FCC FACT SHEET

Space Innovation; Facilitating Capabilities for In-space Servicing, Assembly, and Manufacturing

Notice of Inquiry – IB Docket Nos. 22-271 and 22-272

Background: Space activities are rapidly accelerating, resulting in new opportunities in multiple sectors of society. The FCC's Notice of Inquiry examines the opportunities and challenges of in-space servicing, assembly, and manufacturing—or "ISAM"—that can support sustained economic activity in space. Missions in this category include satellite refueling, inspecting and repairing in-orbit spacecraft, capturing and removing debris, and transforming materials through manufacturing while in space. In particular, the FCC seeks comment on the status of ISAM: where the industry is today, how the Commission can best support its sustainable development, and what tangible economic and societal benefits may result from the development of these capabilities.

ISAM activities are poised to transform the space economy. ISAM missions have the potential to build entire industries, create new jobs, mitigate climate change, and advance our nation's economic, scientific, technological, and national security interests. At the same time, ISAM activities may raise new opportunities and challenges for the sustainability of the outer space environment and the space-based services which the United States government, businesses, and individuals rely on every day to communicate, navigate, and perform other vital functions. The Notice of Inquiry seeks to develop a record on where commercial and other non-governmental ISAM capabilities are today and the steps needed to promote their development.

What the *Notice of Inquiry* Would Do:

- Develop an up-to-date record on current ISAM activities that may involve Commission licensing and rules.
- Seek information on steps the Commission might take to facilitate progress and reduce barriers for ISAM missions, including clarifications, updates or modifications of our licensing processes.
- Seek comment on possible spectrum needs for ISAM missions, and on any modifications to or adaptations of our rules on orbital debris mitigation that may be appropriate to address and facilitate ISAM missions.
- Develop a record on the potential for orbital debris remediation and removal functions that offer the prospect of improvement in the orbital debris environment.
- Seek comment on any unique regulatory issues presented by ISAM activities beyond Earth's orbit and on possible means to promote growth, innovation, and development in ISAM operations.

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

In the Matter of	)	
	)	
Space Innovation;	)	IB Docket No. 22-271
	)	
Facilitating Capabilities for In-space Servicing, Assembly, and Manufacturing	)	IB Docket No. 22-272

NOTICE OF INQUIRY*

Adopted: [] **Released: []**

Comment Date: 45 days following publication in the Federal Register
Reply Comment Date: 75 days following publication in the Federal Register

By the Commission:

I. INTRODUCTION

1. Today we start an effort to promote United States leadership in the emerging space economy. Space activities are rapidly accelerating, resulting in new opportunities in multiple sectors of society. In this Notice of Inquiry, we examine the opportunities and challenges of in-space servicing, assembly, and manufacturing—or "ISAM"—that can support sustained economic activity in space. In particular, we seek comment on the status of ISAM: where the industry is today, how the Commission can best support its sustainable development, and what tangible economic and societal benefits may result from the development of these capabilities.

2. We believe ISAM activities are poised to transform the space economy. Missions in this category—which can include satellite refueling, inspecting and repairing in-orbit spacecraft, capturing and removing debris, and transforming materials through manufacturing while in space—have the potential to build entire industries, create new jobs, mitigate climate change, and advance our nation's economic, scientific, technological, and national security interests. At the same time, we also recognize that ISAM activities may raise new opportunities and challenges for the sustainability of the outer space environment and the space-based services on which the United States government, businesses, and individuals rely on every day to communicate, navigate, and perform other vital functions. As these capabilities evolve, the norms, rules, and principles that guide outer space activities may also require

* This document has been circulated for tentative consideration by the Commission at its August 5, 2022 open meeting. The issues referenced in this document and the Commission's ultimate resolution of those issues remain under consideration and subject to change. This document does not constitute any official action by the Commission. However, the Chairwoman has determined that, in the interest of promoting the public's ability to understand the nature and scope of issues under consideration, the public interest would be served by making this document publicly available. This document is being released as part of a proceeding considered to be "exempt" for purposes of the Commission's *ex parte* rules. *See* 47 CFR § 1.1204(b)(1). Participants in this proceeding should familiarize themselves with the Commission's *ex parte* rules, however, including the general prohibition on presentations (written and oral) on matters listed on the Sunshine Agenda, which is typically released a week prior to the Commission's meeting. *See* 47 CFR §§ 1.1200(a), 1.1203.

renewed attention.

3. This Notice of Inquiry thus seeks to develop a record on where these capabilities are today and the steps needed to promote their development. In particular, we seek comment through this Notice of Inquiry on the regulatory needs related to commercial and other non-governmental ISAM activities and whether such activities could further the Commission's policy goals and statutory obligations. We seek comment on ISAM activities that may involve Commission licensing and rules, on updates or modifications of our rules or licensing processes that might facilitate ISAM activities, on spectrum needs for ISAM missions, and on any regulatory issues presented by ISAM activities beyond Earth's orbit. In addition, we seek comment on space safety issues that may be implicated by ISAM activities, including orbital debris considerations. As part of this inquiry, for the first time, we seek to develop a record not only on efforts to minimize the creation of new debris in connection with ISAM, but on opportunities to leverage these capabilities to clean up existing debris. The information developed in this Notice of Inquiry can help position the United States to realize the critical benefits of ISAM while ensuring space safety and sustainability.

II. BACKGROUND

4. ISAM refers to a set of capabilities that are used on-orbit, in transit, or on the surface of space bodies. Within the category of ISAM, "servicing" includes activities such as use of one spacecraft to inspect another, to dock with other spacecraft and provide support such as maintaining the station in its orbital location in order to extend the period of operations, or to repair or modify a spacecraft after its initial launch. These activities typically include the process of maneuvering close to and operating in the near vicinity of the "client" spacecraft, a set of activities often referred to as rendezvous and proximity operations (RPO). "Servicing" also involves transport of a spacecraft from one orbit to another and debris collection and removal. "Assembly" refers to the construction of a space system using pre-manufactured components, and "manufacturing" is the transformation of raw or recycled materials into components, products, or infrastructure in space.

