docket 17-183.

[39] RS Access Comment, Appendix A, Assessment of Feasibility of Coexistence between NGSO FSS Earth Stations and 5G Operations in the 12.2-12.7 GHz Band, at 6 (filed May 7, 2021) (RS Access Comment RKF Study I); Letter from Noah Campbell, CEO, RS Access, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 20-443, Attach. A, The Effect of 5G Deployment on NGSO FSS Downlink Operations in the 12.2-12.7 GHz Band (filed May 19, 2022) (RS Access May 19, 2022 RKF Study II); Letter from David Goldman, Senior Director, Satellite Policy, Space
(continued….)

15. Based on the record in this proceeding, we find that a new ubiquitous 5G terrestrial mobile service cannot coexist with DBS operations in the band without a significant increase in the risk of harmful interference. We are not persuaded by the assurances of one of the two nationwide DBS providers that DBS will be protected,[40] particularly given that the other nationwide DBS provider raises significant concerns.[41] We find that the study submitted by the 5G advocates is based on unsupported assumptions that undermine its reliability. As explained below, the 5G proponents have not demonstrated that a new 5G service will be able to meet the Equivalent Power Flux Density (EPFD) limits required to protect DBS receivers in the 12.2 GHz band. Also, we find that the 5G proponents have not adequately addressed the issues raised both in the *12.2 Notice* and by commenters regarding the applicability of burden-shifting protection obligations, lower earth-station elevation angles, power limits, EPFD limits and receiver location information.

16. Further, we also find that ubiquitous two-way mobile broadband 5G service is likely to create a significant risk of harmful interference to ubiquitous NGSO FSS operations. The 5G terrestrial advocates' analysis rests on the speculative assumption that 5G and NGSO FSS operations will not be geographically near each other (i.e., 5G advocates offer studies that assume NGSO FSS will largely serve rural areas, and 5G will serve urban/suburban markets) without pointing to any basis for this assumption. We find that this unsupported assumption, which is not in line with current deployment practices and plans, renders the technical studies offered by the 5G advocates unpersuasive, and therefore such studies cannot serve as a basis on which to conclude that the public interest would be best served by allowing a new, ubiquitous 5G service into the band at this time. The Commission specifically asked whether geographic sharing could allow higher-power terrestrial operations in certain areas, and if so, how such geographic sharing should be structured.[42] But apart from studies based on non-binding, hypothetical assumptions, we note that 5G proponents did not offer any rules to limit their proposed 5G operations to less than all of the geographic areas authorized by their MVDDS licenses.

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Exploration Technologies Corp., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 20-443, Attach. A, SpaceX Analysis of the Effect of Terrestrial Mobile Deployment on NGSO FSS Earth Stations and 5G Operations in the 12.2-12.7 GHz Band (filed June 21, 2022) (SpaceX June 21, 2022 Analysis); Letter from V. Noah Campbell, CEO, RS Access, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 20-443, Attach. A, Analysis of Starlink Submission Regarding the Effect of 5G Deployment on NGSO FSS (filed July 15, 2022) (RS Access July 15, 2022 RKF Response Study); Letter from Stacy Fuller, Senior Vice President, External Affairs, DIRECTV, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 20-443, Attach. A, 12 GHz Co-Frequency Interference from Terrestrial Mobile into DBS (filed July 18, 2022) (DIRECTV July 18, 2022 DBS Analysis); Letter from Kimberly M. Baum, Vice President, Spectrum Engineering & Strategy, WorldVu Satellites Limited, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 20-443, Annex, Monte Carlo Analyses of the Potential Impact of an Expanded Terrestrial Service on NGSO FSS Systems in the 12 GHz Band (filed July 11, 2022) (OneWeb July 11, 2022 Analyses); Letter from David Goldman, Senior Director, Satellite Policy, Space Exploration Technologies Corp., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 20-443, Exh. A, Evaluation of SpaceX Study Related to 12 GHz Interference from Terrestrial Mobile into Starlink (filed Oct. 4, 2022) (SpaceX Oct. 4, 2022 SAVID Report).

[40] DISH states that the presence of higher-power two-way mobile and fixed services at 12 GHz are possible and fully consistent with protecting DBS in the band. *See* DISH Comment at 1.

[41] AT&T has argued on behalf of DirecTV that RKF has not established that expanded terrestrial mobile operations could be added without causing harmful interference to DBS operations – a service which RKF's Study completely ignores, and a factor which alone, it argues, should nullify the study. *See* AT&T Reply at 14. AT&T asserts exclusion and/or coordination zones are neither practical nor feasible in the 12 GHz band as a means of protecting DBS because millions of DBS receivers are spread throughout the U.S. and are constantly being added, moved, or relocated. *See id.* at 26. AT&T states its concerns are not lessened just because DISH is not concerned about the possibility of harmful interference posed by terrestrial mobile operations. *See id.* at 22.

[42] *See 12.2 Notice,* 36 FCC Rcd at 624, para. 43.

1. 5G Interference to DBS

17. As a threshold matter, we find that a new ubiquitous 5G terrestrial mobile service cannot coexist with DBS operations in the band without a significant increase in the risk of harmful interference. As noted above, pursuant to the Table of Allocations, both terrestrial and NGSO FSS services are obligated to protect DBS from harmful interference.[43] The Commission has long recognized the public interest benefits that incumbent DBS services provide to millions of subscribers, and has required the other co-primary services in 12.2 GHz band to operate on a non-harmful interference basis with respect to DBS.[44] Congress, too, sought to ensure that DBS would not be subject to harmful interference from any new terrestrial service by requiring that the Commission "provide for an independent technical demonstration of any terrestrial service technology proposed by any entity that has filed an application to provide terrestrial service in the direct broadcast satellite frequency band to determine whether the terrestrial service technology proposed to be provided by that entity will cause harmful interference to any direct broadcast satellite service."[45] The Commission ultimately adopted rules for MVDDS based on the extensive record of a multi-year rulemaking proceeding,[46] which included the statutory mandates to avoid harmful interference to DBS[47] and an independent analysis[48] of potential MVDDS interference to DBS.[49] These rules include detailed frequency coordination procedures that require an MVDDS licensee to ensure that the EPFD[50] from a proposed transmitting antenna does not exceed the applicable EPFD limit[51] at any DBS receiving antenna of a "customer of record."[52] The MVDDS rules also include other limitations on signal emissions, transmitter power levels, and transmitter locations.[53] When an MVDDS

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[43] *See supra* para. 4.

[44] *See generally MVDDS Second Report and Order.*

[45] *See Prevention of Interference to Direct Broadcast Satellite Services*, Pub. L. No. 106-553, App. B. Title. X, § 1012, 114 Stat. 2762, 2762A-128, 2762A-141 (2000) (*LOCAL TV Act* § 1012); *see also Rural Local Broadcast Signal Act,* Pub. L. No. 106-113, App. I., Title II, § 2002, 113 Stat. 1501, 1501A-544 (1999). In December 2018, however, this provision the LOCAL TV Act was stricken. Pub. L. 106-553, 114 Stat. 2762, 265-66 sec. 1012 Prevention of Interference to Direct Broadcast Satellite Services, stricken by Pub. L. 115-334, 132 Stat. 4490, 4777-78 sec. 6603 Amendments to Local TV Act.

[46] *See* ET Docket No. 98-206.

[47] *See LOCAL TV Act* § 1012(a).

[48] *Id.*

[49] *See, e.g., MVDDS Second Report and Order,* 17 FCC Rcd at 9635, para. 56 (citing MITRE Corporation, "Analysis of Potential MVDDS Interference to DBS in the 12.2-12.7 GHz Band" (Apr. 18, 2001) (*MITRE Report*)).

[50] The EPFD is the power flux density produced at a DBS receive earth station, taking into account shielding effects and the off-axis discrimination of the receiving antenna assumed to be pointing at the appropriate DBS satellite(s) from the transmitting antenna of a MVDDS transmit station. *See* 47 CFR § 101.105(a)(4)(ii)(A).

[51] The Commission established different EPFD limits in four regions of the U.S., *see* 47 CFR § 101.105(a)(4)(ii)(B), mainly due to differences in rainfall in each region. *See, e.g., MVDDS Second Report and Order*, 17 FCC Rcd at 9691, para. 197.

[52] *See* 47 CFR § 101.105(a)(4)(ii) (referencing the procedures listed in 47 CFR § 101.1440). Among other things, an MVDDS licensee must conduct a survey of the area around its proposed transmitting antenna site to determine the location of all DBS customers of record that may potentially be affected by the introduction of its MVDDS service and must coordinate with DBS. *See* 47 CFR § 101.1440(a)-(d).

[53] *See, e.g.*, *MVDDS Second Report and Order,* 17 FCC Rcd at 9634-9664, paras. 53-125; 9690-9695, paras. 196-209; 47 CFR §§ 25.139 (NGSO FSS coordination and information sharing between MVDDS licensees in the 12.2 GHz to 12.7 GHz band); 25.208(k); 101.103; 101.105; 101.111; 101.113; 101.129; 101.1409; 101.1440. Notably, the rules limit the EIRP for MVDDS stations to 14 dBm per 24 megahertz. *See* 47 CFR §§ 101.113(a) note 11; 101.147(p). In the *MVDDS Second Report and Order,* the Commission explained that

(continued….)

licensee proposes a new station, coordination with DBS is necessary to demonstrate that the relevant EPFD limit will not be exceeded at the DBS antenna of any DBS subscriber of record.[54] Once an MVDDS station has been successfully coordinated, however, the burden to ensure that DBS subscribers do not suffer interference from that MVDDS station shifts to the DBS operator—immediately for new subscribers[55] and after one year for customers of record.[56] The FCC determined that shifting this burden to DBS from MVDDS—only after successful coordination by the MVDDS operator in the first instance— was reasonable in light of the one-way, relatively low-power limit on MVDDS. In doing so, the Commission did not alter its previous finding that allowing two-way MVDDS operations in the band "would unnecessarily complicate the sharing scenario" and "significantly raise the potential for instances of interference among the operations" sharing the band.[57]

18. In its 2016 Petition for Rulemaking, the MVDDS 5G Coalition proposed that a new 5G mobile terrestrial service could also share with existing DBS in the 12.2 GHz band.[58] The Coalition provided two Coexistence studies that—through careful selection of mobile deployment areas, adjustments to radio frequency design parameters, use of geographic separation, clutter loss, and transmitter power constraints on terrestrial operations—purported to show that sharing with DBS would be possible.[59] In the first Coexistence Study, which studied three potential 5G use cases including point-to-point communications, mobile broadband, and indoor mobile use, the Coalition asserted that these potential uses could be engineered such that terrestrial users would not exceed the existing EPFD limit for MVDDS.[60] In its subsequent Coexistence 2 study, the Coalition studied a different building environment

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> placing a limit on MVDDS EIRP will ensure that DBS entities are not unduly hindered in their ability to acquire customers in areas in close proximity to MVDDS transmit facilities. Thus, we are not permitting higher powers over areas containing mountain ridges or over presently unpopulated regions because the higher power may cause too great of an exclusion zone for future DBS and NGSO FSS subscribers. We recognize that a higher power benefit for MVDDS providers would not offset the potential constraints placed on other service subscribers in the 12 GHz band. *MVDDS Second Report and Order*, 17 FCC Rcd at 9691-92, para.198.

See also id. at 9653, para. 88 (discussing the EIRP limit as a factor in adopting DBS mitigation obligations because "this power limit will not inhibit the introduction of new DBS customers [near] the MVDDS transmitting system, i.e., later-installed DBS receive antennas can be properly sited and shielded from the MVDDS signal").

[54] "DBS customers of record are those who had their DBS receive antennas installed prior to or within the 30 day period after notification to the DBS operator by the MVDDS licensee of the proposed MVDDS transmitting antenna site." 47 CFR § 101.1440(a).

[55] "DBS licensees are responsible for providing information they deem necessary for those entities who install all future DBS receive antennas on its system to take into account the presence of MVDDS operations so that these DBS receive antennas can be located in such a way as to avoid the MVDDS signal. These later installed DBS receive antennas shall have no further rights of complaint against the notified MVDDS transmitting antenna(s)." 47 CFR § 101.1440(e).

[56] Once the new MVDDS station is coordinated and begins operating, the MVDDS licensee must satisfy all complaints of interference to DBS customers of record received during a one-year period. 47 CFR § 101.1440(g).

[57] *MVDDS Second Report and Order,* 17 FCC Rcd at 9668, para. 137.

[58] *See supra* note 9.

[59] *See, e.g.*, Letter from Jeffrey H. Blum, Executive Vice President, External and Legislative Affairs, DISH, to Marlene Dortch, Secretary, FCC, Docket No. RM-11768, at 3 (filed Sept. 22, 2020) (DISH Sept. 22, 2020 Letter). *See also* Coexistence 1 at 35 (finding that "coexistence between MVDDS 5G operations and DBS receivers is possible with modest adjustments to MVDDS site locations and radiofrequency design parameters"); Coexistence 2 (revalidating the original coexistence study in different topological use-cases); Petition of MVDDS 5G Coalition for Petition to Deny, WT Docket No. 10-112, Exh. 1, MVDDS 12.2-12.7 GHz NGSO Coexistence Study (filed Aug. 15, 2016), https://www.fcc.gov/ecfs/document/10816077623256/1 (Coexistence 3 Aug. 15, 2016 Study).

[60] MVDDS 5G Coalition Petition Public Notice Comments at 4-6.

to show that even in a "more challenging" sharing environment, a new 5G service could protect DBS up to the level it "enjoys today from MVDDS licensees."[61] In the *12.2 Notice*, the Commission sought comment on whether the approach proposed by the MVDDS 5G Coalition in the 2016 Coexistence studies was feasible and the costs and benefits of such an approach.[62] The Commission sought comment on whether, and to what extent, the MVDDS 5G Coalition's proposals to license two-way, mobile operations in the band, and to eliminate the EIRP limit, would substantially redefine the scope of DBS operators' obligations and potential burdens under the current regime.[63] Additionally, the Commission asked how other factors—such as geographic separation, transmitter power constraints on terrestrial operations, and other siting parameters for flexible-use base stations—could minimize the risk of interference to DBS users.[64]

19. The advocates for a new 5G service in the band did not directly address the *12.2 Notice* questions but instead continued to rely on the 2016 Coexistence studies. Specifically, DISH stated that "the feasibility of sharing between DBS and 5G is demonstrated by two studies commissioned by the MVDDS 5G Coalition and prepared by [an] expert satellite engineer."[65] Similarly, RS Access stated that, "the coexistence studies submitted in the petition for rulemaking proceeding demonstrated that coexistence between DBS and terrestrial 5G is possible, even under a worst-case scenario."[66]

20. Opponents of the Coalition's proposals responded to the *12.2 Notice* by criticizing the Coexistence studies. AT&T, which owned DIRECTV, the only current DBS operator that does not hold MVDDS licenses, argued that the 2016 Coexistence studies, "too narrowly and simplistically defined the areas in which a DBS receiver could establish a direct line-of-sight path with DBS satellite orbital locations."[67] Moreover, AT&T argued that "these studies made inaccurate baseline assumptions regarding the nature of deployments and relied upon cherry-picked use cases that are not representative of real-world deployments."[68] Subsequently, DIRECTV, which AT&T spun off in 2021,[69] argued that the 2016 Coexistence studies are "outdated or irrelevant, and thus do not accurately reflect the characteristics of either a ubiquitous, modern, high-power terrestrial mobile service or DIRECTV's DBS service."[70] Moreover, SAVID LLC (SAVID), an engineering firm that DIRECTV hired to analyze 5G-DBS coexistence, found that, even if it made favorable assumptions of the terrestrial mobile systems, 5G service in the band would "cause extensive harmful interference to DIRECTV receivers, exceeding the limits currently in place to protect DBS customers by a factor of 100 to 100,000 over areas extending well beyond the intended coverage area of the mobile base stations."[71]

21. Based on the record in this proceeding, we find that a new ubiquitous 5G terrestrial mobile service cannot coexist with DBS operations in the band without a significant increase in the risk of

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[61] MVDDS 5G Coalition Petition Public Notice Reply at 8-9.

[62] *See 12.2 Notice,* 36 FCC Rcd at 616-617, para. 24.

[63] *See 12.2 Notice,* 36 FCC Rcd at 616, para. 23.

[64] S*ee 12.2 Notice,* 36 FCC Rcd at 616, para. 23.

[65] DISH Comment at 3.

[66] RS Access Comment at 45.

[67] AT&T Reply at 11.

[68] AT&T Comment at 8.

[69] *See* AT&T, AT&T & TPG Close DIRECTV Transaction (Aug. 2, 2021), https://about.att.com/story/2021/att_directv.html; AT&T, AT&T Completes Acquisition of DIRECTV (July 24, 2015), https://about.att.com/story/att_completes_acquisition_of_directv.html.

[70] DIRECTV July 18, 2022 DBS Analysis at 1.

[71] DIRECTV July 18, 2022 DBS Analysis at 1.

harmful interference to the DBS operations. In particular, 5G advocates have not shown how such new mobile operations could meet or exceed the metric upon which the Commission based regional EPFD limits (ranging from −172.1 to −168.4 dBW/m^2/4kHz) that the FCC adopted to protect DBS from a fixed, lower power MVDDS service at every existing DBS subscriber's dish. In addition, because MVDDS is a fixed service, the rules were able to take advantage of the discrimination between southern facing DBS antennas and MVDDS antennas; a mobile service does not provide for such accommodations and results in a much more challenging interference environment than MVDDS. Moreover, to meet the existing EPFD limits, it appears that a mobile terrestrial service would need to be restricted to such low power levels that it is unlikely that any given base station could provide substantial geographic coverage or significant 5G service.[72] According to the Coexistence 1 study, 5G services could meet these EPFD limits only when using "newly available spectrum planning tools, and careful engineering of MVDDS systems" to isolate them from DBS receivers, either through geographic separation or terrain blocking.[73] Given the careful and exacting engineering that would be needed to meet these conditions, it is not apparent that terrestrial mobile systems, if installed, could be expanded by adding new base station locations in the future to meet increased consumer demands without significantly impacting DBS service. It is not reasonable to assume that ubiquitous two-way 5G mobile terrestrial service would meet these conditions consistently with respect to ubiquitous DBS which serves millions of customers in all areas of the United States where the location of 5G mobile units could be anywhere in the operator's service area, including right next to the DBS antenna.[74]

22. When DIRECTV commissioned a study from SAVID using what it deemed more reasonable assumptions than those of the 5G advocates, that study found that at power levels of 69 dBm/100 MHz[75] "mobile operations in the band would cause extensive and harmful interference to DIRECTV receivers."[76] DISH raises several criticisms of the SAVID study,[77] but even the MVDDS 5G Coalition's own study found that at 48 dBm/100 MHz in certain small areas actual harmful interference could occur if a DBS receive antenna were present.[78] We note that the power levels used in the Coexistence studies are substantially lower than the 62 dBm/MHz (82 dBm/100 MHz) generally permitted in most other terrestrial mobile bands which operate at lower frequencies with more favorable propagation characteristics and even less than the maximum 47 dBm/10 MHz (57 dBm/100 MHz)

[72] *See, e.g.*, DIRECTV July 18, 2022 DBS Analysis at 6. Largely to protect DBS receivers installed after an MVDDS transmitter is successfully coordinated with DBS, the MVDDS transmit power limit is 14 dBm/24 MHz (or 20 dBm/100 MHz). By comparison, the 2016 MVDDS 5G Coalition coexistence study assumed two-way terrestrial operations at 48 dBm/100 MHz, and the most recent RKF Study assumed a new 5G system would operate at 65 dBm/100 MHz, however, 5G advocates have not proposed any rules regarding power limits that they would deem reasonable to provide 5G service while still protecting incumbent DBS subscribers. We note that a 28-45dB higher transmit power for the proposed 5G service would make meeting the regional EPFD limits to existing DBS subscribers much more challenging and would significantly increase the burden on DBS operators to protect new or modified DBS subscriber receivers.

[73] MVDDS 5G Coalition Petition Public Notice Comments at 4-6.

[74] *See* DIRECTV July 18, 2022 DBS Analysis at 1 (the assumptions made by the Coexistence Studies "do not accurately reflect the characteristics of either an ubiquitous, modern, high-power terrestrial mobile service or DIRECTV's DBS service.").

[75] The base station EIRP is 75 dBm/100 MHz but the base station EIRP density is reduced by the base station TDD activity factor of 75% to 69dBm/100 MHz. *See* DIRECTV July 18, 2022 DBS Analysis at 4-5.

[76] DIRECTV July 18, 2022 DBS Analysis at 1.

[77] *See* Letter from Pantelis Michalopoulos, Counsel, DISH, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 20-443, at 2-3 (filed August 8, 2022) (DISH Aug. 8, 2022 Letter). Among other things, DISH questioned SAVID's assumptions about 5G transmit power and DBS dish location; its decision to "ignore" the potential for horizon nulling and time variability; and its failure to use LIDAR data to accurately account for clutter loss. *Id.* at 2-3.

[78] Coexistence 1 at 21.

permitted in the CBRS service designed specifically for small cell coverage. While the Coexistence studies and the SAVID study do not reach identical conclusions due to differing assumptions, collectively they illustrate that two-way mobile terrestrial 5G operations could not ubiquitously meet the regional EPFD limits that the FCC adopted to protect DBS. As DBS receivers may be located anywhere (and can be either roof-mounted or installed on the ground), and as the Coalition's own Coexistence studies shows the potential for harmful interference from 5G into DBS in some instances, we find that a new 5G service cannot adequately protect incumbent DBS operators in the band from a significant risk of harmful interference. Moreover, we note that DISH and other 5G advocates have not proposed or agreed to rules or limits on 5G operations (such as horizon nulling) that DISH suggests might reduce some risk of harmful interference into DBS. However, even if the 5G advocates agreed to use advanced techniques for interference mitigation, that would not solve the underlying problem that a new ubiquitous 5G terrestrial service poses a significant risk of harmful interference to DBS given the ubiquitous nature of both the existing DBS service and the proposed 5G service.

23. The 5G advocates do not address the increased coordination and DBS interference mitigation burdens that would be placed on DIRECTV and its tens of millions of subscribers if we were to permit mobile 5G operations in the 12.2 GHz band.[79] The original Coexistence study proposed to eliminate the MVDDS EIRP limit as duplicative of the EPFD limits, suggesting that keeping terrestrial signals below the applicable EPFD limit at all DBS antenna locations generally could avoid harmful interference to existing DBS subscribers regardless of the EIRP or whether the terrestrial operations were fixed or mobile, or one- or two-way.[80] However, the proposal to eliminate the EIRP limit would substantially redefine the scope of the burden on DBS operators, particularly for the deployment of additional DBS antennas in the future. While the current rules place the burden to ensure that new DBS subscribers do not suffer interference from previously coordinated MVDDS stations on DBS operators, we are not convinced that similarly shifting this burden from 5G to DBS, going forward, would be reasonable because protecting DBS receivers installed in the future from previously coordinated higher-power, two-way, 5G base and mobile stations would be significantly more burdensome—and in some scenarios impossible—than protecting new DBS receivers from previously coordinated, one-way, low-power, fixed MVDDS transmitters. Due to the mobile nature of the proposed 5G service, the location of devices cannot be determined and therefore cannot be avoided through coordination. Also, a two-way service requires the DBS operator to consider both incoming and outgoing signals. Finally, at higher powers, even using advanced techniques, a DBS receiver might not be able to coordinate operation near a 5G base station.

24. Additionally, given that all DBS earth stations look toward the southern sky for communication with geostationary orbit (GSO) space stations orbiting at the equatorial plane, and given that high-gain antennas are necessary for base stations, the *12.2 Notice* sought comment on whether base station location or antenna orientation can be adjusted to provide greater protection to DBS earth

[79] *See* Letter from Michael P. Goggin, Assistant Vice President – Senior Legal Counsel, AT&T, to Marlene H. Dortch, Secretary, FCC, Docket No. RM-11768, Appx. A, AT&T Response to the MVDDS 5G Coalition Technical Studies, at 4 (filed June 14, 2018) (AT&T June 14, 2018 *Ex Parte*) (arguing that eliminating the EIRP limit would render the EPFD analysis impossible to model and have the effect of shifting the burden of interference mitigation from MVDDS licensees to DBS licensees because the EIRP limits were established specifically to mitigate the potential impact of MVDDS operations on future DBS customers).

[80] *See* MVDDS 5G Coalition Petition at 19; MVDDS 5G Coalition Comments at 6, n.21 (citing Coexistence 1 at 4). AT&T had argued that there may be potential statutory issues including whether proposed two-way, mobile use of the band would require an independent technical analysis showing that DBS would be protected. AT&T Opposition at 2, n.4 (citing Section 1012 of the LOCAL TV Act). In December 2018, however, this provision of the LOCAL TV Act was stricken. Pub. L. 106-553, 114 Stat. 2762, 265-66 sec. 1012 Prevention of Interference to Direct Broadcast Satellite Services, *stricken by* Pub. L. 115-334, 132 Stat. 4490, 4777-78 sec. 6603 Amendments to Local TV Act.

stations.[81] The 5G advocates did not address this issue in their comments, replies, or additional studies, though DIRECTV, in its SAVID study, pointed out that lower earth-station elevation angles generally increase the potential for harmful interference from line-of-sight terrestrial transmitters while higher angles generally result in off-axis attenuation.[82] 5G terrestrial advocates did not address how DBS subscribers in the far northern U.S. could be protected from 5G interference, given the relatively low elevation angles required for subscriber dishes in these regions to point at DBS GSO satellites over the equator. For example, to point a dish in Fairbanks, AK, at a DIRECTV satellite at 95.1° W, an elevation angle of 6.47° is required. Even if the Commission excluded Alaska (as it did in addressing the 3.7 GHz band), an elevation angle of 12.21° is required to point a customer's dish in Bangor, ME, at a DISH satellite at 129°W, and an elevation angle of 17.67° is required in Seattle, WA, to point at a DISH satellite at 72.7°W. That failure of the 5G advocates to acknowledge or address the challenge of adequately protecting DBS customers whose location may render them uniquely susceptible to interference from 5G adds weight to our conclusion that the record does not support a finding that 5G can coexist with ubiquitous DBS dishes.

25. RS Access and DISH contend that concerns about interference to DBS should be given little weight because DISH is one of the country's two DBS providers and one of the advocates of a new 5G terrestrial service in the band. As such, RS Access and DISH state, "DISH would not join a proposal that endangers its own service to about 14 million households."[83] Admittedly, DISH expresses willingness to accept any resultant increase in coordination and DBS interference mitigation burdens in return for new authority to use its 82 MVDDS licenses for two-way mobile broadband.[84] This is not a case, however, where we can conclude—as with DISH's position as the sole licensee with respect to both services in connection with AWS-4 service—that the concerns about harmful interference are capable of resolution by one party. Here, as previously noted, DISH is not the only DBS provider in the band.[85] DISH's support for a new 5G service in the band does not address the potential for harmful interference to DIRECTV's tens of millions of subscribers. For instance, we note that DISH and DIRECTV dishes may

[81] *See 12.2 Notice*, 36 FCC Rcd at 617, para. 25.

[82] *See* DIRECTV July 18, 2022 DBS Analysis at 6 (noting SAVID's Study assumed that all DBS antennas were pointed toward DIRECTV's central orbital location at 101° W.L.—an assumption that ensures high elevation angles and does not, like the Peters Studies, seek out the worst possible angle over the full range of DBS orbital locations available); *see also* DIRECTV July 18, 2022 DBS Analysis at 3 (noting its deployments were modeled at Orlando, FL, which has high elevation angles to DBS satellites, adding conservatism to the analysis by tending to reduce indicated interference levels).

[83] MVDDS 5G Coalition Reply at 4.

[84] AT&T June 14, 2018 *Ex Parte* at 5-6 (arguing that because DISH holds MVDDS licenses in most of the major markets and has developed an alternative means of video distribution that does not require DBS capabilities, DISH may have less incentive to protect DBS operations than it once did). "At a minimum, DISH would now balance the impact of the Coalition's proposals on its existing and future DBS subscriber base against the advantages – arguably very profitable ones for existing MVDDS licensees—that would flow to its other services if the request is granted." *Id*. at 6. The Coalition responds that "DISH would have never been member of the Coalition if 5G terrestrial mobile services posed a meaningful risk of harmful interference to its DBS operations." Letter from MVDDS 5G Coalition to Marlene H. Dortch, Secretary, FCC, Docket No. RM-11768, at 3-4 (filed Aug. 29, 2018) (MVDDS 5G Coalition Aug. 29, 2018 *Ex Parte*).

[85] In the 12.2 GHz band, as one of two DBS providers, DISH is in a different position than in the 2000-2020 and 2180-2200 GHz bands, where in 2011 it became the only Mobile Satellite Service (MSS) authorization holder. *See Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-2200 MHz Bands*, WT Docket 12-70, Report and Order and Order of Proposed Modification, 27 FCC Rcd 16102, 16109-16110, para. 14 (2012). In that context, despite concerns that multiple satellite and terrestrial operators could not coexist in the same frequency band without interference, the Commission granted DISH authorization to use the 2 GHz MSS bands for terrestrial mobile operations, reasoning that a single operator could manage potential interference between two different systems in the band. *See id.* at 16165-16167, paras. 164-168.

not have an equal susceptibility to harmful interference in any given locale, because their respective subscribers may use different types of dishes (e.g., varying in size) aimed at one or several satellites at different orbital slots in the GSO arc. In short, DISH's DBS system architecture and structure, not to mention its motivations and business plans, may be very different from DIRECTV's. Thus, DISH's lack of concern about and/or willingness to work around potential harmful interference from 5G service in the band cannot be viewed as probative of the question of likely interference to DBS service.[86]

26. Finally, DISH argues that DIRECTV does not use the 12.2 GHz band extensively and mostly relies on other spectrum bands to provide service to its customers. Specifically, DISH claims that "[a] review of DIRECTV's satellites and orbital slots suggests that DIRECTV has more bandwidth outside the 12 GHz band than DISH has in the 12 GHz band."[87] DISH goes on to claim that DIRECTV serves its customers mainly using the Ka-band and Reverse Band working Broadcasting-Satellite Service payloads on its satellites at 99°, 101°, and 103° W.L. slots.[88] DIRECTV responds to this claim by pointing out that it "continues to rely heavily on the 12 GHz band" for delivery of its video service to a majority of its DBS customers throughout all fifty states, including customers receiving services on aircraft, boats and RVs, as well as through set-top boxes.[89] The record reflects that DIRECTV continues to use the 12.2 GHz band, having deployed a "12 GHz payload on a relatively new T16 satellite at 101° W.L."[90] Similarly, we find DISH's arguments about the recent decline of DBS subscribers—both DISH and DIRECTV—unavailing.[91] Regardless of overall subscription trends, each DBS operator continues to add new subscribers that can be located anywhere in the United States, and there continue to be millions of existing DBS customers whose service is entitled to protection from harmful interference.

2. 5G Interference to NGSO FSS

27. We also find that ubiquitous two-way mobile broadband 5G service is likely to create a significant risk of harmful interference to ubiquitous and increasing NGSO FSS operations.[92] While deployment of NGSO FSS service in the 12.2 GHz band is still developing, terrestrial 5G service in the band is hypothetical. For this reason, the 5G advocates supported their arguments by submitting Monte Carlo simulation analyses that attempt to model the coexistence of the two services.[93] However, 5G advocates did not then use the assumptions underlying their models as a basis for proposing specific rules that would enable coexistence. NGSO FSS operators responded by submitting their own Monte Carlo analyses which sought to correct various assumptions they claim to be erroneous. While the studies

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[86] *See* AT&T Reply at 22 ("the fact that DISH may not worry about harmful interference from terrestrial, mobile, flexible-use operations does not lessen AT&T's concerns.").

[87] Letter from Pantelis Michalopoulos, Counsel, DISH, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 20-443, at 1 (filed Apr. 4, 2022); DISH Aug. 8, 2022 letter at 7.

[88] DISH Aug. 8, 2022 letter at 7.

[89] Letter from Stacy Fuller, Senior Vice President, External Affairs, DIRECTV, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 20-443, at 2 (filed May 3, 2022).

[90] DISH Aug. 8, 2022 letter at 8.

[91] DISH Aug. 8, 2022 letter at 6-7.

[92] *See* OneWeb July 11, 2022 Analyses at 2 ("Regardless of the assumptions made with respect to NGSO FSS and two-way terrestrial deployments, harmful interference from the proposed terrestrial service will not only exceed the existing interference envelope for MVDDS in the 12 GHz band, but will cause additional harmful interference"); *See also* SpaceX June 21, 2022 Analysis at 2 ("Yet even with …favorable assumptions, SpaceX customers could expect to experience harmful interference in the 12 GHz band the vast majority of the time, which would essentially preclude a consumer-oriented commercial satellite service in the band").

[93] A Monte Carlo (probabilistic) analysis is a simulation that uses random sampling and statistical modeling to estimate mathematical functions and mimic the operations of complex systems. RS Access Comment RKF Study I at 3, n.8 (citation omitted).

provided by the opposing sides contain many contradictory assumptions, ultimately they all agree on the fundamental point that there will be a significant risk of harmful interference to NGSO FSS operations without some geographic separation between a new two-way mobile broadband 5G service and NGSO FSS. The 5G advocates, however, do not propose to limit such new 5G terrestrial service geographically, nor is it clear how such limitations could be consistent with the nature of the 5G service for which they seek authorization. Neither are the authorizations granted to existing NGSO FSS operators limited to specific geographic areas. We therefore find it would not be in the public interest to allow for a new 5G service in the band as it would cause a significant risk of harmful interference to NGSO FSS where these services are deployed ubiquitously.

28. Significantly, we note that initially, the MVDDS 5G Coalition (i.e. the petitioners for a new 5G service in the 12.2 GHz band) argued that coexistence with NGSO FSS was not possible. Specifically, the Coexistence studies concluded that 5G terrestrial operations and NGSO FSS operations could not co-exist in the 12.2 GHz band and therefore, the MVDDS 5G Coalition Petition proposed to delete or demote the NGSO FSS allocation to a lower regulatory status with respect to 5G.[94] 5G advocates subsequently shifted their argument to claim that co-existence is possible with the new generation of NGSO FSS systems.[95] When the Commission issued the *12.2 Notice* in response to the Petition, it noted the public interest in protecting the significant investments made by NGSO FSS operators in the band. To determine whether NGSO FSS operations could coexist with a new 5G service, the *12.2 Notice* sought comment on what technical criteria would be necessary to protect NGSO FSS from harmful interference from high-powered, two-way mobile operations.[96] Specifically, the *12.2 Notice* asked which maximum power levels could be granted to new terrestrial operations within a framework of service-rule sharing that would still protect incumbents from harmful interference.[97] The *12.2 Notice* further inquired as to whether applying the existing MVDDS interference criteria[98] to new terrestrial systems would be sufficient to protect NGSO FSS operations.[99] Notably, it specifically inquired about whether subscribers of satellite services were typically located in more rural areas, the propagation characteristics and cell coverage areas that could be expected from 5G base stations in the band, and whether smaller-sized cells could mitigate potential interference from terrestrial services into DBS and NGSO FSS services.[100]

29. In response to the questions raised in the *12.2 Notice*, RS Access commissioned RKF, a systems engineering firm, to conduct a nationwide simulation of how NGSO FSS and terrestrial 5G systems might interact.[101] Ultimately, RKF provided two studies, both probabilistic Monte Carlo analyses meant to show that terrestrial 5G can coexist with NGSO FSS. In its first study, submitted in May 2021,

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[94] The earlier MVDDS 5G Coalition studies found "MVDDS and NGSO [FSS] cannot effectively share the [12] GHz band, either under the current rules or under any new rules that may be added in response to the Coalition's petition." *See* Coexistence 3 Aug. 15, 2016 Study at 18.

[95] *See supra* paras. 6-7 for a discussion of NGSO FSS systems authorized by the Commission in recent years.

[96] *See 12.2 Notice,* 36 FCC Rcd at 619-620, para. 30.

[97] *See 12.2 Notice,* 36 FCC Rcd at 624, para. 42.

[98] *See* 47 CFR §§ 101.113(a) n.11, (f)(1); 101.147(p). *See also* 47 CFR §§ 101.105(a)(4)(i) (limiting the PFD level beyond 3 km from an MVDDS station to −135 dBW/m^2 in any 4 kHz measured and/or calculated at the surface of the earth), 101.129(b) (prohibiting location of MVDDS transmitting antennas within 10 km of any qualifying NGSO FSS receiver absent mutual agreement of the licensees).

[99] *See 12.2 Notice,* 36 FCC Rcd at 619-620, para. 30.

[100] *See 12.2 Notice,* 36 FCC Rcd at 624, para. 43.

[101] RS Access Comment at 33.

RKF used the 406 Partial Economic Area (PEA) geographic license areas[102] in the contiguous United States ("CONUS") to define where the 5G network will be deployed, and broke these into urban, suburban, and rural based on their population density thresholds.[103] Because the May 2021 RKF Monte Carlo analysis assumed the new 12.2 GHz terrestrial 5G service was likely to be deployed in the most densely populated areas with high demand for broadband service, RKF modeled deployment of 5G in census tracts with a population density greater than 7,500 people per square mile in each PEA. It explained, however, that if deployment in these "urban" density census tracts did not result in deployment to areas that encompassed 10% of a market's population, it added the most densely populated census tracts in each PEA until the area of deployment covered 10% of the market population.[104] RKF's terrestrial model assumed a 5G network of 49,997 terrestrial macro-cell base stations, [105] 89,970 fixed small-cell base stations,[106] 1,949,760 simultaneously active mobile devices[107] and 6,999 point-to-point backhaul links across CONUS.[108]

30. RKF then modeled the distribution of only SpaceX's NGSO FSS satellite terminals, although there are multiple NGSO FSS operators in the band. RKF's satellite model assumed SpaceX would deploy 2,500,000 satellite user terminals in both urban and rural areas,[109] but for this model, it used a different definition of rural and urban areas than it did for modeling terrestrial 5G operations.[110] RKF assumed the majority of NGSO FSS systems, or 1.65 million Starlink user terminals, would be dropped in random locations in non-metropolitan Rural Digital Opportunity Fund (RDOF) blocks[111] either won by

[102] *See Wireless Telecommunications Bureau Provides Details About Partial Economic Areas*, GN Docket No. 12-268, Public Notice, 29 FCC Rcd 6491 (2014).

[103] Urban has a population more than 7,500, suburban between 7,500 and 600, and rural fewer than 600. RS Access Comment RKF Study I at 6.

[104] RS Access Comment RKF Study I at 26-27.

[105] RS Access Comment RKF Study I at i, 13. Macro cells were deployed by multiplying the capped total of almost 50,000 macro cells by the ratio of the high population density area in a given PEA divided by the total such population in 12.2 GHz eligible areas in all PEAS – i.e., each PEA got a percentage of Macro-cell base stations equal to its proportion of the high population density areas across CONUS. *Id.* at 31. The model deployed Macro-cell base stations in three consecutive waves of decreasing inter site distances between them ranging from 500 meters to 200 meters between base stations for urban areas and 1732 meters between base stations for rural areas. *Id.* at 32.

[106] RS Access Comment RKF Study I at i, 34. Small cell base stations were deployed in the same manner as the macro cell base stations but with smaller distances between these and other small-cell base stations and or macro-cell base stations. *See id.* at 34-35.

[107] RS Access Comment RKF Study I at i, 38. The mobile devices were dropped uniformly but randomly within the base stations' coverage areas, and 80% of the mobile devices were assigned as indoor and 20% as outdoor. *Id.* at 37. Outdoor mobile devices were assumed to have a height above ground level (HAGL) of 1.5m. *Id.* at 37.

[108] RS Access Comment RKF Study I at i, 39. The Study estimated that there were a total of 2,500 macro-cell base stations and 4,499 small-cell base stations without fiber access and required microwave backhaul via the 12.2 GHz band, for a total of 6,999 links. *See id.* at 39. The Study assumed that in 2025, less than 5% of the cell-sites will use microwave backhaul in the 7 GHz to 40 GHz band and hence it distributed such use so that 5% of rural macro-cell base stations, 5% of other macro-cell base stations and 5% of small-cell base stations all use microwave backhaul. *See id.* at 38-39.

[109] RS Access Comment RKF Study I at 16-17.

[110] *Compare* RS Access Comment RKF Study I at 6 *with id.* at 8. RKF adopted the Census Bureau's definition of metropolitan areas as "urban areas" which include both cities and surrounding suburbs and it assumed and weighted deployment of satellite terminals to whatever was not metropolitan but instead a "rural" area. RS Access Comment RKF Study I at 8.

[111] RDOF blocks are census blocks made available by the Commission's Rural Digital Opportunity Fund auction where no provider is offering, or has committed to offer service of at least 25/3 Mbps. *See* FCC, Rural Digital

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Starlink or won by another bidder,[112] and that the remaining 850,000 Starlink terminals would be deployed in non-RDOF but also 'rural areas.'[113] Starlink terminals were allowed to be within 5 meters of 5G base stations, and the possibility technically exists that RKF's modeling could place NGSO FSS user terminals near 5G terrestrial base stations.[114] However, such proximity appears unlikely because the study endeavored to separate terrestrial 5G and satellite equipment.

31. In RKF's study, the potential for harmful interference to NGSO FSS from multiple elements of 5G systems is aggregated.[115] With respect to each of the NGSO FSS terminals modeled, RKF computed the aggregate interference power from all 5G emitters within 50 km, and compared the result to the interference-to-noise ratio (I/N) threshold to determine the extent to which the threshold would be

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Opportunity Fund Auction Information, Fact Sheet, https://www.fcc.gov/auction/904#:~:text=The%20Rural%20Digital%20Opportunity%20Fund%20will%20ensure%20that%20networks%20stand,applications%20as%20well%20as%20today's.

[112] RS Access Comment RKF Study I at 17. RKF states that for purposes of this analysis, the study assumes that SpaceX would have a penetration rate of 60% in non-metropolitan RDOF areas (or 327,511 terminals) in which they won funding. *Id.* Likewise, the study assumes a 30% penetration rate in non-metropolitan RDOF areas (or 1.3 million Starlink terminals) where another auction participant won funding. *Id.* For those metropolitan RDOF areas that SpaceX won, the study assumes a penetration rate of 15%, which amounts to an assumed 14,600 total Starlink terminals. *Id.* These assumptions, along with metropolitan RDOF areas that SpaceX did not win, resulted in an assumed 1.65 million Starlink terminal deployments. *Id.*

[113] RS Access Comment RKF Study I at 18. In this case of NGSO FSS terminals dropped over "non-RDOF" rural areas, 'rural' is defined for NGSO FSS operations the same as for 5G terrestrial deployments– less than 600 people per square mile. *Id.* at 17. NGSO FSS terminals are placed using the GPW population density database in proportion to the population density in more populous rural areas, which is similar to how the model sites 12 GHz terrestrial base stations. *Id.* In other words, the model's siting methodology for Starlink terminals in non-RDOF regions is more likely to place terminals in the more populous census tracts in rural areas, where they are deployed in proportion to the population therein using a population density database similar to the method used for siting terrestrial 5G equipment. *Id.* at 17-18, n.39.

[114] RS Access Comment RKF Study I at 18. 5G terrestrial base stations and NGSO FSS user terminals could be near each other, for example if the latter were placed in 'non-urban' areas from a Census Bureau perspective but if these areas still had populations greater than 7,500 persons and were "urban" under RKF's standards and therefore also receiving terrestrial 5G equipment. *Id.* at 11.