5. While many commercial and other non-governmental ISAM activities are still at an early stage, the Commission has played a role in authorizing a number of missions that include technologies relevant for ISAM or offer groundbreaking commercial servicing. Some of these include:

- Licensing of Space Logistics, LLC's Mission Extension Vehicle-1 (MEV-1).[1] This spacecraft has successfully executed the first commercial mission servicing a commercial spacecraft, in this case by docking with and providing station-keeping support to a geostationary orbit (GSO) communications satellite.

- Licensing of Space Logistics, LLC's second Mission Extension Vehicle (MEV-2).[2]

[1] *See Space Logistics LLC*, IBFS File No. SAT-LOA-20170224-00021 (granted-in-part Dec. 5, 2017) (granting authority for Space Logistics to construct, deploy, and conduct telemetry, tracking, and command (TT&C) operations with the MEV-1 as it (1) is deployed from the launch vehicle; engages in orbit-raising maneuvers and conducts post-launch system verification tests; (2) raises its orbit above the geostationary orbital arc; (3) and performs RPO and docking with the Intelsat-901 space station); IBFS File Nos. SAT-LOA-20170224-00021, SAT-AMD-20190207-00008 (granted June 20, 2019) (granting authority for TT&C operations with the combined vehicle stack of the MEV-1 and Intelsat-901 after RPO and docking while in GSO, and during relocation above the GSO arc and undocking) (MEV-1 License). MEV-1 completed its first successful docking operation in February 2020. *See* Space Logistics, Northrop Grumman, https://www.northropgrumman.com/space/space-logistics-services/ (last visited Jun. 1, 2022).

[2] *See Space Logistics LLC*, IBFS File No. SAT-LOA-20191210-00144 (granted Mar. 20, 2020) (MEV-2 License) (granting authority to construct and deploy the MEV-2, and conduct TT&C operations with the MEV-2 as it is deployed from the launch vehicle, engages in orbit-raising maneuvers, and conducts various post-launch system (continued….)

- Granting an experimental license to SpaceIce in October 2020 for a satellite designed to investigate freeze-casting in the microgravity environment.[3]

- Authorizing U.S. earth station communications in November 2021 to support Astroscale Ltd.'s ELSA-d testing of spacecraft capabilities for orbital debris removal.[4]

- Granting an experimental license to NanoRacks LLC in November 2021 for communications with an experimental component attached to the second stage of a SpaceX Falcon 9 launch vehicle, to demonstrate metal-cutting in space.[5]

6. Additionally, topics related to ISAM capabilities have been raised in other Commission rulemaking proceedings. In the Commission's recent orbital debris proceeding, *Mitigation of Orbital Debris in the New Space Age*, the Commission sought comment on a variety of areas for rule updates, including, for example, whether it should update its rules specifically to address RPO.[6] The Commission received a number of comments in the record,[7] and ultimately adopted a requirement that space station applicants disclose whether a spacecraft is capable of, or will be, performing proximity operations, noting that this disclosure would identify situations where such operations are planned and provide a vehicle for further review of those operations.[8] At the time, the Commission noted the evolving and developing nature of RPO and accordingly found that adoption of more specific technical or operational requirements would be premature.[9] The Commission also sought comment on the role of spacecraft retrieval, also

(Continued from previous page)
verification tests, performs RPO with the Intelsat spacecraft IS-1002, operates in a combined vehicle stack in geosynchronous transfer orbit with IS-1002 for an expected five years, and subsequently undocks). MEV-2 successfully docked with IS-1002 in April 2021. *See MEV-2 Servicer Successfully Docks to Live Intelsat Satellite*, https://spacenews.com/mev-2-servicer-successfully-docks-to-live-intelsat-satellite/ (last visited Jun. 14, 2022).

[3] *See SpaceIce Application*, ELS File. No. 0985-EX-CN-2019 (granted Oct. 8, 2020).

[4] *See Denali 20020*, IBFS File No. SES-STA-20200113-00043 (granted Nov. 17, 2021) (granting special temporary authority to provide TT&C support for Astroscale's demonstration of RPO, capture, and deorbit); *see also Viasat, Inc,* IBFS File No. SES-STA-20200117-00055 (granted Mar. 19, 2021); *see also University of Miami – CSTARS*, IBFS File No. SES-STA-20200811-00859 (granted Nov. 17, 2021); *see also* Letter from Karl A. Kensinger, Acting Chief, Satellite Division, International Bureau, FCC, to Darryl White, Denali 20020, et. al., IBFS File Nos. SES-STA-20200113-00043, SES-STA-20200117-00055, SES-STA-20200811-00859 (dated Sept. 29, 2020) (request for information regarding the Astroscale ELSA-d spacecraft mission, to support request for earth station authorization). The ELSA-d spacecraft was licensed by the United Kingdom, and the spacecraft consists of two components, a "client" and "servicer", interacting with each other to complete an orbital maneuver demonstration. *See Astroscale's ELSA-d Successfully Demonstrates Repeated Magnetic Capture*, Astroscale (Aug. 25, 2021), https://astroscale.com/astroscales-elsa-d-successfully-demonstrates-repeated-magnetic-capture/.

[5] *See NanoRacks, LLC* Application, ELS File Nos. 0022-EX-ST-2021 (granted May 28, 2021), 1328-EX-ST-2021 (granted Nov. 15, 2021) (NanoRacks Mars Outpost experiment).

[6] *Mitigation of Orbital Debris in the New Space Age*, Notice of Proposed Rulemaking, 33 FCC Rcd 11352, 11375-11376, para. 68 (2018) (*Orbital Debris NPRM*).

[7] *See e.g.,* IB Docket No. 18-313, Comments of the Consortium for the Execution of Rendezvous and Servicing Operations (CONFERS) at 2 (filed Apr. 4, 2019).

[8] *Mitigation of Orbital Debris in the New Space Age,* Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 4156, 4213, para. 123 (2020) (Orbital Debris R&O and FNPRM). The rules adopted by the Commission state that applicants must disclose planned proximity operations, if any, and address debris generation that will or may result from the proposed operations, including any planned release of debris, the risk of accidental explosions, the risk of accidental collision, and measures taken to mitigate those risks. *Id.* at Appendix A.

[9] *Id*.

referred to as "active debris removal" as a debris mitigation strategy in certain circumstances, and concluded that this was also an area where it would be premature to establish more detailed regulations.[10] Additionally, the Commission sought comment on several topics in a Further Notice of Proposed Rulemaking, including quantifying risks associated with multi-satellite systems and post-mission disposal performance bonds.

7. Similarly, in the Commission's launch frequency proceeding, *Allocation of Spectrum for Non-Federal Space Launch Operations*, [11] some commenters addressed servicing capabilities. While that proceeding was more narrowly focused on several specific frequencies used for launch vehicles, we sought comment on "payload" operations that either utilize or could potentially utilize those frequencies, such as vehicles used for transport to the International Space Station. We also sought comment on cases in which an object that might otherwise function only as a launch vehicle upper stage would continue operations after the initial launch phase in order to support operations of customer instruments or radios.[12] The Commission received comments in the record that addressed a broader range of activities, including situations in which a spacecraft is used either to deploy or move other spacecraft that are already in orbit.[13] Several commenters also advocated for a new licensing framework for on-orbit servicing (OOS) separate from the Commission's existing part 25 and part 5 licensing regimes.[14]

8. Finally, in June 2022, we considered ISAM operations in our annual regulatory fee proceeding and sought comment on these nascent operations in the context of regulatory fee obligations.[15] Some commenters suggested that creating a separate fee category or categories, along with service rules for OOS and RPO operations, would provide clarity.[16] In the *FY 2022 Notice*, we observed that except for GSO servicing missions, we expect that most OOS and RPO will be non-geostationary orbit (NGSO) operations.[17] We tentatively concluded that the technology for OOS and RPO missions was too nascent,

[10] *Id.* at 4206-07, paras. 106-107.

[11] *See Allocation of Spectrum for Non-Federal Space Launch Operations*, Report and Order and Further Notice of Proposed Rulemaking, 36 FCC RCd 7764, paras. 139-44 (2021) (Launch Frequency R&O and FNPRM).

[12] *Id.* The customer equipment is sometimes referred to as a "payload" or "hosted payload", but the meaning of the term "payload" in this context is generally distinct from the use of the term "payload" in the launch licensing context, where the term is used to refer to the object or objects that separate from the launch vehicle at the end of the launch activity.

[13] *See*, *e.g.*, Comments of Spaceflight, Inc. ET Docket 13-115, at 3 (filed September 10, 2021) (asking the Commission to allocate frequencies for "free-flying payload operation services"); Comments of BlackSky Global LLC, ET Docket 13-115, at 1-2 (filed Aug. 11, 2021) (stating the "Commission asks whether use of the Space Operation allocation should be limited to space launches or whether there are other kinds of operations that may be appropriate for this band" and arguing that the band "should be available for all space operation services"); Reply Comments of Astroscale U.S. Inc., Axiom Space Inc., Atomos Space, Sierra Space Corp., And Scout Inc., ET Docket No. 13-115, at 6 (filed Sept. 10, 2021) (stating that the Commission should expand "Space Operation Service" allocations in 2025-2110 MHz and 2200-2290 MHz to include RPO activities).

[14] *Id.* Astroscale, et al. frame OOS and RPO missions as a hybrid of traditional launch and reentry operations and satellite operations. These commenters stressed the need for a regularized license framework for these missions. *See* Reply Comments of Astroscale U.S. Inc., Axiom Space Inc., Atomos Space, Sierra Space Corp., and Scout Inc., ET Docket No. 13-115, at 4-5 (filed Sept. 10, 2021)

[15] *Assessment and Collection of Regulatory Fees for Fiscal Year 2022*, Report and Order and Notice of Proposed rulemaking, FCC 22-39, WL 2045858, para. 20, 45-46 (2022) (*FY 2022 Notice*). Two commenters in the proceeding raised the possibility of creating new fee categories for spacecraft performing RPO and on-orbit servicing (OOS) missions. *Id.* at para. 45.

[16] Spaceflight Comments, MD Docket No. 21-190, at 2, 6, 7; Astroscale Comments, MD Docket No. 21-190, at 2.

[17] FY 2022 Notice, at para. 45.

however, to make broader determinations on the status of such operations for regulatory fee purposes,[18] and we sought further comment on whether and how to assess fees for these types of spacecraft, as well as other types of satellites servicing other satellites, including those operating near the GSO arc.[19]

9. The Commission's ongoing work related to ISAM has dovetailed with other major federal government action. On April 4, 2022, the White House Office of Science and Technology Policy (OSTP) released the *ISAM National Strategy*.[20] As discussed therein, the United States plans to support and stimulate government, academic, and commercial development of ISAM capabilities.[21] In particular, the *ISAM National Strategy* identified six goals to advance ISAM capability development:

1. Advance ISAM research and development, including an ecosystem of capabilities to support ISAM such as standards and systems to implement standards.[22]
2. In collaboration with academic and commercial ISAM stakeholders, prioritize expanding ground infrastructure and support the development of space-based infrastructure.[23]
3. Accelerate the emerging ISAM commercial industry through providing a sustained demand signal for ISAM capabilities and increased collaboration between government stakeholders and industry.[24]
4. Promote international collaboration and communication and support the development of voluntary international standards, best practices, guidelines, and norms for ISAM activities.[25]
5. Prioritize environmental sustainability by developing and implementing best practices, collaborating with commercial partners to support cost-effective space debris removal, and developing new climate science approaches.[26]
6. Inspire the future space workforce by collaborating with academic institutions developing ISAM-enabled research, supporting curriculum development, and advocating for apprenticeships to foster industry-academia collaborations.[27]

III. DISCUSSION

10. We seek comment on Commission actions that can address the needs of ISAM activities, including whether there are any regulatory changes the Commission should consider to facilitate ISAM. For example, we ask questions about spectrum needs for ISAM missions, as well as whether there are clarification of or changes to our licensing processes that would support these types of missions. Recognizing the potential benefits of satellite servicing and orbital debris remediation, we also seek

[18] *Id.* at paras. 20, 46.

[19] *Id.* at para 47. The GSO arc lies on the plane of the Earth's equator at an altitude of approximately 35,786 kilometers. *See Mitigation of Orbital Debris*, Second Report and Order, 19 FCC Rcd 11567, para. 1, n.4 (2004).