[115] RS Access Comment RKF Study I at 13. Each macro-cell base station beamforms a narrow beam toward each mobile device, and 5G transmissions are assumed to operate in time-division-duplex (TDD) mode with all the base stations coordinated such that uplink and downlink transmissions are synchronized. *Id.* The study assumes 5G backhaul operates in frequency-division-duplex (FDD) mode, and both uplink and downlink paths transmit continuously. *Id.* The base station antenna has 256 elements with a peak gain of 27.7 dBi which beamforms toward each mobile device but is constrained by the minimum antenna down tilt levels designed so that the gain directed toward a mobile device at 1.5m HAGL at the edge of coverage of the cell is 10 dB below the peak gain—allowing service at the edge of coverage; smalls cells have a peak gain of 15 dBi. RS Access May 19, 2022 RKF Study II at 11. Starlink terminal selects a random pointing direction from the distribution of simulated pointing directions. RS Access Comment RKF Study I at 13. Then the aggregate interference from all simultaneously active macro base station beams and small-cells on the downlink or all active mobile devices on the uplink, as well as the point-to-point backhaul uplink and downlink transmissions to each of the Starlink terminal receivers within 50 kilometers is computed. *Id.* RKF states the model calculates the emissions from macro-cell base stations as they beamform a transmission path toward each mobile device within the coverage area of each base station. Small-cell emissions are also calculated; these emissions are not beamformed to specific mobile devices, but are instead transmitted omnidirectionally with fixed down tilt and nulling. RS Access May 19, 2022 RKF Study II at 9. Then the model performs two separate aggregate interference power calculations: (1) from all simultaneously active macro base station beams, all small cells on the downlink, and all point-to-point backhaul transmissions, which continually transmit in FDD mode in both directions; and (2) from all active mobile devices on the uplink and all point-to-point backhaul transmissions. *Id.* at 9-10.

exceeded.[116] RKF asserted the objective of the simulation was to model a large number of statistically significant interference paths to evaluate the risk of interference to the Starlink terminals.[117] Initially, RKF found that about 0.888% of Starlink user terminals over CONUS could experience an event that exceeded a nominal ITU threshold of -8.5 dB.[118]

32. NGSO FSS operators, especially SpaceX, criticized many of the assumptions underlying RKF's 2021 study. As a result, in May 2022, RS Access submitted a revised study from RKF that modified certain parameters and specific assumptions to respond to the criticism.[119] RKF's revised study still relied heavily on geographic separation to find that a new 5G service could avoid causing harmful interference to incumbent NGSO FSS operations. The study still assumed that new 12.2 GHz 5G deployment and satellite terminals would have limited geographic overlap due to RKF's assessment of their respective use-cases—namely, that 12.2 GHz 5G services will be deployed most heavily in denser population centers, while satellite services are most useful in lower density population centers.[120] RKF's second study modeled the same number of base stations, mobile devices and point-to-point links,[121] and reached the conclusion that there would be no impact to 99.85% of NGSO FSS terminals by the terrestrial deployment it modeled. In particular, it asserted its study now found that only 0.15% of Starlink terminals which might hypothetically be deployed in the future throughout CONUS experienced an exceedance of the ITU's I/N threshold of -8.5 dB I/N from 5G operations in the 12.2-12.7 GHz portion of the NGSO FSS downlink band.[122] RKF asserted that several other factors contributed to the "highly favorable environment" for the coexistence of NGSO FSS and 5G systems, including the large antenna discrimination resulting from NGSO FSS antennas pointing with high elevation angle and the 5G base stations down tilted; interference mitigation achieved through 5G base station sidelobe suppression and antenna nulling toward the horizon; and, relatively localized 5G coverage due to the 12.2 GHz band's propagation characteristics.[123]

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[116] RS Access May 19, 2022 RKF Study II at 9-10.

[117] RS Access Comment RKF Study I at 10.

[118] RS Access Comment RKF Study I at 2.

[119] RS Access May 19, 2022 RKF Study II at 6.

[120] RS Access May 19, 2022 RKF Study II at iii.

[121] RS Access May 19, 2022 RKF Study II at 2-3.

[122] RS Access May 19, 2022 RKF Study II at 25. RKF asserts that the exceedance threshold of -12.2 dB, suggested by some critics, would not materially affect this study's findings. *Id.* at 26. Furthermore, it noted that any exceedance event that might occur would also affect no more than two of the up to eight available 250-megahertz Ku-band NGSO FSS channels at 10.7-12.7 GHz. *Id.* at 5, 25.

[123] RS Access May 19, 2022 RKF Study II at 7. There are several additional differences from the May 2021 and 2022 RKF Studies, albeit RKF emphasized three. First, whereas in its 2021 Study, RKF assumed Starlink terminals would point at satellites with look angles or elevation angels between 55° and 85°, in response to Starlink criticism, it assumes terminals will more frequently employ a lower elevation angle closer to the minimum authorized angle of 25°. *Id.* at 19. Second, RKF has changed the height above ground level for Starlink terminals from 20% sited at 4.5 meters and 80% at 1.5 meters, instead to 55% at 4.5 meters and 45% at 1.5 meters, in response to claims by Starlink that most users install their terminals "as high as possible." *Id.* at 20. Third, in response to a Starlink claim, a maximum off-axis antenna gain pattern from an ETSI standard for user terminals is used even though RKF asserts no party expressly claims that Starlink terminals perform at this standard and ETSI formulas results in a larger assumed off-axis gain, which in turn makes Starlink terminals more prone to exceedance events. *Id.* at 21-22. Other differences between the two studies include changes in the macro-cell and small-cell base station antenna patterns used, the peak EIRP of the macro cells decreased from 75 dBm/100 MHz to 65 dBm/100 MHz with gain of 27.7 dBi (small-cell base stations likewise increased their EIRP from 45 to 48 dBm/100 MHz but with an increased gain of 18 dBi and not 15 dBi which is accomplished through including horizon nulling and beamforming technologies), and the application of end-point clutter loss at the UEs with an HAGL of less than 3m and at small-cell base stations

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33. Both SpaceX and OneWeb submitted Monte Carlo analyses in response to the May 2022 RKF study commissioned by RS Access. SpaceX's Monte Carlo study modified certain key assumptions including basing buildout in an actual SpaceX market area in Las Vegas, Nevada upon its own asserted user data,[124] and buildout requirement for terrestrial mobile services of 70 percent of population, among other assertions.[125] SpaceX asserted its study showed an impact from interference from terrestrial mobile service that would degrade service to SpaceX's Starlink broadband terminals operating in the 12.2 GHz band more than 77 percent of the time, resulting in full outages 74 percent of the time.[126] Furthermore, SpaceX stated its study showed the impact of this harmful interference would extend at least 21 km (more than 13 miles) from the macro base station in unobstructed conditions even for best-case far-sidelobe-to-far-sidelobe coupling.[127] SpaceX used an antenna receiver pattern based upon the applicable ETSI standard (ETSI_EN_303_981 Class B WBES),[128] and the SpaceX analysis is based on seven 240 megahertz channels with 250 megahertz spacing from 10.95-12.7 GHz.[129] OneWeb's study similarly concluded that NGSO FSS user terminals cannot be deployed within the coverage area of a suburban macro-cell base station deployment without suffering from very high probability of harmful interference.[130]

34. While the analyses submitted by SpaceX and OneWeb have very little accord with the RKF analyses, all of these analyses agree, on some level, on one point: NGSO FSS user terminals will suffer harmful interference if they are operating in close proximity to 5G transmissions in the 12.2 GHz band. The RKF analyses come to this conclusion tacitly because rather than providing a calculation of the separation distance that would be necessary to protect NGSO FSS terminals from harmful emissions from 5G transmitters, these RKF analyses simply assume that in most situations 5G and NGSO FSS services will not be used by consumers in the same locations. Specifically, the RKF studies assume that 5G will most likely operate only in denser, more urban markets and NGSO FSS services will most likely serve only more rural subscribers. Satellite operators, and other parties in the record, have provided more express analyses than RKF of the potential for harmful interference to NGSO FSS operations from 5G operations in close proximity. For example, Google noted in its reply comments that although RKF's report did not separately present the potential interfering impact of a single UE (handset) located in the vicinity of a satellite terminal—because it assumed it was unlikely a handset would be near a satellite terminal—Google's calculations showed that when such a situation inevitably occurs, harmful interference can be expected out to a distance of as much as 0.2-1 km under realistic propagation assumptions, and as far as 3 km under worst-case conditions.[131] For its part, SpaceX asserted that satellite user terminals would be subjected to significant interference whenever located in the line of sight of a 5G base station. Further, SpaceX states that even for best-case far-sidelobe-to-far-sidelobe coupling, the effect of harmful interference (I/N > -12.2dB) between these two operations will extend up to 21.4 km (more than 13 miles) from the macro base station in unobstructed conditions.[132] According to SpaceX, its

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(typically deployed on poles in the vicinity of buildings), incorporating horizon nulling into macro cell base stations. *Id.* at 2.

[124] SpaceX June 21, 2022 Analysis at 3.

[125] SpaceX June 21, 2022 Analysis at 4.

[126] SpaceX June 21, 2022 Analysis at 2.

[127] SpaceX June 21, 2022 Analysis at 3.

[128] SpaceX June 21, 2022 Analysis at 8.

[129] SpaceX June 21, 2022 Analysis at 9.

[130] *See* OneWeb July 11, 2022 Analyses at 8-9.

[131] Google Reply at 14.

[132] SpaceX June 21, 2022 Analysis at 11. SpaceX used RKF's assumption that the macro base station has an input power of 41.3 dBW per 100 MHz per user and that the SpaceX user terminal has a -2 dBi far sidelobe gain and 200
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satellite user terminal is about 16 dB more sensitive to the interfering signal coming into its far sidelobes than the mobile UE is for its desired signal.[133] As a result, if a SpaceX user terminal is located in an area where a mobile device can receive a signal from the base station, the interfering signal its terminal receives will be much stronger than the desired signal received by the user device.[134] Because of their sensitivity, SpaceX states that even if its satellite terminal antennas are pointing only at high elevation angles so that terrestrial mobile signals are only received at large off-axis angles, interference will be overwhelming within the coverage area of a terrestrial base station.[135] SpaceX asserts that RKF recognized this point when it admitted that "Starlink terminals within the 5G coverage area typically suffered an exceedance." [136]

35. Although RKF did not provide specific analysis of the separation distances necessary to protect NGSO FSS user terminals from 5G transmissions, it argued that there would be a natural geographic separation between the two services, based on constraints on the number of user terminals an NGSO FSS system can deploy to one area. For example, the RKF study asserted that while an NGSO FSS licensee can deploy terminals in metropolitan areas, such as New York City or Los Angeles, satellite capacity constraints limit the total number of terminals NGSO FSS licensees can support in any one of these densely populated zones.[137] To illustrate this point, RKF has pointed to statements by Starlink's CEO that its service is not well suited to urban areas.[138] SpaceX does not directly address RKF's capacity argument but it responds that in the very few areas where RKF does consider terrestrial and NGSO FSS systems operating in close proximity, its model finds I/N ratios of 50 dB or more.[139] Furthermore, SpaceX argues that, by assuming only 1.07 percent of SpaceX user terminals would be deployed in urban areas, RKF significantly underestimated the effect of the proposed system on the existing Starlink customers.[140] OneWeb agrees that terrestrial separation of NGSO FSS and 5G terminals is an unrealistic assumption, [141] and states that it intends to focus its initial service on enterprise, government, and mobile

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K system noise temperature. SpaceX also assumed that the far sidelobe level of the macro base station is -2.3 dBi. RKF assumed a -30 dBi sidelobe performance for macro base stations. And, in its later Monte Carlo simulation, SpaceX used the same -30 dBi sidelobe floor for an individual sector antenna pattern, although SpaceX states this value is highly optimistic. *Id.*

[133] SpaceX June 21, 2022 Analysis at 13.

[134] SpaceX June 21, 2022 Analysis at 13. SpaceX argues that even for a mobile UE with a very modest signal-to-noise ratio of only 0 dB (i.e., at the UE noise floor), for the SpaceX user terminal, this mobile signal becomes an interferer that is 16 dB above the noise floor of the user terminal (I/N = 16 dB) and completely wipes out the desired signal. *Id.*

[135] SpaceX June 21, 2022 Analysis at 13.

[136] SpaceX June 21, 2022 Analysis at 13-14 (citing Letter from V. Noah Campbell, CEO, RS Access, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 20-443, Attach. A, Bringing 5G to the 12GHz Band, at 11 (filed June 1, 2022)).

[137] RS Access Comment RKF Study I at 8.

[138] RS Access May 19, 2022 RKF Study II at 25, n.65 (citing Jon Brodkin, *Elon Musk: Starlink latency will be good enough for competitive gaming*, Ars Technica (Mar. 10, 2020), https://bit.ly/3dUrbbu (quoting Elon Musk: "The challenge for anything that is space-based is that the size of the cell is gigantic … it's not good for high-density situations. We'll have some small number of customers in LA. But we can't do a lot of customers in LA because the bandwidth per cell is simply not high enough.")).

[139] SpaceX June 3, 2022 Response to Revised RKF Report at 3, n.9 (citing RS Access May 19, 2022 RKF Study II at 27 and Fig. 3-3).

[140] SpaceX June 21, 2022 Analysis at 9. SpaceX argues its actual distribution as based on the Las Vegas PEA is places 17% in urban areas, 37% in suburban areas and 46% in rural areas. *Id.*

network operator customers, which will require connectivity across metropolitan, suburban, and rural areas.[142]

36. We find that the 5G proponents' arguments that a new 5G service could adequately protect NGSO FSS operations from harmful interference rely too heavily on the unsupported assumption that there will be geographic separation between the services. Neither the FCC's rules governing NGSO FSS operations in the band nor the authorizations that the FCC has granted to NGSO FSS operators place any limitations of the sort assumed by 5G proponents on where these NGSO FSS services may operate.[143] NGSO FSS systems are not restricted to rural areas; indeed, SpaceX is currently authorized to deploy satellites throughout CONUS and for an unlimited number of its second-generation user terminals anywhere within the United States.[144] At this time, satellite operators' plans for, and rollout of service using, this band are still in the early stages, and operators have stated their intentions to serve urban and suburban areas.[145] Based on the current record, and our experience, we conclude that authorizing separate, ubiquitous satellite and terrestrial mobile systems in the same band would be significantly likely to result in harmful interference. Although the technical analyses that 5G advocates submitted made a number of hypothetical assumptions about how both a new 5G service and NGSO FSS service would be deployed, including 5G operating parameters that could reduce or mitigate interference, 5G proponents did not propose or agree to be bound by any specific rules to codify these assumptions. Given our conclusion that NGSO FSS terminals will experience harmful interference if placed in close proximity to terrestrial 5G deployment, and the lack of apparent disagreement by 5G advocates, we decline to authorize a new terrestrial 5G service in the 12.2 GHz band based on the current record.

37. As noted, the Monte Carlo analyses provided by the 5G advocates incorporate a set of assumed operating parameters intended, in addition to geographic separation, to reduce the possibility of harmful interference to NGSO FSS user terminals. These assumptions have become objects of criticism from NGSO FSS interests who argue that their adjustment can skew the interference picture away from showing the significant risk of harmful interference NGSO FSS systems would suffer. Below, we discuss some of the major disagreements on assumptions the parties have raised in the record. We caution, however, that these assumptions do not change our bottom-line decision declining to permit 5G operations in the 12.2 GHz band, due to the risks of harmful interference into NGSO FSS user terminals when the two services are in close proximity. Accordingly, other than in a few instances where we have pointed out that certain debates about assumptions may be missing critical information, we decline to weigh in concerning the relative merits of particular assumptions.

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[141] OneWeb has argued that suburban macro-cell base station deployments will result in harmful interference to NGSO FSS User Terminals when considering real world deployment scenarios. Letter from Brian D. Weimer, Counsel, OneWeb, to Marlene H. Dortch, WT Docket No. 20-443, Attach. B, 12 GHz NGSO FSS Earth station and Terrestrial Study, at 10 (filed Oct.7, 2022). *See also* OneWeb July 11, 2022 Analyses at 3 (notes omitted) ("The principle defect of the [RKF Study attached to Comments of] RS Access] is the assumption of geographical separation: that NGSO FSS user terminals will be deployed with a heavy bias towards rural areas while mobile base stations and devices will be heavily skewed towards urban areas. There is no real world justification for this bias.").

[142] OneWeb July 11, 2022 Analyses at 3, n.8.

[143] *See, e.g., Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd 7809 (2017), recon. pending (*NGSO FSS Report and Order*).

[144] *See Space Exploration Holdings, LLC, Application For Approval for Orbital Deployment and Operating Authority for the SpaceX NGSO Satellite System, et al.,* Memorandum Opinion and Order and Authorization, 33 FCC Rcd 3391, para. 1 (2018); SpaceX June 21, 2022 Analysis at 14, n.41 (citing Radio Station Authorization, Call Sign E210127 (issued Nov. 10, 2021)).

[145] *See, e.g., supra* paras. 6-7.

38. *Ignoring Access to Other Bands and Other NGSO Deployments.* The RKF study assumed that Starlink is assigned eight 250 MHz channels from 10.7-12.7 GHz.[146] SpaceX argues its model did not incorporate use of the 10.7-10.95 GHz portion of the band due to regulatory constraints imposed to protect Radio Astronomy activity in the adjacent 10.6-10.7 GHz band.[147] Accordingly, the SpaceX analysis is based on seven 240 MHz channels with 250 MHz spacing from 10.95-12.7 GHz, whereas RKF appears to assume access to all bands. RS Access argues SpaceX's failure to incorporate the entire 10.7-12.7 GHz range into its calculations, and its use of only the 12.2-12.7 band for downlink increases the probability of interference exceedance experienced by Starlink terminals by a factor of four. RS Access finds this one of the most critical assumptions causing SpaceX's interference results to differ from its own. Furthermore, SpaceX argues RKF only models SpaceX terminal deployments and omits studies of any interference created by deployment of other NGSO FSS operations.[148]

39. *Height of Fixed Subscriber Antennas.* The height at which users mount their SpaceX user terminals has a dramatic effect on the interference to which they are subject—higher placement also means that they are more likely to receive more direct interference from mobile system base stations and UEs.[149] The May 2021 RKF Study assumed a distribution of NGSO FSS fixed subscriber terminals more heavily weighted toward ground installations—80% of Starlink terminals would have an HAGL at 1.5m, and 20% would have an HAGL of 4.5m. RKF's May 2022 study modified this assumption and instead assumed that 45% of Starlink terminals would be installed near ground level with an HAGL of 1.5m, and 55% of Starlink terminals would be installed on rooftops with an HAGL of 4.5m.[150] In response, SpaceX argued this modification still failed to reflect that the majority of SpaceX's customers deployed their antennas on rooftops to avoid obstructions, which significantly increases the likelihood of an unobstructed path for interference from a mobile service base station.[151] SpaceX argued its own informal customer surveys showed that most consumers mounted their antennas on a roof, and accordingly, SpaceX argued that 10% of its user terminals would be deployed at a height of 1.5m and 90% would be deployed at a height of 4.5m.[152] OneWeb agrees most NGSO FSS user terminals are expected to be deployed on rooftops and that such installation practices are consistent with decades of satellite infrastructure deployments.[153]

40. *Number of Macro Cells Deployed.* RKF's May 2022 study models 49,997 5G macro base stations throughout CONUS, distributed in the most densely populated areas of each PEA, comprising at least 10% of the population of the PEA.[154] SpaceX has criticized RKF's 10% coverage, contending that RKF's 10% minimum buildout assumption falls far below the 70% to 80% population coverage requirement the Commission has routinely applied to other recently allocated flexible use spectrum, and it asserts the lower percentage buildout results in less interference, thus skewing the results of RKF's study.[155] SpaceX assumed 3,215 macro base stations in the Las Vegas market in its study,[156]

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[146] RS Access May 19, 2022 RKF Study II at 11. Thus, a "fully loaded" 12 GHz sector can serve a maximum of 20 mobile devices simultaneously. *Id.*

[147] SpaceX June 21, 2022 Analysis at 9.

[148] SpaceX June 21, 2022 Analysis at 4.

[149] SpaceX June 21, 2022 Analysis at 7.

[150] RS Access May 19, 2022 RKF Study II at 20.

[151] SpaceX June 21, 2022 Analysis at 8.

[152] SpaceX June 21, 2022 Analysis at 8.

[153] OneWeb July 11, 2022 Analyses at 5.

[154] RS Access Comment RKF Study I at 9.

[155] SpaceX June 3, 2022 Response to Revised RKF Report at 2. SpaceX has argued RKF's 10% buildout is also inconsistent with the economic study submitted by terrestrial mobile proponents, which "assume the terrestrial mobile operations in the 12GHz band will be available ubiquitously"[...]and is also inconsistent with the public

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which RKF criticized as being a vast overestimation of typical 5G deployment.[157] However, SAVID, which SpaceX hired to review the RKF studies, later argued that the number of macro base stations assumed in the SpaceX analysis did not have a material impact on the interference analysis results.[158] We note that looking at the UMFUS requirements for bands such as 24 GHz and above, licensees may fulfill their performance requirements in various ways, including providing mobile service to 40% of the population of the license area or by demonstrating coverage of at least 25% of their license's geographic area, or by showing the presence of equipment transmitting or receiving on the licensed spectrum in at least 25% of census tracts within the license area.[159] Accordingly, the relevant percentage buildout that would be required at 12 GHz may be different than either side's assumptions.[160]

41. *Technical Advancements.* SpaceX argues that the RKF studies incorporated unreasonable technical advancements into their models of 5G handsets, lowering the estimated interference received. For example, the May 2022 RKF study incorporated horizon nulling into the performance of 5G macro-cell base stations whereby 5G antennas can null the gain pattern at the horizon at all azimuth angles to mitigate ground-based interference to NGSO FSS terminals.[161] SpaceX argued "[this] is a neat trick when the terrestrial operator does not know where the NGSO FSS antennas are located."[162]

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interests claimed by members of its coalition that mobile services in 12 GHz band be required to serve rural customers, left behind by other 5G deployments." SpaceX June 21, 2022 Analysis at 11 (notes omitted).

[156] SpaceX June 21, 2022 Analysis at 15.

[157] *See* RS Access July 15, 2022 RKF Response Study at 9-10 ("If a 5G operator sought to meet Starlink's assumptions and built-out a nationwide 5G network that scaled the 540 POPs per cell Starlink modeled, the operator would have to deploy 610,000 base stations. By contrast, AT&T uses approximately 75,000 towers…to support a fully nationwide network…."). However, RKF also modeled 89,970 fixed small-cell base stations. RS Access Comment RKF Study I at 34. OneWeb notes that 12 GHz terrestrial mobile deployments, should they be allowed, would mostly be on small-cell base stations like the C-band and Ka-band flexible-use deployments for in-fill where more capacity is desired, and according to CTIA, up to 800,000 small cells could be deployed within the next 5 years. *See* OneWeb Reply at 19-20. OneWeb states that even if half of these projected small cells included the 12 GHz band, it would represent a five-fold increase over the RKF study's small-cell deployment assumptions, and the number of affected Starlink terminals could be 9 times higher than predicted for the small-cell base stations. *Id.* at 20-21.

[158] SpaceX Oct. 4, 2022 SAVID Report at 12.

[159] *See Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, et al*., Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014, 8088, para. 206 (2016) (stating that a licensee providing mobile service must provide coverage to 40 percent of the population of the license area); *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, et al*., Third Report and Order, Memorandum Opinion and Order, and Third Further Notice of Proposed Rulemaking, 33 FCC Rcd 5576, 5580, para. 8 (2018) (stating that licensees may fulfill the requirements of [the geographic area performance] metric either by demonstrating mobile or point-to-multipoint coverage of at least 25% of their license's geographic area, or by showing the presence of equipment transmitting or receiving on the licensed spectrum in at least 25% of census tracts within the license area… maintain[ing] parity with the 40% population coverage metric.).

[160] *See, e.g., infra* section V.C.6 (Performance Requirements) (seeking comment on the appropriate coverage percentages for the 12.7 GHz band).

[161] RS Access May 19, 2022 RKF Study II at 12.

[162] SpaceX argues RKF assumptions about nulling technology rely on letters from NOKIA, Ericsson, and Samsung, but it states that first none of these materials refer to any specific level of sidelobe suppression capability from nulling and only Samsung mentions nulling at all, and only as a means of avoiding interference to other mobile user equipment. SpaceX June 3, 2022 Response to Revised RKF Report at 5, n.23 (discussing RS Access May 19, 2022 RKF Study II at 12, n.40 (citing Letter from Jeffrey Marks, Vice President, Nokia, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Sept. 21, 2021); Letter from Mark Racek, Sr. Director of Spectrum Policy, Ericsson, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Sept. 13, 2021); Letter from Robert

(continued….)

42. *Transmitter Power and Path Loss*. As noted previously, RKF changed its transmitter power from 75 dBm to 65 dBm in its second study.[163] SpaceX has supplied its own engineering report arguing that ITU WP 5D which studied terrestrial mobile in the 10-11 GHz bands also assumes 72.6 dBm/100 MHz as a typical base station EIRP value, making 75 dBm the more likely number.[164] OneWeb agrees that 75 dBm/100 MHz is more realistic.[165] Furthermore, the OneWeb study uses the probabilistic clutter model found in Recommendation ITU-R P.2108, which provides a clutter assumption that is expected to be greater than predicted in 10% of the cases, and applies clutter only at the user terminals and only for those terminals deployed at ground level (as opposed to those presumed to be clutter-free on rooftops). Tailored in this manner, OneWeb can temper the recommendation's potentially overly aggressive prediction of clutter losses, yet model expected clutter losses at a range of geographic locations.[166]

43. Furthermore, both the RKF and SpaceX analyses model path loss using 3GPP Specification 38.901, applying the Urban Macro-Cell model for both urban and suburban macro-cells at 30 meters to 1 km distance, the Rural Macro-Cell model for rural macro-cells at 30 meters to 5 km, and the Micro-Cell ("Umi") model for small-cells at 30 meter to 1 km distance.[167] However, SpaceX argues, RKF subtly understates the high interference line of sight cases in the 3GPP 38.901 model by using a single weighted average between NLOS (non-line of sight) and LOS (line of sight) path loss to represent both cases.[168] SpaceX argues RKF's approach of employing a weighted average to represent two distinctly different cases dramatically understates the line of sight cases that would actually occur under the 3GPP 38.901 model.[169] SAVID asserts that while the parties debate either -8.5 dBm or -12.2 dBm I/N, an alternative interference protection criterion based on the Power Flux Density (PFD) limit set by 47 CFR § 101.105(a)(4)15 should be considered.[170] In this regard, SAVID points out that the FCC specifically set the maximum PFD limit from an MVDDS service transmitting antenna in NGSO FSS

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Kubik, Sr. Director, Samsung, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Sept. 20, 2021)). Second, SpaceX argues these letters were filed in the C-band proceeding and that RKF provides no explanation to justify its approach to scaling for the much higher frequencies at 12 GHz. SpaceX June 3, 2022 Response to Revised RKF Report at 5. Furthermore, SpaceX notes there is no 12 GHz equipment and no ITU, 3GPP, or other performance standard for 12 GHz and RKF does not explain how it came up with its assumptions for this band. *Id.* Third, SpaceX argues the letters from Ericsson and Samsung mention grating lobes, but RKF does not consider their effects in its model. *Id.* Fourth, even if nulling were feasible in the 12 GHz band, SpaceX argues it is expensive technology that operators are unlikely to deploy voluntarily—yet no one has proposed to make such technology a regulatory requirement, making RKF's assumption that it will be deployed facially unreasonable. *Id.* And SpaceX argues that, fifth, RKF assumes that the macro base stations use a 256-element antenna, while both Nokia and Ericsson indicate that they contemplated the use of much smaller 96-element antennas, which would result in lower gain, wider beam width, worse sidelobes, and reduced nulling ability. *Id*.

[163] RS Access May 19, 2022 RKF Study II at 12.

[164] SpaceX Oct. 4, 2022 SAVID Report at 4 (citing Report on the 38th meeting of Working Party 5D (e-Meeting 7-18 June 2021), Annex 4.4 to Document 5D/716-E, https://www.itu.int/dms_ties/itu-r/md/19/wp5d/c/R19-WP5D-C-0716!H4-N4.04!MSW-E.docx, Table 3-1 entry 4.5 applicable to the 10-11 GHz band refers to Table 10 entry 1.9 which defines the typical values for antenna element input power of 22 dBm. Using the array parameters in Table 10 results in a typical BS EIRP of 72.6 dBm (in 100 MHz) which is comparable to the 75 dBm/100 MHz maximum EIRP density used in this analysis based on the FCC limit defined in 47 CFR § 30.202(a)).

[165] OneWeb July 11, 2022 Analyses at 6.

[166] OneWeb July 11, 2022 Analyses at 5-6.

[167] SpaceX June 21, 2022 Analysis at 9-10.

[168] SpaceX June 21, 2022 Analysis at 10.

[169] SpaceX June 21, 2022 Analysis at 10.

[170] SpaceX Oct. 4, 2022 SAVID Report at 5-6.

stations at 12.2-12.7 GHz at -135 dBW/m2 in 4 kHz at 3 km, which is the equivalent of an I/N threshold of -10.8 dB.[171] SAVID asserts this means that even for Starlink terminals in the most favorable location in the BS antenna pattern, there must be at least 25.5 dB of clutter loss to meet the FCC MVDDS PFD limit at 3 km separation.[172]

44. The parties' disagreements about the above assumptions underlying how two-way 5G mobile broadband and NGSO FSS user terminals should be modeled does not change our fundamental conclusion that there will be a significant risk of harmful interference to NGSO FSS where these services are deployed without adequate geographic separation. Even if the parties could agree about the values that should be assigned to each of the models' more minor assumptions, it would not change the models' more fundamental flawed assumption that the 5G and NGSO FSS services will be geographically separated. Rather, these disagreements present even more evidence of the difference in opinion between the parties as to the envisioned technical specifications of their respective operations. NGSO FSS continues to evolve and there is not enough data in the record on how these systems are currently configured and how the technical parameters will change over time as NGSO FSS systems add additional subscribers and continue to refine satellite technology. Furthermore, this band is not internationally harmonized for terrestrial 5G use and there is significant disagreement about what an operable 5G system would look like in this band. 5G terrestrial advocates have not demonstrated that it is in the public interest to restrict or impact NGSO FSS operations in urban/suburban markets—especially given that NGSO FSS systems are already serving customers. At this time, we do not see a path forward for adding a terrestrial mobile allocation to the band that adequately protects the incumbent satellite operators.

B. MVDDS Construction Filings

45. While we decline to adopt service rules to allow 5G terrestrial use of the 12.2 GHz band as originally proposed by the MVDDS coalition, we recognize that many of the MVDDS licensees in the band have filed the required buildout showings for the licenses they hold under the current framework. In the *Further Notice of Proposed Rulemaking* below, we seek comment, among other things, on the possibility of changes to the existing framework. We find it appropriate at this juncture to address any uncertainty as to the status of the existing MVDDS licenses under the current rules.

46. Today, eight companies (10 legal entities) hold 191 MVDDS licenses: two DISH subsidiaries hold 82 licenses; RS Access, a subsidiary of a Dell investment fund, holds 60 licenses; two Go Long Wireless entities hold a total of 25 licenses; and five smaller companies hold a total of 24 licenses.[173] As a construction requirement, MVDDS licensees must make a showing of substantial service at the end of five years into the license period and ten years into the license period.[174] We are aware of only one current commercial MVDDS deployment,[175] and most MVDDS licensees received two

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[171] SpaceX Oct. 4, 2022 SAVID Report at 6.

[172] SpaceX Oct. 4, 2022 SAVID Report at 6. OneWeb stated it's OneWeb July 11, 2022 Analyses uses the probabilistic clutter model found in Recommendation ITU-R P.2108, which provides a clutter assumption that is expected to be greater than predicted in 10% of the cases, and applies clutter only at the user terminals and only for those terminals deployed at ground level (as opposed to those presumed to be clutter-free on rooftops). OneWeb July 11, 2022 Analyses at 5-6.

[173] The remaining 23 licenses automatically terminated for failure to meet the buildout requirement. *See Requests of Three Licensees of 22 Licenses in the Multichannel Video and Data Distribution Service for Extension of Time to Meet the Final Buildout Requirement for Providing Substantial Service under Section 101.1413 of the Commission's Rules, Applications of Three Licensees for Renewal of 22 Licenses in the Multichannel Video and Data Distribution Service*, Order, 33 FCC Rcd 10757 (WTB BD 2018), *recons. pending*. *See also* Blumenthal DTV LLC, Call Sign WQAR709 (Terminated July 26, 2014).

[174] 47 CFR § 101.1413.

[175] The licensee uses one station that transmits towards the relatively distant urban market and surrounding suburbs from a unique site, geographically and topographically, that allowed the Commission to waive certain technical rules (continued….)

extensions of the MVDDS buildout requirement, which resulted in final deadlines in 2019.[176] All of the existing licensees have had buildout showings pending since 2019 for each of their licenses, which are available to view in the Commission's Universal Licensing System (ULS).[177] In the 191 pending filings, each licensee reports that it met the 2019 buildout requirement for each license, mostly by satisfying the safe harbor that the Commission established for MVDDS in 2002 of operating at least four transmitters per one million pops in each license area.[178] The Wireless Telecommunications Bureau staff's preliminary review of these construction filings is that they likely meet the safe harbor standard. Accordingly, we direct the Wireless Telecommunications Bureau to finalize the determination of whether the construction filings meet the safer harbor standard and if so to accept each of the pending MVDDS construction filings subject to the following condition: the Commission reserves the right to adopt additional buildout requirements for MVDDS if appropriate based on any revisions to the MVDDS rules adopted in response to the *Further Notice of Proposed Rulemaking*.

47. We further direct the Bureau to reconsider its denials of 2016 requests to extend buildout deadlines for 22 MVDDS licenses, and to extend the buildout deadlines for these licenses for 18 months from the effective date of this item, subject to the same condition above.[179] We believe that the unique circumstances of this proceeding, namely the uncertainty created by the MVDDS 5G Coalition's request for 5G terrestrial use, makes strict application of the buildout deadlines contrary to the public interest.[180] Eliminating the uncertainty over these 22 MVDDS licenses will best serve the public interest by promoting fuller participation in the record to be developed in response to the *Further Notice of Proposed Rulemaking* as well as by providing additional certainty regarding the status of these MVDDS licenses.

IV. FURTHER NOTICE OF PROPOSED RULEMAKING IN WT DOCKET NO. 20-443

A. Expanded Licensed and Unlicensed Fixed Terrestrial Use of the 12.2-12.7 GHz Band

48. As described above, we decline to add a mobile allocation or adopt service rules for expanded terrestrial, high-powered, two-way mobile operations in the 12.2-12.7 GHz band. However, we remain interested in potential expanded terrestrial use of the band. Although the *12.2 Notice* focused on 5G service coexistence with the incumbents in the band, the Commission also asked how it could facilitate more robust terrestrial operations if it chose to maintain the existing regulatory framework,

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without increasing harmful interference to DBS or significantly increasing the area in which future NGSO FSS receivers would be precluded by this MVDDS transmitter. *See MDS Operations Inc., Request for Waiver of Certain Multichannel Video Distribution and Data Service Technical Rules for One Station in Sandia Part, New Mexico,* Order, 25 FCC Rcd 7963, 7968-69, paras. 13-14 (WTB 2010). From 2011 to 2013, a former MVDDS licensee offered fixed wireless broadband and voice service in Florida's Broward and Palm Beach counties. *See, e.g.,* http://www.multichannel.com/news/finance/cablevision-completes-omgfast-shutdown/271409.

[176] *See, e.g., Requests of Ten Licensees of 191 Licenses in the Multichannel Video and Data Distribution Service for Waiver of the Five-Year Deadline for Providing Substantial Service*, Order, 25 FCC Rcd 10097 (WTB 2010).

[177] *See* https://wireless2.fcc.gov/UlsApp/ApplicationSearch/searchAppl.jsp. Click on "Advanced Application Search" and select the following: Radio Service Code: "DV," Status: "2-Pending," Purpose: "NT." Scroll to bottom of page, Customize Your Results, and click on "Search." Ninety-five of the 191 filings were amended in 2020.

[178] *See id. See also MVDDS Second Report and Order*, 17 FCC Rcd at 9684, para. 177.

[179] *See Requests of Three Licensees of 22 Licenses in the Multichannel Video and Data Distribution Service for Extension of Time to Meet the Final Buildout Requirement for Providing Substantial Service under Section 101.1413 of the Commission's Rules, Applications of Three Licensees for Renewal of 22 Licenses in the Multichannel Video and Data Distribution Service*, Order, 33 FCC Rcd 10757 (WTB BD 2018), *recons. pending*.

[180] *See* 47 CFR §1.925(b)(3)(ii).

rather than permitting 5G in the band.[181] Based on comments in response to this question, below we seek further comment on several potential approaches the Commission could take to facilitate such robust use. In their responses to these inquiries, we strongly encourage commenters to provide specific proposals and detailed technical data to support their proposals. We note that several commenters suggest providing priority access to spectrum over Tribal lands to Tribal entities.[182] For each of the possible scenarios below that could involve assigning new, initial licenses, we seek comment on such a suggestion.

49. *Expanded Licensed Use*. We seek comment on the potential to expand terrestrial fixed use of the 12.2 GHz band. For example, should we consider permitting one-way, point-to-point or point-to-multipoint fixed links at a higher power than the current MVDDS rules allow? We seek comment on the following issues related to an updated one-way point-to-point or point-to-multipoint fixed link service. Is sharing between point-to-point or point-to-multipoint fixed links possible with NGSO systems whose receivers, unlike those in the DBS service, are not pointed exclusively at the geostationary satellite arc?[183] What power limit would be appropriate to allow for better expanded terrestrial use of this band while still protecting incumbent licensees? Should such expanded terrestrial rights be conferred on the existing incumbent MVDDS licensees, or are there alternative approaches for expanding terrestrial use opportunities in this band, such as site-based, individually coordinated operations relative to existing MVDDS operations? How should these operations be licensed, what technical data should be collected, and what type of technical limits and coordination requirements should be considered to allow necessary protections and coexistence with incumbent services in the band? Are there use cases or technologies that could be provided in a one-way point-to-multipoint type configuration, subject to higher power limits than MVDDS? To what extent would potential deployments of this type provide substantial benefits to the public? What would be the benefits to consumers and businesses of expanded one-way use, as compared to the benefits of other types or potential expanded terrestrial use cases or architectures?

50. We also seek comment on the possibility of allowing for two-way, point-to-point fixed links at a standard part 101 higher power limit.[184] Allowing this type of use could expand backhaul to

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[181] *See 12.2 Notice,* 36 FCC Rcd at 629, para. 60 ("If we maintain the current framework, should we make any revisions to the MVDDS technical rules within the existing regulatory framework so as to facilitate more robust terrestrial operations without causing harmful interference to satellite operations in the band?"); *id*. at n.154 (citing, *Wireless Telecommunications Bureau Seeks Comment on Petitions of Seven Licensees for Waiver of Multichannel Video Distribution and Data Service Technical Rules*, WT Docket No. 15-218, Public Notice, 30 FCC Rcd 9953 (WTB BD 2015) (petitioners seek waivers of 47 CFR §§ 101.113 note 11, 101.147(p), 101.1407, and 101.1411(a), to use the 12 GHz band for two-way, point-to-point operation at an EIRP up to 55 dBm)).

[182] *See* Letter from Joe Valandra, President & CEO, Tribal Ready, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 22-352 *et al*. (filed May 10, 2023) (Tribal Ready May 10, 2023 *Ex Parte*) ("Tribal Ready respectfully requests that the 12 GHz band FNPRM, as well as any final rules for the band, provide for a set aside for Tribal entities to accelerate [fixed wireless broadband] on Tribal lands. The Commission has previously recognized the value of Tribal set asides in promoting deployment as recently as the 2.5 GHz band. The 12 GHz band can and should also be an option to help Native Americans close the digital divide."). *See also* Letter from Michael Calabrese, Director, Wireless Future Program, New America's Open Technology Institute, and Harold Feld, Senior Vice President, Public Knowledge, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 22-352 *et al*. at 3 (filed May 10, 2023) (Open Technology Institute and Public Knowledge May 10, 2023 *Ex Parte*) ("our groups suggested that the Commission explicitly notice the possibility of opening a rural Tribal window in both the FNPRM and the NPRM. The Commission should ask whether to permit point-to-point or point-to-multipoint operations on tribal lands in 12.2 GHz on terms similar to those authorized to MVDDS licensees. This would require modification of the existing MVDDS licenses, but such modification would be a reasonable tradeoff for the expanded spectrum rights provided to the MVDDS licensees.").

[183] *See* Letter from Daniel C. H. Mah, SES Americom, Inc., W. Ray Rutngamlug, Associate General Counsel, Intelsat US, LLC, GN Docket No. 22-352, at B-1 (filed May 12, 2023) (citing Coexistence Studies).

[184] *See, e.g., 12.2 Notice,* 36 FCC Rcd at 629, para. 60 (citing *Wireless Telecommunications Bureau Seeks Comment on Petitions of Seven Licensees for Waiver of Multichannel Video Distribution and Data Service Technical Rules*, WT Docket No. 15-218, Public Notice, 30 FCC Rcd 9953 (WTB 2015) (petitioners seek waivers of 47 CFR §§

(continued….)

support advanced broadband capacity. Should higher power two-way point-to-point type terrestrial rights be conferred on the existing incumbent geographic service area licensees? Or should we consider alternative approaches, such as site-based, individually coordinated operations relative to existing MVDDS operations? We note that several other similar bands are shared between NGSO FSS and two-way point-to-point operations, based on successful coordination of later-in-time operations.[185] Given the nature of highly directional point-to-point two-way operations, we ask whether terrestrial operations may be able to successfully co-exist with new and incumbent DBS and NGSO FSS operations? What would the interference protection status of NGSO FSS ESIMs be vis-à-vis these newly proposed services? Would it be manageable if rights were conferred on a first-in-time basis, since under the current authorization NGSO FSS ESIMs are not afforded protection? As a baseline, would consideration of the current technical standards in similar part 101 bands (11 GHz, 13 GHz) provide a basis for technical rules for two-way point-to-point operations in the 12.2 GHz band? If not, to what degree should they be limited or modified? How should two-way, point-to-point operations be licensed, what technical data should be collected, and what type of technical limits and coordination requirements should be considered to allow necessary protections and coexistence with incumbent services in the band? In particular, how should the burden of protecting new or modified DBS subscribers be assigned after a point-to-point link is successfully coordinated with existing DBS customers of record? How would new or modified NGSO FSS earth stations be protected? Additionally, should we consider the possibility of relocating 12.7 GHz band point-to-point operations to the 12.2 GHz band and, if so, how would this best be accomplished? Alternatively, would allowing expanded opportunities for disaggregation and partitioning promote more intensive use of the spectrum? Currently, the MVDDS rules do not allow disaggregation and limit partitioning to counties.[186] Should we revisit those rules to allow the option for 12.7 GHz point-to-point operators to lease spectrum larger in the 12.2 GHz band through partitioning and disaggregation?

51. Further, we also seek comment on the possibility of allowing two-way point-to-multipoint links. Specifically, we seek comment on the following issues related to an updated two-way point-to-multipoint fixed link service in the 12.2 GHz band. What power limit would be appropriate to allow for better expanded terrestrial use of this band while still protecting incumbent licensees? Should such expanded terrestrial rights be conferred on the existing incumbent MVDDS licensees, or are there alternative approaches for expanding terrestrial use opportunities in this band, such as site-based, individually coordinated operations relative to existing MVDDS operations? How should these operations be licensed, what technical data should be collected, and what type of technical limits and coordination requirements should be considered to allow necessary protections and coexistence with incumbent services in the band? Is there any adjustment necessary for the interference protection criteria of PFD and EPFD? If so, how should these metrics be calculated for an updated two-way point-to-point or point-to-multipoint fixed link service? Given that EPFD was originally conceived to promote sharing between NGSO FSS and GSO BSS and FSS systems,[187] is this the right metric for the present application? Is it appropriate to reconsider the underlying free space propagation assumption regarding the interference protection criteria? The Commission has previously determined that a combination of different propagation models is most appropriate for the determination of sharing metrics between fixed

(Continued from previous page)
101.113 note 11, 101.147(p), 101.1407, and 101.1411(a), to use the 12 GHz band for two-way, point-to-point operation at an EIRP up to 55 dBm) (*MVDDS Waiver Notice*)).

[185] *See, e.g., Amendment of Parts 2 and 25 of the Commission's Rules to Enable GSO Fixed-Satellite Service (Space-to-Earth) Operations in the 17.3-17.8 GHz Band, to Modernize Certain Rules Applicable to 17/24 GHz BSS Space Stations, and to Establish Off-Axis Uplink Power Limits for Extended Ka-Band FSS Operations*, IB Docket Nos. 20-330 and 22-273, Report and Order and Notice of Proposed Rulemaking, FCC 22-63, 2022 WL 3138555 (Aug. 3, 2022).

[186] 47 CFR § 101.1415.