[20] *See* National Science and Technology Council, In-Space Servicing, Assembly, and Manufacturing Interagency Working Group, In-Space Servicing, Manufacturing, and Assembly National Strategy (April 2022) (ISAM National Strategy), https://www.whitehouse.gov/wp-content/uploads/2022/04/04-2022-ISAM-National-Strategy-Final.pdf.

[21] *Id*. at 5.

[22] *Id.* at 7.

[23] *Id*. at 8.

[24] *Id*.

[25] *Id*. at 9.

[26] *Id*.

[27] *Id*. at 10.

comment on the particular needs of these activities and whether they can further Commission policy goals and statutory obligations. In addition, we seek comment on the orbital debris implications and opportunities posed by ISAM missions, in view of the Commission's role in reviewing orbital debris mitigation plans for non-governmental spacecraft.

A. Spectrum Needs and Relevant Allocations

11. Generally, we seek comment on the variety of radiofrequency communications links that could be involved in ISAM missions, on potentially relevant international frequency allocations and allocations in the U.S. Table of Frequency Allocations, and on other considerations associated with spectrum licensing. To date, some spacecraft involved in ISAM missions have been licensed under part 25 of the Commission's rules, which generally apply to commercial and other non-experimental operations,[28] while other spacecraft involved in ISAM missions have been licensed under part 5 of the Commission's rules, which addresses experimental licensing.[29] Communications that are not consistent with the U.S. Table of Frequency Allocations and communications pursuant to a part 5 experimental license are authorized on a non-interference basis and cannot claim interference protection from authorized spectrum users.[30]

12. Given the wide range of activities that could fall within the ISAM category, we seek comment on how to define the scope of "typical" spectrum usage for ISAM missions, including for such functions as OOS and RPO. While different types of ISAM missions will have different spectrum needs, is it possible to define the scope of typical spectrum use for these different types of missions? Are there useful sub-categories that can be identified within ISAM when it comes to spectrum use? What are the overall requirements for spectrum for these ISAM activities? What are the bandwidth requirements? What are the power requirements? To what degree are the needs short-term or episodic, or to what degree are the needs for "always-on" transmissions and reception?

13. We seek comment on relevant frequency allocations. What services, as defined by the ITU Radio Regulations and the Commission's rules, are most critical for ISAM capabilities? We note that in some instances ISAM missions have been supported by communications in the space operations service, which primarily covers telemetry, tracking, and command (TT&C). We seek comment on whether typical usage for ISAM missions could be considered a space operations service as currently defined.[31] We also note the use of sensors and imaging equipment in some ISAM missions, equipment that may have spectrum needs distinct from the typical needs for obtaining TT&C operations of a spacecraft. Are the current non-Federal allocations for space operations or other relevant services adequate to address spectrum needs for ISAM missions? If not, what frequency ranges would be most viable to support these missions based on current technology and mission requirements, and are there satellite allocations in those frequency ranges? Is it reasonable to continue in some instances to authorize communications supporting ISAM capabilities on a non-interference, unprotected basis, particularly where the communications may be critical to conducting an RPO mission for example, or something similar? Are there conditions that could facilitate coordination with incumbent users, such as geographic or temporal limitations, thereby providing some assurance of interference-free use, even where the status

[28] *See, e.g.*, MEV-1 License, MEV-2 License.

[29] *See, e.g.*, *University of Texas at El Paso*, ELS File. No. 0455-EX-CN-2019 (granted Oct. 24, 2019) (granting authority to operate the Orbital Factory 2 satellite to conduct an experiment to test repair in orbit using additive manufacturing).

[30] 47 CFR § 2.102(b)(3); 47 CFR § 5.84 (Operation of an experimental radio station is permitted only on the condition that harmful interference is not caused to any station operating in accordance with the Table of Frequency Allocations).

[31] *See* ITU Radio Regulations, Article No. 1.23 (defining "space operations" to encompass radiocommunication services concerned exclusively with the operation of spacecraft, particularly TT&C operations).

of such operations remains inconsistent with an allocation.

14. Commercial space industry entities have previously observed that additional spectrum may be necessary to support types of missions that would fall under the category of ISAM.[32] These entities also noted that investment has already been made in technologies to support OOS and RPO in some frequency bands.[33] We seek comment on these issues, and on whether there are steps that can facilitate operations to support ISAM capabilities in frequency bands viewed by commercial and other non-governmental entities as compatible with their needs. For example, in frequency bands shared with Federal operations, what steps would facilitate sharing? What steps would facilitate sharing in frequency bands shared with terrestrial operations?[34] To what extent is sharing with other operators, both federal and commercial, possible, depending on the type of ISAM mission? Are there frequency bands that could support ISAM missions, but that have not been used for these types of missions to date? What are the synergies, if any, between space launch activities and associated frequency uses[35] and ISAM operations? Are there advances in equipment or other technologies that would allow for use of frequency bands to support these missions, or make sharing feasible in bands not previously utilized for space operations? What are the pros and cons of any neccessary operational changes, and how do those affect the cost and viability of ISAM missions?

15. We observe that ISAM missions may involve communications links among spacecraft within or beyond Earth's orbit, among spacecraft and equipment or devices located on celestial bodies, or among equipment and devices located on a celestial body. We seek comment on the potential scope of these types of communications links and the unique issues presented by such communications when it comes to spectrum licensing. In so doing, we ask about the role of existing allocations for satellite services, including inter-satellite links, in supporting some of these communications. Inter-satellite communications may be useful for space-based tracking assets and can enable ultra-high-speed data transfer and quantum-encrypted communications.[36] What are the spectrum needs for communications activities occurring beyond Earth's orbit, such as those between spacecraft or on or around celestial bodies – the moon, or an asteroid, for example? How can the Commission facilitate the development of communications networks on, or in the orbit of, other celestial bodies? What considerations should be made in assigning frequencies for communications on celestial bodies, such as between equipment on the lunar surface? What are the challenges with spectrum assignments for Earth station support for ISAM missions beyond Earth's orbit?

B. Licensing Processes

1. Licensing Processes in General

16. We seek comment on any updates or modifications to the Commission's licensing rules and processes that would facilitate ISAM capabilities. The Commission's licensing for space stations is "facilities-based," meaning that the license is associated with a specific radio station. That station

[32] *See*, *e.g.,* Reply Comments of Astroscale U.S. Inc., Axiom Space Inc., Atomos Space, Sierra Space Corp., and Scout Inc., ET Docket No. 13-115, at 3 (filed Sept. 10, 2021) (*Spectrum Allocation Joint Reply Comments*).

[33] *See Spectrum Allocation Joint Reply Comments*, at 3.

[34] *See, e.g.*, Comments of the National Association of Broadcasters, ET Docket 13-115, at 5-6 (Aug. 11, 2021) (noting a concern that operations for assets in orbit controlled from major urban areas fail to recognize and coordinate with Broadcast Auxiliary Service (BAS) operators).

[35] *Allocation of Spectrum for Non-Federal Space Launch Operations*, ET Docket 13-115, Report and Order and Further Notice of Proposed Rulemaking, 36 FCC Rcd 7764 (2021).

[36] RAND Europe, Future Uses of Space out to 2050: Emerging Threats and Opportunities for UK National Space Strategy at 96 (2022), https://www.rand.org/content/dam/rand/pubs/research_reports/RRA600/RRA609-1/RAND_RRA609-2.annex.pdf.

includes "accessory equipment" necessary to conduct communications activities at a location. For facilities involved in ISAM activities the licensing process would typically involve an application filed under part 25 or part 5 of the Commission's rules.[37] Part 25 licenses are appropriate for commercial operations, including licenses for NGSO and GSO space stations, [38] small satellites,[39] and small spacecraft.[40] Part 5 rules are more limited in scope to specific categories of noncommercial operations, including, among others, scientific experiments, communications research, product development, and market trials.[41] Both part 25 and part 5 also provide for special temporary authority (STA). In general terms, the International Bureau and/or the Office of Engineering and Technology will evaluate the application and issue a grant, typically with conditions, upon a finding that the grant serves the "public interest, convenience, and necessity."[42] We seek comment on any updates to part 25 or part 5 of the Commission's rules for application processing to accommodate and facilitate ISAM missions.

17. Which of the Commission's current processes are suited for licensing different types of ISAM missions? As ISAM capabilities develop and are increasingly offered as commercial services, part 5 licensing may no longer be appropriate. Should ISAM missions generally be licensed under part 25 of the Commission's rules, or will part 5 experimental licensing continue to be appropriate in some instances, and under what circumstances?[43] Do such activities need a new licensing framework based on their needs, perhaps addressed under a new part of the Commission rules, or is continuation of the current approach, distinguishing between commercial and experimental uses, generally useful?

18. Given the Commission's "facilities-based" approach to licensing, we also seek comment on characteristics of ISAM activities and relevant considerations affecting Commission licensing that might be addressed through part 25 of the Commission's rules. What are the challenges, if any, presented by current Commission processes for missions of variable duration or missions exhibiting evolving characteristics? How should the Commission consider variable locations in space such as transition between orbital altitudes and inclinations? Are there other considerations the Commission should take into account regarding individual missions versus multiple, different missions? What application requirements best account for the evolving nature of ISAM missions and activities? How can the Commission effectively regulate to anticipate variations in vehicle designs and mission capabilities depending on mission and stage of development? For missions that face multiple points of variability in mission type, duration, and spectral needs, such as servicers that may service multiple spacecraft, what are the challenges with licensing under existing rules, if any? For example, should these missions be handled under a single license that is modified as needed, or through multiple licenses or some other way? What are alternative ways to account for potential risks and different missions that such spacecraft may encounter? How should the licensing process accommodate spacecraft that provide more typical communications services, but may also be involved to some extent in ISAM activities? Are fixed-satellite service or mobile-satellite service allocations, to the extent that they include in-band space operations, sufficiently flexible to accommodate ISAM activities? If additional frequencies are required or desirable

[37] The Commission also authorizes satellites to operate as amateur space stations under part 97 of the Commission's rules. *See* 47 CFR § 97.207.

[38] *See* 47 CFR § 25.120.

[39] *See* 47 CFR § 25.122.

[40] *See* 47 CFR § 25.123.

[41] *See* 47 CFR § 5.3.

[42] *See* 47 USC § 309.

[43] We again note that part 5 experimental licensees must operate on a non-interference basis, meaning they are prohibited from causing harmful interference to other authorized operators and are not entitled to interference protection. *See* 47 CFR § 5.84.

for the ISAM activities, and those activities occur at a different time than the regular communications operations, should there be some reporting required on the changes in the operations of the spacecraft to reflect changes in the use of the licensed frequencies? What are the ITU filing considerations associated with multi-part or complex missions?

19. Under part 25 of the Commission's rules, space stations are categorized as GSO or NGSO, and processed accordingly. In most cases, space stations involved in ISAM activities will likely be NGSO, but in some cases they could be engaged in activities near the GSO arc, or even co-located or attached to a GSO space station. How should these types of spacecraft be categorized for licensing purposes?[44] GSO space station applications are processed on a first-come, first-served basis,[45] associated with particular frequencies and a specific orbital location in the GSO arc, whereas servicing or other similar missions in the GSO arc seem likely to move between orbital locations, and may or may not be engaged in more typical satellite communications services, such as fixed-satellite service. What are the key considerations in categorizing those types of missions as between GSO and NGSO? Are there additional flexibilities that should be built into the Commission's procedures to reflect these unique cases? Given the apparent need for flexibility, should spacecraft involved in ISAM missions be treated like NGSO applications in all cases? In such a regime, how should those planning to operate at the GSO arc be treated? NGSO applications, unless they are filed under the small satellite or small spacecraft process,[46] are, absent a rule waiver, assessed as part of a processing round. Is it appropriate to exempt certain types of operations associated with ISAM missions from the Commission's processing round rules,[47] or are their certain types of missions that might be categorized as or facilitate ISAM, such as in-space data relay networks, that would require the type of continuous, active spectrum use the Commission's processing round framework is designed to manage? Should the Commission consider process changes under part 25, similar to the streamlined process for small satellites and small spacecraft,[48] to license space stations involving certain types of ISAM activities? What key requirements should the Commission consider?