[187] *See First Report and Order and FNPRM*, 16 FCC Rcd at 11, para. 12-14.

microwave links and unlicensed devices.[188] Given the terrestrial nature of both interferer and victim, is a combination of different propagation models more suitable than relying only on a free space model? If so, what are the appropriate combinations of propagation models and their respective ranges of applicability? Please provide the necessary justification for use of the models. How is the definition of PFD and EPFD changed for the path-loss model other than the free space?[189] Are there any other impacts to consider as a result of using models other than the free space propagation model? For example, should we also consider changing the maximum EIRP allowed? If so, what is the maximum EIRP? Please provide the necessary justification for use of higher EIRP. Should there be multiple categories for the maximum EIRP? For example, should there be a maximum EIRP for the urban environment and another maximum EIRP for the rural environment? Are there use cases or technologies that could be provided in a two-way point-to-multipoint type configuration, subject to higher power limits than MVDDS? To what extent would potential deployments of this type provide substantial benefits to the public? What would be the benefits to consumers and businesses of expanded two-way use, as compared to the benefits of other types or potential expanded terrestrial use cases or architectures?

52. Alternatively, adding indoor-only underlay use of the band could allow for greater control and access assurances that could help stimulate IoT, private Long Term Evolution (LTE) or New Radio (NR) market in the band.[190] If we were to consider such expanded terrestrial authorization in the band, should that authorization be awarded to the existing incumbent MVDDS licensees, or should this type of authorization be available to businessowners/landowners for the operation of private networks/IoT such as on physical campuses or industrial complexes? If such authorizations were conveyed to businessowners/landowners, how would they intersect with the authorizations held by existing MVDDS incumbent licensees, and should the MVDDS authorizations also be expanded? If such rights for a different type of terrestrial use were afforded to businessowners/landowners, should they be licensed-by-rule? What type of coordination mechanism might allow for such use, e.g. standard coordination notifying incumbent services within a specific distance of the proposed facilities of the planned technical parameters of the proposed operation? What interference thresholds or limitations would such indoor-only unlicensed operations need to observe to adequately protect MVDDS, DBS and NGSO FSS operations from harmful interference? Should rights be conveyed to terrestrial licensees on a first-in-time basis, similar to those that currently exist in our rules, or with proposed modifications, in order to provide certainty for licensees that invest in and operate these systems?

53. *Unlicensed Use*. We seek comment on whether, and, if so, how, to permit unlicensed use of the 12.2 GHz band, a step that multiple parties advocate.[191] The unlicensed advocates claim that a low-power, indoor-only unlicensed underlay in the 12.2 GHz band would create additional capacity for Internet of Things (IoT) uses.[192] Part 15 sets out the regulations under which an intentional, unintentional, or incidental radiator may be operated without an individual license.[193] Under the rules for unlicensed

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[188] *See Unlicensed use of the 6 GHz Band,* FCC20-51A1_Rcd at 3874. Para. 63.

[189] PFD for general path-loss can be defined as $\mathrm{PFD} = \mathrm{EIRP\text{-}PL} + 10{*}\log_{10}(4{*}\pi)\text{-}20{*}\log_{10}(\lambda)$. Also EPFD can be expressed in terms of PFD as $\mathrm{EPFD} = \mathrm{PFD}{*}\,G_e(\theta_e, \varphi_e)\ I/G_{e,max}$, where PFD is defined in the previous sentence.

[190] *See 12.2 Notice*, 36 FCC Rcd at 622, para. 39 (stating that in an underlay approach any additional terrestrial operations likely would need to be authorized at low power and would need to operate on an opportunistic basis, not causing harmful interference to—nor seeking protection from harmful interference by—the incumbent primary services in the band.).

[191] Boeing Reply at 10; NCTA Reply at 2; Letter from Chip Pickering, CEO, Incompas, and Joe Lockhart, Partner, Rational 360, to Acting Chairwoman Rosenworcel and Commissioners, FCC, Docket No. 20-443, Attach. A, Ensuring U.S. Leadership in 5G, at 4 (filed Apr. 28, 2021); Dynamic Spectrum Alliance Comment at 6-7; Federated Wireless Comment at 3.

[192] Comments of Public Interest Organizations (New America's Open Technology Institute, et. al.), at 2, 17.

[193] *See* 47 CFR § 15.1(a).

intentional radiators,[194] the 10.6-12.7 GHz band is designated as "restricted."[195] Unless expressly permitted by rule or waiver, unlicensed devices are not allowed to intentionally radiate energy into a restricted band, in order to protect sensitive radio services from harmful interference.[196] We seek comment on the benefits and costs of removing the 12.2 GHz band from the list of restricted bands. What type of applications (e.g. IoT, local networking, etc.) and from what types of devices (e.g. indoor access points, mobile client devices, etc.) would unlicensed operations most benefit in the 12.2 GHz band?

54. We invite commenters to discuss whether unlicensed use may be permitted within the 12.2—12.7 GHz band under provisions that could be implemented under our part 15 rules. Those rules require that unlicensed devices protect the licensed incumbent services[197] which, in this case, includes DBS, NGSO FSS, and MVDDS. We note that the Commission has rules for unlicensed low power indoor devices in the 6 GHz band that could serve as a model for unlicensed use in this band. Under those rules, the Commission found that low-power indoor devices could take advantage of building entry loss to protect incumbent fixed service users.[198] Would these rules provide an appropriate model for indoor devices in the 12.2 GHz band?[199] Under the 6 GHz low power indoor rules, unlicensed access points may operate at 5 dBm/MHz EIRP while client devices are limited to -1 dBm/MHz. The unlicensed access points must be supplied power from a wired connection, may not be weatherized, must use an integrated antenna, and must have a label indicating that use is restricted to indoors. The client devices must operate only under the control of an access point. If the Commission allowed indoor unlicensed use in the 12.2 GHz band, what rules should be adopted to mitigate the risk of harmful interference from indoor unlicensed devices to incumbent services? For example, would the same rules that we rely on to keep 6 GHz low-power indoor devices inside be replicated here to provide signal attenuation between indoor unlicensed devices and outdoor DBS, NGSO FSS, and MVDDS receive antennas? Noting that the

[194] *See* 47 CFR part 15, subpart C.

[195] 47 CFR § 15.205(a) (designates bands of operation in which only spurious emissions are permitted under part 15).

[196] *See, e.g.*, *Amendment of Part 15 of the Commission's Rules to Establish Regulations for Tank Level Probing Radars in the Frequency Band 77-81 GHz*; *Amendment of Part 15 of the Commission's Rules To Establish Regulations for Level Probing Radars and Tank Level Probing Radars in the Frequency Bands 5.925 7.250 GHz, 24.05 29.00 GHz and 75 85 GHz*, ET Docket No. 10-23, Report and Order, (FCC 14-2) 29 FCC Rcd 761, 773 para. 26, n.73 (2014) (citing Revision of the Rules Regarding Operation of Radio Frequency Devices Without an Individual License, First Report and Order, GEN Docket 87-389, 4 FCC Rcd 3493 (1989), 47 CFR § 15.205(a)).

[197] 47 CFR § 15.5(b).

[198] *See Unlicensed Use of the 6 GHz Band and Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, ET Docket No. 18-295; GN Docket No. 17-183, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 3852, 3888, para. 96, *et seq.* (2020), *aff'd in part*, *remanded in part sub nom. AT&T Services, Inc. v. FCC*, 21 F.4th 841 (D.C. Cir. 2021).

[199] We note that in advocating for 5G authorization in the 12.2 GHz band, the MVDDS Coalition's first Coexistence study argued that losses as signals in the 12.2-12.7 GHz band travel through one or more building walls generally provide sufficient attenuation to ensure EPFD limits remain below current limits. Coexistence 1 at 27. Where building attenuation alone might prove insufficient, the Coexistence study stated that "careful placement and power control can prevent the maximum EPFD levels from being exceeded outside of the building envelope to ensure protection of DBS receive antennas." Coexistence 1 at 27. Specifically, the Coexistence study asserted that signals from base stations placed inside one interior wall would have 50 dB attenuation resulting from passing through an interior and exterior wall, while mobile units more likely to travel toward building edges would experience 30 dB. Coexistence 1 at 26. Furthermore, the study noted that 5G network operators could manage interference through controlling the transmission location of 5G mobile devices through "geofencing," which involves the use of location information from the device to assign unit geographical boundaries to the permitted area of operation. Coexistence 1 at 26-27. These mitigation techniques would allow the broadband operator to prevent 5G MVDDS mobile devices from venturing into areas that might offer insufficient attenuation to one or more DBS receivers outside of the building exterior." Coexistence 1 at 27.

incumbent services are generally trying to receive a weak signal from a satellite, would the expected building entry loss be adequate to protect those services? What technical limitations such as power levels, bandwidth restrictions, or out-of-band emission limits would be appropriate in conjunction with an indoor-only requirement to protect the incumbent services? Could we permit less restrictive unlicensed use (e.g., higher indoor power levels, outdoor use, etc.) with a label warning to alert consumers that use near a DBS, NGSO FSS, or MVDDS receive site could result in harmful interference to the consumer device? For example, this would allow DBS subscribers to decide about whether to use such a device in their homes knowing there is a potential interference risk. Are there other potential interference mitigation techniques or system design requirements we should consider to protect incumbent services, such as geofencing capability?[200] We invite commenters to submit engineering analysis or measurement data addressing the potential for such indoor unlicensed devices to cause harmful interference to DBS, NGSO FSS, and MVDDS receivers.

55. *Other Technology-based Sharing*. In addition, we seek comment on whether there may be opportunities to take advantage of technological advancements to accommodate expanded terrestrial capabilities in the 12.2 GHz band. For example, could dynamic, database-driven coordination capabilities such as have been implemented in other frequency bands (e.g., 6 GHz unlicensed and 3.5 GHz Citizens Broadband Radio Service) be implemented in the 12.2 GHz band? Would another type of frequency management system allow for a greater opportunity for expanded terrestrial services to develop within the band while affording protection to incumbent satellite and terrestrial services? What technical data would need to be collected to support such a system? DBS operators are currently required to maintain data on current subscriber locations; NGSO FSS operators have no similar requirement to track consumer terminal location data, and deployments in the band continue to increase. Would additional technical data need to be collected or shared among the licensees so that an advanced frequency management system could effectively manage shared use and prevent interference exceedance to the different services in the band? What parameters should we put in place to ensure that any obligations for a new managed sharing regime in the band would not be overly cumbersome, particularly to the DBS and NGSO FSS incumbents? We seek comment on what type of frequency management system might be used to control access to, and manage potential interference in, the 12.2 GHz band. Who should have ownership or oversight of such systems? How should frequency management system or database operators be selected, and what should be the requirements for such roles? Would there be any interest in operating such systems or databases? What type of testing requirements should there be on these types of systems? How might the associated costs be addressed, and who should bear the burden of those costs? For instance, should new terrestrial fixed services bear all the costs, or should part of this cost be shared by the NGSO FSS and DBS incumbents in the band?

56. We specifically seek comment on the use of Automated Frequency Coordination (AFC) systems, which were adopted for unlicensed outdoor deployments in the 6 GHz band based on several considerations that were specific to that band. Accordingly, we seek comment on whether similar, or otherwise compelling, considerations would support use of an AFC system in the 12.2 GHz band, and also seek comment about the extent to which these considerations may also be applicable to other frequency coordination management and database system concepts. Among the most relevant considerations are what types of propagation models are the most appropriate, considering the incumbents in this band, including DBS and NGSO FSS satellite systems? What protection criteria would be required specific to each service, i.e., DBS, NGSO FSS, and MVDDS? How can modelling of the incumbent services be adequately accomplished, particularly considering the potential complexity of NGSO FSS systems, and their associated Earth stations that track satellites that are in motion? What device location information might be required, and what method would be appropriate to obtain such information? For instance, should the Commission consider requiring automated entry of some or all of the information, or permit manually entered information by a certified installer of the device? How would AFC systems be

[200] Coexistence 1 at 26-27.

able to periodically verify frequency availability considering the incumbent DBS and NGSO FSS satellite operators and the lack of information as discussed above? Moreover, is a periodic re-check interval an appropriate method to determine changes in frequency availability information and, if so, what should be the maximum permissible interval for verifying frequency availability? If not, we seek comment on other alternatives that could identify frequency availability. Should aggregate interference be calculated by an AFC system or is it sufficient to just consider individual devices? How should devices be registered, and what collected information should be required? Should an AFC system be able to give commands to shut down devices when changes in spectrum use occur? What system security concerns would need to be addressed? If this concept were to be considered sufficient, technical information would need to be available to such frequency management systems—specifically the technical information that is not currently sufficiently collected, or collected at all, from DBS and NGSO FSS respectively. If this concept was to be considered at what future date should DBS and NGSO FSS be required to provide the required data? We seek comment on these possible alternatives.

B. Promoting Digital Equity and Inclusion

57. The Commission, as part of its continuing effort to advance digital equity for all,[201] including people of color, persons with disabilities, persons who live in rural or Tribal areas, and others who are or have been historically underserved, marginalized, or adversely affected by persistent poverty or inequality, invites comment on any equity-related considerations[202] and benefits (if any) that may be associated with the proposals and issues discussed herein. Specifically, we seek comment on how our proposals may promote or inhibit advances in diversity, equity, inclusion, and accessibility, as well the scope of the Commission's relevant legal authority.

V. NOTICE OF PROPOSED RULEMAKING IN GN DOCKET NO. 22-352[203]

A. Expanded Use of the 12.7-13.25 GHz Band

1. Repurposing for Mobile Broadband or Other Expanded Use

58. As noted above, on October 28, 2022, the Commission released its *12.7 NOI* to broadly seek information on the current use of the 12.7 GHz band, how the Commission could encourage more efficient and intensive use of the band, and whether the band is suitable for mobile broadband or other expanded use.[204] The 12.7 GHz band has several attributes that argue in favor of its repurposing for advanced services: it is already allocated for terrestrial mobile service on a primary basis domestically, it is only lightly used by the Fixed (FS) and Fixed Satellite (FSS) and Mobile Services (MS), and there is only a single Federal incumbent at one site.

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[201] Section 1 of the Communications Act of 1934 as amended provides that the FCC "regulat[es] interstate and foreign commerce in communication by wire and radio so as to make [such service] available, so far as possible, to all the people of the United States, without discrimination on the basis of race, color, religion, national origin, or sex." 47 U.S.C. § 151.

[202] The term "equity" is used here consistent with Executive Order 13985 as the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality. *See* Exec. Order No. 13985, 86 Fed. Reg. 7009, Executive Order on Advancing Racial Equity and Support for Underserved Communities Through the Federal Government (Jan. 20, 2021).

[203] In sections V and VI, record references and citations refer to GN Docket No. 22-352, unless otherwise noted.

[204] *12.7 NOI* at *1, para. 2.

59. In the United States, the 12.7 GHz band is allocated on a primary basis for non-Federal use to FS, FSS (Earth-to-space), and the MS.[205] The band is shared among Fixed Microwave Services (FS—part 101), Broadcast Auxiliary Services (fixed and mobile BAS—part 74), fixed and mobile Cable Television Relay Services (CARS—part 78), and Fixed Satellite Services (FSS—part 25).[206] Based on the Commission's licensing records, these services in the 12.7 GHz band include approximately 1,846 terrestrial service call signs that authorize a total of approximately 2,070 fixed point-to-point paths, and approximately 400 licenses that authorize mobile TV pickup operations.[207] There are also 27 call signs for FSS space stations and 43 call signs for FSS earth stations.[208] Terrestrial and space services in the 12.7 GHz band are subject to prior-coordination requirements to avoid interference.[209] The 12.7 GHz band has only limited Federal use. Specifically, the National Aeronautics and Space Administration (NASA) operates a receive-only earth station for its Deep Space Network (DSN) at Goldstone, California, that is authorized to receive transmissions across the entire 12.7 GHz band.[210]

60. Given the existing incumbent uses of the band, the *12.7 NOI* sought comment on two potential options for making some or all of the band available for mobile broadband and other expanded uses: (1) repurposing some or all of the band for such use with sunset of some or all incumbent services and relocation and cost-sharing requirements for new services,[211] and (2) potential sharing methods among new and incumbent services.[212] In connection with these potential options, the *12.7 NOI* asked about potential licensing approaches to facilitate deployment of new mobile broadband or other expanded use of the band.[213] The *12.7 NOI* also sought comment on an appropriate protection level that new operations in the 12.7 GHz band would have to provide incumbent services in the lower and upper

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[205] 47 CFR § 2.106. The international and domestic allocations are similar for the 12.75-13.25 GHz band in most respects. However, space-to-Earth transmissions are permitted at 12.7-12.75 GHz in ITU Regions 1 and 3 but not in Region 2. 47 CFR § 2.106, International Table. Domestically, Footnote NG52 of the U.S. Table precludes most GSO FSS systems from using the band for domestic services and limits the deployment of FSS earth stations in the band. *Id*. at n.NG52.

[206] *See* 47 CFR pt. 25 (§§ 25.101-25.702), pt. 74 (§§ 74.600-74.690), pt. 78 (§§ 78.1-78.115), pt. 101 (§§ 101.1-101.1527).

[207] Licensing data for fixed and mobile BAS under part 74 and Fixed Microwave under part 101 is in the Universal Licensing System (ULS). Licensing data for fixed and mobile CARS is in the Cable Operations and Licensing System (COALS). These statistics are based on a review of ULS on April 26, 2023. There are also approximately 65 fixed or mobile CARS call signs in COALS.

[208] FSS data are in the International Bureau Electronic Filing System (MyIBFS). These statistics are based on a review of MyIBFS on April 26, 2023.

[209] *See* 47 CFR §§ 25.115(a)(6)(i), 101.21(f). The administrative aspects of the coordination process are set forth in 47 CFR § 101.103 for coordinating terrestrial stations with earth stations, and in 47 CFR § 25.203 for coordinating earth stations with terrestrial stations. *See also id.* § 25.251(a). The coordination procedures specified in 47 CFR § 101.103 and § 25.203 are applicable for coordinating between earth stations and fixed microwave links, and the information provided during coordination is set forth in 47 CFR § 25.203(c)(2) and 101.103(d)(2)(ii).

[210] *See* 47 CFR § 2.106 & n.US251 ("The band 12.75-13.25 GHz is also allocated to the space research (deep space) (space-to-Earth) service for reception only at Goldstone, CA (35°20′ N, 116°53′ W)."). For additional details concerning the domestic and international allocations, *see 12.7 NOI* at *2-*3, paras. 4-6. For additional details on current uses, *see 12.7 NOI* at *2-*5, paras. 4-11 (II.B. Current uses of the 12.7-13.25 GHz (12.7 GHz) Band).

[211] *See 12.7 NOI* at *5, *6-*9, *9-*11, paras. 12, 14-24, 25-30.

[212] *See 12.7 NOI* at *6-*9, paras. 14-24 (III.A. Potential Methods for Sharing the Band), *9-*11, paras. 25-30 (III.B. Sunset of Incumbent Services, Relocation and Cost-Sharing for New Services).

[213] *See 12.7 NOI* at *11-*12, paras. 31-32 (III.C. Potential Licensing Approaches, Service and Technical Rules), Specifically, the Commission asked whether to assign new licenses on an exclusive-use basis, through the issuance of new geographic-area overlay licenses or consider other licensing approaches, such as non-exclusive, site-based, or a tiered approach such as that used in the Citizens Broadband Radio Service. *Id*. at *11, para. 31.

adjacent bands.[214] The *12.7 NOI* also sought comment on the costs and benefits that should be considered in deciding whether to promote new service opportunities in the band through repurposing/relocation or sharing as well as whether we should consider some combination of these methods.[215]

61. In response to the *12.7 NOI*, very few parties have argued that the current balance of incumbents in the 12.7 GHz band should be left unchanged and that the band should remain untouched. There is substantial support for repurposing these frequencies for mobile broadband or other expanded use and a significant number argue that the band should be used for exclusive, fixed or mobile, flexible high-powered use.[216] Commenters assert that the next-generation wireless technologies underpinning 5G, 5G Advanced, and 6G services will rely depend on extremely high data rates, and the reliability, low latency, and capacity that the 12.7 GHz band spectrum can provide.[217] In addition, standardization is already underway for 6G, and the 12.7 GHz band has considerable capacity and opportunity for channel reuse, making it a good fit for future 6G technologies,[218] including high-speed, low-latency, bandwidth-intensive applications, such as augmented reality (AR), virtual reality (VR), telesurgery, and robotics.[219]

62. Accordingly, we propose to repurpose some or all of the 12.7 GHz band for mobile broadband and other expanded use and seek comment on this proposal. We seek comment on the economic benefits of introducing mobile broadband or other expanded use in all or part of the 12.7 GHz band. Commenters should consider the economic value of current and future use cases for each type of use, including benefits and opportunity costs to consumers and the Nation's economy overall, as well as to unserved or underserved areas and specialized market segments (e.g., education, telemedicine, and manufacturing). Commenters should also address the benefits of international harmonization both in terms of devices and network deployments. In addition, we encourage commenters to consider the economic impact on consumers and businesses in rural communities and areas that are unserved or underserved by current broadband providers, as well as any economic impact on small businesses.

63. The propagation characteristics of this frequency range will require operators to transmit at relatively high power to achieve meaningful coverage and capacity.[220] Parties that support mobile broadband use of the band argue that sharing regimes premised upon relatively low power operations

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[214] *See 12.7 NOI* at *12-*14, paras. 34 (describing incumbent services in 12.2-12.7 GHz band), 35-38 (describing incumbent Federal services in 13.25-13.4 GHz and 13.4-13.75 GHz bands), 39-40 (recognizing the need for services in these adjacent bands to continue providing service and seeking comment on whether provisions beyond the existing 12.7 GHz band fixed service protection levels for adjacent bands would be necessary for mobile broadband or other expanded-use operations in the 12.7 GHz band to prevent harmful interference to operations in those adjacent bands).

[215] *See 12.7 NOI* at *5, para. 12.

[216] *See, e.g.*, AT&T Comments at 4; Competitive Carriers Association Reply at 4 (CCA); CTIA Comments at 5; DISH Network Corp. Comments at 5 (DISH); Ericsson Comments at 10; Nokia Comments at 3; Qualcomm Comments at 7; T-Mobile USA, Inc. Comments at 3; U.S. Cellular Corp. Reply at 2 (UScellular); Verizon Comments at 1; 5G Americas Reply at 5; 5G for 12 GHz Coalition Comments at 3. *But see* EIBASS Comments at 1; Ovzon Comments at 1. Several commercial wireless interests note that more lower mid-band spectrum is needed and that the 12.7 GHz band should be viewed as a complement to lower mid-band spectrum—not a replacement. *See* AT&T Comments at 1; Ericsson Comments at 9; T-Mobile Comments at 14; 5G Americas Reply at 6.

[217] *See* Ericsson Comments at 5; Qualcomm Comments at 3, 7. Qualcomm notes that next generation technology advancements such as active Antenna Systems (AAS) and Giga-MIMO will compensate for attenuation in such high frequency bands. Qualcomm Comments at 5; *see also* Nokia Comments at 2-3.

[218] Ericsson Comments at 6, 8.

[219] Consumer Technology Association Comments at 2 (CTA).

[220] CTIA Comments at 9; Rural Wireless Association, Inc. Comments at 2-3 (RWA); Verizon Comments at 9; T-Mobile Reply at 4.

would not provide the coverage needed to make investment worthwhile.[221] Nokia argues that fixed paths—both BAS/CARS, Fixed Microwave Services and Common Carrier and Operational Fixed Services (OFS)—are concentrated in major cities along the coasts and that allowing these operations to remain in the band would discourage investment in mobile broadband expansion in areas that would most benefit from it.[222] Similar to fixed point-to-point links, current mobile use of the band is limited to BAS/CARS television pickup services generally licensed to operate "over an area defined by a point-radius or other wide-area basis," including large, densely-populated areas with higher spectrum-use demands.[223] Accordingly, parties favoring mobile deployment in the band opposed sharing with these incumbent systems.[224] Some note that sharing should be used in situations where clearing the band is not possible, which is not the case in the 12.7 GHz band, where coordination, repacking and relocation are available.[225]

64. The record, as well as the Commission's experience with other bands, reflects that this proposed repurposing will enable next-generation mobile and fixed broadband services in the 12.7 GHz band. AT&T, T-Mobile, Verizon, Federated Wireless, Nokia, CTIA, Celona, 5G for 12 GHz Coalition, 5G Americas, Dynamic Spectrum Alliance, CCA, and DISH, all support bringing terrestrial mobile wireless services into the 12.7 GHz band.[226] Based on the Commission's well established success in repurposing other bands for new services, such as PCS and AWS, using exclusively assigned geographic-area licenses,[227] we agree with commenters that assigning exclusive licenses is most likely to foster the innovation necessary for an equipment ecosystem to develop in the band and best facilitate the relocation and repacking of incumbents, which in turn will accelerate deployment of mobile broadband and other expanded services in the band.[228] We seek comment on these proposals. We also discuss below and seek comment on whether limited sharing in the band among different types of services is possible.

65. The National Association of Broadcasters and the Society of Broadcast Engineers assert the 12.7 GHz band is generally not favored by BAS for long-distance high reliability links; however, both assert it is necessary for short distance links when no other frequencies are available due to congestion of

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[221] Ericsson states that sharing methods based on dynamic sharing are not likely to optimize usage of the spectrum, and instead "will result in lower power levels, uncertainty regarding access to the band, and limited investment and utility." Ericsson Comments at 10. 5G Americas also argues that the Commission should relocate incumbents instead of creating a low-power sharing regime. 5G Americas Comments at 4-5.

[222] Nokia Comments at 4.

[223] Nokia Comments at 5.

[224] *See, e.g.*, Nokia Comments at 4-5.

[225] T-Mobile Reply Comments at 6-7; Verizon Comments at 5-6.

[226] *See* AT&T Comments at 3-4; CTA Comments at 2; CTIA Comments at 1, 6; DISH Comments at 1; Dynamic Spectrum Alliance Comments at 1-2 (DSA); Ericsson Comments at 1, 8; Federated Wireless Comments at 1; NCTA Comments at 1; Nokia Comments at 2-3; OneWeb Comments at 1; Qualcomm Inc. Comments at 6 (Qualcomm); T-Mobile Comments at 1; Verizon Comments at 1; 5G for 12 GHz Coalition Comments at 2-3; CCA Reply at 2; Celona Reply at 2-3; US Cellular Reply at 2; 5G Americas Reply at 4-5.

[227] *See e.g.*, *infra* note 251 and accompanying text; *accord Spectrum Frontiers 1st R&O and FNPRM*, 31 FCC Rcd at 8027-28, paras. 29-30, 8045-46, paras. 78-79.

[228] Indeed, the majority of the interests that advocate for expanded fixed or mobile uses argue against sharing in the band and for repacking or relocation of incumbents. *See, e.g.,* CTIA Comments at 1,7; Ericsson Comments at 11; Nokia Comments at 4-6; Qualcomm Comments at 7; T-Mobile Comments at 10-12. 5G Americas states that "the Commission should relocate incumbents to the greatest extent possible rather than apply a low-power sharing regime" and that "[r]elocation expenses should be reimbursed from the pool of auctions proceeds for relocation pursuant to a concrete deadline and should be shared by all new 12.7 GHz entrants, on a *pro rata* share." *See* 5G Americas Reply Comments at 6-7.

the 2 GHz and 6 GHz bands.[229] Accordingly, although broadcaster commenters oppose relocation of mobile BAS to other frequency bands, repacking to a discrete portion of the 12.7 GHz band remains not only possible, but a favorable outcome according to broadcasters, provided they are reimbursed and are adequately protected.[230] We therefore propose to repack mobile BAS/CARS incumbents to a portion of the 12.7 GHz band.

66. We acknowledge that some satellite industry commenters do not support opening the 12.7 GHz band to terrestrial mobile use and would instead prefer rule changes to intensify satellite use of the band in the United States.[231] Other satellite companies, however, support examining whether the band can be opened to mobile or other expanded terrestrial use, but they also note their concern that the Commission take steps to ensure that services in adjacent bands are not impacted by out-of-band emissions below 12.7 GHz.[232] Furthermore, as T-Mobile notes, satellite operators themselves recognize that there has been limited use of the 12.7 GHz band in the U.S. for satellite operations, which makes use of the band for mobile wireless operations feasible.[233] As noted by Nokia, "of the total number of GSO satellites, only eight of the 23 space stations are in the arc of 132.85 WL to 30 WL," and "[r]egarding non-GSO satellites, the one operational system does not have any U.S. earth stations licensed in this band, another system is not operational, and a third has surrendered the Ku-band portion of the grant."[234] Therefore, according to Nokia, "the sharing of the band with satellite service mostly refers to sharing with GSO FSS in the uplink direction (Earth-to-space)," and "[w]hile more detailed analysis taking into account the characteristics of both systems would be more conclusive, it is expected that the mobile broadband service can share the band with [existing] GSO FSS uplink with no restrictive conditions."[235] We seek comment on our proposal that satellite systems in the band be conserved in their current state with no further expansion in FSS use in the band.[236] We also seek comment on the best method for mobile and fixed systems to share with these remaining satellite systems, while ensuring against harmful interference to such satellite incumbents.

2. Future Licensing of Incumbent Services

67. Effective September 19, 2022, the International, Public Safety and Homeland Security, Media, and Wireless Telecommunications Bureaus announced a 180-day freeze on the filing of new or

[229] National Association of Broadcasters Comments at 3 (NAB); Society of Broadcast Engineers Comments at 2-3 (SBE).

[230] NAB Comments at 2; NAB Reply at 4.

[231] Eutelsat Comments at 2-3, 5-6; Intelsat/SES May 12, 2023 Ex Parte at 2, B-1 (noting that FSS ability to operate in 12.7 GHz band is constrained by footnote NG52 of the U.S. Table of Frequency Allocations limiting use of the band to international systems); Intelsat License LLC and SES Americom, Inc. Comments at 2; Hispasat Reply at 3-4 (arguing that relocating incumbent FSS services out of the 12.7 GHz band, as suggested by certain commenters, is not a viable option because satellite operators have made significant long-term investments, considering the 15–20-year lifespan of a GSO satellite, in reliance on existing frequency allocations).

[232] Kepler Communications Inc. Comments at 2-3 (Kepler); Space Exploration Holdings, LLC Comments at 3 (SpaceX); WorldVu Satellites Limited Comments at 4 (OneWeb).

[233] *See* T-Mobile Reply at 9 (citing Eutelsat Comments at 6, OneWeb Comments at 2-3). T-Mobile adds that given the restriction on satellite use of the 12.7 GHz band due to NG52 which restricts the majority of the 12.7 GHz band in the U.S. to international systems, it would be unreasonable for satellite operators to claim a reliance interest in expanded use of the band for satellite operations. T-Mobile Reply at 9.

[234] Nokia Comments at 6 citing *12.7 NOI* at para. 11.

[235] Nokia Comments at 6.

[236] Our proposal would not preclude the possibility of a new U.S.-licensed satellite that would have no visibility into the United States, as defined in the Communications Act, i.e., states, territories, and possessions. 47 U.S.C. § 153.

modification applications for licenses or other authorizations in the 12.7 GHz band.[237] The purpose of this temporary freeze was to preserve the current landscape of authorized operations in the 12.7 GHz band pending the Commission's consideration of actions in this proceeding.[238] In light of the *12.7 NOI*, the Commission extended the freeze pending the outcome of GN Docket No. 22-352.[239] Because we propose to transition most of the band to exclusively assigned geographic-area licenses for mobile broadband and other expanded uses, we propose to revise the Commission's rules to, in essence, make the freeze permanent. Accordingly, we propose rule revisions to dismiss any new space station license applications and new requests for access to the U.S. market through non-U.S.-licensed space stations, or those parts of any such applications and requests, that seek to operate in the 12.7 GHz band. This would not apply to new applications for space stations limited to serving earth stations outside the United States, applications for modification of existing space station authorizations,[240] relocations of existing space stations pursuant to the Commission's fleet management policy,[241] or to applications for replacement space stations.[242] We propose rule revisions to dismiss applications, or those portions of applications, received for new earth station licenses, and modifications to earth stations currently authorized, to operate in the 12.7 GHz band. This would not apply to applications for renewal or cancellation of current earth station authorizations,[243] or modifications to correct location or other data required in the earth station file.[244] We also propose rule revisions to dismiss applications received for new or major modifications to fixed microwave, fixed or mobile BAS and CARS stations to operate in the 12.7 GHz band. This change does not extend to applications for renewal, cancellation or applications to modify incumbent mobile BAS/CARS licenses to the mobile BAS/CARS repack band. We seek comment on these proposals.

3. Transition of Incumbent Operations

68. In the *12.7 NOI*, we inquired whether any incumbent services in this band should be sunset,[245] with existing operations relocated from all or part of the band and whether new exclusive, geographic-area-licenses should be required to protect or relocate incumbent operations before the sunset date.[246] We inquired whether the Emerging Technologies (ET) framework could be applied to relocation of incumbents from this band and whether the relocation procedures need to differ for one or more incumbent uses.[247] While we propose that FSS incumbents would not be subject to relocation or sunset,

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[237] *180-Day Freeze on Applications for New or Modified Authorizations for the 12.7-13.25 GHz Band*, Public Notice, DA 22-974, 2022 WL 4358635, at *1 (IB/PSHSB/MB/WTB Sept. 19, 2022).

[238] *Id*. The Bureaus noted that the Commission or the Bureaus might extend the freeze if doing so is deemed necessary to avoid undermining the purpose of the freeze. *Id*.

[239] *See 12.7 Freeze Extension Order*, FCC 22-80, at para. 44 (Commission extended freeze pending the outcome of GN Docket No. 22-352).

[240] 47 CFR § 25.117.

[241] 47 CFR § 25.118(e) (permitting the relocation of a GSO space station without prior authorization, but upon 30 days prior notice to the Commission and any potentially affected licensed spectrum user, provided that the operator meets specific requirements, including a requirement that the space station will be relocated to a position within ±0.15° of an orbital location assigned to the same licensee).

[242] 47 CFR §§ 25.158(a)(2), 25.165(e)(1), (2).

[243] 47 CFR § 25.121(e).

[244] *See generally International Bureau Addresses Accuracy of Earth Station Location Information in IBFS*, Public Notice, 32 FCC Rcd 9512 (IB 2017); 47 CFR § 25.117.

[245] The sunset is the date by which all incumbent operations cease to be protected from interference by new entrants. *See, e.g.,* 47 CFR §§ 27.1253(a), 101.79(a).

[246] *12.7 NOI* at *9-*10, paras. 25-26.

[247] *12.7 NOI* at *10, para. 26; *see, e.g.*, 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

(continued….)

we propose to apply our ET procedures to relocate or repack incumbent terrestrial licensees to introduce new services into a frequency band populated by incumbent licensees. ET procedures represent a broad set of tools that the Commission uses, revises, and updates to aid the process of making spectrum available for new uses. Pursuant to these procedures, the Commission will set a "sunset date" for the terrestrial incumbents in this band—a date after which these licensees may not cause harmful interference to new band entrants.[248] Prior to the sunset date, the new entrants may not cause harmful interference to terrestrial incumbents but will be allowed to enter into mandatory negotiations with these incumbents to gain early entry into the band and, if necessary, may relocate these terrestrial incumbents to comparable facilities.[249] Because new entrants may have to relocate some of these incumbents from a larger frequency range or greater geographic area than where the new entrants will operate, the Commission may establishes a companion set of cost-sharing procedures.[250] We seek comment on these proposals and

(Continued from previous page)
Third Generation Wireless Systems, ET Docket No. 00-258, Ninth Report and Order and Order, 21 FCC Rcd 4473, 4484, para. 19 (2006) (requiring new entrants to relocate incumbents system-by-system rather than link-by-link due to the unique operations of incumbents' systems); *Expanding Flexible Use of the 3.7 to 4.2 GHz Band,* GN Docket No. 18122, Report and Order and Order of Proposed Modification, 35 FCC Rcd 2343, 2416, para. 182 (2020) (*3.7 GHz Band Report and Order*). Some transitions were based on rules that called for negotiations when an ET licensee proposed to operate a base station before the sunset date that would interfere with an incumbent's operation. *See, e.g.*, 47 CFR §§ 101.69-101.81. Other transitions had relatively short sunset dates. *See, e.g.,* 47 CFR §§ 101.83-101.97. In the Broadcast Incentive Auction Transition and for the 3.7-4.2 GHz (3.7 GHz band) Transition, the Commission established cost catalogs for relocation expenses. *See Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, 29 FCC Rcd 6567, 6820, para. 619 (2014) (delegating authority to the Media Bureau "to . . . develop a final Catalog of Eligible Expenses, and make other determinations regarding eligible costs and the reimbursement process."); *see also Wireless Telecommunications Bureau Seeks Comment on Preliminary Cost Category Schedule for 3.7-4.2 GHz Band Relocation Expenses*, Public Notice, 35 FCC Rcd 4440 (WTB May 2020). 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 Commc'ns 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).

[248] The sunset is the date by which all incumbent operations cease to be protected from interference by new entrants. *See, e.g.*, 47 CFR §§ 27.1253(a), 101.79(a). *See infra* App. A, § 27.1712. Regarding protection of incumbent microwave systems prior to sunset and the trigger for relocation, we seek comment on whether the references in § 24.237(a) to TIA Telecommunications Systems Bulletin 10–F, "Interference Criteria for Microwave Systems," May 1994, (TSB10–F), and Appendix I of Subpart E of Part 24 – A Procedure for Calculating PCS Signal Levels at Microwave Receivers), and § 24.237(d) Table 3 (Coordination Distance in Kilometers) need to be updated or adjusted to account for use in the 12.7 GHz band.

[249] *See, e.g., 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, 35 FCC Rcd 2343 (2020) (*3.7 GHz Band Report and Order*), *aff'd PSSI Global Services v. FCC*, 983 F.3d 1 (D.C. Cir. 2020) (permitting accelerated relocation of incumbent FSS space and earth stations by new wireless entrants); *Improving Public Safety Communications in the 800 MHz Band*, WT Docket 00-55, Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order, and Order, 19 FCC Rcd 14969 (2004) (relocation of BAS, CARS, and LTTS incumbents by new, nationwide wireless entrant); *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) (relocation of FS incumbents by new wireless entrants). 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).

[250] *See Amendment to the Commission's Rules Regarding a Plan for Sharing the Costs of Microwave Relocation*, WT Docket No. 95-157, Notice of Proposed Rule Making, 11 FCC Rcd 1923 (1995).

ask commenters addressing them to outline how they would apply the ET framework to this band as discussed further below for each type of terrestrial incumbent.

a. Fixed Service

69. Based on our goal of making the 12.7 GHz band available for advanced communications services, and supported by the record, we propose to revise the Commission's rules to make all incumbent point-to-point operations in the band under parts 74, 78, and 101 secondary to new mobile broadband/expanded use operations on a date certain. We seek comment on whether this sunset date should be three, five, or ten years after the first license for such new operations is issued in the band. Should the sunset date differ based on the incumbent service? Fixed microwave incumbents have a long and successful history of relocation, including clearing the 1850-1990 MHz band for Personal Communications Service (PCS) and the 2110-2200 MHz bands for Advanced Wireless Services (AWS) bands.[251] CTIA argues that most incumbent services currently operating in the 12.7 GHz band can be relocated to different media or spectrum bands without any loss of functionality.[252] For example, CTIA estimates that nearly 80 percent of the BAS licenses in the 12.7 GHz band are for fixed links that could be moved either to different fixed microwave service bands or to alternative media such as fiber.[253]

70. Verizon notes that the 12.7 GHz band "is home to approximately 1,697 Broadcast Auxiliary Service (BAS) call signs, 15 Cable Television Relay Service (CARS) licenses, and 224 call signs for part 101 licensed point-to-point microwave links."[254] Verizon contends that "[s]uch technologies, which support public service and public safety among other functions, could be relocated (and upgraded) consistent with the Commission's longstanding *Emerging Technologies* principles.[255] Nokia believes that we should relocate the limited number of fixed links operating in the 12.7 GHz band.[256] Ericsson states that the Commission, "[w]here possible, … should explore opportunities to relocate incumbents" from the 12.7 GHz band or, in certain instances, consolidate, segment, and repack certain incumbent users into a smaller portion of the band.[257] 5G Americas supports the relocation of incumbents from the 12.7 GHz band "to the greatest extent possible."[258]

71. The record reflects a strong consensus among parties that we utilize our Emerging Technologies policies to transition and sunset all incumbent point-to-point licenses in the band under

[251] *See* CTIA Comments at 7-8 & nn. 20,21 (citing *Amendment of the Commission's Rules to Establish New Personal Communications Services*, GN Docket No. 90-314, Second Report and Order, 8 FCC Rcd 7700 (1993); *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, Second Report and Order*, 17 FCC Rcd 23193 (2002); *Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-220 MHz Band*, Report and Order and Order of Proposed Modification, 27 FCC Rcd 16102, 16214, para. 304 (2012)).

[252] CTIA Comments at 7.

[253] CTIA Comments at 8.

[254] Verizon Comments at 6-7.

[255] Verizon Comments at 7.

[256] Nokia Comments at 4. Nokia notes that "[w]hile the nationwide number of fixed point-to-point links is limited, BAS fixed links (1,172 fixed paths) are concentrated in major cities along the coasts" and "[o]ther licensed fixed service links, such as Common Carrier and Operational Fixed Services (OFS) are concentrated in the West Coast cities and states." *Id.* Nokia recommends that the Commission relocate such services to other fixed microwave bands. *Id.*

[257] Ericsson Comments 11.

[258] 5G Americas Reply Comments 5.

parts 74, 78, and 101.[259] We agree that doing so will appropriately balance the operational needs of incumbents with the public interest benefits of expanded use of the spectrum. The transition of fixed links is relatively straightforward and entails the relocation of independent fixed point-to-point microwave links which can proceed link-by-link basis consistent with our Emerging Technology policies. We therefore propose to apply sections 101.69, 101.73, and 101.75 and amend sections 74.690 and 78.40 to govern relocation of incumbent fixed services from this band.[260] We further propose that, three, five, or ten years after the first mobile broadband/expanded use license is issued in the band, incumbent point-to-point licenses in the band would become secondary (operate on an unprotected, non-interference basis) to new licensed operations. We seek comment on this proposal including the appropriate sunset period for point-to-point licenses.

b. Mobile BAS/CARS

72. We seek comment on our proposal to repack incumbent mobile BAS/CARS licensees into a portion of the 12.7 GHz band to be designated for mobile BAS/CARS operations. The 12.7 GHz band has approximately 450 BAS and CARS call signs that authorize land mobile television pickup stations. These are effectively mobile news gathering technologies that operate over an area defined by a point-radius or other wide-area basis, making them the most likely to potentially interfere with or receive interference from any new mobile broadband co-channel entrants. While these land mobile pickup transmitter licensees coordinate with each other and share the spectrum among multiple licensees in any given area,[261] coordination among these incumbents and new mobile broadband or other expanded use operations is infeasible given that the former need to operate temporary fixed links or mobile transmitters anywhere in their market, often on short notice, and that the latter will be ubiquitous. For this reason, the Commission asked in the *12.7 NOI* if mobile BAS/CARS operations could be relocated to a portion of the band or else to a different band or technology.[262]

73. Given the varied and widespread nature of mobile BAS (403 call signs) and mobile CARS (50 call signs) operations, Verizon encourages the Commission to propose relocating these operations from the band.[263] Nokia also urges relocation of mobile BAS/CARS operations because transmitters in the television pickup service are often licensed to operate over an area defined by a point-radius or other wide-area basis and across the entire frequency band, with large operating areas that include major cities.[264]

74. Significantly, NAB and Scripps Broadcasting recognize that it may be possible to repack broadcaster operations in the 12.7 GHz band into a smaller segment of the band, assuming the Commission adopts rules that will fully protect those broadcaster operations from harmful interference

[259] *See, e.g.,* AT&T Comments at 4; CTIA Comments at 6-7; Nokia Comments at 3-5; T-Mobile Comments at 3-4; Competitive Carriers Association Reply Comments at 3; 5G Americas Reply Comments at 6-7. *But see* Celona Inc. Comments at 1-2 (noting that "Celona does not advocate sunsetting or relocating incumbent users, but instead supports coexisting with the incumbents through a DSMS model.").

[260] *See infra* App. A, 47 CFR §§ 74.690, 78.40, 101.69, 101.173, 101.75.

[261] *See infra* App. A, 47 CFR pt. 74 (§§ 74.600-74.690), pt. 78 (§§ 78.1-78.115).

[262] *12.7 NOI* at *14, para. 28. Ericson recognizes that mobile TV operations "could make sharing the 12.7 GHz band with new terrestrial mobile broadband services more challenging" and that "[o]pportunities to relocate incumbents or consolidate and segment the band should be prioritized," such as "repack[ing] certain existing uses into a smaller portion of the band." Ericsson Comments at 10-11.

[263] Verizon Comments at 7.