20. We seek comment on the Commission's current technical disclosures, such as those in the Schedule S form required for part 25 space station license applications and the technical showings required under sections 25.114(c) and 25.114(d) of the Commission's rules.[49] Are the required technical disclosures sufficient to capture the specifications of ISAM missions? If not, what other technical disclosures should be required? Similarly, for any ISAM missions that fit under the Commission's streamlined processes for small satellites and small spacecraft, are the technical showings required by these processes sufficient to capture the specifications of ISAM missions, and if not, what modifications to these required technical showings would better accommodate ISAM missions? Is the Schedule S format appropriate for ISAM missions? How might the Commission modify its Schedule S form or update the other disclosure requirements in its rules to accommodate ISAM missions?

21. Additionally, we seek comment on licensing processes for earth stations supporting ISAM missions. Are there updates or modifications to the earth station process that would facilitate ISAM missions?

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[44] We note that the Commission's fee schedules for application and regulatory fees also make this distinction between GSO and NGSO facilities. *See* FY 2022 Notice, at para. 20.

[45] *See* 47 CFR § 25.158(b)

[46] *See Streamlining Licensing Procedures for Small Satellites*, Report and Order, 34 FCC Rcd 13077 (2019); *see also* 47 CFR §§ 25.122, 25.123.

[47] *See* 47 CFR § 25.157.

[48] *See* 47 CFR §§ 25.122, 25.123.

[49] *See, e.g.*, 47 CFR § 25.114(c)-(d).

22. Based on the wide array of ISAM operations, how can the Commission provide guidance on its application processes? Are there additional ways that the Commission can offer guidance such as public notices, FCC Fact Sheets, etc.?[50]

2. Satellite Servicing Missions

23. We seek comment on any additional licensing considerations unique to satellite servicing missions. Servicing missions typically consist of multiple spacecraft. In some cases, servicing missions may involve a single operator or licensee that is operating more than one spacecraft. We expect, however, that servicing missions will also involve multiple spacecraft that are owned and operated by different entities. We seek comment on the licensing process for these, or similar missions. Our approach to date has been to treat both the servicer and client spacecraft as needing to be licensed for the scope of radio-frequency activities involved in the servicing operations. Should the licensing process require the servicer alone to be responsible for obtaining a Commission license for communications associated with the servicing activities? Alternatively, should the client operator (i.e., the operator of the space station being serviced) also obtain authorization, either because the client space station may need to undertake radio-frequency operation at variance from what was originally granted in the client's license, or simply to address the additional scope of activity involving servicing? Should this be decided based on a preconceived set of criteria, or would this decision require a case-by-case analysis of individual service activities to better suit the diversity of scenarios? If a case-by-case analysis is considered appropriate, how can the Commission apply additional guidance, such as public notices, to provide clarity to commercial operators seeking licenses for OOS operations? If only the servicer obtains an authorization, what confirmation from the client should be required by the Commission to ensure that the scope of operations is fully agreed-upon by the client and servicer entities? Additionally, in some cases, either the client or servicer may not be a U.S.-licensed spacecraft, and may or may not have U.S. market access. In those instances, what information should the Commission require from the applicant (client or servicer)? Are there special considerations involved where there may be multiple administrations licensing the spacecraft and how should those considerations be taken into account in the Commission's licensing process?

3. Assembly, Manufacturing and Other Activities

24. We seek comment on any special considerations in licensing of assembly and manufacturing missions. Are existing part 5 and part 25 licensing frameworks sufficient for these missions or subsets of these missions? Are there any limitations resulting from existing Commission licensing rules for these missions? If so, how should the Commission consider revising its rules to facilitate the specific needs of these missions?

4. International Considerations

25. ISAM missions also raise the possibility of interactions between operators under the jurisdiction of multiple nations. Servicing and debris remediation missions, in particular, could involve operators or objects outside the jurisdiction of the United States. Assembly activities may also involve these concerns, to the extent assembly involves objects under the supervision of different countries. We seek comment on whether and how to take this into account in the Commission's licensing process. Would such a relationship be governed by a regulatory framework analogous to the U.S. market access framework, enabling non-U.S.-licensed space stations to access the U.S. satellite marketplace? Would documentation of consent from the non-U.S. operator or administration be appropriate? If so, what kind of documentation should the Commission require?

26. In the majority of countries with developing ISAM capabilities, both government and non-government entities have established partnerships with at least one other entity located in another

[50] *See e.g. Guidance on Obtaining Licenses for Small Satellites*, Public Notice, 28 FCC Rcd 2555 (IB/OET 2013).

country.[51] What international coordination is needed for U.S.-licensed servicing of non-U.S. satellites, for example, and vice versa? How can the Commission ensure that operators and/or Administrations are in agreement on the scope of certain activities involving non-U.S. spacecraft? Are there circumstances in which the Commission should consult with the State Department to help ensure mutual understanding between Administrations, and if so, should such a process be formalized?

C. Orbital Debris Mitigation

27. The Commission's orbital debris mitigation rules apply to all space station operators seeking license and authorization under the Commission's rules, including operators of ISAM missions. All applicants, including applicants for operations involving ISAM activities, must provide a description of their orbital debris mitigation design and operational strategies consistent with the Commission's orbital debris mitigation rules, including, among other requirements, addressing release of debris during normal operations, risk of accidental explosions, and collision risk, casualty risk, and post-mission disposal reliability.[52]

28. As the scope of commercial and other non-governmental in-space activities expands, some ISAM activities may present fact patterns that have not been specifically contemplated by current orbital debris mitigation rules and adopted practices. For example, the current practices focus on a "use or deplete" approach to stored energy.[53] Plans for utilizing in-space fuel storage for refueling operations, on the other hand, contemplate at least a temporary location in which energy remains stored in space when not being utilized. Are there additional risks of debris generation implicated in such operations, and if so, what steps can be taken to mitigate such risks? As another example, are there potentially byproducts from in-space assembly and manufacturing, such as small debris from cutting or manipulation of materials, or risks of unplanned release of objects that are not adequately addressed currently in the Commission's rules for which mitigation measures might be developed with greater specificity?[54] Are there other ISAM activities that do not fit with the typical mission profiles for which standard practices for mitigation, or standard disclosures about mitigation strategies that have to date not been developed? In general, are there updates to the Commission's orbital debris mitigation rules that would help to address such risks, through modified disclosure requirements, for example, that would facilitate Commission consideration of whether grant of a license would serve the public interest? If so, what

[51] Benjamin A. Corbin, et al., IDA Science & Technology Policy Institute, Global Trends in On Orbit Servicing, Assembly, and Manufacturing (OSAM) at 65-67 (2020), https://www.ida.org/-/media/feature/publications/g/gl/global-trends-in-on-orbit-servicing-assembly-and-manufacturing-osam/d-13161.ashx.

[52] 47 CFR §§ 25.114(d)(14), 5.64(b).

[53] Space station applicants are required to provide a statement that the operator has assessed and limited the probability of accidental explosions during and after the completion of mission operations. This statement must include a demonstration that debris generation will not result from the conversion of energy sources on board the spacecraft into energy that fragments the spacecraft. Energy sources include chemical, pressure, and kinetic energy. This demonstration needs to address whether stored energy will be removed at the spacecraft's end of life, by depleting residual fuel and leaving all fuel line valves open, venting any pressurized system, leaving all batteries in a permanent discharge state, and removing any remaining source of stored energy, or through other equivalent procedures specifically disclosed in the application. 47 CFR §§ 25.114(d)(14)(iii), 5.64(b)(3). *See also* 47 CFR § 25.283(c) (specifying that upon a spacecraft completing its authorized mission, a space station licensee shall ensure, unless prevented by technical failures beyond its control, that stored energy sources on board the satellite are discharged, by venting excess propellant, discharging batteries, relieving pressure vessels, or other appropriate measures).

[54] The Commission's rules require that space station applicants provide a statement that the operator has assessed and limited the amount of debris released in a planned manner during normal operations. 47 CFR §§ 25.114(d)(14)(i), 5.64(b)(1).

would be the relevant changes to the Commission's rules to cover the additional risks, if any, presented by such activities?

D. Orbital Debris Remediation

29. A specific sub-category of ISAM missions are those performing a remediation or removal function for preexisting space debris, including defunct satellites, satellite fragments, and material released during normal operations. We look forward to the continued advancement of technologies that would enable remediation and removal of debris, and how the Commision can facilitate or support advancement of these technologies. What is the current reliability and technical readiness of these technologies? What actions can the Commission take to promote continued growth, innovation, and development in this space?

30. We seek comment on whether and how the Commission should consider active debris removal as part of an operator's orbital debris strategy. Are these active disposal efforts, in particular retrieval of defunct satellites or related debris, at or close to a technological level that the Commission can consider them as part of an operator's orbital debris strategy for post-mission disposal or backup post-mission disposal?[55] Would the Commission's consideration of active debris removal or remediation as part of its orbital debris mitigation review help to drive innovation in this sector? To ensure a sustainable space environment, should operators be required to utilize active debris removal if the primary post-mission disposal maneuvers fail? If used as a secondary or backup method, how much investment should operators be required to devote to the technological adaptation for disposal methods? What approaches to implement this requirement are possible? For example, to ensure active debris removal, would an operator bond associated with removal be appropriate?[56] Should space stations be required to have technical specifications compatible with active debris removal technology? What would these specifications look like (e.g., commercially adaptable docking components)? Are there standardization efforts currently underway for these types of systems/components and activities? Is it reasonable to expect that there could be one or more standards available for operators in the near term or longer term? How might such standards evolve?

31. What industry adaptations could facilitate active debris removal with consideration to return on investment (e.g., fuel costs, weight, import costs, procurement)? Are there generic technical requirements that could facilitate active debris removal across the industry (e.g., with no consideration to orbit, service, or country of registration) or would requirements vary depending on the client and the servicer?

E. Activities Beyond Earth's Orbit

32. We seek comment on specific considerations for ISAM missions that go beyond Earth's orbit and the Commission's role in planetary protection. ISAM activities beyond Earth's orbit could include a wide range of operations, including missions to the Moon and asteroids.

33. In general, we seek comment on any updates to the Commission's rules that might facilitate licensing ISAM missions beyond Earth's orbit. The Commission recently adopted a set of rules designed for missions beyond Earth's orbit in the part 25 "small spacecraft" rules, but these rules were not

[55] *See id. 35 FCC Rcd.* at 4206-07, para. 106-107 (stating that "[t]o the extent that any applicants seek to rely on direct retrieval as a means to dispose of their spacecraft, the plan may be considered on a case-by-case basis, keeping in mind that the technology would need to be sufficiently developed at the time of the application for the Commission to be able to assess the reliability of the disposal method.").

[56] We note that the Commission proposed a bond associated with successful spacecraft post-mission disposal in the Orbital Debris FNPRM. *See Orbital Debris R&O and FNPRM*, 35 FCC Rcd at 4245-49, paras. 193-205. That proposal for a bond remains pending. A bond to incentivize active debris removal could potentially be tied to a general bond associated with successful post-mission disposal.

adopted with a specific focus on ISAM activities.[57] Are these rules sufficient for ISAM missions beyond Earth's orbit, or are there changes either generally or specific to ISAM activities that would be beneficial? Are there any changes to the Commission's part 5 experimental or regular part 25 processing rules that would facilitate the licensing of ISAM missions beyond Earth's orbit?

34. *Planetary Protection.* Planetary protection typically encompasses the policies and practices designed to protect celestial bodies from contamination by Earth life, and protect the Earth's biosphere from potential contamination from returning spacecraft.[58] Article IX of the Outer Space Treaty states that, "States Parties to the Treaty shall pursue studies of outer space, including the moon and other celestial bodies, and conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter."[59] Planetary protection guidelines have historically been developed in the United States by NASA's Office of Planetary Protection[60] and internationally by the Committee on Space Research (COSPAR).[61] For commercial missions, oversight of planetary protection compliance has been undertaken through FAA payload review, which includes consultations with the Department of State and NASA.[62] For civil space missions, planetary protection is largely coordinated by the Office of Planetary Protection, following NASA regulations.[63]

35. The extent of planetary protection policies needed for an individual mission are determined by categorizing the mission based on the type of celestial body it will encounter (i.e., how likely that body is to support life), and the nature of the encounter (e.g., flyby, orbiting, or landing).[64] For example, a Category I mission (e.g., a flyby of an asteroid) will have minimal requirements relative to a Category IV mission (e.g., a landing on Mars).[65] ISAM operators must only consider planetary protection implications for missions performing a flyby, orbit, or landing on a celestial body. There are no planetary protection implications for on-orbit operations.