[264] Nokia Comments at 5. Nokia contends that "mechanisms to enable coexistence with mobile incumbents are usually more complex than in case of fixed incumbents." *Id.* It also notes that "[r]estrictions on the mobile broadband deployments in such areas to allow sharing with mobile incumbents would decrease the value of the band." *Id.* at 4.

caused by new entrants and ensure that broadcaster do not bear any costs associated with relocation.[265] SBE cautions that the relocation of mobile BAS and other incumbent broadcast operations would be impractical and expensive, because (1) there is no "clear alternative offering the flexibility necessary for mobile ENG and other broadcaster operations; and (2) "even if there were a clear alternative … relocation would "render broadcasters' incumbent mobile newsgathering equipment obsolete—resulting in significant costs to replace and deploy new equipment (for use in other spectrum or within a newly reserved portion of existing spectrum), and for which broadcasters' expenses would need to be compensated."[266] As CTIA observes, in 2000 the Commission adopted rules to repack mostly mobile BAS/CARS operations, similar to those in the 12.7 GHz band, from the 1990-2110 MHz band to the 2025-2110 MHz band using more spectrally efficient equipment.[264]

75. We propose to repack mobile BAS/CARS incumbents into a segment of the 12.7 GHz band to be designated for mobile BAS/CARS use, and we seek comment on this proposal. We propose to retain 25 megahertz for mobile BAS/CARS operation and to repack existing operations into this dedicated band. Is 25 megahertz adequate to accommodate current mobile BAS/CARS incumbent operations in the 12.7 GHz band? If no, how much spectrum would be required for mobile BAS/CARS use after repacking? Where within the 12.7 GHz band should these repacked operations be located? Would locating the repack band at the top, bottom, or both ends of the 12.7 GHz band more effectively serve to mitigate potential interference, from new 12.7 GHz band mobile broadband or other expanded use operations, to operations in adjacent bands? Are the existing provisions that reserved 13.15-13.2125 GHz for mobile BAS/CARS inside a 50 km radius of 100 television markets relevant to this question?[267] Commenters should discuss advantages and disadvantages of different repacking options, included economic considerations.

76. We seek comment on the typical use of this band by mobile BAS/CARS incumbent licensees. For example, is this band typically used by BAS licensees for traditional ENG type operations from a mobile pickup van or truck back to the studio or central receiver site? Or is this band used primarily for shorter more localized transmission from cameras or backpack transmitters to the ENG truck? Are there other typical uses for mobile transmitters in this band? Is equipment in this band tunable within the band? Is equipment in this band capable of scaling bandwidth to different sized channels? How intensively is this band used in practice by incumbent licensees for mobile operations compared to other BAS bands such as 2 GHz and 6 GHz? Is equipment currently being manufactured and marketed for mobile BAS/CARS operation in this band? Can new 12.7 GHz band equipment used for studio-transmitter links be reconfigured for ENG or other mobile BAS/CARS uses?

77. We seek comment on how our Emerging Technologies procedures should apply to incumbent use of non-fixed or mobile operations in the band. Whereas the transition of fixed links is relatively straightforward, in that it entails the relocation of independent fixed point-to-point microwave links, and can proceed link-by-link on an as-needed basis, the integrated nature of mobile BAS and CARS operations makes link-by-link relocation infeasible. It is further complicated by incumbent use of

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[265] NAB Comments at 2, 7-8; Scripps Broadcasting Comments at 1, 5. NAB emphasizes that, any relocation of broadcasters' operations must be fully funded. NAB Reply Comments at 5; *see also* Scripps Broadcasting Comments at 5. Broadcasters have made significant investments in 12.7 GHz operations, and the costs of relocation may be substantial. NAB Reply at 5. Even frequency changes within the 12.7 GHz band may require antenna replacements that are costly or impractical. *Id.*; *see also* Scripps Broadcasting Reply at 5.

[266] SBE Comments at 4-5.

[267] *See* 47 CFR §§ 2.106 note NG 53, 74.602(a) note 2; 78.18(l). *See also Amendment of Part 101 of the Commission's Rules to Facilitate the Use of Microwave for Wireless Backhaul and Other Uses and to Provide Additional Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave Licensees*, Report and Order, Further Notice of Proposed Rulemaking, and Memorandum Opinion and Order, 26 FCC Rcd 11614, 11626 para. 24 (2011) (Commission excluded FS from 13.150-13.200 MHz nationwide because that spectrum was already reserved for TV pickup operations in 100 markets).

frequency-agile, non-fixed or mobile stations.[268] The Commission has previously required that the BAS and CARS operations be cleared from transitioning bands on a market-by-market basis before any new entrant could begin operations.[269] It may also be necessary for a new entrant to relocate more non-fixed or mobile BAS and CARS facilities than an interference analysis might indicate is technically necessary in order to meet the comparable facility requirement for relocating non-fixed or mobile BAS or CARS operations.[270] Should a new entrant therefore be obligated to relocate all incumbent non-fixed or mobile BAS and CARS operations in all affected BAS and CARS markets, including those markets where the new entrant provides partial, minimal, or even no service? We seek comment on our proposals.

78. Once incumbent mobile BAS/CARS have transitioned into a repacked band, should we consider whether to allow the following to operate in some or all of the mobile BAS/CARS repack band: incumbent fixed point-to-point (PTP) BAS, or all incumbent fixed PTP (some of which may have tunable equipment) so long as such fixed PTP links would not intersect with incumbent mobile BAS/CARS authorized mobile operating areas, and new mobile BAS/CARS operations?[271] If the repack band is reserved nationwide for mobile BAS/CARS (limited to incumbents during a transition period) are there any scenarios in which we should consider permitting licensed expanded-use services to operate in portions of the repack band (spectral or geographical) after the transition period? Could an automated spectrum management system at a later design date be needed in the mobile BAS/CARS repack band, or could shared access occur without the use of database managed sharing systems?[272] We seek comments on these issues.

c. Fixed Satellite Service

79. *Space stations.* As noted in our *12.7 NOI*, 27 space stations' records specify use of the 12.7 GHz band with all 27 specifying downlink (space-to-Earth) in the 12.7-12.75 GHz band, 20 specifying uplink (Earth-to-space) in all or a segment of the 12.75-13.25 GHz band, and four specifying uplink (Earth-to-space) in the 12.7-12.75 GHz band and in all or a segment of the 12.75-13.25 GHz band.[273] More generally, of the total number of GSO satellites, we noted in the *12.7 NOI* that only eight of the 23 space stations are in orbital locations with good visibility to all or significant portions of CONUS.[274] Of the four satellite records associated with three non-geostationary orbit (NGSO) systems, we noted that the one operational system does not have any U.S. earth stations licensed in this band,

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[268] Further, while BAS and CARS mobile operations are licensed for specific geographic markets, in some cases they operate nationwide.

[269] *See Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum at 2 GHz for use by the Mobile Satellite Service*, ET Docket No. 95-18, Third Report and Order and Third Memorandum Opinion and Order, 18 FCC Rcd 23638, 23653-23660 paras. 29-42 (2003); *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*, ET Docket No. 00-258, Sixth Report and Order, Third Memorandum Opinion and Order and Fifth Memorandum Opinion and Order, 19 FCC Rcd 20720, 20746-20753 paras. 57-73 (2004) (*AWS Sixth Report and Order*); 47 CFR §§ 74.690(e)(1), 78.40(f)(1).

[270] *Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands*, Notice of Proposed Rulemaking, 19 FCC Rcd 19263, 19285 para. 52 (2006); 47 CFR §§ 74.690(d), 78.40(d)-(e). For example, operations of non-fixed or mobile BAS or CARS operations in an adjacent market may need to be relocated even though the new entrant does not initiate operations in that adjacent market.

[271] *See* 47 CFR § 101.147(a) n.34.

[272] 47 CFR §§ 96.53-96.66 (Spectrum Access System for the Citizens Broadband Radio Service); *id.* §§ 15.713-15.715 (White space database); *id.* § 15.407(k) (Automated Frequency Coordination (AFC) system for 6 GHz devices). No AFC system operators have yet been designated by the Commission.

[273] *12.7 NOI* at *5, para. 11.

[274] *Id.* (Commission noted that these eight space stations are in the arc of 132.85 WL to 30 WL.)

another system is not operational, and a third has surrendered the Ku-band portion of the grant.[275] We are not proposing to sunset or to require new entrants to relocate Fixed Satellite Service incumbents, which we propose to define as any Fixed Satellite Service space station or earth station authorized to serve or operate in the United States in accordance with the Table of Allocations based on an application or petition for market access filed before September 19, 2022.

80. Verizon states, however, that "the Commission's recent action to open the band to new [NGSO] satellites has substantially changed the spectral landscape, despite the goal of the freeze on processing of new applications in this frequency range."[276] According to Verizon, "the Commission should seek further comment on how new wireless operations can coexist with the substantial number of new NGSO FSS deployments."[277] In addition, Verizon states that "[t]o the extent FSS operations are not relocated from the band, the Commission should seek comment on how it might leverage the prior-coordination requirements for terrestrial and space services to facilitate coexistence among operations in the band."[278] We seek comment accordingly. We note, however, that SpaceX supports the Commission's decision to explore use of the 12.7 GHz band rather than the 12.2 GHz band for terrestrial mobile broadband and other expanded use. SpaceX asserts that "[w]hile [it] is licensed for both bands, it nonetheless joins the other commenters supporting the Commission's shift in focus to the upper 12 GHz band."[279] In any event, SpaceX's "[o]perations of [NGSO] systems in the 12.75-13.25 GHz (Earth-to-space) frequency band with earth stations in the United States are restricted to individually licensed earth stations in accordance with footnote NG57 to the U.S. Table of Frequency Allocations, 47 CFR § 2.106, NG57."[280] Additionally, SpaceX's "authorization is subject to modification to bring it into conformance with any rules or policies adopted by the Commission in the future.[281]

81. *Earth stations*. As noted in the *12.7 NOI*, 27 locations are associated with 43 incumbent earth stations.[282] There are eight earth station authorizations for ESIM or temporary fixed operations that do not specify a specific set of geographic coordinates.[283] Of the 35 remaining earth stations, there are

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[275] *Id.*

[276] Verizon Comments at 8 & n.26 (citing *SpaceX Gen2 Order*, FCC 22-91, 2022 WL 17413767, at *1 para. 1, *18, para. 42 (authorizing the construction, deployment, and authorization of up to 7,500 satellites (Earth-to-space) in the 12.75-13.25 GHz band, among other segments)).

[277] *Id.*

[278] *See* Verizon Comments at 7-8.

[279] SpaceX Reply at 1. *See also* Letter from Kimberly M. Baum, Vice President, Spectrum Engineering & Strategy, WorldVu Satellites Limited, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 22-352 *et al*. at 2 (filed Mar. 20, 2023) (OneWeb March 20, 2023 *Ex Parte*) ("OneWeb urged closing out the 12.2-12.7 GHz proceeding and shifting the Commission's focus to the 12.7-13.25 GHz band which holds more promise for expanded terrestrial use.").

[280] *SpaceX Gen2 Order,* FCC 22-91 at para. 135(h) (noting that the licensing of earth stations (i.e. filed after Sept. 19, 2022) for operations in the 12.75-13.25 GHz will be subject to filing freeze on applications for new or modified authorizations for the 12.7-13.25 GHz band.).

[281] *SpaceX Gen2 Order*, FCC 22-91 at para. 135(hh) (stating that the "authorization is subject to modification to bring it into conformance with any rules or policies adopted by the Commission in the future. [And, that]…any investments made toward operations in the bands authorized [by the] Order by SpaceX in the United States assume the risk that operations may be subject to additional conditions or requirements as a result of any future Commission actions…[including, but not limited to]…any conditions or requirements resulting from any action in the proceedings associated with…GN Docket 22-352…").

[282] *See 12.7 NOI* at *5, para. 11.

[283] *Id.* An ESIM is operated by remote control from a ground-based network and monitoring center that is specified in the authorization. *See* 47 CFR § 25.271. "Of the 20 earth station authorizations for uplink [sic] (space-to-Earth) in the 12.7-12.75 GHz band, eight are for Earth Stations in Motion (ESIMs) and may or may not involve operations

(continued….)

eight instances of co-location with other earth stations, resulting in the 27 locations.[284] A majority (23) of those Earth stations are authorized for uplink transmission (Earth-to-space) in the 12.7 GHz band.[285] Additionally, 20 earth stations are authorized for downlink reception (space-to-Earth) in the lower 50 megahertz of the band (i.e., 12.7-12.75 GHz), in many instances together with other frequencies in the lower-adjacent Ku-band.[286] We also noted that, for FSS operations, downlink earth stations are more likely to suffer harmful interference from terrestrial systems than uplink earth stations (where the victim receiver is at the space station far from the terrestrial systems).[287]

82. We propose to grandfather the 23 incumbent earth stations in the 12.75-13.25 GHz band that operate in accordance with the United States and ITU's band allocation for Region 2 by operating earth-to-space. No additional earth stations would be authorized in the 12.7 GHz band. We propose that non-conforming incumbent Earth stations that operate by receiving in the space-to-Earth direction in 12.7-12.75 GHz in the United States may continue on a non-interference basis and have no right to protection from harmful interference.[288] We seek comment on potential international implications of our proposal.

d. Incumbent Status—Licensing Data

83. We propose to define incumbent operations entitled to protection or relocation (until the sunset date), or for grandfathered status, based on the facilities authorized in the Commission licensing records.[289] In the Order section of today's item, we direct fixed and mobile BAS and CARS licensees under parts 74 and 78, for each of their authorizations to use the 12.7 GHz band, to certify the accuracy of all information reflected on each license, including whether the facilities are operating as authorized. If a licensee is unable to make such a certification for a given license, it must cancel or modify the license in accordance with the Commission's rules. For BAS and CARS licenses, we propose to limit eligibility for incumbent status in the 12.7 GHz band to those licenses for which the licensee has timely filed the certification required in this *Order* in ULS or COALS, respectively.

84. Although we do not require other incumbents to provide additional information on their existing operations at this time, in the Order we direct the Bureaus, in coordination with the Office of Economics and Analytics, to consider whether additional information should be collected from some or all 12.7 GHz band incumbents. In the event that additional information is required from incumbents, we propose to limit eligibility for incumbent status to those incumbents that file such required certifications or data. Because the Commission proposed to use these licensing data to inform our deliberations regarding the future use of the 12.7 GHz band, including possible interference avoidance coordination or relocation of facilities, or grandfathered status that could require future licensees to accept harmful

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in these frequencies in the United States." *12.7 NOI* at n.28 (the 20 earth stations, and therefore the eight indicated for ESIM have a "downlink" designation.).

[284] *See 12.7 NOI* at *5, para. 11. In addition, the Department of Defense (DoD) leases commercial satellite services in the 12.7-13.25 GHz band as end users. *Id*.

[285] *See 12.7 NOI* at *5, para. 11.

[286] *See 12.7 NOI* at *5, para. 11.

[287] *12.7 NOI* at *10, para. 28.

[288] *See Application of Fugro-Chance, Inc.*, Order and Authorization, 10 FCC Rcd 2860, 2860, para. 2 (IB 1995) (stating that a waiver of section 2.106—the U.S. Table of Frequency Allocations—is appropriate "when there is little potential for interference into any service authorized under the Table of Frequency Allocations and when the non-conforming operator accepts any interference from authorized services").

[289] Licensing data for fixed and mobile BAS under part 74 and Fixed Microwave under part 101 is in ULS. Licensing data for fixed and mobile CARS is in COALS. Licensing data for FSS stations is in MyIBFS.

interference from existing operations, we encourage all licensees to timely submit their data and to update their information in the event of a change in any of the operational parameters.

e. Cost-sharing

85. When the Commission adopts a transition plan that involves the relocation of incumbents, new entrants sometimes have to relocate an incumbent from a larger frequency range or greater geographic area than where the new entrant will operate, thereby clearing the incumbent for the benefit of others. In such cases, the Commission has often developed cost sharing requirements, so that all licensees that derive a benefit from a relocation action share the responsibility for the costs of that relocation, regardless of whether they are the first to deploy their system or deploy their systems after other licensees have already deployed and incurred spectrum-clearing costs.[290] We seek comment on whether we should adopt cost-sharing procedures applicable to the relocation of incumbents in the 12.7 GHz band. If so, how should we apportion the expenses of a relocation among those new entrants that benefit from the relocation? What type of formula should be applied? Would that formula differ for the reimbursement of relocated fixed microwave services and non-fixed or mobile BAS and CARS operations? If so, how would it differ, and why? For example, if we were to impose an obligation on a new entrant to relocate all non-fixed and mobile BAS and CARS on a market-by-market basis prior to commencing operations, should we obligate all new entrants that are licensed to operate in a cleared market to pay a *pro rata* share of those costs?[291] What type of test should determine whether a new entrant has triggered a cost-sharing obligation for a relocated microwave link or one or more repacked mobile BAS/CARS systems authorized in any part of a new entrant's licensed area? For example, the Commission adopted a Proximity Threshold Test to determine whether an AWS licensee triggered a cost-sharing obligation for relocated microwave links.[292] If we were to adopt a similar Proximity Threshold Test here, how would the input data in Section 27.1168(a)(3)(i) differ to reflect the higher band of microwave operations in the 12.7 GHz band?

86. Would there be a need to designate one or more clearinghouses to administer the cost-sharing plan and calculate the amount of each beneficiary's reimbursement obligation in accordance with any formula that would be set forth in our rules?[293] Are there opportunities to incentivize the relocation of

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[290] *3.7 GHz Band Report and Order*, 35 FCC Rcd at 2445, para. 250; *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); *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*, ET Docket No. 00-258, Ninth Report and Order and Order, 21 FCC Rcd 4473, 4478, para. 8 (2006); *Amendment to the Commission's Rules Regarding a Plan for Sharing the Costs of Microwave Relocation*, WT Docket No. 95-157, Memorandum Opinion and Order on Reconsideration, 15 FCC Rcd 13999, 14004, para. 10 (2000).

[291] *See AWS Sixth Report and Order*, 19 FCC Rcd at 20753 paras. 72-73 (stating the first entrant may seek reimbursement from subsequently entering licensees for a proportional share of the first entrant's costs in clearing BAS spectrum, on a *pro rata* basis according to the amount of spectrum each licensee is assigned); *Improving Public Safety Communications in the 800 MHz Band*, WT Docket 02-55, Fifth Report and Order, Eleventh Report and Order, Sixth Report and Order, and Declaratory Ruling, 25 FCC Rcd13874, 13893 para. 42 (2010) (*800 MHz Fifth Report and Order*) (stating that an AWS entrant will "enter the band" on the date that the grant of its long-form application becomes a final action and any AWS entrant that enters the band prior to the sunset date will be required to reimburse an entrant that has relocated BAS incumbents a *pro rata* share of the relocation costs).

[292] 47 CFR § 27.1168. In comparison, the Commission determined that an AWS licensee triggered a reimbursement obligation for relocated BAS operations in the 2 GHz band upon grant of its long-form application. *See 800 MHz Fifth Report and Order,* 25 FCC Rcd at 13893, para. 42 (stating that an AWS entrant will "enter the band" on the date that the grant of its long-form application becomes a final action).

[293] A cost-sharing clearinghouse is a third-party that is typically designated by the Wireless Telecommunications Bureau pursuant to delegated authority. *See Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, GN Docket 18-22,

(continued….)

some or all types of incumbents on an accelerated basis?[294] Would some form of the accelerated relocation payment approach such as was used for the 3.7-4.2 GHz band (3.7 GHz band) be appropriate to accelerate clearing some or all incumbent services out of some or all of the 12.7 GHz band?[295]

B. Alternative Approaches for Sharing the Band

87. Here we explore the second alternative option raised in the *12.7 NOI* for making the 12.7 GHz band available for mobile broadband and other expanded use: implementation of certain sharing methodologies among incumbents and new entrants. In the *12.7 NOI*, the Commission sought detailed proposals for promoting coexistence or sharing between potential new terrestrial mobile broadband or other expanded use and existing incumbent licensees in the 12.7 GHz band, rather than sunsetting or relocating incumbents, or repacking of the band.[296] The Commission also sought comment on sharing methodologies such as static or dynamic sharing, using a database or spectrum management system, adopting a nonexclusive licensing system, or application of long-term sensing technology.[297] The Commission noted that, while an automated spectrum management systems have been proven to be effective for devices in the part 96 Citizens Broadband Radio Service (CBRS), for part 15 white space devices, and for 6 GHz unlicensed devices, there are several important differences between them.[298] Under the white space and 6 GHz unlicensed rules, devices must query a database system for a list of available frequencies and permissible operating power on a periodic basis, e.g., once per hour or once per day, and a device may select any available operating frequency and permissible power level from a list provided by the database.[299] The CBRS Spectrum Access Systems (SAS) have greater interactivity with managed devices and may require devices to change frequency or power level or to cease operation within 60 seconds as necessary to prevent interference to incumbent services or devices with a higher spectrum access priority.[300] The sharing methods that have been proven for white space devices and

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Public Notice, 35 FCC Rcd 11859 (WTB 2020); *Wireless Telecommunications Bureau Designates Clearinghouses That Will Administer the 2 GHz PCS Relocation Cost-Sharing Plan*, DA 96-1522, Public Notice, 11 FCC Rcd 10634 (WTB 1996); *see also Wireless Telecommunications Bureau Finds CTIA and PCIA Qualified to Administer the Cost-Sharing Plan for Licensees in the 2.1 GHz Bands,* WT Docket 02-353, Public Notice, 21 FCC Rcd 11265 (WTB 2006).

[294] Based on the unique record presented for the 3.7 GHz band, the Commission adopted two Accelerated Relocation Deadlines—a one year Phase I deadline and a three-year Phase II deadline—"for incumbent space station operators that voluntarily relocate on an accelerated schedule (with additional obligations and incentives for such operators)." *3.7 GHz Band Report and Order*, 35 FCC Rcd at 2413, para. 168.

[295] *See id.* at 2413-14, paras. 168-72 (accelerated relocation).

[296] *12.7 NOI* at *6, para. 14.

[297] *Id.* at *6-*8, paras. 16-21.

[298] *Id.* at *7, para. 17.

[299] *Id.* at *7, para. 17 (citing 47 CFR §§ 15.711(h)(1)-(h)(2), 15.407(k)(8)(iv)). While the D.C. Circuit did remand a portion of the 6 GHz Report and Order to the Commission for further discussion, this limited remand concerned a commenter's arguments regarding unlicensed devices operating without a spectrum management system rather than higher powered devices controlled by the 6 GHz band automated frequency coordination (AFC) system. *See Unlicensed Use of the 6 GHz Band*, ET Docket No. 18-295, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 3852 (2020), *aff'd in part and remanded in part*, *AT&T Servs. Inc., v. FCC*, 21 F.4th 841, 853-54 (D.C. Cir. 2021).

[300] *12.7 NOI* at *7, para. 17 (citing 47 CFR § 96.39(c)(2)). Relative to such sharing approaches, we also seek comment on whether any third-party entity that manages, coordinates, or facilitates use of devices by those who are not individually licensed should be required to collect and maintain data documenting operation of devices, including the identity of those persons or entities operating such devices. If so, how long should this data should be retained and made available to the Commission upon request?

CBRS, in conjunction with new or developing sharing technologies, may be used in the 12.7-13.25 GHz band to maximize the use of spectrum.

88. Federated Wireless proposes a Dynamic Spectrum Management System (DSMS) as an effective and efficient way to maximize the use of the 12.7 GHz band, with new and innovative uses of spectrum, while protecting incumbent operations.[301] The DSMS would operate by acquiring information about the incumbent's spectrum use by several methods such as querying a database like the Universal Licensing System (ULS), receiving notifications through an automated portal system, sensing incumbent use, or a combination of two or more of these methods.[302] Federated Wireless also proposes that the Commission adopt a multi-tiered licensing framework in the 12.7 GHz band, similar to the three-tiered regulatory framework used by the SAS in the CBRS band.[303] The three-tier regulatory framework used by the CBRS band enables different classes of users while providing interference protection to incumbents in the 3550-3700 MHz band.[304] Other commenters, such as the Dynamic Spectrum Alliance, NCTA, and the Open Technology Institute and Public Knowledge, all support adopting a shared-licensing framework, emphasizing the benefits that have been achieved in the TV White Space, CBRS, and 6 GHz band.[305]

89. The Society of Broadcast Engineers claims that neither an database-driven spectrum management system nor a spectrum-sensing approach to spectrum sharing will provide adequate protection for electronic news-gathering operations in the band.[306] It adds that spectrum sensing is unable to detect the one-way transmission equipment used in mobile newsgathering, and database-driven systems like the an automated frequency coordination system will not precisely capture mobile BAS operations, which by definition do not have a fixed location found in any database.[307] In its comments, Verizon discourages the use of new and complex dynamic sharing methods or database coordination requirements that may limit investments and complicate new mobile broadband deployments into the 12.7 GHz band.[308] Instead, it recommends the use of an exclusive-use, flexible-rights licensing framework, as well as coordination, repacking, and relocation that is better suited for incumbent operations.[309]

90. We seek comment on using an automated spectrum management system such as the automated frequency coordination (AFC) systems used in the 6 GHz band or spectrum access systems used in CBRS as a method to enable spectrum sharing in the 12.7 GHz band as an alternative to relocating incumbents or repacking the band. To determine whether a new mobile broadband device can operate at a particular location on a given frequency, the device would be required to obtain either a list of permissible frequencies from an automated spectrum management system prior to transmitting or a list of prohibited frequencies on which it cannot transmit. We envision the automated spectrum management system to be a database that is simple to implement. We seek comment on this alternative proposal. What capabilities should be incorporated into the automated spectrum management system? Should it use a centralized model where all data and computations are done in a central location? In this case, the device would establish a connection with the automated spectrum management system, provide its

[301] Federated Wireless Comments at 2.

[302] Federated Wireless Comments at 3.

[303] Federated Wireless Comments at 5.

[304] *See* 47 CFR § 96.11(a).

[305] DSA Comments at 2; NCTA Comments at 4; Open Technology Institute and Public Knowledge Comments at 8 (OTI & PK).

[306] SBE Comments at 5.

[307] SBE Comments at 5.

[308] Verizon Comments at 1-2, 5-6.

[309] Verizon Comments at 6.

location and technical details, and the automated spectrum management system will communicate the list of permissible frequencies (or a list of prohibited frequencies) back to the device. Or should the automated spectrum management system's architecture be de-centralized where the device maintains a local database of incumbent operations and performs the necessary computations to determine which frequencies and power levels can be used without causing harmful interference? Under such a model, how would the local database within the device be kept up to date? What are the trade-offs, including the costs and benefits, between a centralized versus a decentralized model in terms of efficiency, device complexity, and ability to protect incumbent licensee operations?

91. Because BAS was not present in the portions of the 6 GHz band where the AFC systems manage access to spectrum, mobile BAS/CARS was not addressed in the 6 GHz band AFC implementation. The mobile nature of these BAS/CARS operations makes it more difficult to manage spectrum access in real time. Electronic news gathering trucks, while they are mobile by definition, operate in a fixed fashion and direct transmissions towards fixed receive sites when broadcasting from the location of scheduled sporting or news events. Mobile BAS/CARS equipment may also be used for short-range connectivity such as relaying signals from a camera to a news gathering truck. For these types of itinerant mobile-fixed operation, a mobile BAS/CARS licensee could provide advanced notice of its planned operation to enable the automated spectrum management system to protect the BAS operations from harmful interference. We seek comments or proposals on whether these sorts of planned mobile operations can be accommodated on an AFC or SAS-like system. We also seek comment on whether mobile BAS/CARS operations in this band are, in fact, similar to BAS use in the 6 GHz band, and if not whether there are additional considerations that an automated spectrum management would need to address specific to this band. Could such a system be adapted to accommodate unplanned, unscheduled news or other events?

92. Should the automated spectrum management system determine frequency availability using the proposed permissible power limits for base stations, mobile stations, and transportable stations or should it instead determine frequency availability at power levels less than the maximum, and calculate a list of available frequencies and the maximum power permitted on each one? If the automated spectrum management system calculates the maximum power for each frequency, how would it control the power levels of mobile broadband devices to ensure that they operate at permissible levels? How should frequency availability information be reported to the devices? Should the automated spectrum management system report availability for discrete frequency bands, e.g., 10 or 20 megahertz channels, or should it simply report the range or ranges of available frequencies? Alternatively, should the automated spectrum management system simply list the range or ranges of unavailable frequencies?

93. We seek comment on whether device registration with the automated spectrum management system is necessary. Under a registration requirement, a mobile broadband device would transmit identifying information along with its location to the automated spectrum management system before receiving a list of permissible frequencies.[310] Alternatively, a device under a centralized system architecture could provide only its location data and the automated spectrum management system would provide it with the list of permissible channels for that location. Under a decentralized system architecture, registration would not necessarily be required as the device only needs periodic updates of the local fixed service operating environment.

94. We seek comment on the types of security requirements that would be necessary for an automated spectrum management system that manages mobile broadband devices in the 12.7 GHz band. White space devices and databases, CBRS devices and the SAS, as well as 6 GHz AFC systems and unlicensed devices are required to incorporate security measures to ensure that devices communicate only

[310] Fixed white space devices and Citizens Broadband Radio Service Devices are required to register certain information with the white space database or Spectrum Access System, including the device's location, antenna height above ground, device identification information, and contact information for the device's operator. 47 CFR §§ 15.713(g), 96.39(c).

with authorized databases, that all communications and interactions between a database and devices are accurate and secure, and that unauthorized parties cannot access or alter a database, or the list of available frequencies sent to a device.[311] Are similar requirements necessary or appropriate for devices and an automated spectrum management system in the 12.7 GHz band? Are any additional requirements necessary? Do we need to specify security requirements for devices to ensure that the software within them cannot be easily modified to enable operation on frequencies other than those indicated as available by the automated spectrum management system?

C. Licensing and Operating Rules

1. Part 27

95. To encourage intensive investment in, and robust deployment of, next-generation wireless networks, the Commission has adopted or proposed licensing approaches for other mid-band spectrum that are tailored to the unique characteristics of each band. We propose and seek comment on service-specific rules for the 12.7 GHz band. In addressing these issues, commenters should discuss the costs and benefits associated with these proposals and any alternatives that commenters propose.

96. We propose to license the spectrum under our flexible-use part 27 rules, which permit licensees to provide any fixed or mobile service consistent with the permitted allocations, subject to rules necessary to prevent or minimize harmful interference. With the exception noted below, under this proposal, new mobile broadband and other expanded use licensees in the 12.7 GHz band would comply with licensing and operating rules that are applicable to all Part 27 services,[312] including flexible use,[313] regulatory status,[314] foreign ownership reporting,[315] compliance with construction requirements,[316] renewal criteria,[317] permanent discontinuance of operations,[318] partitioning and disaggregation,[319] and spectrum leasing.[320] We seek comment generally on this approach. With respect to technical rules and performance requirements, we intend to adopt rules based on commenter concerns and our experience and expertise. Finally, we propose to make our licensing, authorization, and service rules governing the 12.7 GHz band applicable nationwide, i.e., within the Contiguous United States (CONUS) as well as the non-contiguous states, territories, and possessions. We seek comment on this proposal.

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[311] *See* 47 CFR §§ 96.39(f), 15.407(k)(8)(v), 15.713(*l*).

[312] *See Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal et al.*, Second Report and Order and Further Notice of Proposed Rulemaking and Order, 32 FCC Rcd 8874 (2017) (*WRS Renewal Reform 2nd R&O and FNPRM*) (amending several of the rules applicable to Part 27 services).

[313] 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." Balanced Budget Act of 1997, Pub. L. No. 105-22, 111 Stat. 251, 269-69; 47 U.S.C. § 303(y). *See also* 47 CFR §§ 27.2, 27.3.

[314] 47 CFR § 27.10.

[315] 47 U.S.C. § 310; 47 CFR § 27.12.

[316] 47 CFR § 27.14(k).

[317] *Id.* § 1.949.

[318] *Id.* § 1.953.

[319] *Id.* § 1.950.

[320] *Id.* §§ 1.9001 *et seq*.

2. 12.7 GHz Band Plan

97. The Commission's goal in this proceeding is to make as much of the 12.7 GHz band available for mobile broadband or other expanded uses as possible in order to facilitate next-generation uses of spectrum that are increasingly necessary in the modern, connected world. To promote effective use of the 12.7 GHz band, we propose a technologically neutral policy for licensing the band. That is, we do not make any technological choices or prohibitions, or prefer any particular kind of technology. We do not propose a duplex gap, or distinct blocks for base and mobile that would presume or prohibit FDD or TDD deployments. We seek comment on this proposal. Are there interference issues that we are not currently anticipating that this regime would create? We ask commenters to address interference concerns between FDD and TDD, explain how they could coexist in the band, and discuss coordination and interference rules that must apply if both were to be permitted. In section V.A.3.b above (Mobile BAS/CARS), we propose to set aside 25 megahertz to repack mobile BAS/CARS incumbents.

3. Spectrum Block Sizes for New Licenses

98. Currently, the 12.7 GHz band is licensed for satellite, BAS/CARS fixed and mobile use, and other fixed uses. Under our band plan proposal, most of the 550 megahertz would be made available to new entrants for mobile or other expanded uses, with a small portion of the band set aside to accommodate repacked mobile BAS/CARS incumbents. We seek comment on the appropriate block sizes for these new licenses to best promote efficient and robust use of the band for next-generation wireless technologies. Several commenters note the importance of larger block sizes to the deployment of mobile broadband and other expanded uses; indeed, some commenters indicate that as broadband technologies evolve, operators will be required to have contiguous 100 megahertz blocks to deliver next-generation broadband.[321] In light of this concern, we believe that 100 megahertz blocks will produce the best environment for 5G and future 6G deployments, as large block sizes support faster data speeds and better coverage for next-generation deployments.[322] Additionally, we believe 100 megahertz blocks will afford adequate flexibility to prospective licensees in terms of system design.

99. We seek comment on this proposal (100 MHz blocks) and on how to authorize any spectrum blocks less than 100 megahertz depending on the size of the mobile BAS/CARS repack band. Commenters offering an alternative proposal should detail the advantages and disadvantages of their favored approach, including any costs and benefits, based on what they know about the technical requirements of the respective technologies that either use or could use the band. We recognize that some commenters favor smaller blocks of 50 megahertz.[323] If we adopt smaller sized blocks, should we allow licensees to aggregate the use of these separate licenses into wider bandwidths while retaining the performance requirements of each individual license? Would this approach help ensure that spectrum is put to use, as compared to larger block sizes? Are there any additional considerations that we should take into account in determining the spectrum block sizes to be used for new licenses in this band?

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[321] *See, e.g.* AT&T Comments at 4; Qualcomm Comments at 7 (noting that a 5G base station with 100 MHz bandwidth provides sub-meter positioning accuracy, and that more bandwidth will allow for more precise positioning and improve overall network performance); Verizon Comments at 9; Ericsson Reply at 10-11; 5G Americas Reply at 6.

[322] "[T]he Commission should prioritize large bandwidths such as 50-megahertz or 100-megahertz channel blocks, the latter which 'have become international best practice and are implemented in the majority of 5G-leading markets.'" Verizon Comments at 9 (quoting GSMA, 5G Spectrum: GSMA Public Policy Position, at 5 (June 2022), https://www.gsma.com/-spectrum/wp-content/uploads/2022/06/5G-Spectrum-Positions.pdf).

[323] Competitive Carriers' Association Reply at 5; T-Mobile Comments at 14; US Cellular Reply at 5. Some Commenters, such as T-Mobile, argue that 100 megahertz blocks would orphan a 50 megahertz block, or otherwise require the Commission to license the band with blocks of varying size. T-Mobile Comments at 14; US Cellular Comments at 6. We note that under our band plan proposal, some spectrum would be designated for repacking incumbent mobile BAS/CARS operations.

4. Geographic License Area Sizes

100. Consistent with our approach in several other bands used to provide fixed and mobile services, we propose to license the 12.7 GHz spectrum on an exclusive, geographic-area basis.[324] Geographic-area licensing provides flexibility to licensees, promotes efficient spectrum use, and helps facilitate rapid assignment of licenses. We seek comment on this approach, including the costs and benefits of adopting a geographic area licensing scheme. In the event that a party does not support using geographic licensing, it should explain its position, describe what type of licensing scheme it supports, and identify the costs and benefits associated with its alternative licensing proposal.

101. In determining the appropriate geographic license size, the Commission considers several factors, including: (1) facilitating access to spectrum by both small and large providers; (2) providing for the efficient use of spectrum; (3) encouraging deployment of wireless broadband services to consumers, especially those in rural areas and Tribal lands; and (4) promoting investment in and rapid deployment of new technologies and services.[325] In light of these statutory considerations, we propose to issue flexible use licenses on a Partial Economic Area (PEA) basis.[326] We ask commenters to discuss and quantify the economic, technical, and other public interest considerations of licensing on a PEA basis. We observe that the question of geographic license area sizes intersects with the question of whether to issue exclusive or shared licenses: those that favor exclusive licenses often prefer PEAs or larger, whereas those that favor shared licensing regimes prefer smaller areas, such as counties.[327] Because we propose to license the band exclusively, we also propose PEAs. In our judgment, this area size will also help promote rural deployments by facilitating access to spectrum by small and regional service providers and beyond.[328] We seek comment on licensing the 12.7 GHz band on a PEA basis.

102. Some commenters seek smaller areas, such as counties.[329] They argue that these smaller areas help smaller businesses and rural areas.[330] Could smaller license areas increase the possibility of interference between adjacent areas and complicate a licensee's ability to fully deploy services using their licensed spectrum in their service areas?[331] If so, are there other reasons that would nevertheless support adopting smaller license areas such as promoting competition?[332] Would smaller or larger areas promote or complicate cost-sharing for relocation of incumbents? Are there any additional considerations that we should take into account when determining the geographic license areas sizes for new licenses in the 12.7 GHz band when weighing the factors listed above? For example, could a smaller license area help

[324] *See, e.g.*, 47 CFR § 27.6 (h), (i) (AWS-1 and AWS-4, respectively).

[325] *See, e.g.*, *Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands*, Report and Order, 18 FCC Rcd 25162, 25174, para. 31 (2003) (*AWS-1 Service Rules R&O*).

[326] *See* 47 CFR pt. 27, subpt. A, Appx. A – List of Partial Economic Areas with Corresponding Counties.

[327] *But see* RWA Comments at 2 (arguing for counties and not PEAs for licensed area size).

[328] *See, e.g.*, US Cellular Reply at 7.

[329] RWA Comments at 2-3; OTI & PK Comments at 7; WISPA Reply at 1-2, 7; *see also see* Letter from Traci Biswese, Vice President & Associate General Counsel, NCTA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 22-352, at 3 (May 11, 2023) (NCTA May 11, 2023 Ex Parte)

[330] RWA points out that the propagation characteristics of the band warrant adoption of smaller-sized license areas. RWA Comments at 3. In proposing PEAs, we are making the judgement that it propagates sufficiently far to justify PEA-sized areas. We also seek comment on this approach.

[331] *See* T-Mobile Reply at 6.

[332] *See* NCTA May 11, 2023 Ex Parte at 3.

promote deployment in Tribal areas? We note that several commenters suggest providing priority access to spectrum over Tribal lands to Tribal entities.[333]

5. License Term and Renewal

103. We propose to establish a 10-year license term for new mobile broadband and other expanded use licenses in the 12.7 GHz band. We believe that a 10-year term serves our goal of providing licensees with flexibility to develop this spectrum as the market demands and to employ innovative technologies which may not be available immediately upon licensing. We acknowledge that the Commission has adopted license terms longer than 10 years to account for delays in relocating incumbent operations. In this case, however, because the existing use of the band is relatively light, we are proposing our standard 10-year license term along with an additional year (relative to some services) to meet the proposed interim buildout requirement. We also propose to apply our general renewal requirements for wireless radio service licenses.[334] We seek comment on these proposed license term and renewal requirements, as well as on the costs and benefits of these proposals.[335] Are there alternative license terms that might be better suited for this band?[336] If an alternative license term is better, what impact would it have on investment or deployment, particularly for smaller or rural entities, and how could we determine its costs and benefits?

6. Performance Requirements

104. The Commission establishes performance requirements to ensure that spectrum is intensely and efficiently used. The Commission has applied different performance and construction requirements to different spectrum bands based on considerations relevant to those bands.[337] We continue

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[333] *See* Open Technology Institute and Public Knowledge May 10, 2023 *Ex Parte* at 3 ("With regard to creating a rural Tribal window for any spectrum authorized for new licensees in the 12.7 GHz band, the success of the 2.5 GHz window demonstrates the enormous value to Tribes of creating the opportunity for greater spectrum access on Tribal lands. This would also be consistent with the Memorandum of Understanding between the Department of the Interior and the Department of Commerce National Telecommunications and Information Administration, 11/23/2022. Available at https://www.bia.gov/sites/default/files/dup/inline-files/mou_esb46-009818_doi-fcc-ntia_electromagnetic_spectrum_on_tribal_lands_2022-11-23_final_fcc_ntia_doi_signed_508.pdf "). *See also* Tribal Ready May 10, 2023 *Ex Parte* ("The Commission has previously recognized the value of Tribal set asides in promoting deployment as recently as the 2.5 GHz band. The 12 GHz band can and should also be an option to help Native Americans close the digital divide.").

[334] *See* 47 CFR § 1.949 (Application for renewal of license). The *WRS Renewal 2nd R&O and FNPRM* adopted a unified framework for construction, renewal, and service continuity rules for flexible use geographic licenses in the Wireless Radio Services. *See Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 to Establish Uniform License Renewal et al.*, WT Docket No. 10-112, Second Report and Order and Further Notice of Proposed Rulemaking and Order, 32 FCC Rcd 8874 (2017) (*WRS Renewal Reform 2nd R&O and FNPRM*). *Accord*, *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, 35 FCC Rcd 2343, 2390, para. 106 (2020) (*3.7 GHz Report and Order*).

[335] 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).

[336] *See, e.g.*, 47 CFR § 27.14(k) (AWS-3 licenses have a 12-year initial license terms and 10-year renewal terms), (l) (600 MHz band licenses have 12-year initial license terms and 10-year renewal terms).

[337] *See, e.g.*, *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*, Report and Order, 28 FCC Rcd 9483, 9558-59, para. 195 (2013) (requiring 40 percent population coverage within four years of initial grant and 75 percent population coverage within 10 years of initial grant); *see also Amendment of the Commission's Rules with Regard to Commercial Operations in the 1695-1710 MHz, 1755-1780 MHz, and 2155-2180 MHz Bands*, Report and Order, 29 FCC Rcd 4610, 4659-60, para. 135 (2014) (requiring 40 percent population coverage within six years of initial grant and 75 percent population coverage within 12 years of initial grant);

(continued….)

to believe that performance requirements play a critical role in ensuring that licensed spectrum does not lie fallow.

105. In response to the *12.7 NOI*,[338] AT&T, T-Mobile, Intelsat, Ericsson and others note that the 12.7 GHz band shares many characteristics with millimeter wave (mmW) spectrum.[339] Despite these similarities, T-Mobile and Intelsat suggest that performance requirements for the 12.7 GHz band should not necessarily be similar to those that apply to the mmW spectrum, given the difficulties mmW bands have had fulfilling buildout requirements.[340] Moreover, T-Mobile suggests that the Commission carefully consider buildout requirements and allow for flexibility based on the unique needs of the spectrum being used and the geographic area being served.[341]

106. As with other part 27 services, we propose to adopt specific quantifiable benchmarks for different types of operations. For the 12.7 GHz band, we propose to require licensees offering mobile or point-to-multipoint services to provide reliable signal coverage and offer service to at least 30% to 45% of the population in each of their license areas within five years[342] of the license issue date (interim performance benchmark), and to at least 60% to 80% of the population in each of their license areas within ten years from the license issue date (final performance benchmark).[343] We seek comment on this proposal including the specific population coverage percentage appropriate for the interim and final benchmarks. We recognize that, relative to the recently established 3.45 GHz Service, which has buildout deadlines at years four and eight,[344] we are proposing an additional year for 12.7 GHz band licensees to meet the proposed first buildout requirement and an additional two years to meet the second buildout requirement. We believe this additional time is warranted given the lack of industry standards and 12.7 GHz band mobile broadband equipment. We propose licensees providing fixed point-to-point service would be required to demonstrate within five years of the license issue date (interim performance benchmark) 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 would need to demonstrate that 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

(Continued from previous page)
Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, Report and Order, 29 FCC Rcd 6567, 6877-78, para. 764 (2014).

[338] *See, e.g.*, *12.7 NOI* at *11, para. 31.

[339] AT&T Comments at 1; Ericsson Comments at 8; T-Mobile Comments at 14; Intelsat Reply at 11-12.

[340] T-Mobile Comments at 14-15 (citing an NTIA Study that examined outdoor propagation in the 37-40 GHz band in Boulder, Colorado); Intelsat Reply at 11; T-Mobile Reply at 4-5.

[341] T-Mobile Comments at 15.

[342] For AWS-4, AWS H Block, and 3.45 GHz Service, the first performance benchmark is 4 years from the date of the initial license and the second performance benchmark is 8 years from the date of the initial license for AWS-4 and 3.45 GHz Service and 10 years for H Block. For services with incumbent transitions, the first performance benchmark ranges from 6 years (AWS-3, 600 MHz) to 8 years (3.7 GHz Service) from the date of the initial license, and the second performance benchmark is 12 years (AWS-3, 600 MHz, 3.7 GHz Service). *See* 47 CFR § 27.14(q),(r),(s),(t),(v),(w).

[343] Our proposals and questions comport with actions taken for other licenses taking into account the unique characteristics of the 12.7 GHz band, e.g., presence of incumbents and the location of this mid-band spectrum—significantly higher than 3.7 GHz but significantly lower than mmW spectrum. *See, e.g.*, 47 CFR §§ 27.14(v)(1) (requiring a 3.7 GHz Service licensee providing mobile or point-to-multipoint service to cover 45% of population within eight years of initial grant and 80% population coverage within 12 years of initial grant); 27.14(w)(1)(i) (requiring a 3.45 GHz Service licensee providing mobile or point-to-point service to cover 45% of population within 4 years and 80% of population within 8 years of initial grant); 47 CFR §§ 30.103, 30.104(a) (requiring a UMFUS licensee providing mobile or point-to-multipoint service to cover 40% of population within ten years).

[344] *See* 47 CFR § 27.14(w)(1)(i).

license area. We propose to require licensees relying on point-to-point service to demonstrate within ten 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 propose to 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.[345]

107. We also propose alternate Internet of Things (IoT) performance requirements in order to allow for flexibility to provide services potentially less suited to a population coverage metric. Specifically, we propose that licensees providing IoT-type services would have flexibility to demonstrate that they offer geographic area coverage of at least 25% to 35% of the license area at the interim (five-year) performance benchmark, and geographic area coverage of at least 50% to 65% of the license area at the final (ten-year) performance benchmark.[346] We seek comment on this proposal including the specific geographic area coverage percentage appropriate for the interim and final benchmarks metrics appropriate in the 12.7 GHz band. Commenters should discuss the appropriate metric to accommodate such service offerings or other innovative services in the 12.7 GHz band, as well as the costs and benefits of an alternative approach. We also seek comment on whether to adopt renewal-term performance obligations.

108. *Compliance Procedures*. We propose that 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) would 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

[345] *See, e.g.,* 47 CFR §§ 27.14(v)(1) (requiring a 3.7 GHz Service licensee providing point-to-point service to demonstrate within 8 years and 12 years of initial grant that they are operating four links and eight links, respectively, and providing service to customers or for internal use if the license area is equal to or less than 268,000, and if the population is greater than 268,000, that they are operating at least one link within 8 years and at least two links within 12 years and providing service to customers or for internal use per every 67,000 persons within a license area); 27.14(w)(1)(ii) (requiring a 3.45 GHz Service licensee providing point-to-point service to demonstrate within 4 years and 8 years of initial grant that they are operating four links and eight links, respectively, and providing service to customers or for internal use if the license area is equal to or less than 268,000, and if the population is greater than 268,000, that they are operating at least one link within 4 years and at least two links within 8 years and providing service to customers or for internal use per every 67,000 persons within a license area); 47 CFR §§ 30.103, 30.104(a) (requiring a UMFUS licensee providing point-to-point service to demonstrate within 10 years of initial grant that they are operating four links and providing service to customers or for internal use if the license area is equal to or less than 268,000, and if the population is greater than 268,000, that they are operating at least one link and providing service to customers or for internal use per every 67,000 persons within a license area).

[346] *See, e.g.,* 47 CFR §§ 27.14(v)(2) (requiring a 3.7 GHz Service licensee providing Internet of Things service to offer geographic area coverage of 35% of the license area within 8 years of initial grant and geographic area coverage of 65% of the license area within 12 years of initial grant); 27.14(w)(1)(iii) (requiring a 3.45 GHz Service licensee providing Internet of Things service to offer geographic area coverage of 35% of the license area within 4 years of initial grant and geographic area coverage of 65% of the license area within 8 years of initial grant); 47 CFR §§ 30.103, 30.104(b) (requiring a UMFUS licensee providing Internet of Things or other services deployed along non-traditional lines to offer geographic area coverage of 25% of the license area within 10 years of initial grant).

coverage maps, including the propagation model and the signal strength necessary to provide reliable service with the licensee's technology.

109. *Penalty for Failure to Meet Performance Requirements.* Along with performance benchmarks, we propose to adopt meaningful and enforceable penalties for failing to meet those benchmarks. We propose that, in the event a licensee fails to meet the first performance benchmark, the licensee's final benchmark and license term would be reduced by two years, thereby requiring it to meet the final performance benchmark two years sooner (at 8 years into the license term) and reducing its license term to 8 years. If a licensee fails to meet the final 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. We seek comment on this proposal and on which penalties will most effectively ensure timely buildout.

110. We seek comment on how, in the event a 12.7 GHz band licensee's authority to operate terminates, its spectrum rights should become available for reassignment pursuant to the licensing framework we adopt for this band. We also seek comment on whether, consistent with the Commission's rules for other part 27 licenses, we should require that any 12.7 GHz band flexible use licensee that forfeits its license for failure to meet its performance requirements be precluded from regaining that license. Finally, we seek comment on other performance requirements and enforcement mechanisms that would effectively ensure timely buildout.

7. Open Eligibility

111. We propose to adopt an open eligibility standard for licenses in the 12.7 GHz band, consistent with established Commission practice.[347] An open eligibility standard should encourage the development of new technologies, products, and services, while helping to ensure efficient use of this spectrum. We seek comment on this assumption. We note that an open eligibility approach would not affect citizenship, character, or other generally applicable qualifications that may apply under our rules.[348] Commenters should discuss the costs and benefits of the open eligibility proposal on competition, innovation, and investment.

8. Mutually Exclusive Applications for New Licenses

112. As discussed above, we propose to use an exclusive geographic area licensing scheme for the 12.7 GHz spectrum, which will permit the filing of mutually exclusive applications. The Commission's statutory authority to resolve mutually exclusive applications for initial licenses through a system of competitive bidding has lapsed. Accordingly, in the event we determine to adopt a mutually exclusive application approach, we seek comment on how the Commission should resolve mutually exclusive applications for new initial licenses in the 12.7 GHz band in light of the lapse in our authority to use competitive bidding. In the event that the Commission's statutory authority with respect to auctions is restored, we delegate authority to WTB and the Office of Economics and Analytics to seek comment on appropriate competitive bidding rules and procedures, consistent with prior Commission guidance.

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[347] The Commission has determined in a number of services 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. This approach relies on market forces absent a compelling showing that regulatory intervention to exclude potential participants is necessary. *See, e.g.*, *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, 16193, paras. 241-42 (2012); *Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, WT Docket No. 06-150 *et al*., Second Report and Order, 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*, WT Docket No. 02-146, Report and Order, 18 FCC Rcd 23318, 23346-47, para. 70 (2003).

[348] *Id.* §§ 301, 308(b), 310.

9. Mobile Spectrum Holdings Policies

113. Spectrum is an essential input for the provision of mobile wireless services, and ensuring access to and the availability of sufficient spectrum is crucial to promoting the competition that drives innovation and investment.[349] The Commission has held that the Communications Act requires a close examination of the impact of spectrum aggregation on competition, innovation, and the efficient use of spectrum to ensure that spectrum is allocated and assigned in a manner that serves the public interest, convenience and necessity, and avoids the excessive concentration of licenses.[350] In this *Notice of Proposed Rulemaking*, we seek comment generally on whether to adopt limitations on the aggregation of spectrum holdings in the 12.7 GHz band in order to meet our statutory requirements and to ensure competitive access to the band. We seek comment on whether the technical and market characteristics of the 12.7 GHz band warrant such limitations and, if so, whether implementation of such limitations should be through the Commission's total spectrum screen, a separate screen, a limit on initial licensing, or other means, as discussed below.[351]

114. *Total Spectrum Screen*. The Commission examines the suitability and availability of spectrum to determine whether particular bands should be included within the total spectrum screen.[352] Suitability 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 services.[353] Spectrum is considered "available" if it is "fairly certain that it will meet the criteria for suitable spectrum in the near term, an assessment that can be made

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[349] *Communications Marketplace Report*, GN Docket No. 22-203, Report, FCC 22-103, at 64, para. 82 (Dec. 30, 2022) (*2022 Communications Marketplace Report*); *see* NCTA May 11, 2023 Ex Parte at 2 (arguing for the importance of promoting competition through avoiding excessive concentration).

[350] *Policies Regarding Mobile Spectrum Holdings Expanding the Economic Innovation Opportunities of Spectrum Through Incentive Auctions*, WT Docket No. 12-269, Report and Order, 29 FCC Rcd 6133, 6137, para. 8 (2014) (*Mobile Spectrum Holdings Report and Order*).

[351] In 2004, the Commission established its framework for case-by-case review of spectrum aggregation (and market concentration), in which it established a total spectrum screen "trigger" of approximately one-third of the total suitable and available spectrum for commercial mobile radio services. *Applications of AT&T Wireless Inc. and Cingular Wireless Corporation For Consent To Transfer Control of Licenses and Authorizations*, Memorandum Opinion and Order, 19 FCC Rcd 21522, 21525, 21568-69, paras. 4, 106-112 (2004) (*Cingular-AT&T Wireless Order*). This screen was subsequently expanded and applied to mobile telephony/broadband services. *See, e.g.*, *Applications of Cellco Partnership d/b/a Verizon Wireless and Atlantis Holdings LLC for Consent to Transfer Control of Licenses, Authorizations, and Spectrum Manager and De Facto Transfer Leasing Arrangements*, WT Docket No. 08-95, Memorandum Opinion and Order and Declaratory Ruling, 23 FCC Rcd 17444, 17469-70, paras. 45-46 (2008). In 2008, the Commission determined that its case-by-case review would also apply to the initial licensing of spectrum acquired at auction, similar to the Commission's analysis of secondary market transactions. *Union Telephone Company and Cellco Partnership d/b/a Verizon Wireless Applications for 700 MHz Band Licenses, Auction No. 73*, Order, 23 FCC Rcd 16787, 16791-92, 16796, paras. 9, 18 (2008). In 2014, the Commission determined that it would treat as an "enhanced factor" in its case-by-case review any proposed increase in below-1-GHz spectrum holdings resulting in the acquiring entity holding approximately one-third or more of the suitable and available spectrum below 1 GHz. *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6233, 6240, paras. 267, 286-88. In 2016, the Commission adopted a separate mmW spectrum threshold that would apply to its case-by-case review of proposed secondary market mmW transactions. *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, et al.*, GN Docket No. 14-177, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014, 8081, 8083-84, paras. 184, 189 (2016) (*Spectrum Frontiers 1st R&O and FNPRM*).

[352] *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6169-70, paras. 71-75.

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

at the time the spectrum is licensed or at later times after changes in technology or regulation that affect the consideration."[354]

115. We seek comment on whether, for purposes of the spectrum screen, the 12.7 GHz band will be "suitable" and "available" for the provision of mobile telephony/broadband services shortly after the spectrum is assigned. To the extent we find that the 12.7 GHz band is "suitable and available," we seek comment on whether we should include the band within our total spectrum screen or within a separate spectrum screen, such as the existing mmW threshold.[355] To that end, we seek comment on which bands are most similar in technical characteristics with the 12.7 GHz band.[356]

116. *Initial licensing*. Should there be a limit on the amount of 12.7 GHz band spectrum held by a single entity at the licensing stage? If so, what should that limit be and why? Should the Commission consider the factors set forth in the *Mobile Spectrum Holdings Report and Order*[357] in determining if a limit at the initial licensing stage is appropriate? Should the Commission's determination also be based on the extent to which competitors have opportunities to gain access to alternative bands that would serve the same purpose as the 12.7 GHz band.[358]

D. Technical Rules

1. Power Limits

117. The Commission establishes power limits for wireless services to help limit the potential for harmful interference, among operators using the same frequency bands (for example, in neighboring geographic areas) as well as among operators using adjacent bands. The determination of an appropriate power limit for a particular band is informed by the technical characteristics of the band, as well as the services expected to be deployed.[359] Thus, section 30.202 of the Commission's rules restricts the power for fixed base stations operating in connection with mobile systems to a maximum equivalent isotropic radiated power (EIRP) density of +75dBm/100 MHz.[360] Under section 30.202, mobile stations and transportable stations are each limited to a maximum EIRP of +43 dBm and +55 dBm, respectively.[361] Since the adoption of these power limits, we have seen mmW wave deployments in various parts of the USA, chiefly in urban areas.

118. Setting appropriate power limits for the 12.7 GHz band requires an understanding of what services may be deployed in the band. It is important that new technologies and feasible visions for future wireless deployments are considered so that the appropriate power limits are set to advance wireless innovation. Ericsson asserts that the characteristics of the 12.7 GHz band make it a good fit for future 6G technologies and smart-city applications, and that use of the 12.7 GHz band would complement

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[354] *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6169, para. 71 (internal quotation marks omitted).

[355] *See 2022 Communications Marketplace Report*, FCC 22-103, at 66, para. 85 and Fig. II.B.9.

[356] *See, e.g.*, *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, et al.*, Third Report and Order, Memorandum Opinion and Order, and Third Notice of Proposed Rulemaking, 33 FCC Rcd 5576, 5612, para. 96 (2018); *Facilitating Shared Use in the 3100-3550 MHz Band*, WT Docket 19-348, Second Report and Order, Order on Reconsideration, and Order of Proposed Modification, 36 FCC Rcd 5987, 6022-23, para. 102 (2021) (*3.45 GHz Second Report and Order*); *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, 35 FCC Rcd 2343, 2382-84, paras. 85-88 (2020) (*3.7 GHz Order*).

[357] *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6192-93, paras. 143-44.

[358] *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6193, para. 144.

[359] *See, e.g., Spectrum Frontiers 1st R&O and FNPRM*, 31 FCC Rcd at 8110-12, paras. 276-80.

[360] 47 CFR § 30.202(a).

[361] *Id.* § 30.202(b), (c).

spectrum in the 3-8 GHz range.[362] Qualcomm states the 12.7 GHz Band is ideal for the deployment of the latest 6G technological advances which will offer coverage levels only available today in the lower mid-band spectrum range; these technologies, such as Giga Multiple-Input Multiple-Output (MIMO), will overcome greater signal losses in this upper range through higher beam directionality and offer ubiquitous coverage, low latency, and high capacity.[363] Qualcomm adds that increased data rates will support innovative use cases like deeper immersion into digital and virtual worlds with boundless augmented, virtual, extended and mixed reality (AR/VR/XR/MR) applications and advanced sensing, which will allow for real-time mapping of the physical world to a digital or virtual copy.[364] Besides 6G operations, we seek comment on what other feasible new services or technologies are envisioned to be deployed in the band and whether they would require particular power level profiles.

119. Based on the record in response to the *12.7 NOI*, and our technical expertise, we propose to adopt the same power limits that are applied to UMFUS operations.[365] Specifically, for base stations, mobile stations, and transportable stations, we propose to adopt an EIRP limit of +75 dBm/100 MHz (or +72dBm/50 MHz depending on the final channel size allocations), +43 dBm, and +55 dBm, respectively. We believe these limits to be appropriate because we agree with commenters that RF characteristics in this band more closely resemble mmW transmissions than lower mid-band transmissions.[366] Furthermore, we agree with commenters that higher frequencies are subject to greater signal attenuation.[367] Commenters from the terrestrial mobile wireless industry have submitted general feedback urging the Commission to establish power limits in a way that does not hinder development and innovation in this band while providing sufficient coverage for the public.[368] We seek comment on our proposed power limits for this band. If beams incorporating higher directionality are employed in this band, we seek comment on including provisions similar to section 101.145(c) to protect GSO satellites, particularly if we grandfather existing FSS operations.

120. We seek comment on whether incumbent satellite services and new terrestrial mobile services can coexist if the latter will be subject to the power limits that we propose above. Various satellite industry interests have expressed concerns that satellite operations cannot successfully co-exist with mobile terrestrial broadband networks in the 12.7 GHz band.[369] Overall, they identify two chief sources of interference: FSS uplink transmissions can interfere with receiving terrestrial mobile stations, and aggregate emissions of high power terrestrial mobile stations can also interfere with the satellite antenna of an FSS system receiving in the band.[370] As noted above, Verizon also questions how any

[362] Ericsson Comments at 3, 8.

[363] Qualcomm Comments at 7.

[364] Qualcomm Comments at 3.

[365] *See* 47 CFR § 30.202.

[366] *See, e.g.,* AT&T Comments at 1; Ericsson Comments at 8; T-Mobile Comments at 14; Intelsat Reply a 11-12.

[367] *See* CTIA Comments at 9-10 (arguing that the greater propagation loss at 12.7 GHz as compared to that at low mid-band spectrum will require even higher power levels to provide meaningful coverage range and capacity); Ericsson Comments at 2, 10; Nokia Comments at 2; Verizon Comments at 9 ("The Commission should also promote standard-power deployments and further consider power levels greater than those contained in Part 27 of the Commission's rules to compensate for the higher propagation losses in this frequency range."); CCA Reply at 1-2, ("[H]igh-powered use will provide the greatest potential for innovation and will aid the wireless industry in serving American consumers."); CCA Reply at 5 ("For many CCA members who serve suburban and rural areas, low-power operations may be too costly because of the number of cell sites needed to provide sufficient coverage."); *accord* 5G Americas Reply at 7.

[368] *See, e.g.,* T-Mobile Reply at 9, 12; 5G Americas Reply at 7.

[369] *See* Eutelsat Comments at 4-5; Hispasat Comments at 6-8; Intelsat/SES Comments at 12-14.

[370] Hispasat Comments at 6.

incipient terrestrial mobile services would coexist with a substantial number of new NGSO FSS deployments in the band.[371] CTIA asserts that coexistence is possible between new entrants and incumbent FSS, because FSS space stations will be protected based on the terrestrial service obligations contained in Radio Regulations Table 21-1, which includes a maximum equivalent isotropic radiated power ("EIRP") of +45 dBW for a station in the fixed or mobile service.[372] We agree with CTIA that, as long as terrestrial mobile broadband operations do not exceed the power limits that we propose, they should pose no danger of exceeding any aggregate interference level at any victim receivers on satellites operating in the band, but we seek comment on this observation. Furthermore, proposed grandfathered FSS earth stations are not susceptible to harmful interference because they do not receive in this band. Nevertheless, we seek comment on whether satellite services and terrestrial mobile services can coexist with power limits of section 30.202. Is it appropriate to adopt these power limits for the 12.7 GHz band for base station, mobile station, and transportable stations? Would it be useful to limit the power terrestrial transmitters may emit toward higher elevation angles to protect satellite receivers from aggregate emissions?

121. We also received comments urging the Commission to conduct further technical studies before establishing power limits for 12.7 GHz band.[373] Nokia recommends a detailed analysis regarding the EIRP limit for flexible use in the 12.7 GHz band.[374] It states that such an analysis should consider "(1) the impact of relocating some incumbent services from the 12.7 GHz band, and a potential relaxation of maximum EIRP requirements, (2) the coexistence scenarios involving incumbent services in the 12.7 GHz band and in the lower and upper adjacent bands, and (3) receiver characteristics of incumbent users, including out-of-band receiver blocking performance."[375] Are there other comprehensive technical studies that could shed light on the appropriate power levels for this band? What are the technical reasons that it is appropriate or not appropriate to adopt the part 30 power limits? Are there alternative power limit proposals that would serve the public interest better and what are the technical data and analysis for these reasons? Are there alternative metrics for controlling power in this band? We further seek comment on any additional considerations that should be included to provide adequate protection for services in the adjacent bands. For any alternative or additional proposals, metrics, or considerations, commenters should include technical details, including any and/or all assumptions and parameters. For example, how would the in-band requirements specified in various ITU documents, discussed above, translate to out-of-band requirements in the 12.7 GHz? Is any further information or assumptions necessary, particularly concerning out-of-band receiver blocking performance for receivers in the adjacent bands? Commenters advocating for particular technical rules to protect operations in adjacent bands, including DBS, NGSO FSS, MVDDS, active spaceborne sensors, and ARNS, should provide detailed information on the receiver, antenna, and operational characteristics for such services operating in the adjacent bands.

[371] Verizon Comments at 8 & n.26 (citing *SpaceX Gen2 Order*, FCC 22-91 at para. 49 (authorizing the construction, deployment, and authorization of up to 7,500 satellites in the 12.75-13.25 GHz band, among other segments)); *see supra* note 276 and accompanying text.

[372] EIRP power limits in ITU radio regulations Table 21-1 does not specify a reference bandwidth, so this power limit is 45dBW (75dBm) regardless of the reference bandwidth, i.e. any reference bandwidth may be used for the power limit. Therefore we maintain that our proposed limit of 75dBm/100MHz is at least as conservative as the ITU radio regulations power limit. For example the ITU regulations would permit 75dBm/1MHz, which would be higher power than what we propose.

[373] Hispasat Comments at 13-14; Nokia Comments at 6.

[374] Nokia Comments at 7-8.

[375] Nokia Comments at 7-8.

2. Out-of-Band Emissions (OOBE) Limits

122. We seek comment on appropriate out-of-band emissions (OOBE) limits for base and mobile stations in the 12.7 GHz band. Section 101.111(a)(2)(i) of the Commission's rules establishes an emission limit for fixed stations operating with digital emissions in this band expressed as A = 35 + 0.8(P −50) + 10 Log10 B, where A is attenuation below the mean output power of the transmitter, B is the authorized bandwidth in megahertz, and P is the percentage by which the transmitter bandwidth is removed from the carrier frequency.[376] Under this provision, attenuation greater than 80 decibels or to an absolute power of less than −13 dBm/1MHz is not required.[377] This emission limit is defined in conducted fashion.[378] These rules are intended to support various fixed microwave technologies with conventional antenna systems.

123. For most mobile systems, the Commission has generally required licensees to attenuate their unwanted emission power below the transmission mean power (P) by a factor of at least 43 + 10log10(P), or -13 dBm/MHz for any emissions on frequencies outside the licensee's authorized spectrum.[379] These requirements take effect at the edges of the assigned frequencies (e.g., channel, block, or band), and may be used as a basis for developing further requirements that relate to transmitter performance by industry standard organizations.[380] This limit is applied equally both to base stations and to mobile stations, and compliance with this limit in existing systems, where access to the RF port of the antennas is conveniently available, is based on conducted measurement of transmission power at the output of the individual RF port.[381]

124. In response to the *12.7 NOI*, a few commenters suggest specific criteria for out-of-band emission limits. For example, 5G Americas and CTIA suggest that new broadband users should be subject to the same out-of-band emission limits that apply to the existing incumbents in the band.[382] T-Mobile and Ericsson suggest that the Commission consider adopting the same out-of-band emission limit of –13dBm/MHz that was adopted in the Spectrum Frontiers proceedings for the Upper Microwave Flexible Use Service in the upper mmW spectrum bands.[383] T-Mobile argues that this existing out-of-band emission limit is sufficient to protect services in adjacent bands.[384] Hispasat, Oneweb, Dish, and SpaceX suggest that further analysis should be conducted to determine whether the existing out-of-band emissions limit is, in fact, sufficient to protect users in adjacent bands.[385] Due to the propagation characteristics in the 12.7 GHz band signal attenuation with distance is higher than at lower frequencies and to overcome those losses higher gain antennas are typically used, therefore we believe that deployments in this band are likely to use integrated multiple element antenna arrays that have characteristics more similar to antennas in the UMFUS bands than those in the PCS and AWS bands. As

[376] 47 CFR § 101.111(a)(2)(i).

[377] *Id*.

[378] *Id.*

[379] *See, e.g.,* 47 CFR § 22.359(a), 47 CFR § 27.53(a)(1)(i).

[380] *Id.*

[381] *Id.*

[382] *See* CTIA Comments at 13; 5G Americas Comments at 2.

[383] *See* Ericsson Comments at 11; T-Mobile Comments at 14 & n.47 (citing *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order, 32 FCC Rcd 10988, para. 34 (2017); Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, Fourth Report and Order, 33 FCC Rcd 12168, paras. 11-12 (2018)).

[384] *See* T-Mobile Reply at 10.

[385] *See* OneWeb Comments at 4; DISH Reply at 7; Hispasat Reply at 13; SpaceX Reply at 6.

such, measurement of OOBE based on conducted measurements may be challenging, as was recognized to be the case for the mmW bands.[386] In order to achieve higher antenna gain in the compact format necessary for mobile operation and beam steering necessary for base stations to track mobile devices, we expect that mobile and base stations in the 12.7 GHz band, much like the mmW bands, will have tens of radiating elements with multiple power amplifiers. Recognizing the potential measurement challenges posed by having a requirement based on conducted measurements, we propose to provide flexibility for the out-of-band emission limits to be measured either using conducted power or radiated power, and we seek comment on this proposal. With lack of RF ports, the emission measurement needs to be made in radiated fashion, and the antenna gain must be characterized and subtracted from the radiated measurement if the emission limit is to be defined in conducted fashion. Ericsson suggests that in order to support adaptive antennas, either the conductive power or the total radiated power of any emission outside a licensee's frequency block shall be −13 dBm/MHz or lower.[387]

125. In light of the discussion above, we propose to adopt a requirement that the conductive power or the total radiated power of any emission outside a licensee's frequency block shall be −13 dBm/MHz or lower and seek comment on this proposal. We seek comment on whether a radiated emission limit of –13dBm/MHz can be supported by transmitters operating in the 12.7 GHz band. In this *Notice of Proposed Rulemaking* we also propose to retain a portion of the band either at the top or bottom edge of the band, or both, to accommodate re-packed mobile TV pickup operations. From the perspective of protecting services in adjacent bands from out-of-band emissions and harmful interference, does one of these alternatives offer more benefits than the others? Should the out-of-band emissions limits be different if mobile services are adjacent to incumbent TV pickup operations, as opposed to being directly adjacent to the 12.7 GHz or 13.25 GHz band edges? Should the out-of-band emissions limits be applied at the band edge between new flexible use services and BAS, or is it necessary to define out-of-band emissions limits at the edges of the 12.7 and 13.25 GHz band, regardless of any buffer created by BAS repack bands?

126. We note that out-of-band emissions and spurious emissions characterize the overall emission performance of a transmitter, and that the measurement procedures for spurious emissions at antenna terminals and the field strength of spurious radiation are described in the Commission's rules. For bands higher than 1 GHz, for example PCS and AWS-1, compliance with the emission rule is based on a resolution bandwidth of 1 megahertz or greater, except within the first 1 megahertz.[388] In the first 1 megahertz bands immediately outside and adjacent to the channel block, a resolution bandwidth equal to at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, provided that the measured power is integrated over the full required measurement bandwidth.[389] We seek comment on whether we should apply this measurement methodology in this band; and if so, whether the 1 MHz resolution bandwidth is appropriate. Alternatively, what resolution and frequency offset should be considered to define out-of-band emissions and spurious emissions?

127. We request that commenters proposing specific out-of-band emissions criteria or alternative methods of defining or measuring the out-of-band emissions provide technical analysis describing how the proposed radiated emission limits would mitigate the risk of harmful interference to operations by adjacent users. We also seek comment on protection of Federal operations in adjacent bands in section V.D.7 below (Protection of Federal Operations).

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[386] *Spectrum Frontiers 1st R&O and FNPRM*, 31 FCC Rcd at 8117, para. 297 (discussing OOBE measurement challenges in the mmW band).

[387] *See* Ericsson Comments at 7.

[388] *See, e.g.*, 47 CFR § 27.53(a)(5).

[389] *Id.*

3. Field Strength Limits/Market Boundaries

128. The Commission's rules for mobile services typically define field strength limits at the market boundaries in order to prevent interference or facilitate coordination between licensees in adjacent markets. For example, the part 27 rules for the Advanced Wireless Services (AWS) specify that the predicted or measured median field strength at any location on the geographical border of a licensee's service area shall not exceed 47 dBμV/m unless the adjacent affected service area licensee(s) agree(s) to a different field strength.[390] The part 30 rules for Upper Microwave Flexible Use Service (UMFUS) specify that the predicted or measured Power Flux Density (PFD) from any Base Station operating in the 27.5-28.35 GHz band, 37-38.6 GHz band, and 38.6-40 GHz bands at any location on the geographical border of a licensee's service area shall not exceed −77.6 dBm/m2/MHz (measured at 1.5 meters above ground) unless the adjacent affected service area licensee(s) agree(s) to a different PFD.[391] The part 101 rules for the Multipoint Video and Data Distribution Service (MVDDS) in the 12.2-12.7 GHz band, directly adjacent to the band under consideration here, simply specify that licensees must coordinate their operations whenever the facilities have optical line-of-sight into other licensees' areas or are within the same geographic area.[392] While none of the commenters in response to the *12.7 NOI* suggested specific criteria for field strength limits at the market boundaries, several commenters do support an exclusive market-based licensing framework.[393]

129. In section V.C above (Licensing and Operating Rules) of this *NPRM,* we propose to establish a framework for licensing this band using exclusive market based licenses with 100 or 50 megahertz channel blocks. Since we propose to license geographic areas on an exclusive basis we also propose to establish PFD limits at the market boundaries, consistent with the approach the Commission has used in the past for similar market-based services. We believe that some criteria are necessary at market boundaries to manage interference and coordination between adjacent area licensees. We also believe that given the wide channel bandwidths and diversity of potential applications that might be deployed in these bands, any criteria that we propose should include a scaling factor for the bandwidth. In the Spectrum Frontiers proceeding the Commission adopted a PFD of −77.6 dBm/m2/MHz (measured at 1.5 meters above ground).[394] We believe that deployments in this band are likely to use directional antennas that have characteristics more similar to those in the UMFUS bands than those in the PCS and AWS bands. Therefore, we propose to adopt a requirement that the predicted or measured Power Flux Density (PFD) from any Base Station operating in the 12.7 GHz band at any location on the geographical border of a licensee's service area shall not exceed −77.6 dBm/m2/MHz (measured at 1.5 meters above ground) unless the adjacent affected service area licensee(s) agree(s) to a different PFD. We seek comment on this proposal. We seek comment on whether a PFD at the market boundary is the appropriate metric for this band or whether there are advantages to using a different metric, such as a field strength limit, which is used for other mobile services under part 27? Is the specific PFD value we propose appropriate for this frequency band taking into consideration factors like the typical receive antenna gain and receiver characteristics? Would simple coordination criteria, such as those currently in place for the MVDDS services in the 12.2-12.7 GHz band, which require coordination for any facility that has optical line of sight to an adjacent market be more appropriate? Given the potential flexible uses of the band, would it be appropriate to have different interference protection and/or coordination criteria

[390] *See* 47 CFR § 27.55(a)(1).

[391] *See* 47 CFR § 30.204(a).

[392] *See* 47 CFR § 101.1421(c).

[393] *See* CCA Reply at 4; AT&T Comments at 4; CTIA Comments at 2, 6; Ericsson Comments at 2.

[394] *See Spectrum Frontiers 1st R&O and FNPRM*, 31 FCC Rcd at 8124, para. 312. We note that the final rule adopted by the *Spectrum Frontiers 1st R&O and FNPRM* listed the incorrect value of –76 dBm/m2/MHz as opposed to the –77.6 dBm/m2/MHz value referenced in the discussion of the item. For clarity, in the instant *12.7 GHz NPRM*, we are proposing the -77.6 dBm/m2/MHz value.

depending on the types of services (e.g., fixed or mobile) that a licensee deploys? Commenters who propose alternative metrics or criteria or for controlling interference or facilitating coordination between licensees in adjacent markets or adjacent channels within the same market should describe their proposal in detail and support their proposal with engineering analysis.

4. Antenna Height Limits

130. We propose not to adopt limits on base station antenna height at this time because no commenters address the issue in response to the *12.7 NOI*. We seek comment on this proposal. Considering what future wireless networks are envisioned to be, are antenna height thresholds and corresponding power reductions applicable to certain part 27 bands[395] appropriate for base or fixed stations that will be used in the 12.7 GHz band to provide mobile broadband or for other expanded uses? Conversely, given the are proposing to control interference at license boundaries, are separate antenna height restrictions and corresponding power reductions even necessary? We tentatively propose not to adopt antenna height and power limits similar to those in our part 27 rules for certain bands. However, we seek comment on whether power limits based on antenna height are necessary and/or whether any modifications should be made to either the height thresholds or the power limits at specific heights that we have proposed. We also seek comment on whether there would there be any benefit in requiring antenna downtilt for antennas above a certain height? We seek comment on this proposal, including the costs and benefits of the proposal and any alternatives. For alternative proposals, commenters should provide technical support.

5. Canada and Mexico Coordination

131. Typically, the Commission's rules provide that fixed and mobile operations are subject to international agreements with Mexico and Canada.[396] We propose to apply the same limitation to the newly established rules for the 12.7-13.25 GHz band. Until such time as any adjusted agreements between the United States, Mexico, and/or Canada can be agreed to, operations in the 12.7-13.25 GHz band must not cause harmful interference across any of our international borders, consistent with the terms of the agreements currently in force.[397] Currently, fixed use of the 12.7-13.25 GHz band is covered by an existing arrangement between the United States and Canada.[398] We note that further modification of the proposed rules might be necessary in order to comply with any future agreements with Canada and Mexico regarding the use of this band. We seek comment on this issue, including the costs and benefits of alternatives.

6. General Part 27 Rules

132. There are several additional technical rules applicable to all part 27 services, including sections 27.51 (equipment authorization), 27.52 (RF safety), 27.54 (frequency stability), 27.56 (antennas structures; air navigation safety), and 27.63 (disturbance of AM broadcast station antenna patterns).[399] Given that we propose to designate mobile broadband and other expanded uses of the 12.7 GHz band as part 27 services, we propose to apply these general part 27 rules to all 12.7 GHz band licenses. Further, we propose to apply these rules to licensees that acquire their licenses through partitioning or disaggregation (to the extent the service rules permit such aggregation). We seek comment on our

[395] *See, e.g.,* 47 CFR § 27.50(b)(1)-(5), (c)(1)-(4) (power and antenna height limits set forth in Tables 1-4 of § 27.50 applicable to certain 600 MHz, 700 MHz, and 800 MHz bands), (c)(1)-(4).

[396] *See e.g.*, 47 CFR §§ 27.57, 30.206, 101.147(r)(13), 101.509(d).

[397] *See* Agreement Concerning the Coordination and Use of Radio Frequencies Above Thirty Megacycles per Second, Ca.-U.S., Oct 24, 1962 13 UST 2418, https://transition.fcc.gov/ib/sand/agree/files/can-nb/above30.pdf.

[398] *See* Agreement Concerning the Coordination and Use of Radio Frequencies Above Thirty Megacycles per Second, Ca.-U.S., Oct 24, 1962 13 UST 2418, https://transition.fcc.gov/ib/sand/agree/files/can-nb/above30.pdf.

[399] *See, e.g.*, 47 CFR §§ 27.51, 27.52, 27.54, 27.56, 27.63.

proposals, including specific costs and benefits, and ask commenters to identify any aspects of our general part 27 rules that should be modified to accommodate the particular characteristics of the 12.7 GHz band.

7. Protection of Federal Operations

a. In-Band

133. Federal operations in the 12.7-13.25 GHz band include the Space Research Service (SRS) (space-to-Earth) and the use of commercial satellites in the Fixed Satellite Service (Earth-to-space). NTIA filed comments in response to the *12.7 NOI* raising concerns about interference to SRS operations at Goldstone, CA ground stations and other federal systems.[400]

134. With respect to Goldstone, NTIA has expressed concern that ground stations maybe susceptible to interference from commercial network base stations and handheld mobile stations.[401] Per footnote US251 of the Table of Allocation, the 12.75-13.25 GHz band is also allocated to the space research (deep space) (space-to-Earth) service for reception only at Goldstone, CA (35° 20' N, 116° 53' W).[402] Goldstone is one of three ground station complexes around the world known as the National Aeronautics and Space Administration (NASA)'s Deep Space Network (DSN) established for commanding, tracking and monitoring the health and safety of spacecraft at many distant planetary locales. The DSN is also used to conduct powerful science investigations that examine the nature of asteroids and the interiors of planets and moons.[403]

135. Additionally, NTIA raised concerns about possible aggregate interference from a large population of terrestrial emitters to current and future commercial satellite receivers used by the DoD.[404] In light of this, NTIA suggested that the Commission consider a compatibility analysis between mobile broadband service and commercial GSO and NGSO satellites.[405]

136. NTIA also raised concerns about possible interference to NASA and NSF passive radio astronomy observatories operating in the 12.7 GHz band.[406] The sites at issue include very long baseline interferometry (VLBI) stations for geodesy and astrometry high accuracy reference frames.[407] In its comments, NTIA notes that current coordination requirements exist for Green Bank Telescope within the National Radio Quiet Zone (NRQZ) for ground-based transmitters and that repurposing the 12.7 GHz band to allow terrestrial mobile broadband or other expanded use may require additional coordination zones and/or new coordination agreements and updated NRQZ coordination requirements with the changes beneficial for other U.S. radio astronomy observatories.[408]

137. Recognizing the importance of these Federal operations in the band, and the need to protect them from interference, we seek comment on establishing coordination zone and/or other criteria to protect Goldstone ground stations from possible harmful interference that might be caused by mobile

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[400] *See* NTIA Comments at 2.

[401] NTIA Comments at 2.

[402] *See supra* note 210 and accompanying text.

[403] For details, *see 12.7 NOI* at *3, para. 6 and NASA, *What is the Deep Space Network* (Mar. 30, 2020) (NASA's Deep Space Network "is the largest and most sensitive scientific telecommunications system in the world."), https://www.nasa.gov/directorates/heo/scan/services/networks/deep_space_network/about.

[404] NTIA Comments at 2.

[405] NTIA Comments at 2.

[406] NTIA Comments at 2.

[407] NTIA Comments at 2.

[408] NTIA Comments at 2-3.

broadband or other expanded use intended for the 12.7-13.25 GHz band. We seek comment on how to define such a coordination zone and on what interference protection levels should apply at the edge of the coordination zone. We note that to protect Goldstone site, section 30.205 of the commission rules defines two coordination zones with contours 'coordinates tables corresponding to 60 dBm/100 MHz EIRP and 75 dBm/100 MHz EIRP respectively. Under section 30.205, all licensees in the 37-38 GHz band located in the coordination zone must coordinate with Federal Space Research Service (space to Earth) users of the band via the NTIA. All licensees within the zone defined by the 60 dBm/100 MHz EIRP must coordinate all operations; licensees operating within the area between the zones defined by the 60 dBm/100 MHz and 75 dBm/100 MHz EIRP must coordinate all operations if their base station EIRP is greater than 60 dBm/100 MHz or if their antenna height exceeds 100 meters above ground level; licensees operating outside the zones defined by the 75 dBm/100 MHz EIRP coordinates are not required to coordinate their operations with NTIA. Could a similar approach, based on a coordination agreement with NASA, be adopted for mobile broadband to ensure protection of the DSN?

b. Adjacent Band

138. Federal operations adjacent to the 12.7-13.25 GHz band include both military and scientific operations in the upper adjacent-band, 13.25-13.75 GHz. This band can be divided into two sub bands, the 13.25-13.4 GHz band and the 13.4-13.75 GHz band, each with different federal allocations. The 13.25-13.4 GHz portion is allocated on a secondary basis for federal Earth exploration satellite services (EESS) (active), space research services (SRS) (active), and on a primary basis for aeronautical radionavigation services (ARNS).[409] The 13.25-13.4 GHz portion is allocated for federal EESS (active), SRS (active), and radiolocation services on a primary basis and standard frequency and time signal-satellite (Earth-to-space) on a secondary basis.[410]

139. In response to the *12.7 NOI*, NTIA articulated several concerns related to adjacent band federal operations.[411] First, NTIA noted that the 13.25-13.4 GHz band is used by the Department of Defense (DoD) and the Federal Aviation Administration (FAA) to operate airborne Doppler navigation radar systems used to determine ground speed and drift angle of an aircraft with respect to the ground.[412] NTIA believes those operations may be susceptible to performance degradation due to interference coming from 12.7-13.25 GHz.[413] Future Unmanned aircraft detect-and-avoid safety systems being developed in this band are also a source of concern for the NTIA.[414] Although Recommendation ITU-R M.2008-1 provides characteristics and protection criteria for the 13.25-13.4 GHz band used for airborne Doppler radars,[415] NTIA believes that adjacent-band compatibility studies with representative commercial deployments may be necessary to update Recommendation ITU-R M.2008-1 to reflect the characteristics of current and future airborne Doppler navigation radars airborne.[416]

140. NTIA also noted that the 13.4-13.75 GHz band is used for DoD operations of shipborne radars (search radars, tracking radars, and missile and gun fire-control radars), the National Oceanic and Atmospheric Administration (NOAA) satellite operations in the Joint Satellite Oceanography Network (JASON), NASA's active remote sensing (including the future Surface Water and Ocean Topography (SWOT) mission), Global Precipitation Mission (GPM) and Tracking and Data Relay Satellite (TDRS)

[409] NTIA Comments at 3.

[410] NTIA Comments at 3.

[230] NTIA Comments at 3-5.

[412] NTIA Comments at 4.

[413] NTIA Comments at 4.

[414] NTIA Comments at 4.

[415] NTIA Comments at 4.

[416] NTIA Comments at 4.

operations, and the NSF continuum and spectral-line research (including as a calibration aid for the radionavigation satellite service) operations.[417] NTIA is concerned that aggregate interference from mobile base stations and ubiquitous handheld units may cause interference to NASA and NOAA's satellite systems.[418] Mobile broadband operations are also believed to be possible source of interference to military agencies radar systems.[419] NTIA suggests that adjacent-band compatibility studies with representative commercial deployments are necessary to assess any possible degradation of federal operations in the 13.4-13.75 GHz band.[420]

141. We note that NTIA has set up a Technical Interchange Group (TIG) as a tool for implementation of electromagnetic Compatibility (EMC) studies between 12.7-13.25 GHz band mobile broadband or other expanded use and federal systems.[421] NTIA TIG recommendations can be submitted in the record for the NPRM to help inform the decisions in the Report and Order (R&O). In section V.D.2 above (Out-of-Band Emissions (OOBE) Limits), we propose to establish an out-of-band emissions limit of -13dBm/1MHz anywhere outside a licensee spectrum block and seek comment on that proposal. In this section we seek comment on whether that same out-of-band emission limit is adequate to protect Federal operations in the adjacent bands. If the Commission relocates mobile BAS/CARS operations into a portion of the 12.7-13.25 GHz band, could creating a buffer between base/mobile operations and Federal operations alleviate some of the Federal concerns about interference? Recognizing the importance of Federal operations in adjacent bands, we seek comment generally on how to protect federal operations in bands adjacent to the 12.7-13.25 GHz band.

E. Promoting Digital Equity and Inclusion

142. The Commission, as part of its continuing effort to advance digital equity for all,[422] including people of color, persons with disabilities, persons who live in rural or Tribal areas, and others who are or have been historically underserved, marginalized, or adversely affected by persistent poverty or inequality, invites comment on any equity-related considerations[423] and benefits (if any) that may be associated with the proposals and issues discussed herein. Specifically, we seek comment on how our proposals may promote or inhibit advances in diversity, equity, inclusion, and accessibility, as well the scope of the Commission's relevant legal authority.

VI. ORDER IN GN DOCKET NO. 22-352

143. In the *12.7 NOI,* the Commission noted that to the extent it considers relocation of incumbents, or even future sharing between incumbents and new entrants, it will be important to have

[417] NTIA Comments at 5.

[418] NTIA Comments at 5.

[419] NTIA comments at 5.

[420] NTIA Comments at 5.

[421] NTIA Comments at 5-6.

[422] Section 1 of the Communications Act of 1934 as amended provides that the FCC "regulat[es] interstate and foreign commerce in communication by wire and radio so as to make [such service] available, so far as possible, to all the people of the United States, without discrimination on the basis of race, color, religion, national origin, or sex." 47 U.S.C. § 151.

[423] The term "equity" is used here consistent with Executive Order 13985 as the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality. *See* Exec. Order No. 13985, 86 Fed. Reg. 7009, Executive Order on Advancing Racial Equity and Support for Underserved Communities Through the Federal Government (Jan. 20, 2021).

clear information about the nature and density of incumbent use.[424] Accordingly, the Commission sought comment on whether to require incumbents in the 12.7 GHz band to submit information detailing their current use of the band, and if so, what such information it should require to be submitted.[425]

144. Several commenters urge us to require incumbents to confirm that they are actually operating in the band and to provide detailed information about their operations including transmitter and receiver characteristics.[426] For the 23 uplink Earth stations authorized in the band, and for the fixed point-to-point links authorized under parts 78 and 101, the operator or licensee must file a separate renewal application for each authorization.[427] All of the fixed links under part 101, however, were first authorized relatively recently (2017 or later) and typically consist of paired transmitters and receivers providing a communications link between two fixed locations. By contrast, many of the BAS and CARS incumbents were first authorized decades ago to use channels throughout the 12.7 GHz band over geographic areas for operations typically consisting of a collection of receive sites, mobile equipment, and control equipment,[428] which heightens the need to ensure that these authorizations in ULS and COALS still accurately reflect current operations.

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[424] *12.7 NOI* at *9, para. 25.

[425] *Id*. (citing Letter from Scott K. Bergmann, Senior Vice President, Regulatory Affairs, CTIA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 22-352, at 3 (filed Oct. 20, 2022)).

[426] *See, e.g.*, AT&T Comments at 4 (asserting that to rationally assess how to protect non-Federal incumbents' operations, the Commission should require them to provide detailed "technical and operational data about their services, including transmitter and receiver characteristics"); Ericsson Comments at 12 ("Ericsson supports the Commission seeking information on incumbent use in the band to help assess how it can optimize the introduction of mobile broadband in the 12.7 GHz band"); NCTA Comments at 12 ("NCTA applauds the Commission's collection of more detailed and up-to-date information regarding incumbents to help facilitate consideration of 'sharing between incumbents and new entrants'") (quoting *12.7 NOI* at *9, para. 25); Nokia Comments at 3 (urging the Commission to "require incumbents in the 12.7 GHz band to provide relevant and accurate data" and to use that data to conduct an "in-depth evaluation of the sharing or coexistence conditions for the different incumbent uses in the band" to determine more conclusively "which incumbent services could share the band with mobile broadband, and which incumbent services should be relocated."); Qualcomm Comments at 9 (contending that "licensing records .... do not fully reflect actual use or the intensity of that use" and that "[a]ccurate and updated data on the uses of the band are instrumental" to evaluating possible expanded uses and encouraging the Commission to ask incumbent licensees to (1) "confirm whether they are actually operating on the frequency band"; (2) "provide data about their operations", and (3) provide "the actual technical parameters of such operations."); T-Mobile Comments at 8 (stating that as part of relocating incumbents, the Commission could "require incumbent licensees to provide information about their operations, including certifying to their use, to ensure the accuracy of cost estimates related to their systems."); Verizon Comments at 10 (stating that the Commission "should collect information about how much spectrum incumbent operators use to support their services, the breadth of geographic use by licensees," and "should also establish a deadline for operators to provide this information so that stakeholders may be on notice regarding further action in this proceeding."); Letter from Sarah Leggin, Assistant Vice President, Regulatory Affairs, CTIA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 22-352, at 2 (filed May 5, 2023) (urging the Commission to require CARS licensees to certify that the COALS database accurately reflects current operations in the 12.7 GHz band).

[427] *See* 47 CFR §§ 25.121(b)), 78.15(a), 78.29, § 101.5; *see also id.* § 1.949. For the 12.7 GHz band incumbents licensed under part 74, however, most BAS authorizations are associated with a parent broadcast license and renewed automatically upon renewal of the parent broadcast license. *See* 47 CFR § 74.15(b),(e). Although this streamlined process reduces paperwork burdens and avoids termination for non-renewal of BAS authorizations that support ongoing broadcast operations, it may also increase the probability of inaccurate licensing and operational data in the Commission' records.

[428] *See. e.g., Improving Public Safety Communications in the 800 MHz Band,* WT Docket 02-55, Memorandum Opinion and Order and Further Notice of Proposed Rulemaking, 23 FCC Rcd. 4393, 4408 para 44 (2008); *Improving Public Safety Communications in the 800 MHz Band*, WT Docket 00-55, Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order, and Order, 19 FCC Rcd 14969 (2004).

145. Accordingly, to improve the data that the public and the Commission have to make informed comments and decisions about the proposals discussed in the *Notice of Proposed Rulemaking* above, we direct fixed and mobile BAS and CARS licensees under parts 74 and 78, to certify the accuracy of all information reflected on each license that includes authority to operate in the 12.7 GHz band, including whether the facilities are operating as authorized. If a licensee is unable to make such a certification for a given license, it must cancel or modify the license in accordance with the Commission's rules.[429] We exempt from this *Order* BAS and CARS licensees that have filed separate applications, on or after January 1, 2021, for new or modified licenses in the 12.7 GHz band. We note that for purposes of implementing the Paperwork Reduction Act of 1995 (PRA), these certifications are not "information" collections that require approval from the Office of Management and Budget (OMB).[430] We direct the Wireless Telecommunications Bureau, in coordination with the Media Bureau, to issue a Public Notice that will: (1) provide detailed instructions for BAS and CARS licensees to file certifications regarding existing information in ULS and COALS, respectively; and (2) establish a window for the filing of certifications. We also direct the Bureaus, in coordination with the Office of Economics and Analytics, to consider whether additional information should be collected from some or all 12.7 GHz band incumbents to seek comment regarding the need to initiate an information collection if such additional information is necessary to supplement the information submitted in this proceeding, and to comply with all requirements associated with any such information collection under the PRA.[431]

146. We acknowledge that several comments recommend also seeking information from all incumbent licensees in the 12.7 GHz band, as well as in the bands adjacent to the 12.7 GHz band.[432] As noted above, the Commission's rules require all in-band incumbents to operate in accordance with their authorizations. In the *Notice of Proposed Rulemaking* above, we specifically seek detailed information on the receiver, antenna, and operational characteristics for services operating in the adjacent bands from incumbents in adjacent bands, including DBS, NGSO FSS, MVDDS, active spaceborne sensors, and ARNS, that contend that provisions beyond the existing 12.7 GHz band fixed service protection levels for adjacent bands would be necessary for mobile broadband or other expanded-use operations in the 12.7 GHz band to prevent harmful interference to operations in those adjacent bands.[433]

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[429] 47 CFR §§ 74.600-74.690. Based on ULS data, 12.7 GHz band BAS licenses for the following radio service codes (followed by the approximate number of such licenses in parentheses) are subject to this certification requirement: Aural Intercity Relay (1), TV Intercity Relay (1179), TV Pickup (403), TV Studio-Transmitter Link (485), TV Translator Relay (32).

[430] *See* 5 CFR § 1320.3(h)(1) (defining "information" as not generally including certifications); *accord*, 84 FR 22733, 22734, n.12 (May 20, 2019) (concluding that the certification requirement for Earth station incumbents in the 3.7-4.2 GHz band was not considered "information" for purposes of the Paperwork Reduction Act (citing 5 CFR § 1320.3(h)(1)); Notice of Office of Management and Budget Action, ICR Ref. No. 201811–3060–018 (Jan. 28, 2019), available at https://www.reginfo.gov/public/do/PRAViewICR?ref_nbr=201811-3060-018; Federal Communications Commission, Expanding Flexible Use of the 3.7 to 4.2 GHz Band, 84 FR 13141, Apr. 4, 2019.

[431] While the Commission has discretion to seek comment before undertaking an information collection, it has never taken the position that such comment, other than the comment sought as part of the PRA process, is a necessary prerequisite. Because the information collection adopted here is designed solely to obtain the information necessary to evaluate whether to adopt future Commission rules, it has no direct "future effect" and as such is not a rule requiring notice under the APA. *See* 5 U.S.C. § 551(4).

[432] *See, e.g.*, Nokia Comments at 8 (contending that "the Commission should require incumbents in the … lower and upper adjacent bands to provide relevant and accurate information about their deployments and receiver characteristics"); Verizon Comments at 10 (quoting *12.7 NOI* at *14, para. 40) (stating that the Commission "should collect information on 'detailed information on the receiver, antenna, and operational characteristics for services operating in the adjacent bands.'").

[433] *See supra* para. 121.

147. Although we do not require incumbents to provide additional information on their existing operations at this time, we propose in the *Notice of Proposed Rulemaking* above to protect only those BAS and CARS stations licensed in ULS and COALS, respectively, for which the licensee timely files the certification required in this *Order* (to the extent they have not filed a new or modification application in ULS or COALS for the station on or after January 1, 2021) and to protect FS incumbents based on licensing data. For the 23 incumbent Earth stations in the band, we also propose in the *Notice of Proposed Rulemaking* to use IBFS data in defining the scope of the grandfathered status of these stations. Because the Commission may use these data to inform its deliberations regarding the future use of the 12.7 GHz band, including possible interference avoidance coordination or relocation of facilities, or grandfathered status that could require future licensees to accept harmful interference from existing operations, we encourage all licensees to timely submit their data and to update their information in the event of a change in any of the operational parameters.

VII. PROCEDURAL MATTERS

A. Ex Parte Presentations

148. These proceedings shall be treated as "permit-but-disclose" proceedings in accordance with the Commission's *ex parte* rules.[434] 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.

B. Comment Period and Filing Procedures

149. Pursuant to sections 1.415 and 1.419 of the Commission's rules, 47 CFR §§ 1.415, 1.419, interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. For comments regarding the 12.2 GHz *Further Notice*, comments must be filed in WT Docket No. 20-443. For comments regarding the 12.7 *Notice*, comments must be filed in GN Docket No. 22-352. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS). *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

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

[434] 47 CFR § 1.1200 *et seq.*

  - 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 45 L Street, NE, Washington, DC 20554.
- Effective March 19, 2020, and until further notice, the Commission no longer accepts any hand or messenger delivered filings. This is a temporary measure taken to help protect the health and safety of individuals, and to mitigate the transmission of COVID-19.[435]
  - After COVID-19 restrictions are lifted, the Commission has established that hand-carried documents are to be filed at the Commission's office located at 9050 Junction Drive, Annapolis Junction, MD 20701. This will be the only location where hand-carried paper filings for the Commission will be accepted.[436]
- During the time the Commission's building is closed to the general public and until further notice, if more than one docket or rulemaking number appears in the caption of a proceeding, paper filers need not submit two additional copies for each additional docket or rulemaking number; an original and one copy are sufficient.

C. People with Disabilities

150. 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).

D. Regulatory Flexibility Act

151. The Regulatory Flexibility Act of 1980, as amended (RFA),[437] 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."[438] In the *Report and Order*, the Commission declines to adopt rule changes and, therefore a Final Regulatory Flexibility Analysis has not been performed. The Commission seeks comment on potential rule and policy changes contained in the *Further Notice of Proposed Rulemaking* (*Further Notice*), and accordingly, has prepared an Initial Regulatory Flexibility Analysis (IRFA) The IRFA for Docket 20-443 is set forth in the Appendix B. The Commission has also prepared an Initial Regulatory Flexibility Analysis (IRFA) concerning the possible impact of the rule and policy changes contained in this *Notice of Proposed Rulemaking* (*Notice*) in Docket 22-352. This IRFA is set forth in Appendix C. Written public comments are requested on both IRFAs. Comments must be filed by the deadlines for comments on the *Further Notice* and *Notice* indicated on the first page of this document and must have a separate and distinct heading designating them as responses to the IRFA. We remind commenters to file in the appropriate docket: WT Docket No. 20-443 for the *Further Notice*, and GN Docket No. 22-352 for the *Notice*.

E. Paperwork Reduction Act

152. The *Further Notice of Proposed Rulemaking* in WT Docket No. 20-443 and the *Notice of Proposed Rulemaking* in GN Docket No. 22-352 may contain proposed modified information collection

[435] *See FCC Announces Closure of FCC Headquarters Open Window and Change in Hand-Delivery Policy*, Public Notice, 35 FCC Rcd 2788 (2020), https://www.fcc.gov/document/fcc-closes-headquarters-open-window-and-changes-hand-delivery-policy.

[436] *See Amendment of the Commission's Rules of Practice and Procedure*, Order, DA 20-562 (OMD 2020).

[437] The RFA, 5 U.S.C. §§ 601–612, was amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[438] 5 U.S.C. §§ 603, 605(b).

requirements. Therefore, we seek comment on potential new or revised information collections subject to the Paperwork Reduction Act of 1995. If the Commission adopts any new or revised information collection requirements, the Commission will publish a notice in the Federal Register inviting the general public and the Office of Management and Budget to comment on the information collection requirements, as required by the Paperwork Reduction Act of 1995, Public Law 104-13. In addition, pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, *see* 44 U.S.C. 3506(c)(4)), we seek specific comment on how we might further reduce the information collection burden for small business concerns with fewer than 25 employees.

153. The *Order* in GN Docket No. 22-352 does not contain new or modified information collection requirements subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13. In addition, therefore, the *Order* does not contain any new or modified information collection burden for small business concerns with fewer than 25 employees, pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, *see* 44 U.S.C. 3506(c)(4).

F. Congressional Review Act

154. The Commission will not send a copy of the Report and Order to Congress and the Government Accountability Office pursuant to the Congressional Review Act (CRA), see 5 U.S.C 801(a)(1)(A), because it does not adopt any rule as defined in the Congressional Review Act, 5 U.S.C. 804(3).

G. Further Information

155. For additional information on this proceeding, contact Madelaine Maior of the Wireless Telecommunications Bureau, Broadband Division, at madelaine.maior@fcc.gov or 202-418-1466; Simon Banyai of the Wireless Telecommunications Bureau, at simon.banyai@fcc.gov or (202) 418-1443;or Nick Oros of the Office of Engineering and Technology, at nicholas.oros@fcc.gov or (202) 418-2099.

VIII. ORDERING CLAUSES

156. IT IS ORDERED that, pursuant to sections 1, 2, 4, 5, 301, 302, 303, 304, 307, 309, 310, and 316 of the Communications Act of 1934, 47 U.S.C. §§ 151, 152, 154, 155, 301, 302a, 303, 304, 307, 309, 310, 316, and section 1.411 of the Commission's rules, 47 CFR § 1.411, this Report and Order and Further Notice of Proposed Rulemaking and Notice of Proposed Rulemaking and Order in the captioned dockets IS ADOPTED.

157. The inquiry in *Expanding Flexible Use in Mid-Band Spectrum Between 3.7-24 GHz*, GN Docket No. 17-183, is TERMINATED as to the mid-band spectrum between 12.2 GHz and 13.25 GHz.

158. IT IS FURTHER ORDERED that, pursuant to applicable procedures set forth in sections 1.415 and 1.419 of the Commission's rules, 47 CFR §§ 1.415, 1.419, interested parties may file comments on the Further Notice of Proposed Rulemaking in WT Docket No. 20-443 and the Notice of Proposed Rulemaking in GN Docket No. 22-352 on or before the number of days shown on the first page of this document after publication in the Federal Register, and reply comments on or before the number of days shown on the first page of this document after publication in the Federal Register.

159. IT IS FURTHER ORDERED that the Commission's Office of the Secretary, Reference Information Center, SHALL SEND a copy of this Report and Order and Further Notice of Proposed Rulemaking and Notice of Proposed Rulemaking and Order, including the associated Supplemental Initial Regulatory Flexibility Analysis and Initial Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A

Proposed Rules in GN Docket No. 22-352

The Federal Communications Commission proposes to amend 47 CFR parts 1, 2, 25, 27, 74, 78, and 101, as follows:

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, subparts 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); 900 MHz Broadband Service (part 27, subpart P); 3.45 GHz Service (part 27, subpart Q); 3.7 GHz Service (part 27, subpart O); Advanced Wireless Services (part 27, subparts K and L); 12.7 GHz Service (part 27, subpart R); 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); Educational Broadband Service (part 27, 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 of this chapter).

3. Amend § 1.9005 by:

a. Removing the word "and" at the end of paragraph (nn);
b. Removing the period at the end of paragraph (pp) and adding and "; and" in its place; and
c. Adding paragraph (qq) to read as follows:

§ 1.9005 Included services.

* * * * *

(qq) The 12.7 GHz Service in the 12.7-13.25 GHz band (part 27 of this chapter).

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

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

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

5. Amend § 2.106, the Table of Frequency Allocations, as follows:

a. Revise page 49 to read as follows:

Table of Frequency Allocations			11.7-14.47 GHz (SHF)		Page 49
International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
11.2-11.45 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 (Earth-to-space) 5.484 MOBILE except aeronautical mobile	11.2-11.45 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 MOBILE except aeronautical mobile		(See previous page)		
11.45-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B (Earth-to-space) 5.484 MOBILE except aeronautical mobile	11.45-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B MOBILE except aeronautical mobile				
11.7-12.5 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 5.492	11.7-12.1 FIXED 5.486 FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.488 Mobile except aeronautical mobile 5.485	11.7-12.2 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 5.492	11.7-12.2	11.7-12.2 FIXED-SATELLITE (space-to-Earth) 5.485 5.488 NG143 NG527A	Satellite Communications (25)
	12.1-12.2 FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.488 5.485 5.489	5.487 5.487A			
5.487 5.487A	12.2-12.7 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 5.492 5.487A 5.488 5.490	12.2-12.5 FIXED FIXED-SATELLITE (space-to-Earth) 5.484B MOBILE except aeronautical mobile BROADCASTING 5.484A 5.487	12.2-12.75	12.2-12.7 FIXED BROADCASTING-SATELLITE 5.487A 5.488 5.490	Satellite Communications (25) Fixed Microwave (101)
12.5-12.75 FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B (Earth-to-space) 5.494 5.495 5.496	12.7-12.75 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE except aeronautical mobile	12.5-12.75 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B MOBILE except aeronautical mobile BROADCASTING-SATELLITE 5.493		12.7-12.75 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE NG53 NG57	TV Broadcast Auxiliary (74F) Cable TV Relay (78) Fixed Microwave (101)
12.75-13.25 FIXED FIXED-SATELLITE (Earth-to-space) 5.441 MOBILE Space research (deep space) (space-to-Earth)			12.75-13.25 US251	12.75-13.25 FIXED FIXED-SATELLITE (Earth-to-space) 5.441 MOBILE US251 NG53 NG57	Satellite Communications (25) TV Broadcast Auxiliary (74F) Cable TV Relay (78) Fixed Microwave (101)
13.25-13.4 EARTH EXPLORATION-SATELLITE (active) AERONAUTICAL RADIONAVIGATION 5.497 SPACE RESEARCH (active) 5.498A 5.499			13.25-13.4 EARTH EXPLORATION-SATELLITE (active) AERONAUTICAL RADIONAVIGATION 5.497 SPACE RESEARCH (active) 5.498A	13.25-13.4 AERONAUTICAL RADIONAVIGATION 5.497 Earth exploration-satellite (active) Space research (active)	Aviation (87)

b. In the list of Non-Federal Government (NG) Footnotes, revise footnotes NG52, NG53, NG57, and NG118 to read as follows:

NG52-Except as provided for by NG527A, use of the band 10.7-11.7 GHz (space-to-Earth) by geostationary satellites in the fixed-satellite service shall be limited to international systems, *i.e.,* other than domestic systems.

NG53 The mobile BAS/CARS repack band(s) is reserved for eligible incumbent television pickup (TVPU) and cable television relay service (CARS) pickup stations (collectively, mobile BAS/CARS) that were licensed to operate in the 12.7-13.25 GHz band pursuant to applications filed before September 19, 2022.

NG57- In the band 12.7-13.25 GHz, the following provisions shall apply:

(a) Except as provided in NG53 and in the paragraphs below, the band is designated for emerging technologies under part 27 of this chapter.

(b) *Fixed Satellite Service incumbents*. Any Fixed Satellite Service space station or earth station authorized to serve or operate in the United States in accordance with the Table of Allocations based on a petition for market access or application filed before September 19, 2022, may continue such Earth-to-space operations on a primary basis. For such incumbent Fixed Satellite Service stations, the use of the band 12.75-13.25 GHz by geostationary satellites is limited to international systems, i.e., other than domestic systems; non-geostationary-satellite systems are limited to communications with individually licensed incumbent earth stations. In the sub-band 13.15-13.2125 GHz, NGSO FSS gateway uplink transmissions shall be limited to a maximum e.i.r.p. of 3.2 dBW towards 0° on the radio horizon.

(1) On or after September 19, 2022, petitions for market access or applications for new or modified Fixed Satellite Service space stations and earth stations are unacceptable for filing and shall be dismissed, with the following exceptions:

(i) *Space stations*. Applications for space stations limited to serving earth stations outside the United States, applications for modification of existing space station authorizations, see § 25.117 of this chapter, applications to relocate existing space stations pursuant to the Commission's fleet management policy, see 25.118(e) of this chapter, and applications for replacement space stations.

(ii) *Earth stations*. Applications for renewal or cancellation of incumbent earth station authorizations, modifications to correct location or other data required in the incumbent earth station file, and modifications not requiring prior Commission authorization, see § 25.118(a)-(b) of this chapter.

(c) *Fixed Service and Mobile Service incumbents*. Licensees of Fixed Service or Mobile Service authorized based on an application filed before September 19, 2022, pursuant to parts 74, 78, or 101 of this chapter may continue to operate as authorized until the applicable sunset date.

(1) On or after September 19, 2022, applications for new or modified Fixed Service or Mobile Service operations under parts 74, 78, and 101 are unacceptable for filing and shall be dismissed, with the following exceptions:

(i) *Mobile BAS/CARS repack.* Applications for modification by incumbent mobile BAS/CARS licensees to relocate to the mobile BAS/CARS repack band (see NG53).

(ii) *Other*: Applications for renewal, cancellation, or minor modification (if the incumbent licensee establishes that the modification would not add to any relocation costs).

NG118 In the bands 2025-2110 MHz~~,~~ and 6875-7125 MHz, television translator relay stations may be authorized to use frequencies on a secondary basis to other stations in the Television Broadcast Auxiliary Service that are operating in accordance with the Table of Frequency Allocations.

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 § 25.115 to add "12.7-13.25 GHz" to the heading of paragraph (e), add paragraphs (e)(2) and (f)(4) as follows:

§ 25.115 Applications for earth station authorizations

* * * * *

(e) **GSO FSS earth stations in 12.7-13.25 GHz and 17.8–30 GHz**

(2) On or after September 19, 2022, applications for new or modified GSO FSS earth station licenses in the 12.7-13.25 GHz band are unacceptable for filing and shall be dismissed, with the exception of applications for renewal or cancellation of incumbent earth station authorizations, and modifications to correct location or other data required in the incumbent earth station file, and modifications not requiring prior Commission authorization, see § 25.118(a)-(b).

(f) *NGSO FSS earth stations in 10.7–30.0 GHz*

* * * * *

(4) On or after September 19, 2022, applications for new or modified earth station licenses in the 12.7-13.25 GHz band are unacceptable for filing and shall be dismissed, with the exception of applications for renewal or cancellation of incumbent earth station authorizations, and modifications to correct location or other data required in the incumbent earth station file, and modifications not requiring prior Commission authorization, see § 25.118(a)-(b).

PART 27 – MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

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

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

9. Amend § 27.1 by adding paragraph (b)(18) to read as follows:

§ 27.1 Basis and purpose.

* * * * *

(b) * * *

(18) 12.7–13.25 GHz.

* * * * *

10. Amend § 27.2 by adding paragraph (f) to read as follows:

§ 27.2 Permissible Communications.

* * * * *

(f) 12.7-13.25 GHz band. The 12.7-13.25 GHz frequencies may not be used for downlink satellite transmission.

* * * * *

11. Amend § 27.4 by adding in alphabetical or numerical order the definition for "12.7 GHz Service" to read as follows:

§ 27.4 Terms and definitions.

12.7 GHz Service. A radiocommunication service licensed under this part for the frequency bands specified in § 27.5(p) (12.7-13.25 GHz band).

* * * * *

12. Amend § 27.5 by adding paragraph (p) to read as follows:

§ 27.5 Frequencies.

* * * * *

(p) *12.7-13.25 GHz band*. The 12.7 GHz Service is licensed as five individual 100 megahertz blocks [and one smaller block depending on resolution of mobile BAS/CARS repack band] available for assignment on a Partial Economic Area basis, *see* § 27.6(o).

13. Amend § 27.6 by adding paragraph (o) to read as follows:

§ 27.6 Service areas.

* * * * *

(o) *12.7-13.25 GHz band.* Service areas in the 12.7 GHz Service are based on Partial Economic Areas (PEAs) as defined by appendix A to this subpart.

14. Amend § 27.11 by adding paragraph (n) to read as follows:

§ 27.11 Initial authorization.

* * * * *

(n) *12.7-13.25 GHz band*. Authorizations for licenses in the 12.7 GHz Service will be based on Partial Economic Areas (PEAs), as specified in § 27.6(o), and the frequency blocks specified in § 27.5(p).

15. Amend § 27.13 by adding paragraph (p) to read as follows:

§ 27.13 License period.

* * * * *

(p) *12.7-13.25 GHz band*. Authorization for the band will have a term not to exceed ten (10) years from the date of issuance.

16. Amend § 27.14 by revising the first sentence of paragraphs (a) and (k), and adding paragraph (x) 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, in the 3450-3550 MHz band, in the 3700-3980 MHz band, and in the 12.7-13.25 GHz 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. "Substantial service" is defined as service which is sound, favorable and substantially above a level of mediocre service which just might minimally warrant renewal. Failure by any licensee to meet this requirement will result in forfeiture of the license and the licensee will be ineligible to regain it.

* * * * *

(k) Licensees holding WCS or AWS authorizations in the spectrum blocks enumerated in paragraphs (g), (h), (i), (q), (r), (s), (t), (v), (w), and (x) 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. The licensee must certify whether it has met the applicable performance requirements. The licensee must file a description and certification of the areas for which it is providing service. The construction notifications must include electronic coverage maps, supporting technical documentation and any other information as the Wireless Telecommunications Bureau may prescribe by public notice.

* * * * *

(x) The following provisions apply to any licensee holding an authorization in the 12.7-13.25 GHz band:

(1) Licensees relying on mobile or point-to-multipoint service shall provide reliable signal coverage and offer service within five (5) 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 ten (10) 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 five 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 10 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 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 five (5) years from the date of the initial license to at least thirty-five (35) percent of the license ("First Buildout Requirement"). A licensee offering Internet of Things-type services shall provide geographic area coverage within ten (10) years from the date of the initial license to at least 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.

17. Amend § 27.50 by adding paragraph (l) to read as follows:

§ 27.50 Power limits and duty cycle.

* * * * *

(l) The following power requirements apply to stations transmitting in the 12.7-13.25 GHz band:

(1) For fixed and base stations operating in connection with mobile systems, the average power of the sum of all antenna elements is limited to an equivalent isotopically radiated power (EIRP) density of +75dBm/100 MHz. For channel bandwidths less than 100 megahertz the EIRP must be reduced proportionally and linearly based on the bandwidth relative to 100 megahertz.

(2) For mobile stations, the average power of the sum of all antenna elements is limited to a maximum EIRP of +43 dBm.

(3) For transportable stations (transmitting equipment that is not intended to be used while in motion, but rather at stationary locations), the average power of the sum of all antenna elements is limited to a maximum EIRP of +55 dBm.

(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.

(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.

18. Amend § 27.53 by adding paragraph (p) to read as follows:

§ 27.53 Emission limits.

* * * * *

(p) *12.7 GHz Service*. The following emission limits apply to stations transmitting in the 12.7-13.25 GHz band:

(1) For base station operations in the 12.7-13.25 GHz band, the conducted power or the total radiated power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz. Compliance with this paragraph (p)(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.

(2) For mobile operations in the 12.7-13.25 GHz band, the conducted power or the total radiated power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz. Compliance with this paragraph (p)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.

19. Amend § 27.55 by adding paragraph (f) to read as follows:

§ 27.55 Power strength limits.

* * * * *

(f) *Power flux density for* stations *operating in the 12.7-13.25 GHz band.* For base and fixed stations operation in the 12.7-13.25 GHz 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 −77.6 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.

20. 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, 3450-3550 MHz, 3700-3980 MHz, and 12.7-13.25 GHz bands is subject to international agreements with Mexico and Canada.

21. Add new subpart R to read as follows:

Subpart R – 12.7 GHz Service (12.7-13.25 GHz)

RELOCATION OF INCUMBENT OPERATIONS IN THE 12.7-13.25 GHZ BAND

§ 27.1711 Relocation of fixed microwave services, broadcast auxiliary services, and cable television relay services in the 12.7-13.25 GHz band

Parts 27, 74, 78 and 101 of this chapter contain provisions governing the relocation of incumbent Fixed Microwave Services (FS) (see part 101), Broadcast Auxiliary Services (BAS) (see part 74), and Cable Television Relay Services (CARS) (see part 78) in the 12.7-13.25 GHz bands. The relocation of fixed microwave, BAS, and CARS are governed by parts 27 and 101. The relocation of mobile BAS and CARS licensees are governed, respectively, by §§ 74.690 and 78.40.

PROTECTION OF INCUMBENT OPERATIONS IN THE 12.7-13.25 GHZ BAND

§ 27.1712 Protection of fixed operations in the 12.7-13.25 GHz band under parts 74, 78 and 101.

All Emerging Technologies (ET) licensees, prior to initiating operations from any base or fixed station in the 12.7-13.25 GHz band, must coordinate their frequency usage with co-channel and adjacent-channel fixed incumbents. Coordination shall be conducted in accordance with the provisions of § 24.237 of this chapter.

§ 27.1713 Protection of federal government operations in the 12.7-13.25 GHz band

The band 12.75-13.25 GHz is allocated to the space research (deep space) (space-to-Earth) service for reception only at Goldstone, CA (35°20′ N, 116°53′ W). See § 2.106 note US251 of this chapter. The 12.7-13.25 GHz band includes a federal allocation for reception-only by a satellite ground station at the Goldstone Deep Space Communications Complex (Goldstone Observatory), operated by the National Aeronautics and Space Administration (NASA).

§ 27.1714 Interference to Emerging Technologies licensees in the 12.7-13.25 GHz band from Earth stations in the Fixed Satellite Service.

An ET licensee in the 12.7-13.25 GHz band must accept or protect itself from interference from earth stations that were authorized to transmit (Earth-to-space) in the band based on an application filed before September 19, 2022.

COST-SHARING POLICIES GOVERNING RELOCATION FROM THE 12.7-13.25 GHZ BAND

§ 27.1760 Cost-sharing requirements for Emerging Technologies in the 12.7-13.25 GHz Band.

Frequencies in the 12.7-13.25 GHz band have been reallocated from Fixed Microwave Services (FS) (see Part 101), Broadcast Auxiliary Services (BAS) (see Part 74), Cable Television Relay Services (CARS) (see Part 78), and Fixed Satellite Services (FSS) (see Part 25) to use by Emerging Technologies (ET) (as reflected in § 2.106 of this chapter). The relocation of fixed microwave links, including fixed BAS and CARS, are governed by Parts 27 and 101 and referred to as microwave licensee(s) in this section. The relocation of mobile BAS and CARS operations are governed, respectively, by Sections 74.690 and 78.40. ET entities are required to relocate an existing microwave licensee in these bands if interference to the existing microwave licensee would occur. All ET entities that benefit from the clearance of this spectrum by other ET entities or by a voluntarily relocating microwave incumbent must contribute to such relocation costs. ET entities may satisfy their reimbursement requirement by entering into private cost-sharing agreements or agreeing to terms other than those specified in § 27.1762. However, ET entities are required to reimburse other ET entities or voluntarily relocating microwave incumbents that incur relocation costs and are not parties to the alternative agreement. In addition, parties to a private cost-sharing agreement may seek reimbursement through the clearinghouse (as discussed in § 27.1761) from ET entities that are not parties to the agreement. The cost-sharing plan is in effect during all phases of the relocation. If an ET licensee enters into a spectrum leasing arrangement (as set forth in part 1, subpart X of this chapter) and the spectrum lessee triggers a cost-sharing obligation, the licensee is the ET entity responsible for satisfying the cost-sharing obligations under §§ 27.1760–27.1767.

§ 27.1761 Administration of the cost-sharing plan.

The Wireless Telecommunications Bureau, under delegated authority, will select one or more entities to operate as a neutral, not-for-profit clearinghouse(s). This clearinghouse(s) will administer the cost-sharing plan by, inter alia, determining the cost-sharing obligation of ET entities for the relocation of incumbents from the 12.7-13.25 GHz band. The clearinghouse filing requirements (see §§ 27.1763-27.1765) will not take effect until an administrator is selected.

§ 27.1762 The cost-sharing formula.

An ET relocator who relocates an interfering microwave link, i.e., one that is in all or part of its market area and in all or part of its frequency band or a voluntarily relocating microwave incumbent, is entitled to *pro rata* reimbursement based on the following formula:

$$RN = \frac{C}{N} \cdot \frac{\left[120 - \left(T_m\right)\right]}{120}$$

(a) *RN* equals the amount of reimbursement.

(b) *C* equals the actual cost of relocation. Actual relocation costs include, but are not limited to, such items as: Radio terminal equipment (TX and/or RX—antenna, necessary feed lines, MUX/Modems); towers and/or modifications; back-up power equipment; monitoring or control equipment; engineering costs (design/path survey); installation; systems testing; FCC filing costs; site acquisition and civil works; zoning costs; training; disposal of old equipment; test equipment (vendor required); spare equipment; project management; prior coordination notification under § 101.103(d) of this chapter; site lease renegotiation; required antenna upgrades for interference control; power plant upgrade (if required); electrical grounding systems; Heating Ventilation and Air Conditioning (HVAC) (if required); alternate transport equipment; and leased facilities. Increased recurring costs represent part of the actual cost of relocation and, even if the compensation to the incumbent is in the form of a commitment to pay five years of charges, the ET relocator is entitled to seek immediate reimbursement of the lump sum amount

based on present value using current interest rates, provided it has entered into a legally binding agreement to pay the charges. *C* also includes voluntarily relocating incumbent's independent third-party appraisal of its compensable relocation costs and incumbent transaction expenses that are directly attributable to the relocation, subject to a cap of two percent of the "hard" costs involved. Hard costs are defined as the actual costs associated with providing a replacement system, such as equipment and engineering expenses. *C* may not exceed $125,000 per link, with an additional $150,000 permitted if a new or modified tower is required.

(c) *N* equals the number of ET entities that have triggered a cost-sharing obligation. For the ET relocator, $N = 1$. For the next ET entity triggering a cost-sharing obligation, $N = 2$, and so on. In the case of a voluntarily relocating incumbent, $N = 1$ for the first ET entity triggering a cost-sharing obligation. For the next ET entity triggering a cost-sharing obligation, $N = 2$, and so on.

(d) *Tm* equals the number of months that have elapsed between the month the ET relocator or voluntarily relocating incumbent obtains reimbursement rights for the link and the month in which an ET entity triggers a cost-sharing obligation. An ET relocator obtains reimbursement rights for the link on the date that it signs a relocation agreement with an incumbent. A voluntarily relocating incumbent obtains reimbursement rights for the link on the date that the incumbent notifies the Commission that it intends to discontinue, or has discontinued, the use of the link, pursuant to § 101.305 of the Commission's rules, if applicable, or § 1.953 (Discontinuance of service or operations) of this chapter.

§ 27.1763 Reimbursement under the Cost-Sharing Plan

(a) ***Registration of reimbursement rights***. Claims for reimbursement under the cost-sharing plan are limited to relocation expenses incurred on or after the date when the first ET license is issued in the relevant 12.7-13.25 GHz band (start date). If a clearinghouse is not selected by that date (see § 27.1764) claims for reimbursement (see § 27.1763) and notices of operation (see § 27.1765) for activities that occurred after the start date but prior to the clearinghouse selection must be submitted to the clearinghouse within 30 calendar days of the selection date.

(1) To obtain reimbursement, an ET relocator must submit documentation of the relocation agreement to the clearinghouse within 30 calendar days of the date a relocation agreement is signed with an incumbent. In the case of involuntary relocation, an ET relocator must submit documentation of the relocated system within 30 calendar days after the end of the relocation.

(2) To obtain reimbursement, a voluntarily relocating incumbent must submit documentation of the relocation of the link to the clearinghouse within 30 calendar days of the date that the incumbent notifies the Commission that it intends to discontinue, or has discontinued, the use of the link, pursuant to § 101.305 of the Commission's rules.

(b) ***Documentation of expenses***. Once relocation occurs, the ET relocator, or the voluntarily relocating incumbent, must submit documentation itemizing the amount spent for items specifically listed in § 27.1762(b), as well as any reimbursable items not specifically listed in § 27.1762(b) that are directly attributable to actual relocation costs. Specifically, the ET relocator, or the voluntarily relocating incumbent must submit, in the first instance, only the uniform cost data requested by the clearinghouse along with a copy, without redaction, of either the relocation agreement, if any, or the third party appraisal described in (b)(1) of this section, if relocation was undertaken by the microwave incumbent. ET relocators and voluntarily relocating incumbents must maintain documentation of cost-related issues until the applicable sunset date and provide such documentation upon request, to the clearinghouse, the Commission, or entrants that trigger a cost-sharing obligation. If an ET relocator pays an incumbent a monetary sum to relocate its own facilities, the ET relocator must estimate the costs associated with relocating the incumbent by itemizing the anticipated cost for items listed in § 27.1762(b). If the sum paid to the incumbent cannot be accounted for, the remaining amount is not eligible for reimbursement.

(1) ***Third party appraisal***. A voluntarily relocating incumbent, must also submit an independent third party appraisal of its compensable relocation costs. The appraisal should be based on the actual cost

of replacing the incumbent's system with comparable facilities and should exclude the cost of any equipment upgrades or items outside the scope of § 27.1762(b).

(2) ***Identification of links***. The ET relocator or the voluntarily relocating incumbent must identify the particular link associated with appropriate expenses (i.e., costs may not be averaged over numerous links).

(c) ***Full Reimbursement***. An ET relocator who relocates a microwave link that is either fully outside its market area or its licensed frequency band may seek full reimbursement through the clearinghouse of compensable costs, up to the reimbursement cap as defined in § 27.1762(b). Such reimbursement will not be subject to depreciation under the cost-sharing formula.

(d) ***Good Faith Requirement***. New entrants and incumbent licensees are expected to act in good faith in satisfying the cost-sharing obligations under §§ 27.1760 through 27.1767. The requirement to act in good faith extends to, but is not limited to, the preparation and submission of the documentation required in paragraph (b) of this section.

(e) ***Reimbursement for Self-relocating Incumbents in the 12.7-13.25 GHz band***. Where a voluntarily relocating incumbent relocates its own links, it is entitled to reimbursement from the first ET beneficiary for its actual costs for relocating the links, subject to the reimbursement cap in § 27.1762(b). This amount is subject to depreciation as specified in § 27.1762(b). An ET licensee who is obligated to reimburse relocation costs under this rule is entitled to obtain reimbursement from other ET beneficiaries in accordance with §§ 27.1762 and 27.1764. For purposes of applying the cost-sharing formula relative to other ET licensees that benefit from the self-relocation, depreciation shall run from the date on which the clearinghouse issues the notice of an obligation to reimburse the voluntarily relocating microwave incumbent.

§ 27.1764 Triggering a reimbursement obligation.

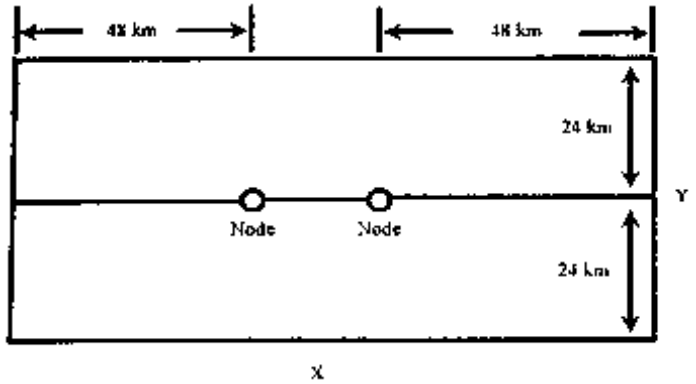
(a) The clearinghouse will apply the following test to determine when an ET entity has triggered a cost-sharing obligation and therefore must pay an ET relocator or a voluntarily relocating incumbent in accordance with the formula detailed in § 27.1762:

(1) All or part of the relocated microwave link was initially co-channel with the licensed ET band of the ET entity;

(2) An ET relocator or a voluntarily relocating incumbent has paid the relocation costs of the incumbent; and

(3) The ET entity is operating or preparing to turn on a fixed base station at commercial power and the fixed base station is located within a rectangle (Proximity Threshold) described as follows:

(i) The length of the rectangle shall be x where x is a line extending through both nodes of the microwave link to a distance of 48 kilometers (30 miles) beyond each node. The width of the rectangle shall be y where y is a line perpendicular to x and extending for a distance of 24 kilometers (15 miles) on both sides of x. Thus, the rectangle is represented as follows:



(ii) If the application of the Proximity Threshold Test indicates that a reimbursement obligation exists, the clearinghouse will calculate the reimbursement amount in accordance with the cost-sharing formula and notify the ET entity of the total amount of its reimbursement obligation.

(b) Once a reimbursement obligation is triggered, the ET entity may not avoid paying its cost-sharing obligation by deconstructing or modifying its facilities.

§ 27.1765 Payment issues.

Prior to initiating operations for a newly constructed site or modified existing site, an ET entity is required to file a notice containing site-specific data with the clearinghouse. The notice regarding the new or modified site must provide a detailed description of the proposed site's spectral frequency use and geographic location, including but not limited to the applicant's name and address, the name of the transmitting base station, the geographic coordinates corresponding to that base station, the frequencies and polarizations to be added, changed or deleted, and the emission designator. If a prior coordination notice (PCN) under § 101.103(d) of this chapter is prepared, ET entities can satisfy the site-data filing requirement by submitting a copy of their PCN to the clearinghouse. ET entities that file either a notice or a PCN have a continuing duty to maintain the accuracy of the site-specific data on file with the clearinghouse. Utilizing the site-specific data, the clearinghouse will determine if any reimbursement obligation exists and notify the ET entity in writing of its repayment obligation, if any. When the ET entity receives a written copy of such obligation, it must pay directly to the relocator the amount owed within 30 calendar days.

§ 27.1766 Dispute Resolution Under the Cost-Sharing Plan.

(a) Disputes arising out of the cost-sharing plan, such as disputes over the amount of reimbursement required, must be brought, in the first instance, to the clearinghouse for resolution. To the extent that disputes cannot be resolved by the clearinghouse, parties are encouraged to use expedited Alternative Dispute Resolution (ADR) procedures, such as binding arbitration, mediation, or other ADR techniques.

(b) ***Evidentiary requirement***. Parties of interest contesting the clearinghouse's determination of specific cost-sharing obligations must provide evidentiary support to demonstrate that their calculation is reasonable and made in good faith. Specifically, these parties are expected to exercise due diligence to obtain the information necessary to prepare an independent estimate of the relocation costs in question and to file the independent estimate and supporting documentation with the clearinghouse.

§ 27.1767 Termination of cost-sharing obligations.

The cost-sharing plan will sunset for all ET entities on the same date on which the relocation obligation for the 12.7-13.25 GHz band terminates. ET entrants that trigger a cost-sharing obligation prior to the sunset date must satisfy their payment obligation in full.

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

22. The authority citation for Part 74 continues to read as follows:

47 U.S.C. 154, 302a, 303, 307, 309, 310, 325, 336 and 554.

23. Modify § 74.602(a) and note 2 of the Table to read as follows:

§ 74.602 Frequency assignment.

(a) The following frequencies are available for assignment to television pickup, television STL, television relay and television translator relay stations. The band segments 17,700-18,580 and 19,260-19,700 MHz are available for broadcast auxiliary stations as described in paragraph (g) of this section. The band segment 6425-6525 MHz is available for broadcast auxiliary stations as described in paragraph (i) of this section. The bands 6875-7125 MHz and 12700-13200 MHz are co-equally shared with stations licensed pursuant to Parts 78 and 101 of the Commission's Rules. Broadcast network-entities may also use the 1990-2110, 6425-6525 and 6875-7125 MHz bands for mobile television pickup only. On or after September 19, 2022, applications for new or modified stations in the 12.7-13.25 GHz band under parts 74, 78, and 101 are unacceptable for filing and shall be dismissed, except for applications of eligible incumbent television pickup (TVPU) and cable television relay service (CARS) pickup stations (collectively, mobile BAS/CARS) licensees to modify incumbent authorizations to the repacked mobile BAS/CARS sub-band.

* * * * *

[2] The mobile BAS/CARS repack band(s) is reserved for mobile BAS/CARS licensees that were licensed to operate in the 12.7-13.25 GHz band pursuant to applications filed before September 19, 2022 that timely certified such authorizations as required in accordance with the procedures set-forth in GN Docket No. 22-352.

24. Modify § 74.690(a)-(d) and add new (f) to read as follows:

§ 74.690 Transition of the 1990-2025 MHz and 12,700-13,250 MHz bands from the Broadcast Auxiliary Service to Emerging Technologies and Reimbursement and Cost-Sharing.

(a) New Entrants are collectively defined as those licensees proposing to use emerging technologies to implement Mobile Satellite Services in the 2000-2020 MHz band (MSS licensees), those licensees authorized after July 1, 2004 to implement new Fixed and Mobile services in the 1990-1995 MHz band, those licensees authorized after September 9, 2004 in the 1995-2000 MHz and 2020-2025 MHz bands, and those licensees authorized under part 27 after in the 12,700-13,250 MHz band. * * * New Entrants in the 12,700-13,250 MHz band are subject to the specific relocation procedures adopted in GN Docket No. 22-352. New Entrants may negotiate with Broadcast Auxiliary Service (BAS) licensees operating on a primary basis and fixed service licensees operating on a primary basis in the 12,700-13,250 MHz band (Existing 12.7 GHz Licensees) for the purpose of agreeing to terms under which the Existing 12.7 GHz Licensees in the 12,700-13,250 MHz band would relocate their authorized operation, if timely certified as required in accordance with the procedures set-forth in GN Docket No. 22-352, or discontinue use of the 12,700-13,250 MHz band.

(b) An Existing Licensee and Existing 12.7 GHz Licensee will maintain primary status in the band until the operations of the Existing Licensee or Existing 12.7 GHz Licensee are relocated by a New Entrant, are discontinued under the terms of paragraph (a) of this section, or become secondary under the terms of paragraphs (e)(6) or (f)(6) of this section or the Existing Licensee or Existing 12.7 GHz Licensee indicates to a New Entrant that it declines to be relocated.

(c) The Commission will amend the operating license of the Existing Licensee or Existing 12.7 GHz Licensee, other than the mobile operations of an Existing 12.7 GHz Licensee that has been transitioned to the repack band, to secondary status only if the following requirements are met:

(1) The service applicant, provider, licensee, or representative using an emerging technology guarantees payment of all relocation costs, including all engineering, equipment, site and FCC fees, as well as any reasonable additional costs that the relocated Existing Licensee or Existing 12.7 GHz Licensee might incur as a result of operation in another authorized band or migration to another medium;

(2) The New Entrant completes all activities necessary for implementing the replacement facilities, including engineering and cost analysis of the relocation procedure and, if radio facilities are used, identifying and obtaining, on the incumbents' behalf, new microwave or Local Television Transmission Service frequencies and frequency coordination.

(3) The New Entrant builds the replacement system and tests it for comparability with the existing system.

(d) The Existing Licensee or Existing 12.7 GHz Licensee is not required to relocate until the alternative facilities are available to it for a reasonable time to make adjustments, determine comparability, and ensure a seamless handoff. If, within one year after the relocation to new facilities the Existing Licensee or Existing 12.7 GHz Licensee demonstrates that the new facilities are not comparable to the former facilities, the New Entrant must remedy the defects.

* * * * *

(f) Subject to the terms of this paragraph (f), the relocation of Existing 12.7 GHz Licensees will be carried out by New Entrants in the following manner:

(1) Existing 12.7 GHz Licensees and New Entrants may negotiate individually or collectively for relocation of Existing 12.7 GHz Licensees to comparable facilities, as that term is used in § 101.73 of this chapter. Parties may not decline to negotiate, though Existing 12.7 GHz Licensees may decline to be relocated.

(i) New Entrants are required to relocate the fixed microwave links of Existing 12.7 GHz Licensees prior to commencing operations if interference would occur. A New Entrant must conform to the technical criteria specified in TIA Bulletin TSB 10-F, or procedures other than TSB 10-F that follow generally acceptable good engineering practices pursuant to Section 101.105(c) of the Commission's rules, to determine if interference would occur such that their relocation would be necessary before a New Entrant's operations could commence.

(ii) New Entrants must relocate the non-fixed and mobile operations of all Existing 12.7 GHz Licensees on a market-by-market basis in a Nielsen Designated Market Areas (DMA), as such DMAs existed on September 19, 2022, in which it seeks to provide service prior to commencing operations, except those Existing 12.7 GHz Licensees that decline relocation.

(iii) Such relocation negotiations shall be conducted as "mandatory negotiations," as that term is used in § 101.73 of this chapter. If these parties are unable to reach a negotiated agreement prior to the expiration of the mandatory negotiation period, New Entrants may involuntarily relocate such Existing 12.7 GHz Licensees in accordance with procedures set-forth in § 101.75 of this chapter.

(iv) After the end of the mandatory negotiation period, an New Entrant may involuntary relocate any Existing 12.7 GHz Licensees with which they have been unable to reach a negotiated agreement.

(2) Notwithstanding paragraph (f)(1) above, the non-fixed and mobile operations of Existing 12.7 GHz Licensees' operations in an adjacent market may need to be relocated even though the New Entrant does not initiate operations in that adjacent market. A New Entrant undertaking clearing would be obligated to relocate all incumbent non-fixed and mobile operations of Existing 12.7 GHz Licensees in all affected markets, including those markets where the New Entrant provides partial, minimal, or even no service. A New Entrant must conform to the technical criteria specified in TIA Bulletin TSB 10-F, or procedures other than TSB 10-F that follow generally acceptable good engineering practices pursuant to Section 101.105(c) of the Commission's rules, to determine any additional market(s) where a New

Entrant would cause interference to the non-fixed and mobile operations of Existing 12.7 GHz Licensees, such that their relocation would be necessary before a New Entrant commences operations.

(3) The obligations of a New Entrant to relocate an Existing 12.7 GHz Licensee will terminate on the sunset date for Existing 12.7 GHz Licensee to retain primary operations in the band. On this date, all Existing 12.7 GHz Licensees will become secondary in the 12.7-13.25 GHz band with the exception of mobile BAS relocated to the repacked band. Upon written demand by a New Entrant that intends to commence operations in the 12.7-13.25 GHz band, Existing 12.7 GHz Licensees that have not been relocated to the repacked band must cease operations in the 12.7-13.25 GHz band within six months.

(4) The cost-sharing obligations of New Entrants for the relocation of the fixed microwave links of Existing 12.7 GHz Licensees is governed by Sections 27.1760-27.1767 of this chapter. The cost-sharing obligations of New Entrants for the relocation of non-fixed and mobile operations of Existing 12.7 GHz Licensee is governed by this subparagraph (f)(4). All New Entrants to the 12.7-13.25 GHz band are required to bear a proportional share of the costs incurred in the relocation of the non-fixed or mobile operations of an Existing 12.7 GHz Licensees, on a *pro rata* basis according to the amount of spectrum each licensee is assigned relative to the amount of 12.7 GHz spectrum that has been licensed. New Entrants that incur relocation costs may seek reimbursement for compensable costs from other New Entrants that have been licensed to provide service in a relocated market prior to the sunset date, *i.e.,* the date on which the relocation obligation terminates. New Entrants that are licensed prior to the sunset date must satisfy their reimbursement obligations for relocated markets in full. Because a New Entrant may be required to relocate the non-fixed and mobile operations of Existing 12.7 GHz Licensees in adjacent markets pursuant to (f)(2), the New Entrant may seek full reimbursement of compensable costs for the relocation of an adjacent market from New Entrants that have been licensed to provide service in the adjacent market. Reimbursement of compensable costs for a relocated market is not subject to depreciation. Compensable costs are limited to the actual costs of relocation and based on the definition set-forth in Section 27.1762(b), as adjusted to reflect mobile operations of Existing 12.7 GHz Licensees. New Entrants must maintain and, as requested, share documentation of relocation costs consistent with Section 27.1763(b), as modified to reflect mobile operations of Existing 12.7 GHz Licensees. New entrants are expected to act in good faith in satisfying the cost-sharing obligations. Parties are encouraged to use expedited Alternative Dispute Resolution (ADR) procedures, such as binding arbitration, mediation, or other ADR techniques to resolve disputes arising out of reimbursement and cost-sharing, such as disputes over the amount of reimbursement required. Parties of interest contesting cost-sharing obligations must provide evidentiary support to demonstrate that their calculation is reasonable and made in good faith. Specifically, these parties are expected to exercise due diligence to obtain the information necessary to prepare an independent estimate of the relocation costs in question and to file the independent estimate and supporting documentation with other affected parties and, if necessary, with the Commission.

PART 78 – CABLE TELEVISION RELAY SERVICE

25. The authority citation for Part 78 continues to read as follows:

Authority: 47 U.S.C. 152, 153, 154, 301, 303, 307, 308, 309.

26. Modify §§ 78.18(b) and (l) to read as follows:

§ 78.18. Frequency assignments.

(b) On or after September 19, 2022, applications for new or modified stations in the 12.7-13.25 GHz band under parts 74, 78, and 101 are unacceptable for filing and shall be dismissed, except for applications of eligible incumbent Television pickup (TVPU) and cable television relay service (CARS) pickup stations (collectively, mobile BAS/CARS) to modify incumbent authorizations to the repacked mobile BAS/CARS sub-band.

(l) The mobile BAS/CARS repack band(s) is reserved for eligible incumbent that were licensed to operate in the 12.7-13.25 GHz band pursuant to applications filed before September 19, 2022.

27. Delete § 78.18(m).

28. Revise the heading of § 78.40 and paragraphs (a)-(e) and add paragraph (g) to read as follows:

§ 78.40 Transition of the 1990-2025 MHz and 12,700-13,250 MHz bands from the Cable Television Relay Service to Emerging Technologies and Reimbursement and Cost-Sharing in the 12,700-13,250 MHz band.

(a) New Entrants are collectively defined as those licensees proposing to use emerging technologies to implement Mobile Satellite Services in the 2000-2020 MHz band (MSS licensees), those licensees authorized after July 1, 2004 to implement new Fixed and Mobile services in the 1990-1995 MHz band, those licensees authorized after September 9, 2004 in the 1995-2000 MHz and 2020-2025 MHz bands, and those licensees authorized after [date] in the 12,700-13,250 MHz band. *** New Entrants in the 12,700-13,250 MHz band are subject to the specific relocation procedures adopted in GN Docket No. 22-352. New entrants may negotiate with Cable Television Relay Service licensees operating on a primary basis and fixed service licensees operating on a primary basis in the 12,700-13,250 MHz bands (Existing 12.7 GHz Licensees) for the purpose of agreeing to terms under which the Existing 12.7 GHz Licensees in the 12,700-13,250 MHz band would relocate their operations to the repacked band, to other authorized bands, or to other media; or, alternatively, would accept a sharing arrangement with the New Entrants that may result in an otherwise impermissible level of interference to the Existing 12.7 GHz Licensee's operations in the 12,700-13,250 MHz band.

(b) An Existing Licensee and Existing 12.7 GHz Licensee will maintain primary status in the band until the operations of the Existing Licensee or Existing 12.7 GHz Licensee are relocated by a New Entrant, or become secondary under the terms of paragraphs (g)(3) of this section or the Existing Licensee or Existing 12.7 GHz Licensee indicates to a New Entrant that it declines to be relocated.

(c) The Commission will amend the operating license of the Existing Licensee or Existing 12.7 GHz Licensee to secondary status only if the following requirements are met:

(1) The service applicant, provider, licensee, or representative using an emerging technology guarantees payment of all relocation costs, including all engineering, equipment, site and FCC fees, as well as any reasonable additional costs that the relocated Existing Licensee or Existing 12.7 GHz Licensee might incur as a result of operation in another authorized band or migration to another medium;

(2) The New Entrant completes all activities necessary for implementing the replacement facilities, including engineering and cost analysis of the relocation procedure and, if radio facilities are used, identifying and obtaining, on the incumbents' behalf, new microwave or Cable Television Relay Service frequencies and frequency coordination.

(3) The New Entrant builds the replacement system and tests it for comparability with the existing system.

(d) The Existing Licensee or Existing 12.7 GHz Licensee is not required to relocate until the alternative facilities are available to it for a reasonable time to make adjustments, determine comparability, and ensure a seamless handoff.

(e) If, within one year after the relocation to new facilities the Existing Licensee or Existing 12.7 GHz demonstrates that the new facilities are not comparable to the former facilities, the New Entrant must remedy the defect.

* * * * *

(g) Subject to the terms of this paragraph (g), the relocation of Existing 12.7 GHz Licensees will be carried out by New Entrants in the following manner:

(1) Existing 12.7 GHz Licensees and New Entrants may negotiate individually or collectively for relocation of Existing 12.7 GHz Licensees to comparable facilities, as that term is used in § 101.73 of this

chapter. Parties may not decline to negotiate, though Existing 12.7 GHz Licensees may decline to be relocated.

(i) New Entrants are required to relocate the fixed microwave links of Existing 12.7 GHz Licensees prior to commencing operations if interference would occur. A New Entrant must conform to the technical criteria specified in TIA Bulletin TSB 10-F, or procedures other than TSB 10-F that follow generally acceptable good engineering practices pursuant to Section 101.105(c) of the Commission's rules, to determine if interference would occur such that their relocation would be necessary before a New Entrant's operations could commence.

(ii) New Entrants must relocate all non-fixed and mobile operations of Existing 12.7 GHz Licensees on a market-by-market basis in a Nielsen Designated Market Areas (DMA), as such DMAs existed on September 19, 2022, where it seeks to provide service prior to commencing operations, except those Existing 12.7 GHz Licensees that decline relocation.

(iii) Relocation negotiations shall be conducted as "mandatory negotiations," as that term is used in § 101.73 of this chapter. If these parties are unable to reach a negotiated agreement prior to the expiration of the mandatory negotiation period, New Entrants may involuntarily relocate such Existing 12.7 GHz Licensees in accordance with procedures set-forth in § 101.75 of this chapter.

(iv) After the end of the mandatory negotiation period, an New Entrant may involuntary relocate any Existing 12.7 GHz Licensees with which they have been unable to reach a negotiated agreement.

(2) Notwithstanding paragraph (f)(1) above, the non-fixed and mobile operations of Existing 12.7 GHz Licensees' operations in an adjacent market may need to be relocated even though the New Entrant does not initiate operations in that adjacent market. A New Entrant undertaking clearing would be obligated to relocate all incumbent non-fixed and mobile operations of Existing 12.7 GHz Licensees in all affected markets, including those markets where the New Entrant provides partial, minimal, or even no service. A New Entrant must conform to the technical criteria specified in TIA Bulletin TSB 10-F, or procedures other than TSB 10-F that follow generally acceptable good engineering practices pursuant to Section 101.105(c) of the Commission's rules, to determine any additional market(s) where a New Entrant would cause interference to the non-fixed and mobile operations of Existing 12.7 GHz Licensees, such that their relocation would be necessary before a New Entrant commences operations.

(3) The obligations of a New Entrant to relocate an Existing 12.7 GHz Licensee will terminate on the sunset date for Existing 12.7 GHz Licensee to retain primary operations in the band. On this date, all Existing 12.7 GHz Licensees will become secondary in the 12.7-13.25 GHz band with the exception of those relocated to the repacked band. Upon written demand by a New Entrant that intends to commence operations in the 12.7-13.25 GHz band, Existing 12.7 GHz Licensees that have not been relocated to the repacked band must cease operations in the 12.7-13.25 GHz band within six months.

(4) The cost-sharing obligations of New Entrants for the relocation of the fixed microwave links of Existing 12.7 GHz Licensees is governed by Sections 27.1760–27.1767 of this chapter. The cost-sharing obligations of New Entrants for the relocation of non-fixed and mobile operations of Existing 12.7 GHz Licensee is governed by this subparagraph (g)(4). All New Entrants to the 12.7-13.25 GHz band are required to bear a proportional share of the costs incurred in the relocation of the non-fixed or mobile operations of an Existing 12.7 GHz Licensees, on a *pro rata* basis according to the amount of spectrum each licensee is assigned relative to the amount of 12.7 GHz spectrum that has been licensed. New Entrants that incur relocation costs may seek reimbursement for compensable costs from other New Entrants that have been licensed to provide service in a relocated market prior to the sunset date, *i.e.,* the date on which the relocation obligation terminates. New Entrants that are licensed prior to the sunset date must satisfy their reimbursement obligations for relocated markets in full. Because a New Entrant may be required to relocate the non-fixed and mobile operations of Existing 12.7 GHz Licensees in adjacent markets pursuant to (g)(2), the New Entrant may seek full reimbursement of compensable costs for the relocation of an adjacent market from New Entrants that have been licensed to provide service in the adjacent market. Reimbursement of compensable costs for a relocated market is not subject to

depreciation. Compensable costs are limited to the actual costs of relocation and based on the definition set-forth in Section 27.1762(b), as adjusted to reflect mobile operations of Existing 12.7 GHz Licensees. New Entrants must maintain and, as requested, share documentation of relocation costs consistent with Section 27.1763(b), as modified to reflect mobile operations of Existing 12.7 GHz Licensees. New entrants are expected to act in good faith in satisfying the cost-sharing obligations. Parties are encouraged to use expedited Alternative Dispute Resolution (ADR) procedures, such as binding arbitration, mediation, or other ADR techniques to resolve disputes arising out of reimbursement and cost-sharing, such as disputes over the amount of reimbursement required. Parties of interest contesting cost-sharing obligations must provide evidentiary support to demonstrate that their calculation is reasonable and made in good faith. Specifically, these parties are expected to exercise due diligence to obtain the information necessary to prepare an independent estimate of the relocation costs in question and to file the independent estimate and supporting documentation with other affected parties and, if necessary, with the Commission.

PART 101 - FIXED MICROWAVE SERVICES

29. The authority citation for Part 101 continues to read as follows:

Authority: 47 U.S.C. 154, 303.

30. Revise the undesignated center heading above § 101.69 and the introductory text, paragraph (a), and the first sentence of the introductory text of paragraph (d) of § 101.69 to read as follows:

Policies Governing Microwave Relocation From the 1850-1990, 2110-2200, and 12,700-13,250 MHz Bands

§ 101.69 Transition of the 1850-1990 MHz, 2110-2150 MHz, 2160-2200, and 12,700-13,250 MHz bands from the fixed microwave services to personal communications services and emerging technologies.

Fixed Microwave Services (FMS) in the 1850-1990 MHz, 2110-2150 MHz, 2160-2200, and 12,700-13,250 MHz bands have been allocated for use by emerging technology (ET) services, including Personal Communications Services (PCS), Advanced Wireless Services (AWS), and Mobile Satellite Services (MSS). The rules in this section provide for a transition period during which ET licensees may relocate existing FMS licensees using these frequencies to other media or other fixed channels, including those in other microwave bands.

(a) ET licensees may negotiate with FMS licensees authorized to use frequencies in the 1850-1990 MHz, 2110-2150 MHz, 2160-2200 MHz and 12,700-13,2500 MHz bands, for the purpose of agreeing to terms under which the FMS licensees would:

* * * * *

(d) Relocation of FMS licensees in the 2110-2150, 2160-2200, and 12,700-13,250 MHz band will be subject to mandatory negotiations only. * * *

31. Amend § 101.73 by revising paragraph (a) and the first sentence of the introductory text of paragraph (d) to read as follows:

§ 101.73 Mandatory negotiations.

(a) A mandatory negotiation period may be initiated at the option of the ET licensee. Relocation of FMS licensees by Mobile Satellite Service (MSS) operators and AWS licensees in the 2110-2150 MHz and 2160-2200 MHz bands or ET licensee in the 12,700-13,250 MHz band will be subject to mandatory negotiations only.

* * * * *

(d) Provisions for Relocation of Fixed Microwave Licensees in the 2110-2150, 2160-2200 MHz, and 12,700-13,250 MHz bands. * * *

32. Revise the heading of § 101.79 and paragraph (a) to read as follows:

§ 101.79 Sunset provisions for licensees in the 1850-1990 MHz, 2110-2150 MHz, 2160-2200 MHz, and 12,700-13,250 MHz bands.

(a) FMS licensees will maintain primary status in the 1850-1990 MHz, 2110-2150 MHz, 2160-2200 MHz, and 12,700-13,250 MHz bands unless and until an ET licensee requires use of the spectrum. ET licensees are not required to pay relocation costs after the relocation rules sunset. Once the relocation rules sunset, an ET licensee may require the incumbent to cease operations, provided that the ET licensee intends to turn on a system within interference range of the incumbent, as determined by TIA TSB 10–F (for terrestrial-to-terrestrial situations) or TIA TSB 86 (for MSS satellite-to-terrestrial situations) or any standard successor. ET licensee notification to the affected FMS licensee must be in writing and must provide the incumbent with no less than six months to vacate the spectrum. After the six-month notice period has expired, the FMS licensee must turn its license back into the Commission, unless the parties have entered into an agreement which allows the FMS licensee to continue to operate on a mutually agreed upon basis. The date that the relocation rules sunset is determined as follows:

* * * * *

(3) For the 12,700-13,250 MHz band, the sunset date shall be three years after the first ET license is issued in the band.

* * * * *

APPENDIX B

Initial Regulatory Flexibility Analysis in WT Docket No. 20-443

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),[1] the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on a substantial number of small entities by the policies and rules proposed in the *Further Notice of Proposed Rulemaking (Further Notice)*. Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments on the *Further Notice*. The Commission will send a copy of the *Further Notice*, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA).[2] In addition, the *Further Notice* and IRFA (or summaries thereof) will be published in the Federal Register.[3]

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

2. Although the Commission declines to add a mobile allocation or adopt service rules for expanded terrestrial, high-powered, two-way mobile operations in the 12.2-12.7 GHz band (12.2 GHz band) the *Further Notice* seeks additional comment on other possible fixed terrestrial uses of the band. The *Further Notice* explores expanded licensed fixed uses as well as unlicensed opportunities in the band. The potential rule changes seek to facilitate more robust terrestrial fixed or unlicensed use while protecting incumbent operations in the bands. The *Further Notice* pursues the Commission's joint goals of maximizing the use of these 500 MHz of spectrum, while balancing desired speed to the market, efficiency of use, and effectively accommodating incumbent operations in the band.

3. In the United States, the 12.2 GHz band is allocated on a primary basis for non-Federal use for the Broadcasting Satellite Service (BSS) (referred to domestically in the band as Direct Broadcast Satellite (DBS); the Fixed Satellite Service (space-to-Earth) limited to non-geostationary orbit systems (NGSO FSS); and the Fixed Service.[4] While these three services are co-primary, the NGSO FSS and

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[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] 5 U.S.C. § 603(a).

[3] *Id*.

[4] *See* 47 CFR § 2.106, United States Table of Frequency Allocations, non-Federal Table for the band 12.2-12.7 GHz. NGSO FSS (space-to-Earth) operations are authorized pursuant to international footnote 5.487A, which provides additional allocations including in Region 2 as follows:

> [The 12.2-12.7 GHz is] allocated to the fixed-satellite service (space-to-Earth) on a primary basis, limited to non-geostationary systems and subject to application of the provisions of [ITU Radio Regulations] No. 9.12 for coordination with other non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the broadcasting-satellite service operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the [ITU Radiocommunication] Bureau of the complete coordination or notification information, as appropriate, for the non-geostationary-satellite systems in the fixed-satellite service and of the complete coordination or notification information, as appropriate, for the geostationary-satellite networks, and [international footnote] No. 5.43A does not apply. Non-geostationary-satellite systems in the fixed-satellite service in the [12 GHz band] shall be operated in such a way that any unacceptable interference that may occur during their operation shall be rapidly eliminated.

47 CFR § 2.106, footnote 5.487A. When an international footnote is applicable without modification to non-Federal operations, the Commission places the footnote on the non-Federal Table. *See* 47 CFR § 2.105(d)(5).

Fixed Service are allocated on a non-harmful interference basis with respect to BSS.[5] Currently there are three services authorized and operating in the band: DBS providers operating under the primary BSS allocation, Multi-Channel Video and Data Distribution Service (MVDDS) licensees operating on a non-harmful interference basis to DBS under the co-primary Fixed Service allocation, and NGSO FSS licensees operating on a non-harmful interference basis to DBS under the co-primary NGSO FSS allocation. This proceeding is predicated in part on the MVDDS 5G Coalition petition for rulemaking,[6] however alternative uses for the band were raised by various commenters. Incumbent NGSO and some DBS interests seek to continue to use the band without ceding rights to MVDDS licensees. To facilitate further consideration of the various proposals in the *Further Notice* the Commission seeks comments on how to weigh public interest considerations associated with allowing, prohibiting and prioritizing uses and on the costs and benefits of allowing new uses of the 12 GHz bands.

4. Our rules currently enable sharing between co-primary NGSO FSS and MVDDS using a combination of technical limitations, information sharing, and first-in-time procedures.[7] While we decline to add a mobile allocation or adopt service rules for expanded terrestrial, high-powered, two-way mobile operations in the 12.2-12.7 GHz band, we remain interested in potential expanded terrestrial use of the band. We therefore seek comment on additional possible terrestrial uses of the 12.2-12.7 GHz band including one-way, point-to-point or point-to-multipoint fixed links at higher powers than current MVDDS rules; two-way, point-to-point fixed links at standard part 101 power limits; two-way, point-to-multipoint links; indoor only underlay on a licensed by rule basis; unlicensed use; and expanded use through technology-based share using Automated Frequency Coordination (AFC).

5. By modifying our rules and implementing policies designed to provide for more robust use of the 12 GHz band, the Commission hopes to ensure that this spectrum is efficiently utilized and will foster the development of new and innovative technologies and services, as well as encourage the growth and development of a wide variety of services, ultimately leading to greater benefits to consumers.

B. Legal Basis

6. The proposed action is authorized pursuant to sections 1, 2, 4, 5, 301, 302, 303, 304, 307, 309, 310, and 316 of the Communications Act of 1934, 47 U.S.C. §§ 151, 152, 154, 155, 301, 302a, 303, 304, 307, 309, 310, 316, and section 1.411 of the Commission's rules, 47 CFR § 1.411.

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

7. The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.[8] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[9] In addition, the term "small business" has the

[5] *See* 47 CFR § 2.106, n.5.490 (International Footnote). In Region 2, in the band 12.2-12.7 GHz, existing and future terrestrial radiocommunication services shall not cause harmful interference to the space services operating in conformity with the broadcasting satellite Plan for Region 2 contained in Appendix 30.

[6] MVDDS 5G Coalition Petition. *See also* Petition Public Notice. In its most recent filing, the Coalition's members were reported to be: Cass Cable TV, Inc., DISH Network L.L.C., Go Long Wireless LTD., MDS Operations, Inc., MVD Number 53 Partners, Satellite Receivers, Ltd., SOUTH.COM LLC, Story Communications, LLC, and Vision Broadband, LLC. *See* Letter from MVDDS 5G Coalition, to Marlene H. Dortch, Secretary, FCC, Docket No. RM-11768, at 1 (filed May 28, 2019). We note that MDS Operations subsequently assigned its remaining 60 MVDDS licenses to RS Access.

[7] *See* 47 CFR §§ 101.113(a) n.11; 101.147(p).

[8] 5 U.S.C. § 603(b)(3).

[9] 5 U.S.C. § 601(6).

same meaning as the term "small business concern" under the Small Business Act."[10] A "small business concern" is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.[11]

8. *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, at the outset, three broad groups of small entities that could be directly affected herein.[12] First, while there are industry specific size standards for small businesses that are used in the regulatory flexibility analysis, according to data from the Small Business Administration's (SBA) Office of Advocacy, in general a small business is an independent business having fewer than 500 employees.[13] These types of small businesses represent 99.9% of all businesses in the United States, which translates to 32.5 million businesses.[14]

9. 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."[15] 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.[16] Nationwide, for tax year 2020, there were approximately 447,689 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.[17]

10. 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."[18] U.S. Census Bureau data from the 2017 Census

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[10] *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."

[11] 15 U.S.C. § 632.

[12] 5 U.S.C. § 601(3)-(6).

[13] *See* SBA, Office of Advocacy, Frequently Asked Questions, "What is a small business?," https://cdn.advocacy.sba.gov/wp-content/uploads/2021/11/03093005/Small-Business-FAQ-2021.pdf. (Nov 2021).

[14] *Id*.

[15] 5 U.S.C. § 601(4).

[16] 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 of 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.

[17] *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 businesses for the tax year 2020 with revenue less than or equal to $50,000 for Region 1-Northeast Area (58,577), Region 2-Mid-Atlantic and Great Lakes Areas (175,272), and Region 3-Gulf Coast and Pacific Coast Areas (213,840) that includes the continental U.S., Alaska, and Hawaii. This data does not include information for Puerto Rico.

[18] 5 U.S.C. § 601(5).

of Governments[19] indicate there were 90,075 local governmental jurisdictions consisting of general purpose governments and special purpose governments in the United States.[20] Of this number, there were 36,931 general purpose governments (county,[21] municipal, and town or township[22]) with populations of less than 50,000 and 12,040 special purpose governments—independent school districts[23] with enrollment populations of less than 50,000.[24] 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."[25]

11. *Radio Frequency Equipment Manufacturers (RF Manufacturers).* There are several analogous industries with an SBA small business size standard that are applicable to RF Manufacturers. These industries are Fixed Microwave Services, Other Communications Equipment Manufacturing, Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing. A description of these industries and the SBA small business size standards are detailed below.

12. *Fixed Microwave Services.* Fixed microwave services include common carrier,[26] private-operational fixed,[27] and broadcast auxiliary radio services.[28] They also include the Upper Microwave

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[19] *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.

[20] *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) and special purpose governments (special districts and independent school districts). *See also* tbl.2. CG1700ORG02 Table Notes_Local Governments by Type and State_2017.

[21] *See id.* at tbl.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.

[22] *See id.* at tbl.6. Subcounty General-Purpose Governments by Population-Size Group and State: 2017 [CG1700ORG06], https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html. There were 18,729 municipal and 16,097 town and township governments with populations less than 50,000.

[23] *See id.* at tbl.10. Elementary and Secondary School Systems by Enrollment-Size Group and State: 2017 [CG1700ORG10], https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html. There were 12,040 independent school districts with enrollment populations less than 50,000. *See also* tbl.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.

[24] 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.

[25] 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 tbls.5, 6 & 10.

[26] *See* 47 CFR part 101, subparts C and I.

[27] *See id*. subparts C and H.

[28] Auxiliary Microwave Service is governed by Part 74 of Title 47 of the Commission's Rules. *See* 47 CFR Part 74. Available to licensees of broadcast stations and to broadcast and cable network entities, broadcast auxiliary microwave stations are used for relaying broadcast television signals from the studio to the transmitter, or between two points such as a main studio and an auxiliary studio. The service also includes mobile TV pickups, which relay signals from a remote location back to the studio.

Flexible Use Service (UMFUS),[29] Millimeter Wave Service (70/80/90 GHz),[30] Local Multipoint Distribution Service (LMDS),[31] the Digital Electronic Message Service (DEMS),[32] 24 GHz Service,[33] Multiple Address Systems (MAS),[34] and Multichannel Video Distribution and Data Service (MVDDS),[35] where in some bands licensees can choose between common carrier and non-common carrier status.[36] Wireless Telecommunications Carriers (*except* Satellite)[37] is the closest industry with an SBA small business size standard applicable to these services. The SBA small size standard for this industry classifies a business as small if it has 1,500 or fewer employees.[38] U.S. Census Bureau data for 2017 show that there were 2,893 firms that operated in this industry for the entire year.[39] Of this number, 2,837 firms employed fewer than 250 employees.[40] Thus, under the SBA size standard, the Commission estimates that a majority of fixed microwave service licensees can be considered small.

13. The Commission does not generally track subsequent business size unless, in the context of assignments or transfers, unjust enrichment issues are implicated. Additionally, since the Commission does not collect data on the number of employees for licensees providing these services, at this time we are not able to estimate the number of licensees with active licenses that would qualify as small under the SBA's small business size standard.

14. *Wired Telecommunications Carriers.* The U.S. Census Bureau defines this industry as establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired communications networks.[41] Transmission facilities may be based on a single technology or a combination of technologies. Establishments in this industry use the wired telecommunications network facilities that they operate to provide a variety of services, such as wired telephony services, including VoIP services, wired (cable) audio and video programming distribution, and wired broadband Internet services.[42] By exception, establishments providing satellite television distribution services using facilities

[29] *See* 47 CFR part 30.

[30] *See* 47 CFR part 101, subpart Q.

[31] *See id*. subpart L.

[32] *See id*. subpart G.

[33] *See id*.

[34] *See id.* subpart O.

[35] *See id*. subpart P.

[36] *See* 47 CFR §§ 101.533, 101.1017.

[37] *See* U.S. Census Bureau, *2017 NAICS Definition, "517312 Wireless Telecommunications Carriers* (*except Satellite*)," https://www.census.gov/naics/?input=517312&year=2017&details=517312.

[38] *See* 13 CFR § 121.201, NAICS Code 517312 (as of 10/1/22, NAICS Code 517112).

[39] *See* U.S. Census Bureau, *2017 Economic Census of the United States*, *Employment Size of Firms for the U.S.: 2017,* Table ID: EC1700SIZEEMPFIRM, NAICS Code 517312, https://data.census.gov/cedsci/table?y=2017&n=517312&tid=ECNSIZE2017.EC1700SIZEEMPFIRM&hidePreview=false.

[40] *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.

[41] *See* U.S. Census Bureau, *2017 NAICS Definition, "517311 Wired Telecommunications Carriers,"* https://www.census.gov/naics/?input=517311&year=2017&details=517311.

[42] *Id.*

and infrastructure that they operate are included in this industry.[43] Wired Telecommunications Carriers are also referred to as wireline carriers or fixed local service providers.[44]

15. The SBA small business size standard for Wired Telecommunications Carriers classifies firms having 1,500 or fewer employees as small.[45] U.S. Census Bureau data for 2017 show that there were 3,054 firms that operated in this industry for the entire year.[46] Of this number, 2,964 firms operated with fewer than 250 employees.[47] Additionally, based on Commission data in the 2022 Universal Service Monitoring Report, as of December 31, 2021, there were 4,590 providers that reported they were engaged in the provision of fixed local services.[48] Of these providers, the Commission estimates that 4,146 providers have 1,500 or fewer employees.[49] Consequently, using the SBA's small business size standard, most of these providers can be considered small entities.

16. *Wireless Telecommunications Carriers (except Satellite).* This industry comprises establishments engaged in operating and maintaining switching and transmission facilities to provide communications via the airwaves.[50] 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.[51] The SBA size standard for this industry classifies a business as small if it has 1,500 or fewer employees.[52] U.S. Census Bureau data for 2017 show that there were 2,893 firms in this industry that operated for the entire year.[53] Of that number, 2,837 firms employed fewer than 250 employees.[54] Additionally, based on Commission data in the 2022 Universal Service Monitoring Report, as of December 31, 2021, there were 594 providers that reported they were engaged in the provision of

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[43] *Id.*

[44] Fixed Local Service Providers include the following types of providers: Incumbent Local Exchange Carriers (ILECs), Competitive Access Providers (CAPs) and Competitive Local Exchange Carriers (CLECs), Cable/Coax CLECs, Interconnected VOIP Providers, Non-Interconnected VOIP Providers, Shared-Tenant Service Providers, Audio Bridge Service Providers, and Other Local Service Providers. Local Resellers fall into another U.S. Census Bureau industry group and therefore data for these providers is not included in this industry.

[45] *See* 13 CFR § 121.201, NAICS Code 517311 (as of 10/1/22, NAICS Code 517111).

[46] *See* U.S. Census Bureau, *2017 Economic Census of the United States, Selected Sectors: Employment Size of Firms for the U.S.: 2017,* Table ID: EC1700SIZEEMPFIRM, NAICS Code 517311, https://data.census.gov/cedsci/table?y=2017&n=517311&tid=ECNSIZE2017.EC1700SIZEEMPFIRM&hidePreview=false.

[47] *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.

[48] Federal-State Joint Board on Universal Service, Universal Service Monitoring Report at 26, Table 1.12 (2022), https://docs.fcc.gov/public/attachments/DOC-391070A1.pdf. https://docs.fcc.gov/public/attachments/DOC-379181A1.pdf

[49] *Id.*

[50] *See* U.S. Census Bureau, *2017 NAICS Definition, "517312 Wireless Telecommunications Carriers (except Satellite),"* https://www.census.gov/naics/?input=517312&year=2017&details=517312.

[51] *Id.*

[52] *See* 13 CFR § 121.201, NAICS Code 517312 (as of 10/1/22, NAICS Code 517112).

[53] *See* U.S. Census Bureau, *2017 Economic Census of the United States*, *Employment Size of Firms for the U.S.: 2017,* Table ID: EC1700SIZEEMPFIRM, NAICS Code 517312, https://data.census.gov/cedsci/table?y=2017&n=517312&tid=ECNSIZE2017.EC1700SIZEEMPFIRM&hidePreview=false.

[54] *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.

wireless services.[55] Of these providers, the Commission estimates that 511 providers have 1,500 or fewer employees.[56] Consequently, using the SBA's small business size standard, most of these providers can be considered small entities.

17. *Satellite Telecommunications*. This industry 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."[57] Satellite telecommunications service providers include satellite and earth station operators. The SBA small business size standard for this industry classifies a business with $38.5 million or less in annual receipts as small.[58] U.S. Census Bureau data for 2017 show that 275 firms in this industry operated for the entire year.[59] Of this number, 242 firms had revenue of less than $25 million.[60] Additionally, based on Commission data in the 2021 Universal Service Monitoring Report, as of December 31, 2020, there were 71 providers that reported they were engaged in the provision of satellite telecommunications services.[61] Of these providers, the Commission estimates that approximately 48 providers have 1,500 or fewer employees.[62] Consequently, using the SBA's small business size standard, a little more than half of these providers can be considered small entities.

18. *All Other Telecommunications*. This industry is comprised of establishments primarily engaged in providing specialized telecommunications services, such as satellite tracking, communications telemetry, and radar station operation.[63] This industry also includes establishments primarily engaged in providing satellite terminal stations and associated facilities connected with one or more terrestrial systems and capable of transmitting telecommunications to, and receiving telecommunications from, satellite systems.[64] Providers of Internet services (e.g. dial-up ISPs) or Voice over Internet Protocol (VoIP) services, via client-supplied telecommunications connections are also included in this industry.[65] The SBA small business size standard for this industry classifies firms with annual receipts of $35 million or less as small.[66] U.S. Census Bureau data for 2017 show that there were 1,079 firms in this industry

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[55] Federal-State Joint Board on Universal Service, Universal Service Monitoring Report at 26, Table 1.12 (2022), https://docs.fcc.gov/public/attachments/DOC-391070A1.pdf.

[56] *Id.*

[57] *See* U.S. Census Bureau, *2017 NAICS Definition, "517410 Satellite Telecommunications,"* https://www.census.gov/naics/?input=517410&year=2017&details=517410.

[58] *See* 13 CFR § 121.201, NAICS Code 517410.

[59] *See* U.S. Census Bureau, *2017 Economic Census of the United States*, *Selected Sectors: Sales, Value of Shipments, or Revenue Size of Firms for the U.S.: 2017,* Table ID: EC1700SIZEREVFIRM, NAICS Code 517410, https://data.census.gov/cedsci/table?y=2017&n=517410&tid=ECNSIZE2017.EC1700SIZEREVFIRM&hidePreview=false.

[60] *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. We also note that according to the U.S. Census Bureau glossary, the terms receipts and revenues are used interchangeably, *see* https://www.census.gov/glossary/#term_ReceiptsRevenueServices.

[61] Federal-State Joint Board on Universal Service, Universal Service Monitoring Report at 26, Table 1.12 (2021), https://docs.fcc.gov/public/attachments/DOC-379181A1.pdf.

[62] *Id.*

[63] *See* U.S. Census Bureau, *2017 NAICS Definition*, "*517919 All Other Telecommunications,*" https://www.census.gov/naics/?input=517919&year=2017&details=517919.

[64] *Id.*

[65] *Id*.

[66] *See* 13 CFR § 121.201, NAICS Code 517919 (as of 10/1/22, NAICS Code 517810).

that operated for the entire year.[67] Of those firms, 1,039 had revenue of less than $25 million.[68] Based on this data, the Commission estimates that the majority of "All Other Telecommunications" firms can be considered small.

19. *Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing.* This industry comprises establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment.[69] Examples of products made by these establishments are: transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment.[70] The SBA small business size standard for this industry classifies businesses having 1,250 employees or less as small.[71] U.S. Census Bureau data for 2017 show that there were 656 firms in this industry that operated for the entire year.[72] Of this number, 624 firms had fewer than 250 employees.[73] Thus, under the SBA size standard, the majority of firms in this industry can be considered small.

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

20. The Commission expects the various proposals seeking to change rules to permit expanded fixed use of the 12.2 GHz band considered in the *Further Notice* may impose new or additional reporting or recordkeeping and/or other compliance obligations on small entities, as well as on other licensees and applicants if adopted. In particular, potential rule changes involving licensing, registration, and coordination could increase recordkeeping, reporting, or other operational obligations for small entities and for other licensees and applicants. There may also be new compliance obligations created by required equipment upgrades. As a result of these potential additional obligations, small entities may need to hire outside consulting or other professional services for compliance purposes and therefore, the Commission has requested cost-benefit analyses in the *Further Notice*. The Commission expects to make a determination as to whether small entities will incur additional costs for complying with the rules upon its review of any comments filed.

21. The Commission is also considering adopting rules that will promote shared access to the 12.2 GHz band that may lead to additional compliance requirements. For example, should expanded terrestrial use be authorized in the band, the Commission has requested comment on whether the burden

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[67] *See* U.S. Census Bureau, *2017 Economic Census of the United States*, *Selected Sectors: Sales, Value of Shipments, or Revenue Size of Firms for the U.S.: 2017,* Table ID: EC1700SIZEREVFIRM, NAICS Code 517919, https://data.census.gov/cedsci/table?y=2017&n=517919&tid=ECNSIZE2017.EC1700SIZEREVFIRM&hidePreview=false.

[68] *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. We also note that according to the U.S. Census Bureau glossary, the terms receipts and revenues are used interchangeably, *see* https://www.census.gov/glossary/#term_ReceiptsRevenueServices.

[69] *See* U.S. Census Bureau, *2017 NAICS Definition, "334220 Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing,"* https://www.census.gov/naics/?input=334220&year=2017&details=334220.

[70] *Id*.

[71] *See* 13 CFR § 121.201, NAICS Code 334220.

[72] *See* U.S. Census Bureau, *2017 Economic Census of the United States*, *Employment Size of Firms for the U.S.: 2017,* Table ID: EC1700SIZEEMPFIRM, NAICS Code 334220, https://data.census.gov/cedsci/table?y=2017&n=334220&tid=ECNSIZE2017.EC1700SIZEEMPFIRM&hidePreview=false. https://factfinder.census.gov/bkmk/table/1.0/en/ECN/2012_US/31SG2//naics~334220

[73] *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 avoiding or correcting for interference to existing or future DBS subscribers should be revised, or whether new terrestrial operations should be subject to the same requirements for protecting DBS subscribers that currently apply to other services in the band. Another proposed approach for comment aimed at protecting incumbents raised in the *Further Notice* is whether new terrestrial operations should be required to disclose certain technical data to facilitate coordination, which would impact small entities providing new service within the band.

22. The Commission's assigning of new terrestrial service rights could also result in new or modified compliance obligations. For example, the Commission seeks comment as to whether it should modify existing licenses using our section 316 authority to conform to new service rules designed to allow increased operational flexibility when considering any new fixed service in the band. The Commission is also considering alternative approaches, such as site-based, individually coordinated operations relative to existing MVDDS operations, or whether to allow expanded opportunities for disaggregation and partitioning to promote more intensive use of the spectrum.

23. Additionally, potential approaches to facilitate sharing in the 12.2 GHz band upon which the Commission seeks comment in the *Further Notice*—both expanded unlicensed use and technology-based sharing approaches such as Automated Frequency Coordination—could also impact compliance obligations if adopted. For example, we invite small entity and other commenters to discuss whether unlicensed use may be permitted within the 12.2—12.7 GHz band under provisions that could be implemented under our part 15 rules. We also seek comment as to whether we could permit less restrictive unlicensed use (e.g., higher indoor power levels, outdoor use, etc.) with a label warning to alert consumers that use near a DBS, NGSO FSS, or MVDDS receive site could result in harmful interference to the consumer device. Alternatively, we ask for comment as to whether dynamic, database-driven coordination capabilities such as have been implemented in other frequency bands (e.g., 6 GHz unlicensed and 3.5 GHz Citizens Broadband Radio Service) should be implemented in the 12.2 GHz band or if another type of frequency management system would allow for a greater opportunity for expanded terrestrial services to develop within the band.

24. Other potential impacts to compliance obligations center around the maintenance of technical data as a means of supporting such a system. For example, DBS operators are currently required to maintain data on current subscriber locations; NGSO FSS operators have no similar requirement to track consumer terminal location data, and deployments in the band continue to increase. If this system were to be implemented, we seek comment as to whether additional technical data would need to be collected or shared among the licensees so that an advanced frequency management system could effectively manage shared use and prevent interference exceedance to the different services in the band. In our discussion of these proposals in the *Further Notice*, we have requested comments from the parties in the proceeding and requested cost-benefit analyses, which may help the Commission identify and evaluate relevant matters for small entities, including any compliance costs and burdens that may result in the proceeding.

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

25. The RFA requires an agency to describe any significant, specifically small business, alternatives for small businesses that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): "(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such 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 such small entities."[74]

[74] 5 U.S.C. § 603(c)(1)-(4).

26. In the *Further Notice*, the Commission continued to explore how to best protect current usage of the 12.2 GHz band, while simultaneously seeking ways to increase innovation in the band by expanding further terrestrial uses that could benefit millions of people across the country, as well as small and other entities utilizing those services. While doing so, the Commission is also mindful that small and other entities may incur costs should the proposals we make, and the alternatives upon which we seek comment in the *Further Notice*, be adopted. Below, we discuss some specific actions taken and alternatives considered by the Commission in the *Further Notice*.

27. In the *Further Notice*, the Commission considered different ways in which to potentially expand licensed use of terrestrial fixed services in the 12.2 GHz band. For example, expansion of licensed use for incumbent MVDDS licensees could include increasing power limits or expanding terrestrial rights for incumbent MVDDS licensees. Incumbent MVDDS licensees that are small entities may benefit from the expansion of licensed use. At present, eight companies (10 legal entities) hold 191 MVDDS licenses: two DISH subsidiaries hold 82 licenses; RS Access, a subsidiary of a Dell investment fund, holds 60 licenses; two Go Long Wireless entities hold a total of 25 licenses; and five smaller companies hold a total of 24 licenses.[75]

28. Additionally, in the *Further Notice* among other things, the Commission considered what types of technical data reporting requirements should be considered. More specifically, different technical data reporting requirements or timetables that take into account their limited resources; simplification or consolidation of reporting requirements for small entities; or an exemption from any reporting requirements considered as potential steps the Commission could take to the benefit of small entities. We also considered the expansion of unlicensed use of the band, as a means of potentially creating additional capacity for Internet of Things (IoT) use,[76] or alternatively, other types of applications. As a means of accommodating this expansion, the Commission considered whether our rules for unlicensed low power indoor devices in the 6 GHz band could serve as a model for unlicensed use in the 12.2 GHz band. The use of existing rules as a model could make the compliance obligations we adopt for the 12.2 GHZ band easier to meet for those small entities already complying with similar requirements in the 6 GHz band. In the *Further Notice* we seek comment on this matter.

29. Lastly, the Commission considered whether there may be opportunities to take advantage of technological advancements to accommodate expanded terrestrial capabilities in the 12.2 GHz band. For example, services providing potentially dynamic, database-driven coordination capabilities, such as those that have been implemented in other frequency bands (e.g., 6 GHz unlicensed and 3.5 GHz Citizens Broadband Radio Service) could be implemented in the 12.2 GHz band. Alternatively, we considered whether perhaps another type of frequency management system would allow for a greater opportunity for expanded terrestrial services to develop within the band while affording protection to incumbent satellite and terrestrial services. The type of frequency management system adopted could make compliance easier to meet for small entities providing those services. Accordingly, in the *Further Notice* we seek additional comment on this issue.

30. The Commission expects to more fully consider the economic impact and alternatives for small entities following the review of comments, including cost-benefit analyses, filed in response to the *Further Notice*. The Commission's evaluation of this information will shape the final alternatives it

[75] The remaining 23 licenses automatically terminated for failure to meet the buildout requirement. *See Requests of Three Licensees of 22 Licenses in the Multichannel Video and Data Distribution Service for Extension of Time to Meet the Final Buildout Requirement for Providing Substantial Service under Section 101.1413 of the Commission's Rules, Applications of Three Licensees for Renewal of 22 Licenses in the Multichannel Video and Data Distribution Service*, Order, 33 FCC Rcd 10757 (WTB BD 2018), *recons. pending*. *See also* Blumenthal DTV LLC, Call Sign WQAR709 (Terminated July 26, 2014).

[76] Comments of Public Interest Organizations (New America's Open Technology Institute, et. al.), at 2, 17.

considers to minimize any significant economic impact that may occur on small entities, the final conclusions it reaches, and any final rules it promulgates in this proceeding.

F. Federal Rules that May Duplicate, Overlap, or Conflict with the Proposed Rules

31. None.

APPENDIX C

Initial Regulatory Flexibility Analysis in GN Docket No. 22-352

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),[1] the Commission has prepared this Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on a substantial number of small entities by the policies and rules proposed in the attached *Notice of Proposed Rulemaking* (*Notice*). Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments on the *Notice*. The Commission will send a copy of the *Notice*, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA).[2] In addition, the *Notice* and IRFA (or summaries thereof) will be published in the Federal Register.[3]

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

2. Today's *Notice* seeks comment on proposals to repurpose some or all of the 550 megahertz of upper mid-band spectrum between 12.7-13.25 GHz (12.7 GHz band) for mobile broadband or other expanded use. The Commission is pursuing the joint goals of making this spectrum available for new wireless uses while effectively accommodating incumbent operations in the band. Accordingly, the *Notice* seeks comment on various proposals for transitioning all or part of the band to make it available for mobile broadband, as well as other expanded uses that will help ensure that the speed, capacity, and ubiquity of the nation's wireless networks so that they may keep pace with the demands placed upon them by new technologies and possible new types of services for consumers and businesses.

3. The *Notice* proposes to require new licensees to protect fixed point-to-point incumbents until a sunset date with the option to negotiate agreements for accelerated relocations to other bands or media, and to repack mobile Broadcast Auxiliary Service (BAS) and Cable Television Relay Services (CARS) incumbents within a portion(s) of the band designated for such use. We also propose to grandfather the 23 Fixed Satellite Service (FSS) earth stations currently authorized to operate in the band (Earth-to-space) in accordance with the U.S. Table of Allocations, but otherwise prohibit all future earth stations of this type. Other earth station operations in the band could continue to operate on a non-interference, unprotected basis. Furthermore, we propose to dismiss any new space station license applications and new requests for access to the U.S. market through non-U.S.-licensed space stations, or those parts of any such applications and requests, that seek to operate in the 12.7 GHz band. Under these proposals, the band would be unavailable for new Fixed Service (FS), mobile BAS, or FSS earth stations and would become available for mobile broadband and other expanded uses. The *Notice* encourages commenters to discuss and quantify the costs and benefits associated with any of the proposed approaches for transitioning the band, along with other helpful technical or procedural details. Today's actions are another step in the Commission's efforts to close the digital divide by providing wireless broadband connectivity across the nation and to secure U.S. leadership in the next generation of wireless services, including fifth-generation (5G) wireless, 6G, and beyond.

B. Legal Basis

4. The proposed action is taken pursuant to sections 1, 2, 4, 5, 301, 302, 303, 304, 307, 309, 310, and 316 of the Communications Act of 1934, 47 U.S.C. §§ 151, 152, 154, 155, 301, 302a, 303, 304, 307, 309, 310, 316, and section 1.411 of the Commission's rules, 47 CFR § 1.411.

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[1] *See* 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. §§ 601–612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[2] 5 U.S.C. § 603(a).

[3] *Id*.

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

5. The RFA directs agencies to provide a description of and, where feasible, an estimate of, the number of small entities that may be affected by the rules, if adopted.[4] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[5] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[6] A small business concern is one that: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.[7]

6. *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, at the outset, three broad groups of small entities that could be directly affected herein.[8] First, while there are industry specific size standards for small businesses that are used in the regulatory flexibility analysis, according to data from the Small Business Administration's (SBA) Office of Advocacy, in general a small business is an independent business having fewer than 500 employees.[9] These types of small businesses represent 99.9% of all businesses in the United States, which translates to 32.5 million businesses.[10]

7. 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."[11] 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.[12] Nationwide, for tax year 2020, there were approximately 447,689 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.[13]

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[4] *Id.* § 603(b)(3).

[5] *Id.* § 601(6).

[6] *Id.* § 601(3) (incorporating by reference the definition of "small business concern" in 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."

[7] 15 U.S.C. § 632.

[8] 5 U.S.C. § 601(3)-(6).

[9] *See* SBA, Office of Advocacy, Frequently Asked Questions, "What is a small business?," https://cdn.advocacy.sba.gov/wp-content/uploads/2021/11/03093005/Small-Business-FAQ-2021.pdf. (Nov 2021).

[10] *Id.*

[11] 5 U.S.C. § 601(4).

[12] 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 of 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.

[13] *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

(continued….)

8. 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."[14] U.S. Census Bureau data from the 2017 Census of Governments[15] indicate there were 90,075 local governmental jurisdictions consisting of general purpose governments and special purpose governments in the United States.[16] Of this number, there were 36,931 general purpose governments (county,[17] municipal, and town or township[18]) with populations of less than 50,000 and 12,040 special purpose governments—independent school districts[19] with enrollment populations of less than 50,000.[20] 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."[21]

9. *Radio Frequency Equipment Manufacturers (RF Manufacturers).* There are several analogous industries with an SBA small business size standard that are applicable to RF Manufacturers. These industries are Fixed Microwave Services, Other Communications Equipment Manufacturing, Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing. A description of these industries and the SBA small business size standards are detailed below.

(Continued from previous page)
BMF data for businesses for the tax year 2020 with revenue less than or equal to $50,000 for Region 1-Northeast Area (58,577), Region 2-Mid-Atlantic and Great Lakes Areas (175,272), and Region 3-Gulf Coast and Pacific Coast Areas (213,840) that includes the continental U.S., Alaska, and Hawaii. This data does not include information for Puerto Rico.

[14] 5 U.S.C. § 601(5).

[15] *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.

[16] *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) and special purpose governments (special districts and independent school districts). *See also* tbl.2. CG1700ORG02 Table Notes_Local Governments by Type and State_2017.

[17] *See id.* at tbl.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.

[18] *See id.* at tbl.6. Subcounty General-Purpose Governments by Population-Size Group and State: 2017 [CG1700ORG06], https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html. There were 18,729 municipal and 16,097 town and township governments with populations less than 50,000.

[19] *See id.* at tbl.10. Elementary and Secondary School Systems by Enrollment-Size Group and State: 2017 [CG1700ORG10], https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html. There were 12,040 independent school districts with enrollment populations less than 50,000. *See also* tbl.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.

[20] 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.

[21] 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 tbls.5, 6 & 10.

10. *Fixed Microwave Services.* Fixed microwave services include common carrier,[22] private-operational fixed,[23] and broadcast auxiliary radio services.[24] They also include the Upper Microwave Flexible Use Service (UMFUS),[25] Millimeter Wave Service (70/80/90 GHz),[26] Local Multipoint Distribution Service (LMDS),[27] the Digital Electronic Message Service (DEMS),[28] 24 GHz Service,[29] Multiple Address Systems (MAS),[30] and Multichannel Video Distribution and Data Service (MVDDS),[31] where in some bands licensees can choose between common carrier and non-common carrier status.[32] Wireless Telecommunications Carriers (*except* Satellite)[33] is the closest industry with an SBA small business size standard applicable to these services. The SBA small size standard for this industry classifies a business as small if it has 1,500 or fewer employees.[34] U.S. Census Bureau data for 2017 show that there were 2,893 firms that operated in this industry for the entire year.[35] Of this number, 2,837 firms employed fewer than 250 employees.[36] Thus, under the SBA size standard, the Commission estimates that a majority of fixed microwave service licensees can be considered small.

11. The Commission does not generally track subsequent business size unless, in the context of assignments or transfers, unjust enrichment issues are implicated. Additionally, since the Commission does not collect data on the number of employees for licensees providing these services, at this time we are not able to estimate the number of licensees with active licenses that would qualify as small under the SBA's small business size standard.

12. *Other Communications Equipment Manufacturing.* This industry comprises establishments primarily engaged in manufacturing communications equipment (except telephone

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[22] *See* 47 CFR part 101, subparts C and I.

[23] *See id*. subparts C and H.

[24] Auxiliary Microwave Service is governed by Part 74 of Title 47 of the Commission's Rules. *See* 47 CFR Part 74. Available to licensees of broadcast stations and to broadcast and cable network entities, broadcast auxiliary microwave stations are used for relaying broadcast television signals from the studio to the transmitter, or between two points such as a main studio and an auxiliary studio. The service also includes mobile TV pickups, which relay signals from a remote location back to the studio.

[25] *See* 47 CFR part 30.

[26] *See* 47 CFR part 101, subpart Q.

[27] *See id*. subpart L.

[28] *See id*. subpart G.

[29] *See id*.

[30] *See id.* subpart O.

[31] *See id*. subpart P.

[32] *See* 47 CFR §§ 101.533, 101.1017.

[33] *See* U.S. Census Bureau, *2017 NAICS Definition, "517312 Wireless Telecommunications Carriers* (*except Satellite*)," https://www.census.gov/naics/?input=517312&year=2017&details=517312.

[34] *See* 13 CFR § 121.201, NAICS Code 517312 (as of 10/1/22, NAICS Code 517112).

[35] *See* U.S. Census Bureau, *2017 Economic Census of the United States*, *Employment Size of Firms for the U.S.: 2017,* Table ID: EC1700SIZEEMPFIRM, NAICS Code 517312, https://data.census.gov/cedsci/table?y=2017&n=517312&tid=ECNSIZE2017.EC1700SIZEEMPFIRM&hidePreview=false.

[36] *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.

apparatus, and radio and television broadcast, and wireless communications equipment).[37] Examples of such manufacturing include fire detection and alarm systems manufacturing, Intercom systems and equipment manufacturing, and signals (e.g., highway, pedestrian, railway, traffic) manufacturing.[38] The SBA small business size standard for this industry classifies firms having 750 or fewer employees as small.[39] For this industry, U.S. Census Bureau data for 2017 shows that 321 firms operated for the entire year.[40] Of that number, 310 firms operated with fewer than 250 employees.[41] Based on this data, we conclude that the majority of Other Communications Equipment Manufacturers are small.

13. *Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing.* This industry comprises establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment.[42] Examples of products made by these establishments are: transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment.[43] The SBA small business size standard for this industry classifies firms having 1,250 employees or less as small.[44] U.S. Census Bureau data for 2017 show that there were 656 firms in this industry that operated for the entire year.[45] Of this number, 624 had fewer than 250 employees.[46] Based on this data, we conclude that a majority of manufacturers in this industry are small.

14. *Broadcast Auxiliary Services (BAS) Remote Pickup (RPU) Licensees (TV Stations).* Only licensees of broadcast stations, broadcast networks, and cable networks can hold RPU licenses. BAS involves a variety of transmitters, generally used to relay broadcast programming to the public (through translator and booster stations) or within the program distribution chain (from a remote news gathering unit to the studio or from the studio to the transmitter). The Commission nor the SBA has developed a small business size standard for Broadcast Auxiliary Services (BAS) Remote Pickup (RPU) licensees. Television Broadcasting[47] is the closest industry with a SBA small business size standard for Remote

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[37] *See* U.S. Census Bureau, *2017 NAICS Definitions, "334290 Other Communications Equipment Manufacturing,"* https://www.census.gov/naics/?input=334290&year=2017&details=334290.

[38] *Id.*

[39] *See* 13 CFR § 121.201, NAICS Code 334290.

[40] *See* U.S. Census Bureau, *2017 Economic Census of the United States*, *Selected Sectors: Employment Size of Firms for the U.S.: 2017,* Table ID: EC1700SIZEEMPFIRM, NAICS Code 334290, https://data.census.gov/cedsci/table?y=2017&n=334290&tid=ECNSIZE2017.EC1700SIZEEMPFIRM&hidePreview=false.

[41] *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.

[42] *See* U.S. Census Bureau, *2017 NAICS Definition*, "*334220 Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing,*" https://www.census.gov/naics/?input=334220&year=2017&details=334220.

[43] *Id.*

[44] *See* 13 CFR § 121.201, NAICS Code 334220.

[45] *See* U.S. Census Bureau, *2017 Economic Census of the United States*, *Employment Size of Firms for the U.S.: 2017,* Table ID: EC1700SIZEEMPFIRM, NAICS Code 334220, https://data.census.gov/cedsci/table?y=2017&n=334220&tid=ECNSIZE2017.EC1700SIZEEMPFIRM&hidePreview=false.

[46] *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.

[47] *See* U.S. Census Bureau, *2017 NAICS Definition, "515120 Television Broadcasting,"* https://www.census.gov/naics/?input=515120&year=2017&details=515120.

pickup BAS when used by a TV station. The SBA small business size standard for this industry classifies a business as small if it has $41.5 million or less in annual receipts.[48] 2017 U.S. Census Bureau indicates that 744 firms in this industry operated for the entire year.[49] Of that number, 657 firms had revenue of less than $25,000,000.[50] Based on this data we estimate that the majority of firms are small entities under the SBA size standard.

15. *Wireless Telecommunications Carriers (except Satellite).* This industry comprises establishments engaged in operating and maintaining switching and transmission facilities to provide communications via the airwaves.[51] 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.[52] The SBA size standard for this industry classifies a business as small if it has 1,500 or fewer employees.[53] U.S. Census Bureau data for 2017 show that there were 2,893 firms in this industry that operated for the entire year.[54] Of that number, 2,837 firms employed fewer than 250 employees.[55] Additionally, based on Commission data in the 2022 Universal Service Monitoring Report, as of December 31, 2021, there were 594 providers that reported they were engaged in the provision of wireless services.[56] Of these providers, the Commission estimates that 511 providers have 1,500 or fewer employees.[57] Consequently, using the SBA's small business size standard, most of these providers can be considered small entities.

16. *Satellite Telecommunications.* This industry 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."[58] Satellite telecommunications service providers include satellite and earth station operators. The SBA small business size standard for this industry classifies a business with $38.5 million or less in annual receipts as small.[59] U.S. Census Bureau data for 2017 show that 275

[48] *See* 13 CFR § 121.201, NAICS Code 515120 (as of 10/1/22 NAICS Code 516120).

[49] *See* U.S. Census Bureau, *2017 Economic Census of the United States*, *Selected Sectors: Sales, Value of Shipments, or Revenue Size of Firms for the U.S.: 2017,* Table ID: EC1700SIZEREVFIRM, NAICS Code 515120, https://data.census.gov/cedsci/table?y=2017&n=515120&tid=ECNSIZE2017.EC1700SIZEREVFIRM&hidePreview=false.

[50] *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. We also note that according to the U.S. Census Bureau glossary, the terms receipts and revenues are used interchangeably, *see* https://www.census.gov/glossary/#term_ReceiptsRevenueServices.

[51] *See* U.S. Census Bureau, *2017 NAICS Definition, "517312 Wireless Telecommunications Carriers (except Satellite),"* https://www.census.gov/naics/?input=517312&year=2017&details=517312.

[52] *Id.*

[53] *See* 13 CFR § 121.201, NAICS Code 517312 (as of 10/1/22, NAICS Code 517112).

[54] *See* U.S. Census Bureau, *2017 Economic Census of the United States*, *Employment Size of Firms for the U.S.: 2017,* Table ID: EC1700SIZEEMPFIRM, NAICS Code 517312, https://data.census.gov/cedsci/table?y=2017&n=517312&tid=ECNSIZE2017.EC1700SIZEEMPFIRM&hidePreview=false.

[55] *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.

[56] Federal-State Joint Board on Universal Service, Universal Service Monitoring Report at 26, Table 1.12 (2022), https://docs.fcc.gov/public/attachments/DOC-391070A1.pdf.

[57] *Id.*

[58] *See* U.S. Census Bureau, *2017 NAICS Definition, "517410 Satellite Telecommunications,"* https://www.census.gov/naics/?input=517410&year=2017&details=517410.

[59] *See* 13 CFR § 121.201, NAICS Code 517410.

firms in this industry operated for the entire year.[60] Of this number, 242 firms had revenue of less than $25 million.[61] Additionally, based on Commission data in the 2022 Universal Service Monitoring Report, as of December 31, 2021, there were 65 providers that reported they were engaged in the provision of satellite telecommunications services.[62] Of these providers, the Commission estimates that approximately 42 providers have 1,500 or fewer employees.[63] Consequently, using the SBA's small business size standard, a little more than half of these providers can be considered small entities.

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

17. The Commission expects the rules proposed in the *Notice* governing the operations of new licensees in the 12.7 GHz band will impose new reporting or recordkeeping and/or other compliance obligations on small entities as well as other applicants and licensees, if adopted. The rule changes proposed in this *Notice* sunsetting fixed service operations in the 12.7 GHz band, repacking mobile BAS/CARS operations, and prohibiting certain fixed satellite service operations in the band, could also impose other new compliance obligations on small and other entities. In the event these proposed actions are adopted, the *Notice* seeks comment on relocation options and on transition and protection mechanisms for incumbent non-federal operations. In the alternative, the *Notice* explores the possibility of shared use of the band. Finally, for newly licensed mobile and other expanded uses in the 12.7 GHz band, the *Notice* seeks comment on various service rules that should apply, including construction benchmarks and technical operating requirements. The projected reporting, recordkeeping, and other compliance obligations proposed for small entities and other licensees are described below.

18. *Certification.* In the *Certification Requirement for Part-74 and Part 78 Licensees Order* (*Order*) attached to the *Notice*, we direct each BAS and CARS licensee for each of their authorizations to use the 12.7 GHz band to certify the accuracy of all information reflected on each license, including whether the facilities are *operating* as authorized. If a licensee is unable to make such a certification for a given license, it must cancel or modify the license in accordance with the Commission's rules. We propose in the *Notice* to protect only those BAS and CARS stations licensed in the Universal Licensing System (ULS) and the Cable Operations and Licensing System (COALS), respectively, for which the licensee timely files the certification required in the *Order.* To minimize burdens on entities, including small entities, the Commission exempted from the certification requirement of 12.7 GHz band licenses for which the licensee has filed an application in ULS or COALS on or after January 1, 2021. The *Notice* does not require other incumbents to provide certifications for their existing authorized operations at this time. However, the Commission encourages all licensees to timely submit their data and update their information because it may use this data to inform its deliberations regarding the future use of the 12.7 GHz band. . Moreover, the *Notice* emphasizes that the Commission's rules require all in-band incumbents to operate in accordance with their authorizations and that the latter must be kept current. Therefore, while providing updated information may come at some cost, the revisions the Commission may ultimately adopt should benefit small entities by providing them with increased access to wireless

[60] *See* U.S. Census Bureau, *2017 Economic Census of the United States*, *Selected Sectors: Sales, Value of Shipments, or Revenue Size of Firms for the U.S.: 2017,* Table ID: EC1700SIZEREVFIRM, NAICS Code 517410, https://data.census.gov/cedsci/table?y=2017&n=517410&tid=ECNSIZE2017.EC1700SIZEREVFIRM&hidePreview=false.

[61] *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. We also note that according to the U.S. Census Bureau glossary, the terms receipts and revenues are used interchangeably, *see* https://www.census.gov/glossary/#term_ReceiptsRevenueServices.

[62] Federal-State Joint Board on Universal Service, Universal Service Monitoring Report at 26, Table 1.12 (2022), https://docs.fcc.gov/public/attachments/DOC-391070A1.pdf.

[63] *Id.*

spectrum, more information about opportunities in the 12.7 GHz band, and more flexibility to provide a wider range of services.

19. *Transitioning Mechanism*. In the *Notice*, the Commission proposes using the Emerging Technologies (ET) framework to relocate incumbent licensees and to introduce new services into the 12.7 GHz band. Pursuant to those procedures, if adopted, the Commission will set a sunset date for this band by which incumbent licensees may not cause harmful interference to new band entrants. Prior to this date, new entrants will be allowed to negotiate with incumbents to gain early entry into the band and, if necessary, may relocate the incumbents to comparable facilities. Because new entrants may have to relocate incumbents from a larger frequency range or greater geographic area than where the new entrants will operate, certain expenses will be placed upon incumbents by the proposed rules, and the Commission may establishes a companion set of cost-sharing procedures.[64] This process may require small entities that are incumbent operators in the band to participate in negotiations to reassign their spectrum access rights, involving additional attendant costs. Incumbents operating in the spectrum designated for new licensed mobile and expanded use would further be required to relocate their operations to different bands, potentially requiring reconfiguration or replacement of their existing facilities, also at additional cost.

20. *The 12.7 GHz Band Plan.* We propose to allocate the 12.7 GHz band as an unpaired band and to license it on an exclusive, geographic license area (using Partial Economic Areas (PEA)) basis, and in roughly 100 megahertz blocks without guard bands, which will permit the filing of mutually exclusive applications. The Commission's statutory authority to resolve mutually exclusive applications for initial licenses through a system of competitive bidding has lapsed.[65] Accordingly, in the event we determine to adopt a mutually exclusive application approach, we seek comment on how the Commission should resolve mutually exclusive applications for new initial licenses in the 12.7 GHz band in light of the lapse in our authority to use competitive bidding. In the event that the Commission's statutory authority with respect to auctions is restored, we delegate authority to WTB and OEA to seek comment on appropriate competitive bidding rules and procedures, consistent with prior Commission guidance.

21. *Licensing and Operating Rules.* In the *Notice,* we propose that licensees in the 12.7 GHz band would be required to comply with certain licensing and operating rules applicable to all part 27 services,[66] flexible use,[67] regulatory status,[68] foreign ownership reporting,[69] compliance with construction notification requirements,[70] renewal criteria,[71] permanent discontinuance of operations,[72] partitioning and

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[64] *See Amendment to the Commission's Rules Regarding a Plan for Sharing the Costs of Microwave Relocation*, WT Docket No. 95-157, *Notice* of Proposed Rule Making, 11 FCC Rcd 1923 (1995).

[65] *See* 47 U.S.C. § 309(j)(11).

[66] The *WRS Renewal 2nd R&O and FNPRM* adopted a unified framework for construction, renewal, and service continuity rules for flexible use geographic licenses in the Wireless Radio Services. *See Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal et al.*, WT Docket No. 10-112, Second Report and Order and Further *Notice* of Proposed Rulemaking and Order, 32 FCC Rcd 8874 (2017) (*WRS Renewal Reform 2nd R&O and FNPRM*).

[67] 47 CFR §§ 2.106, 27.2, 27.3. Section 303(y) of the Act 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 an 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." Balanced Budget Act of 1997, Pub. L. No. 105-33, 111 Stat. 251, 268-69; 47 U.S.C. § 303(y).

[68] 47 CFR § 27.10.

[69] 47 U.S.C. § 310; 47 CFR § 27.12.

[70] 47 CFR § 27.14(k).

disaggregation,[73] and spectrum leasing.[74] We seek comment on this proposal and on certain other part 27 rules that may be appropriate to apply to 12.7 GHz band licensees, or whether there are any aspects of our general part 27 service rules that should be modified to accommodate the particular characteristics of the 12.7 GHz band. In addition, small entities and other future 12.7 GHz band licensees will have to comply with service-specific requirements for the band addressing eligibility, mobile spectrum holdings policies, license term, performance requirements, renewal term construction obligations, and other licensing and operating rules, some of which include reporting and recordkeeping obligations.

22. *Alternatives for Sharing the Band.* The sharing methods that have been proven for white space devices and Citizens Broadband Radio Service (CBRS), in conjunction with new or developing sharing technologies, may be used in the 12.7 GHz band to maximize the use of spectrum. Accordingly, the *Notice* seeks comment on such methods as well as on using an automated spectrum management system such as the Automated Frequency Coordination (AFC) systems used in the 6 GHz band or spectrum access systems used in CBRS as a method to enable spectrum sharing in the 12.7 GHz band as an alternative to relocating incumbents or repacking the band.

23. *Eligibility, License Term and Renewal.* An open eligibility standard has been proposed for licensing in the 12.7 GHz band along with a 10-year initial term for new licenses. The Commission also proposes to apply our general part 27 renewal requirements for wireless licenses as the renewal standard for the 12.7 GHz as the Commission did in the 3.7 GHz Service and the 3.5 GHz band orders.

24. *Performance Requirements.* The *Notice* seeks comment on requiring a 12.7 GHz band licensee, deploying mobile or point-to-multipoint service in accordance with our part 27 rules, to provide reliable signal coverage and offer service to at least 30% to 45% of the population in each of their license areas within five years of their license issue date (interim performance benchmark), and to at least 60% to 80% of the population in each of their license areas within ten years from the license issue date (final performance benchmark). For licensees deploying point-to-point service, the *Notice* seeks comment on requiring them to demonstrate within five years of the license issue date (interim performance benchmark) 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 deploying point-to-point service would need to demonstrate that 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 propose to require licensees deploying point-to-point service to demonstrate within ten 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 propose to require a licensee deploying 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.

25. While the *Notice* seeks comment on performance benchmarks based on population coverage applicable for a range of fixed and mobile services, the *Notice* recognizes that 12.7 GHz licenses have flexibility to provide services potentially less suited to a population coverage metric. In particular, licensees providing Internet of Things-type (IoT-type) fixed and mobile services may benefit from an alternative performance benchmark metric. To account for this, we propose that licensees providing IoT-type services would have flexibility to demonstrate that they offer geographic area coverage of at least

(Continued from previous page)

[71] *Id.* § 1.949.

[72] *Id.* § 1.953.

[73] *Id.* § 1.950.

[74] *Id.* § 1.9001 *et seq*.

25% to 35% of the license area at the interim (five-year) performance benchmark, and geographic area coverage of at least 50% to 65% of the license area at the final (ten-year) performance benchmark.[75]

26. Along with performance benchmarks, the Notice seeks comment on which penalties will most effectively ensure timely build-out. Specifically, the *Notice* states that, in the event a licensee fails to meet the first performance benchmark, the licensee's final benchmark and license term would be reduced by two years, thereby requiring it to meet the final performance benchmark two years sooner (at eight years into the license term) and reducing its license term to eight years. If a licensee fails to meet the final 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. We seek comment on how, in the event a 12.7 GHz band licensee's authority to operate terminates, its spectrum rights should become available for reassignment pursuant to the licensing framework we adopt for this band. We also seek comment on whether, consistent with the Commission's rules for other part 27 licenses, we should require that any 12.7 GHz band flexible use licensee that forfeits its license for failure to meet its performance requirements be precluded from regaining that license. Finally, we seek comment on other performance requirements and enforcement mechanisms that would effectively ensure timely buildout.

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

28. *Mobile Spectrum Holdings and Initial Licensing.* Small entities could be impacted by additional requirements pursuant to our request for comment on how to address spectrum holdings issues involving the 12.7 GHz band. We also seek comment on whether or not to include the 12.7 GHz band in the total spectrum screen or in a separate spectrum screen; on how to address spectrum aggregation issues in the initial licensing of this band; and, on whether there should be a limit on the amount of 12.7 GHz band spectrum held by a single entity at the licensing stage.

29. *Technical Rules.* Small entities and other licensees would also be subject to certain technical rules established to maximize flexible use of the 12.7 GHz band spectrum while minimizing the impact on adjacent band incumbents, consistent with the public interest. In that context, the *Notice* proposes to adopt the same power limits that are applied to UMFUS operations and it seeks comment on whether incumbent satellite services and new terrestrial mobile services can coexist if the latter will be subject to these power limits.

[75] *See, e.g.,* 47 CFR §§ 27.14(v)(2) (requiring a 3.7 GHz Service licensee providing Internet of Things service to offer geographic area coverage of 35% of the license area within 8 years of initial grant and geographic area coverage of 65% of the license area within 12 years of initial grant); 27.14(w)(1)(iii) (requiring a 3.45 GHz Service licensee providing Internet of Things service to offer geographic area coverage of 35% of the license area within 4 years of initial grant and geographic area coverage of 65% of the license area within 8 years of initial grant); 47 CFR §§ 30.103, 30.104(b) (requiring a UMFUS licensee providing Internet of Things or other services deployed along non-traditional lines to offer geographic area coverage of 25% of the license area within 10 years of initial grant).

30. For out-of-band-emissions, the *Notice* proposes that emissions be kept to a level that will provide protection to incumbent services in adjacent bands, while allowing the full use of the new band, and additionally proposes to adopt a requirement that the conductive power or the total radiated power of any emission outside a licensee's frequency block shall be −13 dBm/MHz or lower. Further, the *Notice* seeks comment on whether additional technical protection criteria, beyond out-of-band-emission limits, are necessary to ensure effective coexistence with adjacent band FSS operations. To implement field strength limit at market boundaries, the *Notice* proposes to adopt a -77.6 dBm/m^2/MHz power flux density limit at the service-area boundaries. The *Notice* also proposes that fixed and mobile operations be subject to international agreements with Mexico and Canada.

31. To comply with the proposed rules in the *Notice*, small entities may be required to hire attorneys, engineers, consultants, or other professionals. In particular, for small entities that are not existing operators and do not have existing staffing dedicated to regulatory compliance, engineering and legal expertise may be necessary to make the requisite filings and to demonstrate compliance with the proposed performance obligations. At this time, while the Commission cannot quantify the cost of compliance with the proposed rule changes, we note that several of the proposed 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 if similar requirements are adopted for this band. We also note that for most of the proposals and requests for comments in the *Notice,* the Commission also requests cost-benefit analyses. The Commission expects that the information it receives in comments and through cost-benefit analyses will help it identify and evaluate all relevant matters associated with the proposed reallocation and the relocation of public safety operations out of the band, including compliance costs and other burdens on small entities.

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

32. The RFA requires an agency to describe any significant, specifically small business, alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): "(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such 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 such small entities."[76]

33. In the *Notice*, the Commission seeks to identify potential opportunities for additional flexible access—particularly for wireless broadband services—in the 12.7 GHz band. Throughout the *Notice*, we considered the economic impact the proposed rules could have on small businesses. For example, we considered if there were particular instances where certain parameters – such as use of smaller license areas – could help small businesses. The use of smaller license areas could potentially assist those small entities that favor shared licensing regimes, and also could help promote rural deployments by facilitating access to spectrum by small and regional service providers and beyond.[77]

34. The Commission also considered applying ten-year license terms for any licensees issued in the 12.7 GHz band. This approach specifically considers the potential impact to small entities, as they must allocate resources carefully over the length of their license term. Moreover, as small entities tend to have more limited funds, should they be required to compete at auction for a particular license, the

[76] 5 U.S.C. § 603(c)(1)-(4).

[77] *See supra* at para. 102.

certainty of a longer license term would provide licensees with sufficient incentive to make the long-term investments necessary for compliance. In the *Notice*, we seek comments on this matter.

35. With respect to our proposal in the *Notice* to protect only those BAS and CARS stations licensed in ULS and COALS for which the licensee timely files the certification required in the *Order*, to minimize burdens on small and other entities, the Commission exempted from the certification requirement 12.7 GHz band licenses for which the licensee has filed an application in ULS and COALS on or after January 1, 2021. Further, to minimize the economic impact for any small entity that is required to be repacked to a smaller portion of the 12.7 GHz band, the date that the Commission will set for mobile BAS/CARS operators to cease operations in this band will be set to provide them with enough notice to allow them to relocate without causing disruption to their services. Likewise, the sunset period for incumbent FS operations could potentially be set to provide additional time in order to aid small entities.

36. To assist with the Commission's evaluation of the economic impact on small entities that may result from the actions and alternatives that have been proposed in this proceeding, the *Notice* seeks alternative proposals and requests information on the potential costs of such alternatives to licensees. The Commission expects to consider more fully the economic impact on small entities following its review of comments filed in response to the *Notice*, including costs and benefits information. Alternative proposals and approaches from commenters would also help the Commission further minimize the economic impact on small entities. The Commission's evaluation of the comments filed in this proceeding will shape the final conclusions it reaches, the final alternatives it considers, and the actions it ultimately takes in this proceeding to minimize any significant economic impact that may occur on small entities from the final rules that are ultimately adopted.

F. Federal Rules that May Duplicate, Overlap, or Conflict with the Proposed Rules

37. None.

STATEMENT OF
CHAIRWOMAN JESSICA ROSENWORCEL

Re: *Expanding Flexible Use of the 12.2-12.7 GHz Band*, Report & Order and FNPRM, WT Docket No. 20-443; *Expanding Use of the 12.7-13.25 GHz Band for Mobile Broadband or Other Expanded Use*, NPRM and Order, GN Docket No. 22-352 (May 18, 2023)

Just a few weeks ago I joined the National Science Foundation to discuss 6G wireless and the potential that it holds. That's right—6G. Just like with the early days of 5G, 6G discussions have started with big ideas and big goals. And just like in the early days of 5G, the scrum for 6G is already underway. We are seeing countries around the world launching programs, projects, and alliances to ensure their foothold in the next generation of wireless technology.

Of course, you could say, on good authority, that no one knows yet with precision what 6G will entail—and you would be right. But if we have learned anything from our experience rolling out 5G, it is that wireless policy matters for economic and national security. That is true in the United States, and it is true globally.

It is also true that fortune favors the bold. So today we identify more than 1000 megahertz of prime mid-band spectrum for new and innovative use. These are airwaves in the 12.2-13.25 GHz band, which puts them right in the middle of the 7-16 GHz band we have already identified as the sweet spot for the 6G era. We are the first country in the world to identify these bands for new wireless use—and take action.

What does this more than 1000 megahertz of spectrum look like? We have ideas today. We believe these airwaves can be optimized with a mix of licensed, unlicensed, and space-based services.

First, we take action to ensure the present and future of satellite services in the 12.2-12.7 GHz band. We recognize that millions of people rely on services in this band—and we want to see that continue. But we also realize there may be additional potential in these airwaves, so we are exploring ways to also use this mid-band spectrum for fixed licensed and unlicensed terrestrial services.

Second, we identify the 12.7-13.25 GHz band as a prime candidate for new mobile use. So we explore how to put it in the pipeline for new wireless broadband.

Count this more than 1000 megahertz as an investment in our wireless future. It is an investment in our leadership in 5G, 6G, and beyond. But back to the here and now. Because all of our planning for a bold future requires that we address something in the here and now. For us to be successful, we need to have Congress reauthorize the spectrum auction authority of the Federal Communications Commission. For thirty years the agency has held this authority, which it uses to distribute airwaves for development nationwide. The ongoing lapse in this authority has immediate consequences for 5G and could soon exact a toll on our 6G leadership. In the past Congress has always extended our auction authority without interruption. That didn't happen this time around and we need to fix it—stat. That's because restoring this authority will provide the United States with the strongest foundation to compete in a global economy, counter our adversaries' technology ambitious, and safeguard our national security.

Thank you to the agency staff who worked on this effort, including Chris Andes, Simon Banyai, Robert Bickford, Stephen Buenzow, Baron Chan, Peter Daronco, Jessica Greffenius, Garnet Hanly, Lamine Kone, Susannah Larson, John Lockwood, Madelaine Maior, Blaise Scinto, Joel Taubenblatt, Natasha Wiltz, and Brian Wondrack from the Wireless Telecommunications Bureau; Bahman Badipour, Michael Ha, Ira Keltz, Matthew Miller, Nicolas Oros, Ron Repasi, and Tom Struble from the Office of Engineering and Technology; Craig Bomberger, Nicolas Copeland, Judith Dempsey, Paul LaFontaine, Catherine Matraves, Giulia McHenry, Gary Michaels, Erik Salovaara, Martha Stancill, and Donald Stockdale from the Office of Economics and Analytics; Deborah Broderson, Doug Klein, Keith

McCrickard, and Bill Richardson from the Office of General Counsel; Greg Boran, Jennifer Gilsenan, Karl Kensinger, Kathyrn Medley, and Merissa Velez from the Space Bureau; Nese Guendelsberger, Dante Ibarra, Ethan Lucarelli, and James McCluckie from the Office of International Affairs; Jim Schlichting from the Public Safety and Homeland Security Bureau; Brendan Holland, Jeffrey Neumann, and Sima Nilsson from the Media Bureau; and Michael Gussow, Joy Ragsdale, and Chana Wilkerson from the Office of Communications Business Opportunities.

STATEMENT OF
COMMISSIONER GEOFFREY STARKS

Re: *Expanding Flexible Use of the 12.2-12.7 GHz Band*, Report & Order and FNPRM, WT Docket No. 20-443; *Expanding Use of the 12.7-13.25 GHz Band for Mobile Broadband or Other Expanded Use*, NPRM and Order, GN Docket No. 22-352 (May 18, 2023)

A massive part of our economy today—and our vision for a more prosperous and secure future tomorrow—depends on our ability to pack more information, more users, and more applications into the scarce resource we know as spectrum. Part of the challenge with spectrum policy is that it takes time to develop the frequencies we unlock for consumers. That means we have to lean forward and act early if we want to successfully untap underused spectrum. But it also means that we can't be afraid to adapt to the best available evidence as we steer the ship.

That's what you're seeing today in the 12.2 and 12.7 GHz bands. In 12.2 GHz, we're correcting course in response to the technical evidence. As some of you might remember, I had voiced concerns about whether mobile broadband and satellite services could successfully share this frequency band. But in the interest of supporting efficient spectrum use—and doing more with less—I was open, and in fact committed, to following the engineering wherever it went. Based on the studies filed to date, our engineers have concluded that high-powered mobile broadband, when deployed throughout the country, will interfere with established and emerging satellite services that serve millions of consumers. I would have welcomed a path forward that allowed both services to thrive. But for now, it's time to adapt.

In 12.7 GHz, we're leaning forward. We're proposing specific rules to lift 550 megahertz of underused spectrum off the ground while protecting or transitioning incumbents and fully exploring sharing-based alternatives. While many of the details remain undecided, there is one thing this item makes abundantly clear. The best way to get this spectrum into the hands of users could very well be an auction. We need our authority to hold one restored.

I thank the Commission staff who developed this item. It has my full support.

STATEMENT OF
COMMISSIONER NATHAN SIMINGTON

Re: *Expanding Flexible Use of the 12.2-12.7 GHz Band*, Report & Order and FNPRM, WT Docket No. 20-443; *Expanding Use of the 12.7-13.25 GHz Band for Mobile Broadband or Other Expanded Use*, NPRM and Order, GN Docket No. 22-352 (May 18, 2023)

I am happy to support today's item. The Report and Order makes the right policy call by protecting NGSO FSS incumbents who have engaged in significant investment in the 12.2 to 12.7 GHz band. The Report and Order also gets the engineering right, considering both these same incumbents' on-going deployment of state-of-the-art satellite technology and overall trends in earth station design and regulation.

Today's NGSO FSS satellites speak to arrays of electronically steered receivers. Signal rejection within those receivers is frequently achieved very close to the desired reception angle with arrays composed of antennas of limited dynamic range. The power levels and coverage profiles of terrestrial networks risk saturating such arrays with interference from networks of powerful terrestrial transmitters, including via side lobes even when care is taken with terrestrial antenna angles. Barring significant technology developments driving down the price and complexity of individual array elements while driving up quality, this will probably be the case for some time to come. And unless and until we see terrestrial technologies deployed in real-world situations, the FCC has no business betting the store on them by undermining the viability of fixed incumbent services in active deployment at large scale for which there is significant demonstrated public demand.

And while I am hopeful that there is a way to allow satellite and two-way high-power fixed wireless service to coexist in the 12.2 to 12.7 GHz band, I believe the FCC needs to be sure that it is not putting the cart before the horse and that it protects incumbents. That is why I am grateful that my colleagues agreed to include language in the Further Notice that impresses upon parties who comment in this proceeding an obligation to provide clear and detailed technical and operational information, including studies—preferably real-world studies—that support these proposals. Without such proposals, the FCC will never emerge from the quagmire of incommensurable, contradictory technical proposals that are laced with advocacy—as we saw with the record in response to the 2021 12.2 to 12.7 GHz NPRM.

I am also happy to support the proposals made in today's 12.7 to 13.2 GHz NPRM. A high-power exclusive-use licensing approach makes the most sense in a band where there are few incumbents who can be easily relocated without the need for spectrum sharing—which is otherwise the preferred approach in congested spectrum bands. I look forward to a fulsome record.

Finally, I would like to thank the staff WTB and OET for their hard work on this item.