36. We seek comment on what, if any, role the Commission should play in reviewing planetary protection plans and implications for ISAM missions. What are the planetary protection implications of ISAM capabilities? Are there contractual mechanisms or governmental processes that ensure adequate supervision of missions with respect to planetary protection policies? What, if any, steps can the Commission take to facilitate planetary protection review? Are there any statutory limits for the Commission's involvement in ensuring that the United States meet its treaty obligations and international commitments? How can the commission best ensure our authorizations for these missions serve the

[57] *See* 47 CFR § 25.123; *Streamlining Licensing Procedures for Small Satellites*, Report and Order, 34 FCC Rcd. 13077 (2019).

[58] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, art. 9, Jan. 27, 1967, 18 U.S.T. 2410 610 U.N.T.S. 205.

[59] *Id.*

[60] NASA Planetary Protection, *Policy and Guidance* (May 31, 2022), https://sma.nasa.gov/sma-disciplines/planetary-protection.

[61] COSPAR, *COSPAR Policy on Planetary Protection* (Jun. 3, 2021), https://cosparhq.cnes.fr/assets/uploads/2021/07/PPPolicy_2021_3-June.pdf.

[62] 14 CFR § 415.57(b).

[63] NASA Planetary Protection, *Policy and Guidance* (May 31, 2022), https://sma.nasa.gov/sma-disciplines/planetary-protection.

[64] NASA Planetary Protection, *Mission Categories* (May 31, 2022), https://sma.nasa.gov/sma-disciplines/planetary-protection.

[65] *Id.*

public interest?

37. With respect to manufacturing missions, in-situ resource utilization (ISRU) is currently being considered for use in missions to the asteroids, the Moon, and Mars.[66] Landing spacecraft at these destinations have varying degrees of planetary protection considerations: undifferentiated, metamorphosed asteroids are Category I; other asteroids and the Moon are Category II; and Mars is Category IV.[67] Are there unique or specific planetary protection concerns for space resource utilization? What role should be appropriate for the Commission to play in overseeing such missions from a planetary protection perspective?

38. The ISAM National Strategy calls for the U.S. domestic regulatory regime to be updated as ISAM technologies mature to facilitate ISAM activities.[68] How can the Commission's regulations, or the Commission's coordination with other government agencies, facilitate ISAM activities beyond Earth's orbit, including on other celestial bodies? What should be the extent of oversight by the Commission of objects remotely controlled via an FCC-licensed station?

F. Encouraging Innovation and Investments in ISAM

39. We also seek comment on ways to facilitate development of and competition in ISAM activities, provide a diversity of on-orbit service options, and promote innovation and investment in the ISAM field. Are there any regulatory barriers that may increase cost or prevent entry that can be removed or modernized to facilitate innovation and investment in ISAM in the public interest? How can the Commission encourage new operators to enter into the marketplace to provide commercial ISAM services as well as those wishing to expand their market access? What actions can the Commission take to promote continued growth, innovation, and development in ISAM operations? Moreover, how can we promote innovation and investment in ISAM without simultaneously reducing incentives for compliance with our rules for orbital debris mitigation, such as rules that encourage post-mission disposal?

40. The costs of commercial space activity are extensive and there are not necessarily immediate returns on investment opportunities for operations such as orbital debris remediation efforts. Aside from the incentives provided to ISAM operators, we seek to analyze the current state of ISAM technology and understand its economic impact on space-based services. To better understand this emerging market segment, we ask for comment on where ISAM fits within the broader satellite communications services sector. What firms currently supply ISAM services? What entities demand ISAM services? We also seek comment on the nature of the cost structure of firms supplying ISAM activities. How important are economies of scale in production? We seek comment on the current and future state of ISAM technology and its economic impact on space-based services. How does innovation in such technologies and services impact the space-based industry when evaluated through long-term projections (e.g., a five-year projection or a ten-year projection)?

41. What regulatory incentives can be provided to ISAM operators and developers to encourage innovation and growth in this field? What regulatory incentives can be provided to ISAM clients to encourage use of ISAM technology? What are ISAM operators' concerns with respect to the Commission's regulatory processes regarding their operations? How can the Commission address these concerns while also maintaining access to spectrum and a safe space environment for all operators?

[66] NASA, *Overview: In-Situ Resource Utilization* (Apr. 3, 2020), https://www.nasa.gov/isru/overview.

[67] NASA Planetary Protection, *Mission Categories* (May 31, 2022), https://sma.nasa.gov/sma-disciplines/planetary-protection.

[68] *See* ISAM National Strategy.

G. Digital Equity and Inclusion

42. Finally, the Commission, as part of its continuing effort to advance digital equity for all,[69] 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[70] and benefits (if any) that may be associated with the topics discussed herein. Specifically, we seek comment on how the topics discussed and any related proposals may promote or inhibit advances in diversity, equity, inclusion, and accessibility, as well as the scope of the Commission's relevant legal authority.

IV. PROCEDURAL MATTERS

43. *Comment Filing Procedures.* 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. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS) or by paper. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

- Electronic Filers: Comments may be filed electronically by accessing ECFS at https://www.fcc.gov/ecfs.
- Paper Filers: Parties who choose to file by paper must file an original and one copy of each filing. Paper filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail.
    - 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.[71]
    - 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, D.C. 20554.

44. *Availability of Documents*. Comments, reply comments, and other submissions will be publicly available online via ECFS. These documents will also be available for public inspection during regular business hours in the FCC Reference Information Center, when FCC Headquarters reopen to the public.

45. *People with Disabilities*. To request materials in accessible formats for people with

[69] Section 1 of the Communications Act 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.

[70] 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 (January 20, 2021).

[71] *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.

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).

46. *Further Information*. For additional information on this proceeding, contact Jameyanne Fuller, 202-418-0945 or Jameyanne.Fuller@fcc.gov.

V. ORDERING CLAUSES

47. Accordingly, IT IS ORDERED that, pursuant to sections 4(i), 301, 302(a), 303(e), 303(f), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 301, 302(a), 303(e), 303(f), and 303(r), this Notice of Inquiry IS ADOPTED.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch