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

In the Matter of	)	
	)	
Amendment of Part 2 of the Commission's Rules	)	
for Federal Earth Stations Communicating with	)	ET Docket No. 13-115
Non-Federal Fixed Satellite Service Space	)	
Stations;	)	RM-11341
	)	
Federal Space Station Use of the 399.9-400.05	)	
MHz Band; and	)	
	)	
Allocation of Spectrum for Non-Federal Space	)	
Launch Operations	)	

NOTICE OF PROPOSED RULEMAKING
AND NOTICE OF INQUIRY

Adopted: May 9, 2013 **Released: May 9, 2013**

Comment Date: (60 days after date of publication in the Federal Register)
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By the Commission: Chairman Genachowski , Commissioners Clyburn, Rosenworcel, and Pai issuing separate statements. Commissioner McDowell not participating,

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I. INTRODUCTION

1. The National Space Policy recognizes that "[a] robust and competitive commercial space sector is vital to continued progress in space."[1] In the Notice of Proposed Rulemaking (NPRM) we address the spectrum needs of two separate, but closely related portions of the commercial space sector: the commercial communications satellite industry and the commercial space launch industry. It is our expectation that, if adopted, these proposals would advance the commercial space industry and the important role it will play in our nation's economy and technological innovation now and in the future.

2. The communications satellite industry has grown from a handful of communications satellites in the 1960s to a vibrant industry that today provides a variety of communications services to consumers, businesses, and governments around the world. The technological breakthroughs that enabled the growth of the communication satellite industry have been made in partnership between the United States government and the private sector. The National Aeronautics and Space Administration (NASA); the Advanced Research Projects Agency; and companies such as AT&T, Hughes, and RCA developed the early communications satellites.[2] The satellite technology developed from this collaboration between government and the private sector led to the emergence of a vibrant commercial communications satellite industry in the 1970s and 1980s. Later, in 1993 NASA, in the Advanced Communications Technology Satellite (ACTS) program, developed advanced satellite technologies such as dynamic hopping spot beams and advanced onboard switching and processing that are now commonly used in communication satellites.[3] The elaborate spot beam technology has increased the spectral efficiency of communication satellites and facilitated the development of a Mobile-Satellite Service (MSS) capable of serving handheld radios. To promote a robust domestic commercial space industry, the National Space Policy directs that federal departments and agencies purchase and use commercial space capabilities and services to the maximum practical extent possible when they are available in the marketplace and meet United States Government requirements.[4] The National Space Policy also provides that the United States Government shall seek appropriate regulatory approval under U.S. domestic regulations for United States Government earth stations operating with commercially owned satellites, consistent with the regulatory approval granted to analogous commercial earth stations.[5] In the NPRM we propose to take steps that will facilitate the use of commercial satellite networks by government agencies on an equal basis with the private sector.

3. The United States space launch industry is in a transformational stage. The end of NASA's space shuttle program has required the development of a new era of cargo delivery and manned space travel initiatives that promise to continue the U.S. legacy of exploration, education and discovery. Several private companies are competing to take cargo and, in the future, people into space to support the International Space Station (ISS) and other NASA initiatives. Space Exploration Technologies (SpaceX) has recently accomplished three successful missions to the ISS and Orbital Sciences Corporation (Orbital Sciences) is expected to undertake a mission to the ISS in 2013. Other companies are developing the

[1] National Space Policy of the United States of America (June 28, 2010) at 3, *available at* http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf. The National Space Policy expresses the President's direction for the nation's space activities.

[2] Scientific and Technical Information Division, National Aeronautics and Space Administration, *Significant Achievement in Space Communications and Navigation 1958-1964*, 15-29 (1966), available at http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19660009169_1966009169.pdf; Stephen J. Lukasik, *DARPA*, The Froehlich/Kent Encyclopedia of Telecommunications, Vol. 5, 75-77 (Fritz Froehlich and Allen Kent Marcel eds. 1993).

[3] *About ACTS*, NASA, *available at* https://acts.grc.nasa.gov/about/index.shtml.

[4] National Space Policy at 10.

[5] *Id*. at 9.

capability to take tourists on suborbital forays into space. To support the nascent private launch industry, a number of non-Federal government owned space ports have been established. The Commission's allocation and service rules must evolve to support the communications needs of the developing private space launch industry.[6] In the NPRM we consider several options to provide spectrum for communications during commercial space launches. The Notice of Inquiry (NOI) explores how the FCC can support the future communications needs of the commercial space industry.

4. To advance the goals of the National Space Policy, we present two alternative proposals in the NPRM to provide Federal earth stations that communicate with non-Federal Fixed-Satellite Service (FSS) and Mobile-Satellite Service (MSS) space stations interference protection identical to that afforded to non-Federal earth stations communicating with the same FSS and MSS space stations. Under the first proposal we propose to modify the Allocation Table in Section 2.106 of our rules to add a Federal allocation for the FSS bands, along with a footnote restricting Federal use to earth stations communicating with non-Federal space stations. In the second proposal we propose to place a footnote in the Allocation Table in the FSS bands that provides that Federal earth stations that communicate with non-Federal FSS and MSS space stations would receive interference protection identical to that afforded to non-Federal earth stations communicating with the same FSS and MSS space stations.

5. We also propose in the NPRM to amend a footnote to the Allocation Table to permit a Federal MSS system to operate in the 399.9-400.05 MHz MSS band. This action would allow traffic to be migrated from Argos, the existing Federal MSS system, to a new Federal satellite, thereby resulting in less interference and improved service and reliability for users of both the existing and new Federal MSS systems. No Federal or non-Federal MSS systems have been deployed in this band since it was allocated for MSS in 1993, and this proposed Federal allocation will permit long-vacant spectrum to be put to an important use.

6. Finally, in the NPRM we propose several alternatives for providing spectrum for use during commercial space launches, thereby providing launch vehicles[7] with interference protection. During launches, spectrum in the 420-430 MHz, 2200-2290 MHz, and 5650-5925 MHz bands is typically used to send a self-destruct signal to the launch vehicle (if needed) and information from the launch vehicle to controllers on ground, as well as to track the launch vehicle by radar. Because these frequency bands are allocated only to Federal use for these purposes, the Commission may not issue licenses for these bands that provide interference protection to commercial space launch operators.[8] We seek comment on two possible options to support commercial space launches by either adding a co-primary non-Federal allocation to these bands or by providing an Allocation Table footnote to allow non-Federal use of these bands to provide commercial entities access to these important spectrum resources. We also seek comment on ways to ensure the long term sustainability of the commercial launch industry by exploring other alternatives to use of these bands as more commercial launches are conducted and more private spaceports are established.

7. In the NOI we seek comment broadly on the future spectrum needs of the commercial space sector. We ask whether access to other frequency bands will be required and whether amendments to the Commission's rules will be needed. We also inquire into the communication needs of suborbital space flights and commercial space stations.

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[6] *See infra* paragraph 71.

[7] A launch vehicle is a rocket used to send a payload, such as a communications satellite, into space. *See infra* paragraph 67.

[8] The Commission has granted special temporary authority under the Part 5 experimental licensing rules to allow non-interference operation in the 2200-2290 MHz and 5650-5925MHz bands for commercial launches. *See infra* paragraph 70.

II. BACKGROUND

A. Expanded Federal Use of the non-Federal FSS and MSS Bands

8. Section 301 of the Communications Act gives the Commission licensing authority over non-Federal stations,[9] and Section 305(a) of the Communications Act authorizes the President to assign frequencies to Federal stations.[10] The authority under Section 305(a) has been delegated to the Assistant Secretary of Commerce for Communications and Information, who also serves as the Administrator of the NTIA.[11]

9. The Allocation Table in the Commission's rules[12] is divided into the International Table of Frequency Allocations (International Table) and the United States Table of Frequency Allocations (U.S. Table). The U.S. Table is the roadmap by which the Commission and the NTIA share responsibilities for managing the nation's spectrum resources. The U.S. Table allocates specific frequency bands for use by one or more radio services[13] on either a primary or secondary basis.[14] Because both NTIA and the Commission have the authority to authorize spectrum use within the United States — NTIA authorizes Federal stations and the Commission issues licenses to non-Federal stations — the U.S. Table is further divided into the Federal Table of Frequency Allocations (Federal Table) and the non-Federal Table of Frequency Allocations (non-Federal Table). This subdivision creates three categories of allocations: frequency bands allocated for exclusive Federal use, frequency bands allocated for exclusive non-Federal use, and frequency bands allocated for shared Federal/non-Federal use.[15] These categories guide how NTIA and the Commission regulate radio services and authorize frequency use in this shared national resource.

10. Generally, under established policies of particular relevance to this proceeding, if there is no radio service allocation for a frequency band in the non-Federal Table, non-Federal stations may not operate in that band. The same holds true for Federal stations when there is no radio service allocation for a frequency band in the Federal Table. Nonetheless, the Commission and NTIA can accommodate non-allocated uses in other ways. For example, in frequency bands allocated for non-Federal use, Federal agencies may apply to NTIA to receive authority to operate a station in the band on a non-interference basis—that is, they may not cause interference to and must accept interference from non-Federal stations in the band. If a Federal station operating in one of these bands causes interference to a non-Federal station, the Federal station must correct the interference or cease operating. In addition, the rule applies even if the Federal station was in operation before the non-Federal station began operations. As an alternative to non-interference operation, a Federal agency can enter into a contractual agreement with an FCC licensee whose station is entitled to interference protection. In effect, the Federal agency would lease communications services from a Commission licensee in the same way that non-Federal entities would, and that service would be protected from interference.

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[9] 47 U.S.C. § 301.

[10] 47 U.S.C. § 305(a).

[11] *See* 47 U.S.C. § 902(b)(2)(A).

[12] 47 C.F.R. §2.106.

[13] The U.S. Table also includes various footnotes which denote "stipulations" applicable to radio services provided by Federal and non-Federal operators ("US" designations), non-Federal operators ("NG" designations), and Federal operators ("G" designations).

[14] Secondary service cannot cause interference to and must accept interference from primary services, even if the primary service station commences operation after the secondary service station has begun operation. 47 C.F.R. §2.105(c)(2).

[15] In the case of shared use, the type of service(s) permitted need not be the same. 47 C.F.R. § 2.105(b).

11. For many decades, the FCC and NTIA (and predecessor organizations) have worked together to ensure that spectrum policy and management decisions promote efficient use of the spectrum consistent with both commercial economic interests and national security. This cooperative relationship has been formalized in interagency agreements dating back to October 1940 and is supported and enhanced through regular meetings, staff-level interactions and other joint coordination procedures.[16] In frequency bands allocated for shared Federal/non-Federal use, the Commission develops regulations for those services in which it may license non-Federal stations, and NTIA develops regulations for those services in which it may authorize Federal stations to prevent interference between Commission-licensed stations and Federal stations.[17] An established set of procedures guides this interaction both for developing regulations for the radio services in the shared bands and for authorizing frequency use by Federal agencies and Commission licensees. Under the Memorandum of Understanding (MOU) between NTIA and the Commission, the Commission and NTIA endeavor to give notice to each other of "all proposed actions that could potentially cause interference" to non-Federal and Federal operations, respectively.[18]

12. In August 2006, NTIA filed a petition requesting that the Commission initiate a rulemaking to permit Federal earth stations that are authorized by NTIA and that operate with non-Federal satellites to have primary status in a number of frequency bands currently allocated for non-Federal FSS and non-Federal MSS on a primary basis.[19] Earth stations authorized by NTIA must now operate on a non-interference basis. Alternatively, Federal agencies may lease services from a licensee of an FCC-authorized earth station to operate with interference protection. NTIA requests that the Federal Table be modified to add a primary FSS allocation along with a footnote that would restrict primary Federal use of these bands to Federal earth stations accessing non-Federal satellites.[20] The NTIA petition outlines a means for Federal agencies to deploy their own earth stations to overcome the uncertainties associated with operating on a non-interference basis and the limitations of leasing services through a third party operator. Such a modification would turn certain exclusive non-Federal use frequency bands into shared Federal/non-Federal spectrum, although use of these bands by Federal agencies would be limited by the terms of the footnote. The allocation and footnote that NTIA requests would mirror an existing Federal allocation for a number of MSS bands. These MSS bands have co-primary Federal and non-Federal

[16] *See, e.g.,* "Memorandum of Understanding between the Federal Communications Commission and the National Telecommunications and Information Administration, January 31, 2003 (MOU), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-230835A2.pdf; *see also* FCC News Release, "FCC and NTIA Sign New Memorandum of Understanding on Spectrum Coordination," (Jan. 31, 2003), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-230835A1.pdf.

[17] The "Manual of Regulations and Procedures for Federal Radio Frequency Management," May 2012 Revision of the January 2008 Edition (*NTIA Manual*) describes technical requirements for Federal radio services. The *NTIA Manual* is available at http://www.ntia.doc.gov/osmhome/redbook/redbook.html.

[18] MOU at 2-3.

[19] Petition for Rulemaking of the National Telecommunications and Information Administration, RM-11341, filed Aug. 4, 2006 (*NTIA Petition*). On August 17, 2006, the Commission sought comment on the petition. Consumer and Government Affairs Bureau Reference Information Center Petition for Rulemaking Filed, *Public Notice*, Report No. 2789, RM-11341, Aug. 17, 2006.

[20] NTIA seeks an allocation status for Federal users that is equal to the primary status held by non-Federal earth station licensees. Accordingly, its petition is couched as seeking a "primary" or "co-primary" allocation. NTIA suggests that the footnote simply state that in certain specified bands, "…Government stations operating in the fixed-satellite service shall be limited to earth stations operating with non-Government satellites." *See NTIA Petition* at Appendix A.

allocations along with footnote US319, which restricts Federal MSS earth stations in the bands to operating with non-Federal space stations.[21]

13. NTIA's petition identifies 13.275 gigahertz of spectrum in ten frequency bands for which it seeks primary status. As background, spectrum used for satellite communications is divided into different frequency bands which are referred to with letter designations, such as the C-band, Ku-band, or Ka-band. The spectrum which the NTIA petition identifies falls into parts of four of these lettered satellite bands: 3.6-4.2 GHz and 5.85-6.725 GHz (in the C-band); 10.7-12.2 GHz, 12.7-13.25 GHz, and 13.75-14.5 GHz (in the Ku-band); 18.3-19.3 GHz, 19.7-20.2 GHz, and 27.5-30 GHz (in the Ka-band); and 37.5-39.5 GHz and 47.2-50.2 GHz (in the V-band). While we analyze these bands in greater detail below, we note that all of the bands addressed in the NTIA petition are allocated for the FSS. In the FSS, earth stations in stationary locations communicate with space stations (*i.e.* satellites).[22] In addition, a portion of the Ka-band from 19.7-20.2 GHz and 29.5-30.0 GHz is also allocated on a primary basis to the MSS with MSS use for most of this spectrum restricted to satellite systems that are also in the FSS.[23] In the MSS mobile earth stations communicate with space stations. In most of the NTIA-listed FSS spectrum bands, the satellites are in a geostationary orbit (GSO) with a separation of 2 degrees.[24] The earth stations and satellites use directional antennas which, along with the separation between the satellites, prevent interference with earth stations communicating with adjacent satellites. In this way, multiple commercial satellite licensees can share the same spectrum band.[25]

[21] 47 C.F.R. § 2.106 footnote US319. These MSS bands are 137-138 MHz, 148-150.05 MHz, 399.9-400.05 MHz, 400.15-401 MHz, 1610-1626.5 MHz, and 2483.5-2500 MHz.

[22] While the great majority of FSS earth stations are in stationary locations, there are three exceptions. FSS earth stations can be licensed for use on board ships, on moving vehicles, and on aircraft. In all of these cases, directional antennas or lower power operations are used to avoid causing interference to other satellites. Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz/3700-4200 MHz Bands and 14.0-14.5 GHz/11.7-12.2 GHz Bands, IB Docket No. 02-10, *Report and Order*, 20 FCC Rcd 674 (2004); Amendment of Parts 2 and 25 of the Commission's Rules to Allocate Spectrum and Adopt Service Rules and Procedures to Govern the Use of Vehicle-Mounted Earth Stations in Certain Frequency Bands Allocated to the Fixed-Satellite Service, IB Docket No. 07-101, *Report and Order*, 24 FCC Rcd 10414 (2009); Revisions to Parts 2 and 25 of the Commission's Rules to Govern the Use of Earth Stations Aboard Aircraft Communicating with Fixed-Satellite Service Geostationary-Orbit Space Stations Operating in the 10.95-11.2 GHz, 11.45-11.7 GHz, 11.7-12.2 GHz and 14.0-14.5 GHz Frequency Bands, IB Docket Nos. 05-20, 12-376, *Notice of Proposed Rulemaking and Report and Order*, 27 FCC Rcd 16510 (2012).

[23] 47 C.F.R. § 2.106 footnote 5.529. The use of the bands 19.7-20.1 MHz and 29.5-29.9 by the MSS is limited to satellite networks that are in both the FSS and MSS.

[24] *See* Licensing of Space Stations in the Domestic Fixed-Satellite Service and Related Revisions of Part 25 of the Rules and Regulations, CC Docket No. 81-704, *Report and Order*, FCC 83-184, 54 Rad. Reg. 2d (P & F) 577 paras. 43, 49 (1983); *summary printed in* Licensing of Space Stations in the Domestic Fixed-Satellite Service and Related Revisions, 48 Fed. Reg. 40,233 (Sept. 6, 1983), *on reconsideration*, Licensing of Space Stations in the Domestic Fixed-Satellite Service and Related Revisions of Part 25 of the Rules and Regulations, CC Docket No. 81-704, *Memorandum Opinion and Order*, FCC 84-487, 99 FCC 2d 737 (1984). While certain FSS spectrum has been designated for non-geostationary orbit (NGSO) satellites, the use of such spectrum is currently limited to feeder links for MSS NGSO systems.

[25] This is in contrast to the MSS, where the spectrum is generally licensed exclusively to a single licensee. The earth stations in the MSS often use omni-directional antennas on portable devices which makes it extremely difficult to avoid causing interference to other satellites sharing the same spectrum. Stations operating in the FSS are able to reuse frequencies by using highly directional antennas and orbital separation between space stations.

14. Comments received in response to NTIA's petition were generally supportive but did express a number of specific reservations.[26] For example, the Satellite Industry Association (SIA) stated that non-Federal commercial and experimental license applicants should not face delays because of the need for the Commission to coordinate applications with NTIA.[27] The Fixed Wireless Communications Coalition commented that Federal earth stations should be required to conduct coordination with terrestrial stations sharing the same band prior to applying for a license as is required for non-Federal earth station applicants.[28] SIA, Hispasat, and Lockheed Martin believe that Federal earth stations should be subject to the Commission's technical and enforcement rules, which is not normally the case for Federal agencies.[29]

15. More recently, NTIA also requested a change to a footnote in the Allocation Table to allow Federal space stations to operate in the 399.9-400.05 MHz MSS bands.[30] As mentioned above, footnote US319 restricts Federal earth stations in a number of MSS bands to communicate only with non-Federal space stations. NTIA requests that this restriction be removed for the 399.9-400.05 MHz MSS band. According to NTIA, the allocation change will allow some applications to be shifted from the Argos satellite system operated by the National Oceanic and Atmospheric Administration (NOAA) to the 399.9-400.05 MHz band. NTIA claims that this will result in lower interference, higher capacity, and improved reliability and service for both the applications that continue to use Argos as well as the applications on the new satellite network to be deployed in the 399.9-400.05 MHz spectrum. NTIA notes that the Commission has never licensed any operations in this MSS band so there should be no impact to non-Federal licensees.

B. Spectrum Access for Commercial Space Operators

16. Federal agencies such as the Department of Defense (DoD) and NASA undertook the early development of launch vehicles capable of reaching outer space. The first commercial GSO communications satellite was launched in 1965.[31] While numerous commercial launches have occurred since then, most launches in the United States have been conducted from government owned spaceports such as Cape Canaveral or Vandenberg Air Force Base. In addition, both government and the private sector have been actively involved in the development of space technology, including the International Space Station (ISS) and the Space Shuttle. In recent years there has been increased development of space technology by private companies. The U.S. National Space Policy requires that Federal agencies purchase space services from commercial enterprises to the maximum practical extent.[32] With the end of the space shuttle program in 2011, NASA awarded contracts to two companies, Space Exploration Technologies (SpaceX) and Orbital Sciences Corporation (Orbital Sciences), for cargo services to support

[26] Comments on NTIA's petition were filed by the Satellite Industry Association (SIA), Hispasat, Lockheed Martin Corp. (Lockheed), and the Fixed Wireless Communications Coalition (FWCC).

[27] SIA Comments, RM-11341, filed Sept. 18, 2006, at 5-6.

[28] FWCC Reply Comments, RM-11341, filed Oct. 3, 2006, at 2.

[29] SIA Comments, RM-11341, filed Sept. 18, 2006, at 4-5; Hispasat Comments, RM-11341, filed Sept. 15, 2006, at 4-5; Lockheed Comments, RM-11341, filed Sept. 18, 2006, at 3. The Commission's rules apply only to Commission licensed stations and not to Federal stations. NTIA adopts spectrum use policies that apply solely to Federal agencies.

[30] *See* Letter from Karl B. Nebbia, Associate Administrator, Office of Spectrum Management, NTIA, U.S. Department of Commerce, to Julius P. Knapp, Chief, Office of Engineering and Technology, July 10, 2012, ET Docket 13-115 (*NTIA US319 Letter*).

[31] *See* Harold A. Rosen, *Syncom and its Successors*, 72 Proceedings of the IEEE 1429, 1431 (1984); Bruno Pattan, *Satellite Systems: Principles and Technologies*, 12 (1993).

[32] *See* National Space Policy at 10.

the ISS.[33] In May 2012, October 2012, and March 2013, SpaceX successfully launched spacecraft[34] that docked with the ISS.[35] A number of companies such as Virgin Galactic and XCOR Aerospace are developing craft that will take paying commercial customers on suborbital spaceflights.[36] The Federal Aviation Administration (FAA) has licensed a number of non-Federal spaceports from which commercial launches can be made.[37]

17. A number of frequency bands are needed to connect the space launch vehicle with the controllers on the ground and to track the launch vehicle. The 420-430 MHz band is used for sending self-destruct commands to the launch vehicle if necessary during the launch. The 2200-2290 MHz band is used to send performance data from the launch vehicle to the controllers on the ground. The 5650-5925 MHz band is used for radar transponders that track the launch vehicle. The 420-430 MHz and 2200-2290 MHz frequency bands are allocated on a primary basis for Federal use only. The 420-430 MHz band is also allocated to the Amateur Radio Service on a secondary basis. The 5650-5935 MHz band is allocated on a primary basis for Federal use only except for a portion that has non-Federal FSS and mobile service allocations. Because these frequency bands have no non-Federal allocation for space launch purposes, the Commission does not license commercial entities to use these bands on an interference protected basis.

18. The Commission recently granted SpaceX and Orbital Sciences special temporary authority (STA) under the Part 5 experimental licensing rules to use the 2200-2290 MHz and 5650-5925 MHz bands during launches on a non-interference basis.[38] Because 2200-2290 MHz and 5650-5925 MHz are Federal bands, the Commission coordinated the grant of these experimental STAs with the NTIA. Each of these experimental STAs was limited to a single launch. Each experimental STA contained the condition that future launches would be considered on a case-by-case basis and that there shall be no expectation that spectrum for future launches will be approved. SpaceX used STAs for successful launches on May 22, 2012, October 7, 2012, and March 1, 2013.[39]

[33] *NASA Awards Space Station Commercial Resupply Services Contracts*, (Dec. 23, 2008), *available at* http://www.nasa.gov/home/hqnews/2008/dec/HQ_C08-069_ISS_Resupply.html.

[34] A spacecraft is a vehicle that travels through space. It is usually launched into space using a launch vehicle.

[35] *SpaceX Dragon Attached to Space Station in Spaceflight First* (May 25, 2012), *available at* http://www.nasa.gov/exploration/commercial/cargo/spacex_attach.html; *Station Welcomes First Commercial Resupply Mission* (Oct. 10, 2012), *available at* http://www.nasa.gov/mission_pages/station/expeditions/expedition33/dragon_arrives.html; *Dragon Arrives With Treasure Trove of Science* (March 3, 2013), http://www.nasa.gov/mission_pages/station/expeditions/expedition34/dragon_arrives.html.

[36] *See* Virgin Galactic, http://www.virgingalactic.com; XCOR Aerospace, http://www.xcor.com/.

[37] *See Launch Data and Information*, FAA Office of Commercial Space Transportation, *available at* http://www.faa.gov/about/office_org/headquarters_offices/ast/launch_license/active_licenses/.

[38] *See infra* note 141. An experimental STA allows operation only on a non-interference basis. Stations operating on a non-interference basis have no protection from and must not cause interference to stations operating under a primary or secondary allocation. *See* Guidance on Obtaining Experimental Authorizations for Commercial Space Launch Activities, *Public Notice*, DA 13-446 (rel. March 15, 2013).

[39] Kenneth Chang, *Big Day for Entrepreneur Who Promises More*, N.Y. Times, May 23, 2012, at A13; Kenneth Chang, *Group Sends First Rocket Under Deal with NASA*, N.Y. Times, October 8, 2012, at A16; Marcia Dunn, *Enter the Dragon, After Glitch in Orbit*, Wash. Post, March 4, 2013, at A4.

III. NOTICE OF PROPOSED RULEMAKING

A. Expanded Federal Use of the non-Federal FSS and MSS bands

19. The FSS is the backbone of the U.S. commercial satellite industry and is widely used to provide a variety of commercial services domestically and internationally. For example, the FSS supports video distribution both on a point-to-point basis (*e.g.*, transmission of media content from point of origination to point of production by teleport operators, broadcast networks, and news reporting organizations) and on a point-to-multipoint basis (*e.g.*, transmission from point of production to affiliated broadcast stations and cable headends).[40] The FSS also provides network services consisting of "backbone" capacity for point-to-point trunking for voice, data or Internet traffic; "backhaul" of communications services; communications to ships; and redundancy and restoration of communications services when other primary technologies fail.[41] Further, the FSS is used to provide corporate, government, and military voice and data communications, as well as broadband and video services directly to the home.

20. Satellite communications also are vital for Federal agencies to accomplish their missions — both for critical public safety, military, and emergency response communications, and for day-to-day operations. For example, the Federal Bureau of Investigation uses commercial satellites to link field offices,[42] the FAA uses commercial satellites to provide safety of flight communication services in Alaska,[43] and the Department of Defense uses commercial satellites for more than 80 percent of its satellite communication bandwidth.[44] Under existing policy, Federal agencies are required to use commercial satellite systems unless specific mission requirements cannot be met.[45] However, the current allocation scheme for the FSS—which is primary non-Federal in many frequency bands—and the current system under which the Commission and the NTIA authorize earth stations pose challenges for Federal agencies in meeting this objective and satisfying their mission requirements.

21. We seek comments generally on the benefits of greater Federal use of commercial satellite networks. For example, would Federal agencies increase their use of commercial satellite networks to accomplish their missions with greater efficiency and reduced costs while meeting the national policy objective requiring the use of commercial satellite systems? Would increased Federal use of commercial satellites serve to strengthen the commercial satellite industry — a vital component of the economy and an important driver of United States productivity?

22. The FSS has operated under a regulatory framework in which the Commission establishes the technical and licensing rules for space stations and earth stations operating as integrated systems, thereby enabling many earth stations to be authorized and operate independently of each other with little risk of interference even if they communicate with the same space station. NTIA requests that Federal

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[40] *See* Second Annual Report and Analysis of Competitive Market Conditions with Respect to Domestic and International Satellite Communications Services, IB Docket No. 07-252, FCC 08-247, *Second Report*, 23 FCC Rcd 15170, 15174-75 paras. 15-17 (2008).

[41] *Id*. at 15175 para. 18. We define "backbone" as referring to use on major routes with large volumes of traffic in regions, such as East Coast to West Coast. We define "backhaul" as transmitting from a remote site or network to a central or main site, usually over a high capacity line and for purposes of efficient network management.

[42] Letter from Vance E. Hitch, U.S. Department of Justice, to Michael Gallagher, NTIA, Appendix B of *NTIA Petition*.

[43] Letter from Steve Zaidman, FAA, to Michael Gallagher, NTIA, Appendix B of *NTIA Petition*.

[44] Keith Norton, *Commercial Satcom Remains Vital to Military Ops,* Defense Systems, Aug. 22, 2011, *available at* http://defensesystems.com/articles/2011/08/08/industry-perspective-commercial-satellite-communications.aspx.

[45] *See NTIA Manual*, § 2.3.3.

earth stations it authorizes be allowed to operate with the same regulatory status as non-Federal earth stations in the same frequency band. In order to accomplish this objective, it requests a modification of the Federal Table to include a co-primary FSS allocation in certain frequency bands for Federal earth stations communicating with commercial satellites. This allocation approach would increase uncertainty over who is the regulator of the satellite systems that operate in these bands. NTIA states that the Commission would not be required to consult with NTIA or other Federal agencies regarding these bands any more than they currently coordinate, NTIA would utilize the current FCC processes as much as possible, and the current FCC process would remain as it is today for non-Federal earth station applications.[46]

23. Based on our experience in spectrum management in conjunction with NTIA, and in consideration of the goals of the National Space Policy as well as the comments we received in response to the Public Notice that the Commission issued subsequent to receiving NTIA's petition,[47] we recognize that a policy guiding Federal use of commercial satellite networks can be successful only if it provides a clear method for establishing and enforcing operational rights and responsibilities that can be applied consistently regardless of whether the user is licensed by the Commission or authorized by NTIA. We identify and seek comment on the following four key objectives, which we believe best express this intent:

- To ensure parity between Federal and non-Federal earth stations;
- To provide certainty that the Commission retains regulatory oversight of the satellite network and the FSS even though the Commission would license non-Federal earth stations, and NTIA would authorize Federal earth stations;
- To ensure that the rules and procedures do not hinder the Commission's rulemaking processes or delay the issuance of Commission licenses and coordination in the affected bands; and
- To establish procedures to ensure that both Federal and non-Federal earth stations comply with the Commission's rules for operating in the frequency bands.

24. We seek comment on the means by which we can provide interference protection to Federal earth stations used to access commercial satellite networks. First, we address the commercial satellite frequency bands where NTIA has requested that we should place Federal earth stations on an equal footing with non-Federal earth stations. We then outline two proposals for providing Federal agencies with interference-protected access to these frequency bands. The first proposal follows NTIA's suggested approach by adding a co-primary Federal FSS and MSS allocation to the Federal Table as well as a footnote that limits primary Federal use of the bands to earth stations communicating with non-Federal satellites. The second approach retains the existing non-Federal allocation structure in those satellite bands, but adds a footnote to the U.S. Table that recognizes the interference protection status for certain Federal earth stations in communication with non-Federal space stations.

1. Frequency Band Allocation

25. As discussed above, the NTIA petition addresses spectrum in parts of four distinct satellite bands: the C-band, the Ku-band, the Ka-band and the V-band. These bands are summarized in the following table:

[46] *See* Letter from Lawrence E. Strickling, Assistant Secretary for Communications and Information and Administrator, NTIA, U.S. Department of Commerce, to Julius Genachowski, Chairman, Federal Communications Commission, May 3, 2013, ET Docket 13-115.

[47] Consumer and Government Affairs Bureau Reference Information Center Petition for Rulemaking Filed, *Public Notice*, Report No. 2789 (Aug. 7, 2006).

Table 1: NTIA Requests Primary Status in 13.275 MHz of Non-Federal Spectrum			
Common Name	Frequency Band	Amount of Spectrum	Directional Indicator
C-band	3600-4200 MHz	600 MHz	space-to-Earth
	5850-6725 MHz	875 MHz	Earth-to-space
Ku-band	10.7-12.2 GHz	1,500 MHz	space-to-Earth
	12.7-13.25 GHz	550 MHz	Earth-to-space
	13.75-14.5 GHz	750 MHz	Earth-to-space
Ka-band	18.3-19.3 GHz	1,000 MHz	space-to-Earth
	19.7-20.2 GHz	500 MHz	space-to-Earth
	27.5-30.0 GHz	2,500 MHz	Earth-to-space
V-band	37.5-39.5 GHz	2,000 MHz	space-to-Earth
	47.2-50.2 GHz	3,000 MHz	Earth-to-space

26. The C-band is divided into a heavily-used "conventional" segment (3700-4200 MHz downlink and 5925-6425 MHz uplink) and a lightly-used "extended" segment (3600-3700 MHz downlink and 5850-5925 MHz + 6425-7075 MHz uplink). Similarly, the Ku-band is split between a heavily-used "conventional" segment (11.7-12.2 GHz downlink and 14-14.5 GHz uplink) and a lightly-used "extended" segment (10.7-11.7 GHz downlink and 12.7-13.25 GHz + 13.75-14.0 GHz uplink). As described below, certain of these bands are heavily used by commercial satellite providers while other bands currently have seen little FSS usage. Similarly, the degree to which Federal agencies make use of satellite services varies among the different frequency bands.

27. The conventional C-band FSS allocation is heavily used for commercial satellite operations. Services available from C-band satellite operators include delivery of television programming to cable headends and corporate data networks. The Fixed Service (terrestrial) is also allocated on a co-primary basis in the conventional C-band. FCC staff surveys of available records in the Government Master File (GMF), an NTIA-administered database that lists Federal frequency use authorizations, found that Federal use of the C-band is overwhelmingly concentrated in the conventional C-band.

28. The conventional Ku-band FSS allocation is also heavily used by many satellite operators and commercial service providers.[48] Blanket licenses are available for large networks of small antenna earth stations operating in this band.[49] These earth station networks, commonly called VSAT (very small aperture terminals) networks, do not share primary allocation status with other services, do not need to be

[48] Within the conventional Ku-band, the 14.0-14.2 GHz band is shared with the Federal space research service, which operates on a secondary basis; and the 14.4-14.5 GHz band is shared with the Federal fixed and mobile services, which operate on a secondary basis. 47 C.F.R. § 2.106. Radio astronomy observations are conducted within the 14.47-14.5 GHz band, even though there is no allocation for the radio astronomy service. 47 C.F.R. § 2.106 footnotes US203 and US342.

[49] 47 C.F.R. § 25.134; Routine Licensing of Large Networks of Small Antenna Earth Stations Operating in the 12/14 GHz Frequency Bands, *Declaratory Order*, 1986 WL 291567 para. 6 (CCB Released April 9, 1986); CC Docket No. 90-219, *Report and Order*, 6 FCC Rcd. 7372 (1991); 2000 Biennial Regulatory Review—Streamlining and Other Revisions of Part 25 of the Commission's Rules Governing the Licensing of, and Spectrum Usage by, Satellite Network Earth Stations and Space Stations, *Fifth Report and Order in IB Docket No. 00-248 and Third Report and Order in CC Docket No. 86-496*, 20 FCC Rcd 5666 (2005); 2000 Biennial Regulatory Review—Streamlining and Other Revisions of Part 25 of the Commission's Rules Governing the Licensing of, and Spectrum Usage by, Satellite Network Earth Stations and Space Stations, IB Docket No. 00-248, *Sixth Report and Order and Third Further Notice of Proposed Rulemaking*, 20 FCC Rcd 5593, 5614-21 paras. 51-70 (2005). Blanket licensing is feasible in the conventional Ku-band because no other services are co-primary with the FSS and the VSAT technical specifications are designed to prevent interference from occurring.

coordinated, and do not require individual licenses. As long as VSATs operate under a blanket license and comply with the technical rules, such as for transmitted power density and antenna size, they may be placed anywhere within the area of operations specified in the license.[50] Authorized Federal earth stations[51] are already able to operate with what effectively amounts to equal status to non-Federal earth stations because the only primary services in the band are FSS and those operations are coordinated by satellite operators, without distinguishing between customers based on whether the ultimate end user is Federal or non-Federal.[52] However, we also recognize that the Commission licenses non-standard earth stations in the Ku-band that do not comply with the VSAT technical specifications. We grant such licenses after a determination that the earth stations will not cause interference. FCC staff surveys of available records in the GMF found that Federal use of the Ku-band is overwhelmingly concentrated in the conventional Ku-band.

29. The extended C-band is shared with other services on a co-primary basis and is used for commercial satellite services to a lesser extent than the conventional C-band. This is because terrestrial services make heavier use of this spectrum than the conventional C-band. Moreover, the 3650-3700 MHz portion of the extended C-band has been reallocated for terrestrial fixed services.[53] Because 3650-3700 MHz has been allocated for terrestrial services, we do not propose changes to the Allocation Table to provide interference protection for Federal earth stations in this portion of the extended C-band. In 2011 NTIA recommended that the Commission make the 3600-3650 MHz portion of the extended C-band available for wireless broadband and the Commission has recently initiated a proceeding to make this band available for wireless broadband.[54] Consequently, we tentatively conclude to not change the Allocation Table for the 3600-3650 MHz portion of the extended C-band. Given that the Commission is considering the transition of the extended C-band downlink away from satellite use, we expect that future Federal use of the C-band will continue to be overwhelmingly in the conventional C-band.

30. The extended Ku-band is used to a lesser extent than the conventional Ku-band for satellite communications. The non-Federal Table limits use of a majority of the uplink and the entire downlink

[50] A typical VSAT network consists of a main earth station that communicates via satellite with a large number of identical VSAT terminals at remote locations.

[51] Section 7.23 of the *NTIA Manual* permits Federal agencies to use radio devices with commercial systems licensed by the Commission such as cellular phones, pagers, MSS radios, and FSS earth stations that are operating under a blanket license in the Ku-band without applying for authorization from NTIA. The *NTIA Manual* permits this when the operation of the radio device is under the control of the Commission licensee and in accordance with the Commission's rules governing the specific service. In effect, Federal agencies make use of these radio devices in the same manner as non-Federal entities by contracting with a Commission licensee for the frequency band.

[52] The non-interference basis status of Federal VSAT stations does not alter this outcome.

[53] Amendment of the Commission's Rules With Regard to the 3650-3700 MHz Government Transfer Band, ET Docket No. 98-237, WT Docket No. 00-32, *First Report and Order and Second Notice of Proposed Rulemaking*, 15 FCC Rcd 20488, 20495, 20497 paras. 13, 18 (2000). Preexisting earth stations continue to have primary status. *Id*. at 20500 para. 24.

[54] Letter from Karl B. Nebbia, Associate Administrator, Office of Spectrum Management, NTIA, U.S. Department of Commerce, to Julius P. Knapp, Chief, Office of Engineering and Technology, Jan 19, 2011, *available at* http://www.ntia.doc.gov/legacy/filings/2011/NTIA_FCC_Letter_115%20MHz_01192011.pdf; *See* "Plan and Timetable to Make Available 500 MHz of Spectrum for Wireless Broadband, U.S. Department of Commerce, Oct. 29, 2010, *available at* http://www.ntia.doc.gov/files/ntia/publications/tenyearplan_11152010.pdf; An Assessment of the Near-Term Viability of Accommodating Wireless Broadband Systems in the 1675-1710 MHz, 1755-1780 MHz, 3500-3650 MHz, 4200-4220 MHz, and 4380-4400 MHz Bands, U.S. Department of Commerce, Oct. 15, 2010, *available at* http://www.ntia.doc.gov/reports/2010/FastTrackEvaluation_11152010.pdf. Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band, GN Docket No. 12-354, *Notice of Proposed Rulemaking and Order*, 27 FCC Rcd 15594 (2012).

band to international satellite systems.[55] There is extensive terrestrial use within the extended Ku-band. The 10.7-11.7 GHz extended Ku-band downlink is heavily used for terrestrial services such as fixed point-to-point microwave links.[56] The 12.7-13.25 GHz extended Ku-band uplink is used by the Broadcast Auxiliary Service (BAS) for electronic news gathering and point-to-point transmission of television signals as well as by fixed point-to-point microwave links.[57] The 13.75-14.0 GHz extended Ku-band uplink is shared with Federal radars,[58] and NASA's Tracking and Data Relay Satellite System.[59] Because the terrestrial services heavily use the extended Ku-band and because of the international satellite system limitation, we do not anticipate that the band will be heavily used by Federal agencies.

31. The Ka-band (18.3-19.3 GHz and 19.7-20.2 GHz downlink, and 27.5-30.0 GHz uplink) is moderately used for commercial satellite service, supporting mostly consumer-oriented applications (*e.g.* home Internet and television).[60] Several companies are also proposing more extensive use of these bands for broadband services.[61] There are overlapping FSS, MSS, Mobile Service (MS), and FS allocations in the Ka-band.[62] The Commission has designated the 18.3-18.8 GHz and 19.7-20.2 GHz portions of the Ka-band downlink and the 28.35-28.6 GHz and 29.25-30 GHz portions of the Ka-band uplink for use with GSO satellites with blanket licensing available in most of the spectrum.[63] The 18.8-19.3 GHz

[55] 47 C.F.R. § 2.106 footnote NG52.

[56] *See generally* 47 C.F.R. § 2.106. A search of the Commission's licensing database shows over 21,000 Fixed Service (FS) call signs in the 10.7-11.7 GHz band.

[57] 47 C.F.R. § 74.602(a).

[58] The Table includes additional limitations on FSS antenna size and power levels in this band. 47 C.F.R. § 2.106 footnote US356.

[59] *See* Reply Comments of NASA, RM-11351, filed Jan. 17, 2007, 4-5; 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 and 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, ET Docket No. 98-206, *Notice of Proposed Rulemaking*, 14 FCC Rcd 1131, 1151-52 para. 38 (1998).

[60] Companies such as ViaSat have satellites in the Ka-band. *See* High-Capacity Satellite System and ViaSat-1, *available at* http://www.viasat.com/broadband-satellite-networks/high-capacity-satellite-system.

[61] *See, e.g.,* O3B US Market Access Application, IBFS File No. SES-LIC-20100723-00952. Inmarsat plans to offer commercial satellite service in the Ka-band in 2014. Inmarsat Group Ltd. Condensed Consolidated Financial Results for Three and Nine Months Ended 30 Sept. 1012 (unaudited), 1 *available at* http://www.inmarsat.com/cs/groups/inmarsat/documents/assets/018494.pdf.

[62] 47 C.F.R. § 2.106. The Commission has designated discrete sub-bands within the Ka-band uplink for particular types of terrestrial and satellite services. Rulemaking to Amend Parts 1, 2, 21 and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services, CC Docket No. 92-297, *First Report and Order and Fourth Notice of Proposed Rulemaking*, 11 FCC Rcd 19005, 19024 paras. 42-44 (1996) (*28 GHz R&O*). The designated services will have licensing priority in the portion of the Ka-band uplink that is designated for their use over other allocated services.

[63] Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use, IB Docket No. 98-172, *Report and Order*, 15 FCC Rcd 13430, 13443-44, 13471 paras. 28-30, 87 (2000) (*18 GHz R&O*); *Second Order on Reconsideration*, 17 FCC Rcd 24248, 24251-56 paras. 9-19 (2002); *28 GHz R&O* at 19029 para. 57; 47 C.F.R. §§ 25.115(e), 25.138, 25.145(b). Note that the 29.25-29.5 GHz portion of the spectrum designated for GSO use is also designated for MSS feederlinks. The Federal Earth Exploration-Satellite Service and Space Research Service are co-primary with the FSS in the 18.6-18.8 GHz band. NGSO FSS may operate on a secondary basis in the 28.35-28.6 GHz and 29.5-30.0 GHz GSO designated spectrum. The 27.5-28.35 GHz band is designated for the Local (continued….)

portion of the Ka-band downlink and the 28.6-29.1 GHz portion of the Ka-band uplink are designated for non-NGSO (NGSO) satellites, but there are no active NGSO commercial systems in this band and several GSO systems are authorized to operate on a non-interference basis using this spectrum.[64] The MSS and FSS share Federal primary allocations in the 19.7-20.2 GHz downlink and 29.5-30.0 GHz uplink of the Ka-band, but MSS use of most of this spectrum is limited to satellite systems that are in the FSS.[65] The entire Ka-band downlink (18.3-20.2 GHz) also has a Federal co-primary FSS allocation, with Federal FSS use of the band restricted to earth stations in three locations.[66] An FCC staff analysis indicates that Federal agencies make limited use of the Ka-band for communication with commercial satellite services. Moreover, the prevalence of blanket licensing in the band — where earth stations that meet the criteria for blanket licensing are specifically designed not to cause interference — means that Federal agencies are already able to engage in communications with these commercial satellites on what effectively amounts to an equal basis with Commission licensees under our current rules. Because a Federal user operating under the blanket licensing rules would use equipment that is designed not to cause interference, including the Ka-band in the footnote would serve no practical benefit. This is evidenced by the fact that NTIA already allows federal agencies to use commercial satellite services operating under FCC blanket licenses without any specific authorization by NTIA.[67]

32. While there are currently no commercial satellites operating in the V-band (37-42 GHz downlink and 45.5-50.5 GHz uplink), Hughes Network Systems has been authorized to operate two satellites using V-band spectrum.[68] Moreover, the Commission has designated portions of the V-band for wireless terrestrial use.[69] In addition, primary Federal FSS allocations already exist in portions of the V-band at 40-41 GHz and 48.2-50.2 GHz.

(Continued from previous page)
Multipoint Distribution Service (LMDS) on a primary basis with FSS licensees permitted to operate on a non-interference basis to LMDS licensees. *28 GHz R&O* at 19025 para. 45.

[64] *28 GHz R&O* at 19030 para. 59; *18 GHz R&O* at 13455-56 para. 52. The Commission has received one application for a NGSO Ka-band license from O3B. While the Commission has decided in general to allow blanket licensing in the NGSO designated sub-band, it has not adopted specific rules for blanket licensing earth stations. *18 GHz R&O* at 13475 para. 95. GSO satellites are able to use the 28.6-29.1 GHz NGSO designated spectrum on a secondary basis.

[65] *See supra* note 23.

[66] 47 C.F.R. §§ 1.924(e), 2.106 footnote US334, 74.32, 78.19(f). The restriction of Federal FSS earth stations to three locations is per an agreement with NTIA and is not included in the Table. We recently proposed to amend footnote US334. Amendment of Parts 1, 2, 15, 74, 78, 87, 90, and 97 of the Commission's Rules Regarding Implementation of the Final Acts of the World Radiocommunication Conference (Geneva, 2007) (WRC-07), Other Allocation Issues, and Related Rule Updates, ET Docket No. 12-338, *Notice of Proposed Rulemaking and Order*, 27 FCC Rcd 14598 (2012).

[67] See NTIA Manual at 7.23. This section authorizes agencies to operate various commercial telecommunication systems without an allocation or even a specific authorization by NTIA. Other examples of such systems are cellular, personal communication service (PCS), wireless communications service (WCS), etc.

[68] Application of Hughes Network Systems, IBFS File No. SAT-LOI-20111220-00242, Call Sign S2849, *Grant*; Application of Hughes Network Systems, IBFS File No. SAT-LOI-20111223-00248, Call Sign S2852, *Grant*.

[69] *See* Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations, IB Docket No. 97-95, *Second Report and Order*, 18 FCC Rcd 25428, 25434 para. 14 (2003); *Report and Order*, 13 FCC Rcd 24649, 24668 para. 35 (1998) (designating the 37-40 GHz, 42-42.5 GHz, 46.9-47.0 GHz, 47.2-48.2 GHz, and 50.4-51.4 GHz bands for terrestrial wireless services).

33. We propose to modify the U.S. Table using one of the approaches discussed below to provide Federal earth stations interference protection in the frequency bands proposed by NTIA with the exception of 3600-3700 MHz as discussed above. We seek comment generally on this proposal. We recognize that use of some of these bands for commercial satellite services has evolved since the NTIA petition was filed, that Federal agency use of the commercial satellite services may vary among the different frequency bands, and that in some bands Federal access may not be needed at all. We thus seek comment on whether Federal access should be added for those frequency bands discussed above that are most likely to meet the needs of Federal earth station users.

34. In a number of the NTIA requested bands, the FSS shares spectrum with terrestrial services. These include the C-band and the extended Ku-band. In bands shared between terrestrial and satellite users, coordination between terrestrial licensees and earth stations is required to prevent interference. Should the complexity that this coordination adds to licensing of earth stations in these bands affect our decision to add a co-primary Federal allocation to these bands? In addition, portions of the Ka-band and V-band have been designated for terrestrial use.[70] Should we consider modifying the Allocation Table to provide protection to Federal earth stations in the portions of these bands designated for terrestrial services?

2. Rule Changes

35. Below we propose two approaches, either of which would achieve the purpose of providing interference protection to Federal earth stations operating with commercial fixed satellites. We first describe a proposal to add a co-primary Federal FSS and/or MSS allocation entry to the Federal Table for the selected bands. We then describe an alternate proposal to add a footnote to the Allocation Table that provides that Federal earth stations receive interference protection equivalent to non-Federal earth stations in the selected bands.

36. *Allocation Approach*: We seek comment on whether we should amend the Federal Table to add a co-primary Federal FSS or MSS allocation to the selected bands. Under this proposal (the "allocation approach"), we would also add a footnote to the Federal Table restricting primary use of Federal earth stations in these bands to communication with non-Federal space stations.[71] Under the allocation approach, Federal agencies authorized by NTIA to operate earth stations in these bands would have co-primary status with Commission-licensed non-Federal earth stations. The allocation approach mirrors NTIA's request.

37. Successful implementation of the allocation approach will require agreement by NTIA and the Commission on coordination procedures that Federal agencies would follow for authorizing Federal earth stations. We propose that Federal users would follow a process similar to that used by Commission applicants to obtain approval to use earth stations in the FSS bands, as described below. This process is especially important for preventing interference where the FSS shares the band with terrestrial services, such as the C-band and extended Ku-band.[72] Interference between earth stations communicating with different space stations is largely avoided because the Commission's rules require that earth stations use directional antennas and that space stations are separated by 2 degrees in the orbital arc. To avoid interference between terrestrial stations and earth stations sharing the same band, the Commission's rules rely on coordination between operators of these stations prior to issuance of a license. The Commission's rules require an applicant for an FSS earth station license in bands shared with terrestrial services to

[70] *See supra* notes 62, 63, and 69.

[71] The proposed footnote does not permit any Federal space stations to operate in the selected bands except for those permitted under footnote US334.

[72] Portions of the Ka-band and V-band are also shared with terrestrial stations.

conduct a frequency coordination analysis prior to filing an application.[73] This frequency coordination analysis requires the applicant to perform an interference analysis for each "close by" terrestrial station for which a license or construction permit has been granted or an application has been filed.[74] The applicant must provide the interference analysis and technical information about the earth station to each of these terrestrial station licensees, permittees, or applicants. The terrestrial station licensee, permittee, or applicant then responds to the earth station applicant if it has an interference concern. The parties may resolve potential interference by an agreement that is filed with the application.[75] Applicants for fixed point-to-point microwave licenses in bands shared with the FSS must coordinate their proposed links with nearby earth stations prior to filing their applications using a similar process.[76] In addition to the coordination requirements for terrestrial stations, the Commission's rules also impose coordination requirements on earth stations with antennas that do not meet specified off-axis EIRP envelopes.[77] These earth stations, called non-conforming earth stations, must be coordinated with satellites within a 6 degree orbital separation of the satellite the earth station will be communicating with.[78] A statement that this coordination has been conducted must be included in the application for the earth station.

38. We propose the following procedures to be agreed to and followed by the Commission and NTIA to ensure parity between Federal and non-Federal earth stations. The Federal agency would request approval from NTIA to deploy and operate an earth station.[79] In bands shared with terrestrial users such as the C-band and extended Ku-band, either NTIA or the Federal agency would coordinate with terrestrial stations as required by the Commission's rules.[80] For non-conforming earth stations in any satellite band, either NTIA or the Federal agency would coordinate the proposed earth stations with other satellites as required by the Commission's rules.[81] After such coordination, NTIA would send the request to the Commission, providing all technical information that would be provided by a non-Federal applicant, such as station location and basic technical characteristics. The Commission would process the request in the same way as it would process applications for Commission licenses. The Commission would place the request on public notice. Following the public notice period, if the Commission determines that the request meets all technical criteria for licensing (*i.e.,* that the application would be granted if it were submitted by a non-Federal entity), the Commission would notify NTIA and make an entry in the Commission's database indicating the technical characteristics of the station and its protected status. The Commission's database entries will facilitate future coordination with terrestrial operations sharing the satellite bands. In bands where there are no terrestrial stations or where the earth stations are conforming, there will be no need to coordinate the earth station application prior to NTIA filing a request with the

[73] 47 C.F.R. § 25.130(b).

[74] 47 C.F.R. §§ 25.203(c); 25.251. The earth station applicant calculates a "great circle coordination distance contour" in accordance with the Commission's rules to determine which terrestrial stations are close enough to require an interference analysis. 47 C.F.R. § 25.203(b).

[75] 47 C.F.R. § 25.203(c)(4).

[76] 47 C.F.R. §§ 101.21(f), 101.103.

[77] 47 C.F.R. §§ 25.218, 25.220(a)(1).

[78] 47 C.F.R. § 25.220(d)(1)(ii).

[79] According to NTIA's petition, the footnote we add to the Table should be patterned after an existing footnote for a number of shared MSS bands where Federal earth stations are limited to operating with non-Federal space stations. *NTIA Petition* at 3; 47 C.F.R. § 106 footnote US319. We note that very few authorizations for Federal earth stations for these MSS bands have been processed through the FAS. Either Federal agencies do not use these MSS bands or they utilize these bands on an unprotected basis.

[80] 47 C.F.R. §§ 25.130(b), 25.203(b), 25.203(c).

[81] 47 C.F.R. § 25.220(d).

FCC. In that case, NTIA would file a request with the FCC providing all technical information that would be provided by a non-Federal applicant, such as station location and basic technical characteristics.[82] The Commission would place the request on public notice. Following the public notice period, if the Commission determines that the request meets all technical criteria, the Commission would notify NTIA and make an entry in the Commission's database indicating the technical characteristics of the station and its protected status.[83] We seek comment on these coordination procedures.

39. Under the proposed allocation approach, these FSS bands would be shared Federal/non-Federal FSS bands. Under existing coordination procedures the Commission routinely coordinates license applications for bands shared with Federal stations with NTIA.[84] We believe that the addition of the Federal earth stations should not require any additional coordination procedures for non-Federal applicants. Accordingly, we propose that applications for Commission licenses using frequencies currently allocated for exclusive non-Federal use not be coordinated with NTIA . To enable protection of government FSS earth station operations in these new bands, we propose that the Federal agencies or NTIA monitor Commission public notices regarding filed earth station applications[85] to determine whether proposed non-Federal terrestrial stations raise any interference concerns to existing Federal earth stations.[86] If a proposed non-Federal station will cause interference to an existing Federal earth station, NTIA could file an opposition to the earth station application in accordance with established Commission procedure.[87] The Commission will consider any such opposition in the same manner as oppositions filed by other parties. We seek comment on these proposals, as well as any other considerations that may impact the process currently used by FCC and NTIA for frequency coordination. For parties proposing additional coordination approaches, we ask that they also include an analysis on timing and cost of such an approach.

40. Under our existing procedures under the MOU, the Commission and NTIA coordinate proposed actions that could potentially cause interference to Federal operations, including changes to our technical or service rules in shared Federal/non-Federal bands.[88] The Commission's *ex parte* rules generally exempt presentations by NTIA in matters over which NTIA and the Commission share jurisdiction.[89] Thus, Federal agencies may be afforded an opportunity to participate, through NTIA, in

[82] In the case of a VSAT network, the hub station location is specified, but the remotes could be located anywhere. 47 C.F.R. § 25.134.

[83] Because we are proposing that Federal agencies would follow the same technical requirements and procedures as Commission licensees in obtaining authorization to operate earth stations, we believe there would be no negative effect on emergency response communications. We seek comment on this proposal.

[84] Commission license applications in the shared bands are prior coordinated with NTIA through the Frequency Assignment Subcommittee (FAS) of the IRAC, and proposed government use of shared bands is coordinated by NTIA with the Commission using the same FAS procedures.

[85] The Commission regularly issues public notices regarding earth station applications. 47 C.F.R. § 25.151.

[86] NTIA and the Federal agencies would be treated the same as Non-Federal licensees in this respect. NTIA or the Federal agency may monitor the Commission public notices themselves or contract this responsibility to another party. The earth station technical rules are designed so that such interference concerns should rarely if ever actually arise.

[87] 47 C.F.R. § 25.154. These oppositions will be publicly disclosed by the Commission.

[88] *See supra* paragraph 11.

[89] 47 C.F.R. § 1.1204(a)(5). The Commission must make public any new factual information from NTIA that it relies upon no later than the time of release of the decision document if such information is not otherwise submitted for the record. *Id*.; *See also* Amendment of 47 C.F.R. § 1.1200 et seq. Concerning Ex Parte Presentations in Commission Proceedings, GC Docket No. 95-21, *Report and Order*, 12 FCC Rcd 7348, 7368 para. 62 (1997) (continued….)

rulemakings in a manner unavailable to non-Federal licensees.[90] We invite comment on how we might continue to protect against harmful interference to or from Federal earth station operations in a manner that is consistent with the coordination practice as set forth in the MOU, while at the same time ensuring transparency, fairness, and integrity in the Commission's decision making process.

41. We believe that under an allocation approach, we would need to include in the footnote that we propose to add to the Federal Table a requirement that Federal earth stations in these bands comply with Part 25 of the Commission's rules. Are there other ways that we could ensure that Federal agencies exercise only the same rights and obligations that are afforded similarly situated non-Federal entities?[91] For example, if Federal agencies are not required to follow the Commission's technical rules, including coordination procedures, what rules should they follow? We also seek comment on how to treat Federal agencies operating under a direct allocation but that are not in compliance with the footnote. If interference occurs between Federal earth stations and non-Federal stations, how should it be resolved?

42. The Commission's Part 25 rules permit operation of Vehicle Mounted Earth Stations (VMES), Earth Stations on Vessels (ESV), and Earth Stations Aboard Aircraft (ESAA) in a number of FSS bands. VMES are earth stations operating from a motorized vehicle that travels primarily on land, receives from and transmits to GSO FSS space stations, and operates within the United States.[92] An ESV is an earth station onboard a craft designed for traveling on water receiving from and transmitting to FSS space stations.[93] ESAA are earth stations operating from an aircraft that receive from and transmit to GSO FSS space stations and operate within the United States.[94] VMES, ESV, and ESAA may have either primary or secondary status depending on the particular FSS band or on whether the ESV or VMES is in motion. A number of footnotes in the Allocation Table define the status of VMES, ESV, and ESAA.[95] For example, in the 3700-4200 MHz band an ESV in motion operates on a secondary basis while in the

(Continued from previous page)

(recognizing that "communications between the FCC and, for example, NTIA, may involve matters that are predecisional with respect to that agency or otherwise privileged or sensitive" and codifying the FCC's informal practice "that information will be relied on and disclosure will be made of presentations under the shared jurisdiction exemption only after advance coordination with the other agency . . . to ensure that the other agency retains control over the timing and extent of any disclosure that may have an impact on that agency's jurisdictional responsibilities."); 47 C.F.R. § 1.1204(a) (Note 1 to paragraph (a)).

[90] By statute, NTIA has the responsibility to ensure that the views of the executive branch on telecommunications matters are effectively presented to the Commission. *See* 47 U.S.C. § 902(b)(2)(J). The purpose of the *ex parte* rules is to ensure the fairness and integrity of the Commission's decision-making. 47 C.F.R. § 1.1200(a). Non-Federal licensees and other parties are permitted to make *ex parte* presentations to Commission decision-making personnel in "permit-but-disclose" proceedings such as rulemakings, but such presentations must be disclosed. 47 C.F.R. § 1.1206. The Commission and its staff retain the discretion to modify the applicable *ex parte* rules by order, letter, or public notice in a particular proceeding. 47 C.F.R. § 1.1200(a).

[91] *See NTIA Petition* at 2.

[92] 47 C.F.R. § 25.201; Amendment of Parts 2 and 25 of the Commission's Rules to Allocate Spectrum and Adopt Service Rules and Procedures to Govern the Use of Vehicle-Mounted Earth Stations in Certain Frequency Bands Allocated to the Fixed-Satellite Service, IB Docket No. 07-101, *Report and Order*, 24 FCC Rcd 10414 (2009).

[93] 47 C.F.R. § 25.201; Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz/ 3700-4200 MHz Bands and 14.0-14.5 GHz/11.7-12.2 GHz Bands, IB Docket No. 02-10, *Report and Order*, 20 FCC Rcd 674 (2004); *Order on Reconsideration*, 24 FCC Rcd 10369 (2009); *Second Order on Reconsideration*, 27 FCC Rcd 8555 (2012).

[94] 47 C.F.R. § 25.201; Revisions to Parts 2 and 25 of the Commission's Rules to Govern the Use of Earth Stations Aboard Aircraft Communicating with Fixed-Satellite Service Geostationary-Orbit Space Stations Operating in the 10.95-11.2 GHz, 11.45-11.7 GHz, 11.7-12.2 GHz and 14.0-14.5 GHz Frequency Bands, IB Docket Nos. 05-20, 12-376, *Notice of Proposed Rulemaking and Report and Order*, 27 FCC Rcd 16510 (2012).

[95] 47 C.F.R. § 2.106 footnotes NG52, NG54, NG55, NG180, NG181, NG183, NG187, US133.

10.95-11.2 GHz and 11.45-11.7 GHz bands ESV, VMES, or ESAA must accept interference from the fixed service.[96] We note that under the allocation approach NTIA would be able to authorize Federal agencies to operate VMES, ESV, and ESAA in the bands to which we are adding a Federal FSS allocation to the same extent and with the same restrictions as Commission licensees. Federal agencies would be expected to comply with all of the Part 25 rules pertaining to VMES, ESV, and ESAA and with the footnotes to the Allocation Table regarding VMES, ESV, and ESAA.[97] We seek comment on this proposal.

43. Under the allocation approach, we propose to amend the Federal Table by adding the following primary allocations: 1) "FIXED-SATELLITE (space-to-Earth)" to the 3700-4200 MHz, 10.7-12.2 GHz, and 37.5-39.5 GHz bands; 2) "FIXED-SATELLITE (Earth-to-space)" to the 5850-6725 MHz, 12.7-13.25 GHz, 13.75-14.5 GHz, 27.5-30 GHz, and 47.2-48.2 GHz bands; 3) "MOBILE-SATELLITE (space-to-Earth)" to the 19.7-20.2 GHz band; and 4) "MOBILE-SATELLITE (Earth-to-space)" to the 29.5-30 GHz band. We also propose to add new footnote US107 to the Allocation Table that would restrict Federal stations in the FSS to earth stations operating with non-Federal space stations in these ten frequency bands, with the exception of Federal earth stations in three locations that operate in the 18.3-19.3 GHz and 19.7-20.2 GHz bands.[98] In addition, we propose to amend US319 by adding the 19.7-20.2 GHz (space-to-Earth) and 29.5-30 GHz (Earth-to-space) bands, thereby restricting Federal MSS stations in those bands to earth stations operating with non-Federal space stations.[99] We also take this opportunity to propose to revise the text of US319 so that it parallels the text of proposed footnote US107 and to renumber footnote US319 in frequency order as footnote US46.[100] We seek comment on these proposals.

44. Further, if we adopt the allocation approach, we propose to reclassify all non-Federal footnotes that apply to the non-Federal FSS allocations in the proposed frequency bands (NG52, NG53, NG54, NG55, NG143, NG164, NG165, NG166, NG180, NG181, NG183, NG185, NG187) as U.S. footnotes. In particular, we note that seven of these non-Federal footnotes (NG52, NG54, NG55, NG180, NG181, NG183, NG187) authorize mobile applications (*i.e.*, ESV, VMES, and ESAA) in the fixed-satellite service.[101] We seek comment on this proposal.

45. Finally, we propose to add all international and U.S. footnotes that apply to the non-Federal FSS and MSS allocations in the requested bands to the Federal Table. We request comment on this proposal.

46. In seeking comment on our proposal to add a primary Federal allocation to the Allocation Table for these satellite bands, we urge commenters to discuss how implementation of the allocation

[96] 47 C.F.R. § 2.106 footnotes NG52, NG180.

[97] 47 C.F.R. §§ 25.202(a)(8), 25.202(a)(10), 25.202(a)(11), 25.204(h), 25.204(i), 25.204(j), 25.204(k), 25.205(b), 25.205(c), 25.205(d), 25.209(f), 25.221, 25.222, 25.226, 25.227.

[98] *See supra* paragraph 31. 47 C.F.R. § 2.106 footnote US334.

[99] In paragraphs 59-64, *infra*, we address NTIA's request that US319 be amended by removing the 399.9-400.05 MHz band.

[100] See Appendix A for the proposed additions to the Allocation Table and for the text of proposed footnotes US46 and US107.

[101] The *ESAA Notice of Proposed Rulemaking* proposes to revise footnote NG55 and to remove footnotes NG54, NG183, and NG187. Revisions to Parts 2 and 25 of the Commission's Rules to Govern the Use of Earth Stations Aboard Aircraft Communicating with Fixed-Satellite Service Geostationary-Orbit Space Stations Operating in the 10.95-11.2 GHz, 11.45-11.7 GHz, 11.7-12.2 GHz and 14.0-14.5 GHz Frequency Bands, IB Docket Nos. 05-20, 12-376, *Notice of Proposed Rulemaking and Report and Order*, 27 FCC Rcd 16510, 16564-65 para. 142 (2012).

approach can satisfy the four key objectives that we have defined above. We likewise seek comment on the process we propose for Federal users to obtain approval to operate earth stations in these satellite bands. Can the allocation approach sufficiently protect the interests of non-Federal licensees in both the FSS and other services operating in these bands? Would the approach provide the flexibility needed for Federal users to effectively make use of the commercial satellite services? Are there additional steps we should take to ensure that non-Federal users are protected from harmful interference from Federal earth stations? How could NTIA's "treat the same" request be most effectively realized and how could the concerns that commenters have raised regarding NTIA's petition be addressed?[102] We also seek comment on the costs and benefits of the allocation approach.

47. *Interference Protection Approach*: Under our second proposal we would add the following U.S. footnote to both the Federal Table and non-Federal Table for each of the FSS bands included in NTIA's petition:

USxxx The following provisions shall apply to Federal earth stations that operate with non-Federal space stations in the fixed-satellite service (FSS), and in the bands 19.7-20.2 GHz and 29.5-30 GHz, the mobile-satellite service (MSS), in accordance with the Commission's rules and regulations (see in particular the technical requirements of 47 CFR part 25) and that are authorized by NTIA:

(a) Federal earth stations that receive signals in the bands 3700-4200 MHz, 10.7-12.2 GHz, and 37.5-39.5 GHz can claim protection from harmful interference from non-Federal stations to which these frequencies are assigned at a later date even though there are no Federal FSS or MSS allocations in these bands.

(b) Federal earth stations that receive signals in the bands 18.3-19.3 GHz and 19.7-20.2 GHz from non-Federal space stations in the FSS can claim protection from harmful interference from non-Federal stations to which these frequencies are assigned at a later date.

(c) Non-Federal stations cannot claim protection from harmful interference from Federal earth stations to which frequencies in the bands 5850-6725 MHz, 12.7-13.25 GHz, 13.75-14.5 GHz, 27.5-30 GHz, and 47.2-48.2 GHz have previously been assigned even though there are no Federal FSS or MSS allocations in these bands.

(d) *Mobile applications in the non-Federal FSS*. Federal Earth Stations on Vessels (ESVs), Vehicle Mounted Earth Stations (VMES), and Earth Stations Aboard Aircraft (ESAA) may also operate in accordance with footnotes NG52, NG54, NG55, NG180, NG181, NG183, NG187, and US133.

48. Under this proposal we would not place Federal FSS and MSS allocations in the Federal Table as shown in Appendix A. The footnote we propose to add to the Table of Allocations under this approach (the "interference protection approach") would permit Federal earth stations in communication with non-Federal space stations to receive interference protection equivalent to that afforded non-Federal earth stations in the commercial satellite bands requested by NTIA. In addition to restricting Federal earth stations to operating with non-Federal satellites as the allocation approach does, this footnote would provide interference protection to the Federal earth stations under the condition that they comply with the Commission's technical rules. Under the interference protection approach the bands will not contain a Federal FSS or MSS allocation in the Federal Table and would not be considered shared Federal/non-Federal bands. Federal agencies authorized by NTIA to operate earth stations in these bands would operate on the same basis as Commission-licensed non-Federal earth stations, so long as the Federal agency's operations are consistent with Part 25 of the Commission's rules. Federal agencies would, for example, have interference protection against later-entering FCC licensees that they do not currently enjoy. As discussed below, the interference protection approach would entail coordination procedures similar to those proposed under the allocation approach but, under either approach, we seek to ensure parity in the context of future rulemaking proceedings affecting these bands. We seek comment below on these aspects of the proposed approaches.

[102] *See supra* paragraph 14 for a description of the commenters' concerns.

49. As with the allocation approach described above, successful implementation of the interference protection approach will require agreement by NTIA and the Commission on coordination procedures that Federal agencies would follow for authorizing Federal earth stations. We seek comment on whether the process described above with regard to the allocation approach should be followed for Federal agencies to obtain approval to use an earth station in these bands.[103] This process would require Federal agencies to request approval from NTIA to set up an earth station, NTIA or the Federal agency to coordinate the earth station in bands shared with terrestrial users and for non-conforming earth stations, NTIA to send the request to the Commission, and the Commission to place the request on public notice. We seek comment on the use of these procedures in association with the interference protection approach.[104]

50. While we recognize that the interference protection approach differs from the plan suggested in the NTIA petition, we also believe that it will meet the objective of the NTIA petition — to provide interference protection to Federal earth stations and to place Federal earth stations on an equal footing with earth stations licensed by the Commission. Moreover, we believe that the interference protection approach is well suited to meeting the four objectives we believe are necessary for the success of any policy guiding Federal use of commercial satellite networks and we seek comment on this tentative conclusion.

51. Because Federal and non-Federal earth station operators will be communicating with the same Commission-approved space stations,[105] we seek to ensure parity between Federal and non-Federal earth stations. The technical and coordination requirements contained in Part 25 of the Commission's rules are designed to prevent interference between users of the satellite bands and should apply to all earth station users, both Federal and non-Federal. To facilitate the harmonious sharing of the bands among all users, the proposed footnote explicitly conditions protected operation of Federal earth stations in these bands on the earth stations complying with Part 25 of the Commission's rules.[106] We seek comment on this approach.

52. Under the interference protection approach, no Federal allocation would be added to the satellite bands, and thus those satellite frequency bands that are currently exclusively non-Federal would not become shared Federal/non-Federal spectrum. Because the Federal and non-Federal earth stations both communicate with the same commercial satellites, it is important that the satellite network as a whole remain under the Commission's oversight, even when the authority to operate the Federal and non-Federal earth stations is granted by different entities. This approach would continue to ensure the effective regulation by the Commission of the space and earth segments provided by commercial space stations. We seek comment on this view.

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[103] *See supra* paragraph 38.

[104] A similar process has been used to provide protection to FAA earth stations in the conventional C-band. The Commission has placed FAA earth stations located in Alaska and Oklahoma in the Commission database of FSS earth stations. Because the earth stations are listed in the Commission database they will receive interference protection from future Commission terrestrial and earth station licensees despite the lack of a Federal FSS allocation for the conventional C-band. Letter from Scott Kotler, Chief, Systems Analysis Branch, Satellite Division, International Bureau, FCC, to Dr. Abdul Rana, dated June 15, 2006, IBFS File No. SES-ASG-20051109-01546, 21 FCC Rcd 6627 (IB, 2006) (DA 06-1282). Database Entry, IBFS File No. SES-DBE-20120820-00763, granted Nov. 2, 2012.

[105] A space station can be approved either by obtaining a U.S. license or through the market access procedures for non-U.S. licensed satellites. 47 C.F.R. § 25.137.

[106] FSS earth stations that qualify as "portable devices" may also be subject to equipment authorization requirements under Part 2, Subpart J of the rules. 47 C.F.R. §§ 2.1093, 25.129.

53. As discussed above, under our *ex parte* rules, presentations by NTIA are normally exempt from *ex parte* restrictions in matters involving shared jurisdiction.[107] Unlike other parties, NTIA is able to make presentations to the Commission in its role as a co-regulator without disclosing the content of the presentations on the record at the time it makes each presentation. Even when the Commission makes NTIA materials public, other parties may not have the opportunity to respond to the presentation's content prior to adoption of the Commission's rulemaking action unless NTIA submits the information into the record beforehand.[108] If we adopt the interference protection approach we would not add a Federal allocation to these bands, but Federal agencies would be on an equal footing with non-Federal users. To ensure this parity in the context of rulemaking proceedings affecting these bands, we seek comment on whether the exemption from *ex parte* disclosure requirements should apply to any presentations made by NTIA on behalf of Federal agencies using or seeking to use earth stations under our proposed rules herein.

54. The interference protection approach would avoid subjecting non-Federal earth station applicants to new licensing procedures, such as additional approval and coordination requirements.[109] As discussed above, license applications in bands shared with Federal users are, in general, coordinated with NTIA.[110] Under the interference protection approach, the satellite bands that are exclusively non-Federal would not acquire a Federal allocation and therefore will not become shared Federal/non-Federal bands. As a result, we propose not to coordinate license applications with NTIA in these bands. Rather, we propose that Federal earth stations listed in the Commission's publicly-available database will be protected from interference in the same manner as non-Federal stations.[111] We seek comment on this approach.

55. As we noted above, there are a number of bands allocated for the FSS included in the NTIA petition that have Federal allocations.[112] For example, the 13.75-14 GHz portion of the extended Ku-band is shared with Federal radars and NASA's Tracking and Data Relay Satellite System. The Ka-band downlink has a Federal co-primary FSS allocation that is restricted to use at three earth station locations. The 48.2-50.2 GHz portion of the V-band has a primary Federal FSS allocation. We are not proposing under the interference protection approach to change the application of the coordination process with NTIA with regard to these and other shared bands with Federal and non-Federal allocations.

56. We believe that the interference protection approach can provide assurance that the Commission's rules and practices will be applied in a consistent manner regardless of whether the applicant is a Federal agency or a non-Federal entity that owns and operates the earth station communicating with a non-Federal space station.[113] Our proposed footnote would condition protected operation of Federal earth stations in these bands on conformance with Part 25 of the Commission's rules.

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[107] 47 C.F.R. § 1.1204(a)(5). The *ex parte* rules are codified at 47 C.F.R. §§ 1.1200-1.1216.

[108] For example, when it relies upon that information to support a particular decision, the Commission might not place information from NTIA into the record until the order is released. 47 C.F.R. § 1.1204(a)(5).

[109] SIA expressed concern that commercial and experimental earth station applicants not face any additional delays. SIA Comments, RM-11341, filed Sept. 18, 2006, 6.

[110] *See supra* paragraph 39.

[111] For example, applicants for terrestrial licenses in the conventional C-band will have to coordinate with nearby Federal earth stations prior to applying for a license. This prior coordination will be made possible by having the Federal earth station information publicly available in the Commission database.

[112] *See supra* paragraphs 30-32.

[113] SIA requests that Federal earth stations operating in these commercial satellite bands be subject to the Commission's enforcement procedures. SIA Comments, at 5.

If a Federal agency obtains approval from NTIA to operate an earth station in these bands and the earth station does not operate in conformance with our rules, we would remove it from our database. These non-compliant stations would operate on a non-interference basis and would have to accept any interference from non-Federal stations — just as is the case today. This will provide an incentive for Federal earth stations to comply with the Commission's rules to mitigate the interference potential to both Federal and non-Federal stations.[114] We seek comment on additional actions the Commission can take to provide assurance that Federal agencies will comply with the Commission's rules when using earth stations in these bands.

57. As mentioned above, the Commission's Part 25 rules permit operation of VMES, ESV, and ESAA in a number of FSS bands. The footnote we propose under the interference protection approach would allow Federal agencies to operate VMES, ESV, and ESAA on an interference protected basis to the same extent as non-Federal licensees.[115] Federal agencies would be expected to comply with all of the Part 25 rules pertaining to VMES, ESV and ESAA and with the footnotes to the Allocation Table regarding VMES, ESV, and ESAA. We seek comment on this proposal.

58. We seek comment on the costs and benefits of the interference protection approach. Do commenters agree with our observation that this interference protection approach would satisfy the four ----key objectives we believe are necessary to the establishment of a successful policy guiding Federal use of commercial satellite networks? Would this approach meet the needs of Federal users for protected access to the commercial satellite bands? We likewise seek comment on the process we propose for Federal users to obtain approval to operate earth stations in these satellite bands. Would the process sufficiently protect the interest of non-Federal licensees in both the FSS and other services operating in these bands? Would the process provide the flexibility needed for Federal users to effectively make use of the commercial satellite services? Should the Commission take additional steps to ensure that non-Federal users are protected from harmful interference from Federal earth stations? Are there economic costs associated with the interference protection approach which should be considered?

B. Federal Space Stations in 399.9-400.05 MHz MSS Band

59. NTIA has requested that the Commission modify footnote US319 of the Allocation Table to allow Federal space stations (*i.e.* satellites) to operate in the 399.9-400.05 MHz band.[116] This band is allocated to the MSS and the Radionavigation-Satellite Service on a primary basis in both the Federal and non-Federal Table. Footnote US319 states:

> In the bands 137-138 MHz, 148-149.9 MHz, 149.9-150.05 MHz, 399.9-400.05 MHz, 400.15-401 MHz, 1610-1626.5 MHz, and 2483.5-2500 MHz, Federal stations in the mobile-satellite service shall be limited to earth stations operating with non-Federal space stations.[117]

[114] *See* SIA Comments at 4-5.

[115] *See supra* paragraph 47.

[116] *See NTIA US319 Letter* at footnote 30, *supra*. Under the allocation approach, we propose in para. 43, *supra*, to revise footnote US319 and to renumber this U.S. footnote as US46.

[117] 47 C.F.R. § 2.106 footnote US319.

60. US319 prevents Federal space stations from operating in these bands even though there is a co-primary Federal MSS allocation for this band. NTIA requests that the footnote be modified to delete the 399.9-400.05 MHz band thereby allowing Federal satellites to operate in this band.[118]

61. NTIA proposes that the 399.9-400.05 MHz band be used for a new satellite system that will assume some of the traffic currently handled by the Argos satellite system. Argos is a satellite system that was established by the French Space Agency, NASA, and the National Oceanic and Atmospheric Administration (NOAA).[119] Argos is used for a large number of applications such as monitoring the oceans at thousands of fixed and drifting buoys, tracking the movements of wildlife, relaying information by humanitarian agencies from remote areas, monitoring water resources, and tracking the locations of ships.[120] According to NTIA, establishing a new satellite system in the 399.9-400.05 MHz band would allow non-environmental applications to be removed from the Argos system which will result in lower interference, higher capacity, and improved reliability and service for both the environmental applications remaining on Argos and the non-environmental applications moved to the new system.[121]

62. The Commission allocated the 399.9-400.05 MHz band along with three other frequency bands to the MSS in 1993.[122] At that time the 399.9-400.05 MHz band was used by the Transit-SAT Radionavigation satellite system operated by the United States Navy.[123] Transit-SAT was discontinued in 1996. The Commission made the allocation of these MSS bands to allow deployment of non-geosynchronous low Earth orbit (LEO) satellite systems, called "Little LEO" systems, to provide non-voice services such as data messaging and position determination.[124] At the 1992 World Administrative Radio Conference ("WARC-92") the Little LEO bands, except for the 399.9-400.05 MHz band, had been allocated to the MSS on a worldwide shared basis.[125] Later, the 1995 World Radio Conference ("WRC-95") added a worldwide MSS allocation for the 399.9-400.05 MHz band.[126] There are currently no Commission licensees or applicants for this band.[127]

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[118] We note as a procedural matter that NTIA's request does not meet the formal requirements of a petition for rulemaking. *See* 47 C.F.R. § 1.401(c). Accordingly, we will commence a rulemaking proceeding on our own motion. *See* 47 C.F.R. § 1.411.

[119] *See* Argos History, *available at* http://www.argos-system.org/web/en/66-history.php.

[120] *See* Argos Applications, *available at* http://www.argos-system.org/web/en/44-applications.php.

[121] *See NTIA US319 Letter* at footnote 30, *supra*.

[122] Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum to the Fixed-Satellite Service and the Mobile-Satellite service for Low-Earth Orbit Satellites, ET Docket No. 91-280, *Report and Order*, 8 FCC Rcd 1812, 1813 para. 12 (1993). The 137-138, 148-150.05, and 400.15-401 MHz bands were also allocated for MSS.

[123] *Id*. at 1816 para. 24.

[124] *Id*. at 1813 para. 7. The Little LEO band is distinct from the "Big LEO" MSS band at 1610-1626.5 MHz and 2483.5-2500 MHz. The Little LEO MSS is officially known as the non-voice, non-geostationary (NVNG) mobile-satellite service

[125] *Id*. at 1813 para. 5; Amendment of Part 25 of the Commission's Rules to Establish Rules and Policies Pertaining to the Second Processing Round of the Non-Voice, Non-Geostationary Mobile Satellite Service, IB Docket No. 96-220, *Report and Order*, 13 FCC Rcd 9111, 9114 para. 5 (1997) (*Little LEO 2nd Round R&O*).

[126] *Little LEO 2nd Round R&O* at 9120 para 22. WRC-95 also allocated 455-456 MHz and 459-460 MHz for MSS in Region 2. The Commission has declined to adopt these allocations. Amendment of Part 2 of the Commission's Rules to Allocate the 455-456 MHz and 459-460 MHz bands to the Mobile-Satellite Service, ET Docket No. 97-214, *Order*, 17 FCC Rcd 8899, 8899 para. 1 (2002).

[127] A spectrum sharing plan proposed by five Little LEO applicants did not include use of the 399.9-400.05 MHz band, and, consequently, the Commission did not assign this band to any of the Little LEO licensees. *Little LEO 2nd* (continued….)

63. We propose to modify US319 and to renumber this footnote in frequency order as US46.[128] No MSS systems have been deployed or authorized in the 399.9-400.05 MHz band since the allocation was made almost twenty years ago and there are no pending applications or other proposed uses for this band. Given that the band has only a 150 kilohertz bandwidth, the band is not suitable for mobile broadband or most other applications. Rather than have the band lie fallow, we tentatively conclude that the public interest is best served by allowing a Federal satellite system to be operated in this band so that the spectrum does not lay fallow. We seek comment on this proposal.

64. We seek comment on the cost and benefits of making this amendment to US319. While no MSS systems currently operate in the 399.9-400.05 MHz band, other parties may have interest in operating satellite systems in this band in the future. Given this possibility, we seek comment on whether operation of a Federal MSS system in this band would preclude operation of non-Federal MSS systems in the band in the future. We also recognize that interference may occur from a Federal MSS system operating in 399.9-400.05 MHz to other nearby frequency bands. The 400.15-401 MHz band is also allocated for MSS while the 335.4-399.9 MHz band has a Federal fixed and mobile allocation. NTIA would be responsible for ensuring that any new Federal space stations authorized in the 399.9-400.05 MHz band will not cause harmful interference to Federal systems operating in Federal allocations. We seek comment on whether a Federal MSS system operating in the 399.9-400.05 MHz band would cause harmful interference to systems operating in frequency bands allocated for use by non-Federal systems and, if so, what mitigation techniques are possible.

C. Spectrum Access for Commercial Space Operators

65. Three frequency bands are commonly used by Federal agencies for communications with and tracking of space launch vehicles: 420-430 MHz, 2200-2290 MHz, and 5650-5925 MHz. These bands currently have Federal, but no non-Federal, allocations supporting launches. Non-Federal use of these bands has been possible by granting Special Temporary Authorizations (STAs) for use of these bands when launches occur at Federal facilities. In this NPRM we broadly seek comment on the spectrum requirements to support development of the commercial launch sector.

66. We could take a number of different regulatory approaches to address the spectrum requirements of the commercial space sector. For example, we could modify the Allocation Table to include a non-Federal co-primary allocation for the 2200-2290 MHz and 5650-5925 MHz bands with a footnote providing for coordination with Federal operations in these bands for communications and tracking during launches. Alternatively, we could add a footnote to the Allocation Table to allow non-Federal use of certain Federal bands when supporting Federal launch missions or when conducting launches from Federal facilities. We could also look to the 2360-2395 MHz band to satisfy the commercial launch sector spectrum requirements as this spectrum is currently shared on a co-equal basis for Federal and non-Federal aeronautical mobile telemetry uses.[129] We seek comment on the relative merits of each of these approaches. We also seek comment on whether a non-Federal allocation in the 420-430 MHz band is necessary to support commercial launches. We believe this action is necessary to

(Continued from previous page)
Round R&O at 9120-21 para 22. Only Orbcomm has constructed a Little LEO system and Orbcomm did not include the 399.9-400.05 MHz band when later requesting additional spectrum for use by a second generation Little LEO system. Orbcomm did state that it may seek authority to operate in the 399.9-401 MHz band at a later date. Applications by Orbcomm License Corp. for Authority to Modify its Non-Voice, Non-Geostationary Satellite System, IBFS File No. SAT-MOD-20070531-00076, SAT-AMD-20071116-00161, *Order and Authorization,* 23 FCC Rcd 4804, 4807-08 para. 10 (IB 2008); Modification Application of Orbcomm License Corp., Narrative Description, IBFS File No. SAT-MOD-20070531-00076, filed May 30, 2007 at 1, 11.

[128] The revised footnote is included in Appendix A.

[129] 47 C.F.R. §§ 2.106 footnote US276, 87.303(d)(1).

support the forecasted increase in the number of commercial launches in the future. We seek comment on these views.

67. A launch vehicle is a rocket used to send a payload into space. The payload may be a satellite[130] that remains in orbit or a spacecraft[131] that transports cargo or people or travels beyond Earth's atmosphere to collect scientific data. Launch vehicles oftentimes have multiple stages. A first stage initially propels the launch vehicle until its fuel is exhausted and then separates from the rest of the launch vehicle to allow the next stage to propel the launch vehicle. Many launch vehicles separate from the payload after reaching space and fall back to Earth.[132] However, some launch vehicles, such as the space shuttle, are spacecraft that transport cargo and people to and from space.

68. We note that the Commission has long regulated communication involving satellites.[133] As part of regulating satellites' use of radio spectrum,[134] the Commission has required applicants to provide additional information, such as design and operational strategies for mitigating orbital debris.[135] For purposes of this portion of the NPRM, however, our scope is limited to spectrum used during launches.

69. Historically, NASA was responsible for launching both Federal and non-Federal payloads into space. However, in 1986 the President announced that NASA would no longer be responsible for

[130] *See* 47 C.F.R. § 2.1.

[131] The Commission's rules define spacecraft as "a man-made vehicle which is intended to go beyond the major portion of the Earth's atmosphere." *Id.* A spacecraft may be a launch vehicle as well as a payload that is carried on top of a launch vehicle, such as a communications satellite or a capsule that is used to transport cargo and crew into space.

[132] It may take days, months, or even years for a launch vehicle to fall back to Earth. Stephen Clark, *Private Falcon 9 Rocket Meets Fiery End after 3 Weeks in Space*, Space.com (June 29, 2010) *available at* http://www.space.com/8681-private-falcon-9-rocket-meets-fiery-3-weeks-space.html; John Mason and Howard Miles, *Reentry of 'Cosmos 749' Rocket on 1980 December 25*, 91 J. of British Astronomical Ass'n 561, 565 (1981); *Reentry Predictions*, The Aerospace Corp., *available at* http://www.aerospace.org/cords/reentry-predictions/past-reentries-2012/1978-020b/ (Atlas F rocket body 1978-020B launched Feb. 22, 1978 with reentry on Aug. 11, 2012).

[133] The FAA has the primary role in regulating commercial launches within the United States and abroad by U. S. entities. A license from the FAA is required for non-Federal launches and reentry – *i.e*. the spacecraft returns from Earth orbit or outer space to Earth, substantially intact. 51 U.S.C. §§ 50902(16), 50904(a); 14 C.F.R. §§ 413.3(b), 415.9(b).

[134] 47 C.F.R. § 25.113(g). We require technical information such as frequencies to be used, bandwidth, predicted receiver and transmitter filter responses to be used, receiving system noise temperature, the power flux density levels within each coverage area, and the gain of each transponder channel. 47 C.F.R. § 25.114 (c).

[135] 47 C.F.R. § 25.114(c)(14). *See also* Mitigation of Orbital Debris, IB Docket No. 02-54, *Second Report and Order*, 19 FCC Rcd 11567, 11613-14 para. 111 (2004); Northrop Grumman Space & Mission Systems Corporation, IBFS File Nos. SAT-LOA-19970904-00080, SAT-AMD-19971222-00219, SAT-AMD-20031104-00324, SAT-AMD-20040312-00030, Call sign S2254, *Order and Authorization*, 24 FCC Rcd 2330, 2363-64 para. 102 (IB 2009) (Commission anticipates that modification to application for satellite license will involve insurance policies listing the United States as an additional insured party.); Letter to Walter Sonnenfeldt and Stephen L. Goodman, IBFS File No. SAT-MOD-20110801-00141, Call Sign: S2103, 26 FCC Rcd 12706, 12708 (IB Sat. Div. 2011) (Applicant may want to discuss possible insurance arrangements in connection with reentry of satellites.); Application of Virtual Geosatellite LLC, IBFS No. SAT-LOA-19990108-00007, SAT-AMD-20020916-00173, Call Sign S2366, *Order and Authorization*, 21 FCC Rcd 14687, 14708 para. 68 (IB 2006) (Commission anticipates that satellite end-of-life disposal plan will involve insurance policies listing the United States as an additional insured party).

launching commercial payloads into space.[136] When NASA conducted all launches, Federal spectrum was used for launch related communications purposes. Anticipating the need for non-Federal spectrum for communications for commercial launches, the Commission in 1990 set aside spectrum in the 2310-2390 MHz band for telemetry and telecommand use during commercial launches.[137] Telemetry is diagnostic information transmitted from the launch vehicle to ground controllers during the flight which allows the controllers to track the performance of the launch vehicle. Telecommand is the transmission of signals to initiate, modify or terminate functions of equipment at a distance.[138] In the intervening years the Commission has not authorized use of this spectrum for launches. Instead, commercial launches in the United States have continued to rely on Federal spectrum authorized by NTIA.

70. Recently, two launch vehicle manufacturers have applied to the Commission for access to Federal spectrum during commercial launches. The Commission is able to grant special temporary authority (STA) under the Part 5 experimental licensing rules to commercial entities to operate in these Federal bands on a non-interference basis[139] for a maximum of six months.[140] This means that the experimental STA grantees are not allowed to cause interference to and must accept interference from Federal users of the band that are operating with authorizations. Because these bands have a Federal allocation, the Commission coordinates these experimental STAs with NTIA. Once these STAs have been coordinated with NTIA, the potential for interference to or from Federal systems to commercial launch operations is minimized. The Commission recently granted both SpaceX and Orbital Sciences experimental STAs to use frequencies in the 2200-2290 MHz and 5650-5925 bands during their launches.[141] These experimental STAs were valid for a single launch and were issued with the condition that any future launches by the grantees would be considered on a case-by-case basis and no expectation that experimental STAs for future launches would be approved.

71. The frequency of commercial launches in the United States is expected to increase in the future. According to the National Space Policy, Federal agencies should purchase commercial space capabilities and services to the maximum extent possible.[142] The National Space Policy requires that NASA seek partnerships with the private sector to enable cost-effective commercial spaceflight

[136] Amendment of the Frequency Allocation and Aviation Services Rules (Parts 2 and 87) to Provide Frequencies for Use by Commercial Space Launch Vehicles, GEN Docket No. 89-16, RM-6423, *Report and Order,* 5 FCC Rcd 493, 493 para. 2 (1990) (*Space Launch R&O*).

[137] *Id*. at 495 para. 15.

[138] 47 C.F.R. § 2.1(c).

[139] 47 C.F.R. §§ 2.102(b)(3), 5.85(c).

[140] 47 C.F.R. §, 5.61(a). As an alternative to an experimental STA the Commission may issue experimental licenses that are valid for up to five years. 47 C.F.R. § 5.71. Experimental licenses permit operation only on a non-interference basis.

[141] Space Exploration Technologies Corp. (SpaceX), Special Temporary Authorization, OET Experimental Licensing System File Nos. 0301-EX-ST-2012, 0334-EX-ST-2012, 0691-EX-ST-2012, 0692-EX-ST-2012, 0071-EX-ST-2013, 0072-EX-ST-2013; Orbital Sciences Corp., Special Temporary Authorization, OET Experimental Licensing System File Nos. 0136-EX-ST-2012, 0139-EX-ST-2012, 0611-EX-ST-2012 (*available at* https://apps.fcc.gov/oetcf/els/index.cfm). SpaceX and Orbital Sciences did not apply for STAs for the 420-430 MHz band. SpaceX and Orbital Sciences have also obtained longer term experimental licenses for ground testing of their launch vehicles. Space Exploration Technologies Corp. (SpaceX), Radio Construction Permit and License, OET Experimental Licensing System File Nos. 0394-EX-PL-2011, 0380-EX-PL-2012; Orbital Sciences Corp., Radio Station Construction Permit and License, OET Experimental Licensing System File Nos. 0524-EX-PL-2011, 0022-EX-ML-2012.

[142] *See* National Space Policy at 10.

capabilities to transport cargo and crew to the ISS.[143] NASA has contracted with SpaceX for twelve supply flights to the ISS and with Orbital Sciences for eight supply flights.[144] Several companies are expected to eventually develop the capability to transport astronauts to the ISS.[145] Given this expected increase in commercial space flights, the continued use of experimental STAs for the radio spectrum needed for launches may create uncertainty.[146] Because there is no non-Federal allocation allowing the use of these frequencies, each request to operate on these frequencies must be evaluated on a case-by-case basis, with no guarantee that one can be granted for any given launch. However, given that the Federal agencies have been supportive of the commercial launch sector in carrying out the President's National Space Policy objectives, all STAs related to commercial launches to date have been approved. Given that a single launch can cost millions of dollars, commercial launch providers should not have to assume the risk that launches may have to be postponed or cancelled if an experimental STA is not timely granted. Even if an experimental STA is granted, the grantee must contend with the uncertainty of non-interference status. Communications links that operate on a non-interference basis are not likely to be acceptable from a safety standpoint for future manned spaceflights. The experimental STA process also increases the burden on commercial launch providers' time and expense, since each is evaluated on a case by case basis. Allocation status for commercial launch providers would enable the Commission to develop service rules for issuing authorizations using well-defined application and coordination processes. We seek comment on these tentative conclusions as well as the cost to the space launch industry of not having a non-Federal allocation in these bands. Consequently, we are proposing, and seeking comment as discussed below, on adding non-Federal allocations to these three bands to allow Commission licensees to operate in these bands on an interference protected basis. We seek comment on possible approaches we could take to provide non-Federal entities with interference protection in these bands, such as adding a non-Federal allocation to the bands or the addition of a footnote to the Allocation Table that provides non-Federal entities with interference protection. We note that even these approaches require coordination with the Federal incumbents in the band.

72. We recognize that identifying the non-Federal spectrum needs associated with launch of a launch vehicle necessarily raises larger questions about the respective roles of the FCC and NTIA in future launch scenarios. At the most basic level, whether access to spectrum for use during a launch requires authorization from NTIA or a license from the Commission will depend on whether the radio transmitters belong to and are operated by the U.S. government.[147] Making this determination is not always straightforward. As a practical matter, all launch vehicles launched in the past several decades have been built with substantial private company involvement. All regular commercial launches within the United States have been conducted from launch facilities owned by the Federal Government.[148] Payloads launched from Federal launch facilities have included commercial communications satellites

[143] *Id*. at 11.

[144] *NASA Awards Space Station Commercial Resupply Services Contract*, Dec. 23, 2008, *available at* http://www.nasa.gov/home/hqnews/2008/dec/HQ_C08-069_ISS_Resupply.html.

[145] *NASA Announces Next Steps in Effort to Launch Americans from U.S. Soil,* Aug. 3, 2012, *available at* http://www.nasa.gov/centers/kennedy/news/releases/2012/release-20120803.html; *Commercial Crew and Cargo*, *available at* http://www.nasa.gov/offices/c3po/partners/ccdev_info.html; *NASA Partner Sierra Nevada Completes Preliminary Design Review of Dream Chaser Vehicle to Transport Astronauts*, June 6, 2012, *available at* http://www.nasa.gov/centers/kennedy/news/releases/2012/release-20120606.html.

[146] The Commission has recently issued a Public Notice on obtaining experimental STAs for launches. Guidance on Obtaining Experimental Authorizations for Commercial Space Launch Activities, *Public Notice*, DA 13-446 (rel. March 15, 2013).

[147] 47 U.S.C. § 305(a).

[148] The New Mexico state government has established Spaceport America located near Las Cruces New Mexico as a commercial spaceport.

and satellites owned and operated by Federal agencies such as the Department of Defense and NOAA. Because multiple satellites can be launched into space on a single launch vehicle, both government and non-government payloads have been included on the same launch.[149] There have also been several instances of Federal Government-owned equipment or sensors on commercial communications satellites.[150] Given that Federal agencies are required to use commercial space services where possible, we believe that there will be increasing Federal reliance on non-Federal operations.

73. We seek comment on how to determine whether a given launch is non-Federal or Federal for purposes of licensing spectrum for use during a launch. According to the Communications Act, the Commission has authority to license radio stations except those "belonging to and operated by the United States."[151] Spectrum use by radio equipment belonging to or operated by Federal agencies is authorized by NTIA instead of licensed by the Commission. How easy or difficult has it been in practice to determine whether use of spectrum during launches should be licensed by the Commission or authorized by NTIA? How should factors such as the nature of the payload, the location of the launch, the provider of the launch vehicle and whether the FAA classifies the launch as commercial be taken into account in making this determination?

74. Making non-governmental allocations within the 420-430 MHz, 2200-2290 MHz, and 5650-5925 MHz bands would be a first step to issuing licenses to commercial operators for use during launches. After the allocations are adopted, the Commission would have to open a proceeding to create service rules for non-Federal launches. We recognize the critical nature of some of the Federal operations performed using these frequency bands, and realize that service rules would have to be carefully crafted to ensure that the commercial space launch operations do not interfere with the important Federal operations in these bands, particularly as the commercial launch sector expands. Accordingly, any service rules would be developed in close coordination with NTIA and the Department of Defense to assure the continued certainty that this spectrum remains available for priority use by critical systems. The FCC is committed to ensuring that our rules would require technical specifications, eligibility requirements, and coordination procedures necessary to preserve the nation's defense capabilities. Adoption of these service rules will allow the Commission to issue licenses to commercial launch operators for spectrum for use during launches without the uncertainty of operating on a non-interference basis. Because the bands would be shared Federal/non-Federal bands, use of spectrum for commercial space launches would be coordinated with the NTIA. In the short term, because the commercial launches will occur at relatively few locations and will not be an everyday occurrence, we believe that service rules and coordination procedures can be adopted that will prevent harmful interference from occurring to the Federal services in these bands or the commercial launch operators. In adopting service and licensing rules for these bands we must make sure that Federal operations are protected. We seek comment on these assumptions. Furthermore, we seek comment on whether the existing Federal bands are able to

[149] This has become increasingly common with the launch of small satellites as secondary payloads. For example, the October 2011 launch of NOAA's Suomi weather satellite also deployed several non-Federal satellites. *NASA Readies New Type of Earth-Observing Satellite for Launch*, Oct. 12, 2011, *available at* http://www.nasa.gov/mission_pages/NPP/news/launch-prep.html; *NASA Transfers Operational Contol of Environmental Satellite*, March 3, 2013, *available at* http://www.nasa.gov/mission_pages/NPP/news/control-transfer.html. The September 2012 launch of a satellite for the National Reconnaissance Office also deployed 11 small satellites for both Federal and non-Federal groups. *NRO 2012 Launch Campaign Completed with Sucessful Atlas V Rocket Launch*, National Reconnaissance Office, Press Release #11-12, Sept. 13, 2012, available at http://www.nro.gov/news/press/2012/2012-11.pdf.

[150] This arrangement is often referred to as a hosted payload. *See Hosted Payloads*, Department of Commerce, *available at* http://www.space.commerce.gov/general/commercialpurchase/hostedpayloads.shtml; *After Hosted Payload Success, U.S. Air Force Plans Follow-on*, Space News, April 13, 2012, *available at* http://www.spacenews.com/military/120413-hosted-success-af-plans-follow-on.html.

[151] 47 U.S.C. § 305(a).

sustain the anticipated growth of the commercial launch sector. Are there alternatives to use of these bands that may satisfy the commercial launch requirements?

75. What would be the costs and benefits of providing non-governmental access within the 420-430 MHz, 2200-2290 MHz, and 5650-5925 MHz bands? Would having access to portions of these bands meet the needs of commercial launch operators? What costs would be imposed on Federal agencies to coordinate use of the spectrum with commercial launch operators? Would having access to portions of these bands allow commercial launch operators to incur lower development costs because they will be able to use the same communications systems for both Federal and non-Federal launches? How would the costs and benefits of having access to portions of these bands compare with other spectrum bands that could be used instead of these bands? How can we best ensure that the anticipated growth of the commercial launch industry is sustained in the longer term?

76. *420-430 MHz*. The 420-430 MHz band is used to transmit a self-destruct signal from ground controllers to a launch vehicle during launch.[152] This signal causes the launch vehicle to self-destruct if it goes off course and would pose a danger to a populated area. For safety reasons this communications link must be extremely reliable. NTIA has authorized a number of frequencies throughout the 420-430 MHz band for self-destruct signals at different Federal launch facilities.

77. The 420-430 MHz band is allocated on a primary basis for Federal radiolocation and on a secondary basis for the non-Federal amateur service.[153] Federal radiolocation use of the band is restricted to the military services.[154] Portions of the band are also allocated on a primary basis for the non-Federal land mobile service at three locations.[155] The band may also be used for low power Federal radio control operations.[156] The International Table contains primary fixed and mobile, except aeronautical mobile, allocations and a secondary radiolocation allocation. Because the only non-Federal allocation for the 420-430 MHz band is for secondary amateur operations, the Commission cannot issue licenses that provide interference protection to commercial entities to use this band for self-destruct signals during launches. Commercial entities have not requested experimental STAs or licenses from the Commission for self-destruct signals in the 420-430 MHz band to date. In this regard, we seek comment on the requirements associated with command and destruct communications for commercial launch vehicles and whether access to the 420-430 MHz band is necessary. The commercial launch vehicle has only a receiver for the self-destruct signal and therefore does not require a license to transmit. If the self-destruct signal is being transmitted from a government owned facility using equipment under the control of Federal Government employees, no license from the Commission would be required. Instead, an authorization from NTIA would be needed.

78. We seek comment on whether we should make a co-primary non-Federal aeronautical mobile allocation for the 420-430 MHz band for use for self-destruct signals during commercial launches. In addition, we seek comment on whether we should add a footnote to the Allocation Table restricting use of this non-Federal allocation to self-destruct signals during launches. Given that no one has requested an experimental STA from the Commission for this band for self-destruct signals, is there a need for access to the 420-430 MHz band for self-destruct signals and would the current STA process be sufficient to

[152] *See NTIA Manual*, § 8.2.54 (Policy on the Use of the Frequency Bands Between 406.1 and 450 MHz by Range Safety Operations).

[153] 47 C.F.R. § 2.106.

[154] 47 C.F.R. § 2.106 footnote G2. Non-Federal radiolocations systems may also use the band on a secondary basis with certain restrictions. 47 C.F.R. § 2.106 footnote US269.

[155] 47 C.F.R. § 2.106 footnote US230.

[156] 47 C.F.R. § 2.106 footnote G8.

satisfy this need? As private spaceports are developed, use of Federal authorizations for this purpose may no longer be sufficient. Even when launches are conducted from Federal facilities, commercial entities conducting launches may want to use their own equipment for the self-destruct communications link and therefore would need a license from the Commission. Given the necessity of a reliable self-destruct communications link for the safety of the public, the use of a non-interference basis experimental STA would be problematic. We acknowledge that use of this band for non-Federal space activities will require coordination with NTIA and Federal users of the band. We propose that any non-Federal use of the allocation should be limited to commercial launch activities. We seek comment on this proposal as well as alternative bands that may be used for this purpose by the commercial launch sector.

79. *2200-2290 MHz.* The 2200-2290 MHz band is used for launch telemetry - *i.e.* the sending of information from the launch vehicle to ground controllers during the launch. We propose two alternative approaches that would provide commercial launch operators access to spectrum in the 2200-2290 MHz band for launch telemetry. As a first alternative, we propose to add a footnote to the Allocation Table providing primary non-Federal space operation service allocations to portions of the 2200-2290 MHz band for launch telemetry. This footnote would require successful coordination of the assignment and use of the band for space launches with NTIA, would restrict non-Federal use of the band to pre-launch testing and to use at Federal ranges, would limit non-Federal use of the band to the 2207-2219 MHz, 2270.5-2274.5 MHz, and 2285-2290 MHz portions of the band, and would limit non-Federal use of the band to channels with bandwidth of less than 5 MHz based on our understanding of current usage. As a second alternative we propose to amend the Allocation Table to add a non-Federal Space Operations allocation to the 2200-2290 MHz band. This allocation would be accompanied by a footnote to the Allocation Table with the same restrictions specified in the footnote proposed in the first alternative. We seek comment on these two alternative proposals. Which alternative would be better suited to meeting our goal of providing access to spectrum during launches for launch telemetry?

80. The 2200-2290 MHz band is allocated on a primary basis for the Federal space operation, Earth exploration-satellite, fixed, mobile, and space research services.[157] The fixed and mobile allocations are limited to line-of-sight operations only. There are no non-Federal allocations for this band, although certain non-Federal space stations may use the 2285-2290 MHz portion of the band to communicate with NASA's Tracking and Data Relay Satellite System.[158] The International Table contains allocations for the space operation, Earth exploration-satellite, fixed, mobile, and space research services. Because the 2200-2290 MHz band has no non-Federal allocation, the Commission does not license frequencies except on a non-interference basis. The primary Federal space operation service allocation enables NTIA to assign frequencies in the 2200-2290 MHz band to Federal agencies for telemetry during launches.

81. The 2200-2290 MHz band is heavily used by Federal agencies. We seek comment on whether there is sufficient spectrum available in this band for use during commercial launches, and, in particular, whether the use of this band could sustain the anticipated growth of the commercial launch sector. Using the same frequencies for Federal and non-Federal launches has distinct advantages for the commercial space industry. The equipment used for communications during launches has been developed and is reliable. Launch communications have successfully shared this band with the other services present for numerous launches through coordination of the various operations. Many commercial launches will occur from facilities co-located with Federal launch sites such as Cape Canaveral or Vandenberg Air Force Base where this sharing has been accomplished. In the future, the same companies will likely conduct launches for both Federal agencies and private entities and eventually likely transition

[157] 47 C.F.R. § 2.106.

[158] This is limited to non-Federal space stations in the space research, space operation, and Earth exploration-satellite services. 47 C.F.R. § 2.106 footnote US303.

to commercial space ports that are completely independent of Federal operations. We seek comment on whether requiring industry to have the capability to conduct communications in different bands depending on whether the launch is considered Federal or non-Federal would place an expensive burden on these companies.[159] Providing access to spectrum that can sustain the short and long term needs of the commercial launch industry is in accordance with the policy of the United States government to develop a vibrant commercial space industry.[160]

82. In both of the alternative proposals we have proposed that non-Federal use of the bands for space launches be limited to the 2207-2219 MHz, 2270.5-2274.5 MHz, and 2285-2290 MHz portions of the band. We have proposed this limitation based on our understanding of current usage. We seek comment on limiting non-Federal use to these portions of the band for space launches. Can limiting non-Federal use to this portion of the band support the expected growth of the commercial launch industry? We have also proposed to limit non-Federal use of these bands to communication channels with bandwidths of less than 5 megahertz based on our understanding of current usage. We seek comment on this limitation. In addition, we have proposed to limit non-Federal use of this band for space launches to pre-launch testing and for launches conducted at Federal ranges. We propose this restriction to limit the potential for interference to Federal operations to a few locations. As the commercial space ports are established that are independent of Federal operations would this restriction unduly limit the future growth of the commercial space launch industry?

83. As mentioned above, in 1990 the Commission made six frequencies in the 2310-2390 MHz band available for both Federal and non-Federal use for telemetry and telecommand of launch and reentry vehicles.[161] The Commission later reduced these to three frequencies in the 2360-2395 MHz band.[162] The 2360-2395 MHz band is primarily used for aeronautical telemetry and telecommand operations for flight testing of aircraft and missiles.[163] We seek comment generally on the use of these frequencies as an alternative to the heavily used 2200-2290 MHz band for communications during launches. In the time since the Commission made this spectrum available for launch telemetry, the intensity of use of this band

[159] *Space Launch R&O* at 494 para. 10.

[160] *See* National Space Policy at 3 (stating that the "United States is committed to encouraging and facilitating the growth of a U.S. commercial space sector that supports U.S. needs, is globally competitive, and advances U.S. leadership in the generation of new markets and innovation-driven entrepreneurship").

[161] 47 C.F.R. § 2.106 footnote US276; 47 C.F.R. § 87.303(d)(1); *Space Launch R&O* at 495 para. 15.

[162] In 1997 and 2003 these six frequencies were reduced to three after a portion of the band was reallocated for Satellite Digital Audio Radio (SDARS) and the Wireless Communications Service (WCS). Establishment of Rules and Policies for the Digital Audio Radio Service in the 2310-2360 MHz Frequency Band, IB Docket No. 97-91, GEN Docket No. 90-357, *Report and Order, Memorandum Opinion and Order, and Further Notice of Proposed Rulemaking,* 12 FCC Rcd 5754, 5805-06 paras. 124-126 (1997); Amendment of Parts 2, 25, and 87 of the Commission's Rules to Implement Decisions from World Radiocommunication Conferences Concerning Frequency Bands Between 28 MHz and 36 GHz and to Otherwise Update the Rules in this Frequency Range, ET Docket No. 02-305, *Report and Order*, 18 FCC Rcd 23426, 23441-43 paras. 37-40 (2003). The Commission has recently proposed in a pending proceeding to remove outdated references to two of these frequencies from the Allocation Table. *See* Amendment of Parts 1, 2, 15, 74, 78, 87, 90, and 97 of the Commission's Rules Regarding Implementation of the Final Acts of the World Radiocommunication Conference (Geneva, 2007) (WRC-07), Other Allocation Issues, and Related Rule Updates, ET Docket No. 12-338, *Notice of Proposed Rulemaking and Order,* 27 FCC Rcd 14598, 14623 para. 57 (2012).

[163] The entire 2360-2395 MHz band may be used for telemetry and telecommand of launch vehicles undergoing flight test. 47 C.F.R. § 87.303(d)(1). The 2360-2395 MHz band is also used on a secondary basis for Medical Body Area Network (MBAN) devices. 47 C.F.R. §§ 2.106 footnote US101, 95.628(a)(2), 95.1211(c); Amendment of the Commission's Rules to Provide Spectrum for the Operation of Medical Body Area Networks, ET Docket No. 08-59, *First Report and Order and Further Notice of Proposed Rulemaking*, 27 FCC Rcd 6422 (2012)

for aeronautical telemetry for flight testing may have significantly changed. Does the current and expected future use of the 2360-2395 MHz band for aeronautical telemetry for flight testing make it unsuitable for communications associated with launch activity? What are the impediments to use of this band for commercial launches in the future? What are the spectrum requirements of the commercial launch sector in the short and long term and are the available frequencies in this band sufficient to meet, at least in part, these requirements? Because the number of frequencies available for launch vehicle telemetry and telecommand has been halved, would the needed data capacity be available for telemetry and telecommand during commercial launches? Should the Commission make the entire 2360-2395 MHz band available for telemetry and telecommand during commercial launches? Will the development of communications equipment for use on launch vehicles for this band place a significant economic burden on the commercial space industry? Prior to the Commission making frequencies in the 2310-2395 MHz band available for space launch telemetry, several commenters stated that it would be more cost efficient to use the same frequencies for both Federal and non-Federal launches and that the band should not be used until all Federal launch facilities had transitioned to the band.[164] We seek comment on whether these concerns are still valid. Are there other reasons why the 2360-2395 MHz band is not a viable alternative to the 2200-2290 MHz band for telemetry during launches?

84. Looking beyond the 2360-2395 MHz band, we seek comment on alternatives to the use of the 2200-2290 MHz band for launch communications. We realize that as the demand for spectrum has increased, finding spectrum for new applications has become more difficult. That is especially the case for an application such as the space operation service, which involves transmitting high powered signals from high altitudes that may result in interference over a large area. Because these communications will take place from space, must the spectrum used be internationally allocated to the space operation service (space-to-Earth)? There is meager spectrum allocated for this purpose.[165] Assuming that another suitable frequency band could be identified, would obtaining an international space allocation be a long process with uncertain success?

85. *5650-5925 MHz*. The 5650-5925 MHz band is used for radar tracking of a launch vehicle during launch.[166] Tracking of a launch vehicle may involve use of a transponder that is placed on the launch vehicle. The transponder transmits a signal in response to a radar signal received from a ground-based tracking station thus allowing the launch vehicle to be more accurately tracked. Both SpaceX and Orbital Sciences have obtained experimental STAs in the 5650-5925 MHz band for use during launches.[167]

86. The 5650-5925 MHz band is allocated on a primary basis for Federal radiolocation and on a secondary basis for the non-Federal amateur service.[168] The 5650-5850 MHz portion of the band is also allocated on a secondary basis to the non-Federal amateur satellite service. The 5850-5925 MHz portion of the band contains a non-Federal primary FSS allocation which is limited to use with international

[164] *Space Launch R&O* at 494 para. 10.

[165] The 137-138 MHz and 401-402 MHz bands are the only other spectrum bands allocated to the space operation service (space-to-Earth) on a primary basis for non-Federal use. 47 C.F.R. § 2.106.

[166] *See, e.g.* Application for Special Temporary Authority of Orbital Sciences Corp., OET Experimental Licensing System File Nos. 0139-EX-ST-2012.

[167] Space Exploration Technologies Corp. (SpaceX), Special Temporary Authorization, OET Experimental Licensing System File Nos. 0334-EX-ST-2012, 0691-EX-ST-2012, 0072-EX-ST-2013; Orbital Sciences Corp., Special Temporary Authorization, OET Experimental Licensing System File Nos. 0139-EX-ST-2012, 0611-EX-ST-2012.

[168] 47 C.F.R. § 2.106.

inter-continental satellite systems subject to a case-by-case electromagnetic compatibility analysis.[169] 5850-5925 MHz also has a non-Federal mobile primary allocation that is limited to the Intelligent Transportation System radio service.[170] The International Table for Region 2 contains a secondary amateur allocation throughout the band; a primary radiolocation allocation in the 5650-5830 MHz portion of the band; a secondary amateur-satellite service allocation in the 5830-5850 MHz portion of the band; primary fixed, FSS, and mobile service allocations in the 5850-5925 MHz portion of the band; and a secondary radiolocation allocation in the 5850-5925 MHz portion of the band.[171]

87. Because the radiolocation allocation in the 5650-5925 MHz band is Federal, the Commission can only license commercial entities to use the band to track launch vehicles on a non-interference basis. Federal radar facilities are able to track launches from government owned launch facilities under current NTIA authorizations even for commercial launches. However, NTIA may not authorize radar transponders on commercial launch vehicles. In the future private spaceports may need to establish non-Federal radar facilities to track commercial launch vehicles or spacecraft. Even for commercial launches from government run launch sites, the commercial space operator may want to develop and use its own radar facilities to track the launch vehicle. Given the need for radar transponders on commercial launch vehicles or for non-government radar tracking of launch vehicles, we make two alternative proposals for providing non-Federal access to the 5650-5925 MHz band for tracking of launch vehicles. As a first proposal we propose to add a footnote to the Allocation Table providing primary non-Federal Radiolocation service allocations to portions of the 2200-2290 MHz band for launch telemetry. This footnote would require successful coordination of the assignment and use of the band for space launches with NTIA and would restrict non-Federal Radiolocation use of the band to the tracking of launch vehicles during launches and for pre-launch testing. The second alternative proposal would add a non-Federal radiolocation allocation to the 5650-5925 MHz band with footnote containing the same restrictions. Is only a portion of the band needed for the tracking during launches? What are the spectrum and operational requirements for radar tracking of commercial launch vehicles in the short and longer term? Could launch vehicles instead be tracked in other radiolocation bands, whether Federal, non-Federal, or shared? Would the addition of a non-Federal radiolocation allocation introduce any compatibility issues with Intelligent Transportation Systems that are significantly different than compatibility with the existing Federal radiolocation allocation? We also propose to restrict non-Federal use of this band to use for launch activities. We seek comment on these proposals.

IV. NOTICE OF INQUIRY

88. While the commercial space operations portion of the NPRM has focused on use of the 420-430 MHz, 2200-2290 MHz, and 5650-5925 MHz bands during launches, we understand that the commercial space industry may have additional needs for spectrum in the future. In this Notice of Inquiry, we launch an inquiry into the future spectrum requirements of the commercial space industry. We seek comment broadly on what other spectrum needs may be important as the commercial space sector continues to develop. What spectrum will be required as commercial spaceports are developed where the established communications infrastructure that is in place at the government-owned launch facilities is not present? Are there communications needs during other portions of space missions after the launch such as during re-entry or the "on orbit" phase of a mission that require changes in allocations? Are there any other frequency bands, whether Federal, non-Federal, or shared that the commercial space industry will need access to? Can some of the spectrum needs of the commercial space industry be satisfied by purchasing or leasing spectrum from other licensees? Are there any portions of the Commission's rules that will need to be amended to keep pace with this rapidly changing industry?

[169] 47 C.F.R. § 2.106 footnote US245.

[170] 47 C.F.R. § 2.106 footnote NG160.

[171] 47 C.F.R. § 2.106.

89. While previous commercial launches have been conventional rockets, several companies plan to take passengers on suborbital spaceflights using spacecraft that have more in common with planes than rockets.[172] For example, Virgin Galactic's spacecraft will be carried aloft suspended from a plane.[173] The spacecraft will then be released by the plane and a rocket engine will be fired to propel it into space. The spacecraft will then glide back to earth for an unpowered landing in the same manner as NASA's space shuttle. XCOR Aerospace's spacecraft will take off on a horizontal runway like a plane, fire a rocket engine to propel it into space, and then glide back to earth for a horizontal landing.[174] The spacecraft are only expected to reach altitudes of 100 km as compared to orbits of over 300 km for low earth orbit satellites and space stations.[175] Given the airplane-like qualities of these spacecraft and their lower maximum altitudes, they may have different communications needs than conventional launches. Because the spacecraft will glide back to earth will their frequency use have to be coordinated over a much larger area than conventional launches and reentries? Will access to the spectrum used by commercial aviation under the Part 87 Aviation Services be more appropriate for all or part of the spacecraft's flight? Would we need to initiate a proceeding to modify Part 87 to meet the needs of these commercial spacecraft? We seek comment generally on the communication needs of these spacecraft.

90. Bigelow Aerospace has announced plans to have a commercial space station in orbit as early as 2016.[176] Presumably, a space station with human habitation will need reliable communications with earth based ground stations. We seek comment generally on the communications needs of such a space station. Will additional allocations of spectrum be necessary to support a commercial space station? What modifications to the Commission's rules will be needed to support the communication needs of the space station?

V. PROCEDURAL MATTERS

91. *Ex Parte Rules*. The proceeding this Notice initiates shall be treated as a "permit-but-disclose" proceeding in accordance with the Commission's *ex parte* rules.[177] 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 Section 1.1206(b). In proceedings governed by Section 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

[172] *See* Virgin Galactic, http://www.virgingalactic.com and XCOR Aerospace, http://www.xcor.com/.

[173] *See Safer by Design*, Virgin Galactic, *available at* http://www.virgingalactic.com/overview/safety/.

[174] *The Lynx Experience*, XCOR Aerospace, *available at* http://www.xcor.com/products/vehicles/lynx_flightprofile.html.

[175] The ISS has an average orbit of 354 km. *See* Human Space Flight, NASA, *available at* http://spaceflight.nasa.gov/cgi-bin/comment.cgi#29.

[176] David M. Ewalt, *Cosmic Landlord*, Forbes, June 27, 2011, at 146.

[177] 47 C.F.R. §§ 1.1200 *et seq*.

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.

92. *Comments and Reply Comments*. 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). *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

- Electronic Filers: Comments may be filed electronically using the Internet by accessing the ECFS: http://fjallfoss.fcc.gov/ecfs2/.
- Paper Filers: Parties that choose to file by paper must file an original and one copy of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number.

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

  - All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th St., SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes and boxes must be disposed of before entering the building.
  - Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743.
  - U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554.

93. People with Disabilities: To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an e-mail to fcc504@fcc.gov or call the Consumer & Governmental Affairs Bureau at 202-418-0530 (voice), 202-418-0432 (tty).

94. *Paperwork Reduction Act.* This document does not contain proposed information collection(s) subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13. Therefore, it 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).

95. *Further Information*. For further information, contact Nicholas Oros at (202) 418-0636, Office of Engineering and Technology; or via the Internet at Nicholas.Oros@fcc.gov.

VI. ORDERING CLAUSES

96. Accordingly, IT IS ORDERED that, pursuant to Sections 4(i), 301, 303(c), 303(f), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 301, 303(c), 303(f), and 303(r), this Notice of Proposed Rulemaking and Notice of Inquiry IS ADOPTED.

97. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this Notice of Proposed Rulemaking, including the Initial Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

98. IT IS FURTHER ORDERED that the National Telecommunications and Infrastructure Administration's Petition for Rulemaking is GRANTED to the extent described herein.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A

Proposed Rules Under the Allocation Approach

For the reasons discussed in the preamble, the Federal Communications Commission proposes to amend 47 CFR part 2 as follows:

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

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

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

2. Section 2.106, the Table of Frequency Allocations, is amended as follows:

a. Pages 21-22, 26, 33-34, 37-38, 40, 42-43, 47-49, 51-52, 54, 56, and 58 are revised.

b. In the list of United States (US) Footnotes, footnotes US46, US107, USyyy, and USzzz are added, and footnote US319 is removed.

§ 2.106 Table of Frequency Allocations.

The revisions and additions read as follows:

* * * * *

International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
137-137.025 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) 5.208A 5.208B 5.209 SPACE RESEARCH (space-to-Earth) Fixed Mobile except aeronautical mobile (R) 5.204 5.205 5.206 5.207 5.208			137-137.025 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) US46 US320 SPACE RESEARCH (space-to-Earth) 5.208		Satellite Communications (25)
137.025-137.175 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Fixed Mobile-satellite (space-to-Earth) 5.208A 5.208B 5.209 Mobile except aeronautical mobile (R) 5.204 5.205 5.206 5.207 5.208			137.025-137.175 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Mobile-satellite (space-to-Earth) US46 US320 5.208		
137.175-137.825 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) 5.208A 5.208B 5.209 SPACE RESEARCH (space-to-Earth) Fixed Mobile except aeronautical mobile (R) 5.204 5.205 5.206 5.207 5.208			137.175-137.825 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) US46 US320 SPACE RESEARCH (space-to-Earth) 5.208		
137.825-138 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Fixed Mobile-satellite (space-to-Earth) 5.208A 5.208B 5.209 Mobile except aeronautical mobile (R) 5.204 5.205 5.206 5.207 5.208			137.825-138 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Mobile-satellite (space-to-Earth) US46 US320 5.208		
138-143.6 AERONAUTICAL MOBILE (OR) 5.210 5.211 5.212 5.214	138-143.6 FIXED MOBILE RADIOLOCATION Space research (space-to-Earth)	138-143.6 FIXED MOBILE Space research (space-to-Earth) 5.207 5.213	138-144 FIXED MOBILE	138-144	
143.6-143.65 AERONAUTICAL MOBILE (OR) SPACE RESEARCH (space-to-Earth) 5.211 5.212 5.214	143.6-143.65 FIXED MOBILE RADIOLOCATION SPACE RESEARCH (space-to-Earth)	143.6-143.65 FIXED MOBILE SPACE RESEARCH (space-to-Earth) 5.207 5.213			
143.65-144 AERONAUTICAL MOBILE (OR) 5.210 5.211 5.212 5.214	143.65-144 FIXED MOBILE RADIOLOCATION Space research (space-to-Earth)	143.65-144 FIXED MOBILE Space research (space-to-Earth) 5.207 5.213	G30		

144-146 AMATEUR AMATEUR-SATELLITE 5.216			144-148	144-146 AMATEUR AMATEUR-SATELLITE	Amateur Radio (97)
146-148 FIXED MOBILE except aeronautical mobile (R)	146-148 AMATEUR 5.217	146-148 AMATEUR FIXED MOBILE 5.217		146-148 AMATEUR	
148-149.9 FIXED MOBILE except aeronautical mobile (R) MOBILE-SATELLITE (Earth-to-space) 5.209 5.218 5.219 5.221	148-149.9 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) 5.209 5.218 5.219 5.221		148-149.9 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) US46 US320 US323 US325 5.218 5.219 G30	148-149.9 MOBILE-SATELLITE (Earth-to-space) US46 US320 US323 US325 5.218 5.219	Satellite Communications (25)
149.9-150.05 MOBILE-SATELLITE (Earth-to-space) 5.209 5.224A RADIONAVIGATION-SATELLITE 5.224B 5.220 5.222 5.223			149.9-150.05 MOBILE-SATELLITE (Earth-to-space) US46 US320 RADIONAVIGATION-SATELLITE 5.223		
150.05-153 FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY 5.149	150.05-156.4875 FIXED MOBILE		150.05-150.8 FIXED MOBILE US73 G30	150.05-150.8 US73	
			150.8-152.855 US73	150.8-152.855 FIXED LAND MOBILE NG4 NG51 NG112 US73 NG124	Public Mobile (22) Private Land Mobile (90) Personal Radio (95)
153-154 FIXED MOBILE except aeronautical mobile (R) Meteorological aids			152.855-156.2475	152.855-154 LAND MOBILE NG4 NG124	Remote Pickup (74D) Private Land Mobile (90)
154-156.4875 FIXED MOBILE except aeronautical mobile (R) 5.226	5.225 5.226			154-156.2475 FIXED LAND MOBILE NG112 5.226 NG117 NG124 NG148	Maritime (80) Private Land Mobile (90) Personal Radio (95)
156.4875-156.5625 MARITIME MOBILE (distress and calling via DSC) 5.111 5.226 5.227			156.2475-156.7625	156.2475-156.7625 MARITIME MOBILE US106 US226 NG117	Maritime (80) Aviation (87)
156.5625-156.7625 FIXED MOBILE except aeronautical mobile (R) 5.226	156.5625-156.7625 FIXED MOBILE 5.225 5.226		US77 US106 US226 US266	US77 US266 NG124	Page 22

399.9-400.05 MOBILE-SATELLITE (Earth-to-space) 5.209 5.224A RADIONAVIGATION-SATELLITE 5.222 5.224B 5.260 5.220	399.9-400.05 MOBILE-SATELLITE (Earth-to-space) US320 RADIONAVIGATION-SATELLITE 5.260		Satellite Communications (25)
400.05-400.15 STANDARD FREQUENCY AND TIME SIGNAL-SATELLITE (400.1 MHz) 5.261 5.262	400.05-400.15 STANDARD FREQUENCY AND TIME SIGNAL-SATELLITE (400.1 MHz) 5.261		
400.15-401 METEOROLOGICAL AIDS METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) 5.208A 5.208B 5.209 SPACE RESEARCH (space-to-Earth) 5.263 Space operation (space-to-Earth) 5.262 5.264	400.15-401 METEOROLOGICAL AIDS (radiosonde) US70 METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to- Earth) US46 US320 US324 SPACE RESEARCH (space-to-Earth) 5.263 Space operation (space-to-Earth) 5.264	400.15-401 METEOROLOGICAL AIDS (radiosonde) US70 MOBILE-SATELLITE (space-to- Earth) US46 US320 US324 SPACE RESEARCH (space-to-Earth) 5.263 Space operation (space-to-Earth) 5.264	Satellite Communications (25)
401-402 METEOROLOGICAL AIDS SPACE OPERATION (space-to-Earth) EARTH EXPLORATION-SATELLITE (Earth-to-space) METEOROLOGICAL-SATELLITE (Earth-to-space) Fixed Mobile except aeronautical mobile	401-402 METEOROLOGICAL AIDS (radiosonde) US70 SPACE OPERATION (space-to-Earth) EARTH EXPLORATION- SATELLITE (Earth-to-space) METEOROLOGICAL-SATELLITE (Earth-to-space) US64 US384	401-402 METEOROLOGICAL AIDS (radiosonde) US70 SPACE OPERATION (space-to-Earth) Earth exploration-satellite (Earth-to-space) Meteorological-satellite (Earth-to-space) US64 US384	MedRadio (95I)
402-403 METEOROLOGICAL AIDS EARTH EXPLORATION-SATELLITE (Earth-to-space) METEOROLOGICAL-SATELLITE (Earth-to-space) Fixed Mobile except aeronautical mobile	402-403 METEOROLOGICAL AIDS (radiosonde) US70 EARTH EXPLORATION- SATELLITE (Earth-to-space) METEOROLOGICAL-SATELLITE (Earth-to-space) US64 US384	402-403 METEOROLOGICAL AIDS (radiosonde) US70 Earth exploration-satellite (Earth-to-space) Meteorological-satellite (Earth-to-space) US64 US384	
403-406 METEOROLOGICAL AIDS Fixed Mobile except aeronautical mobile	403-406 METEOROLOGICAL AIDS (radiosonde) US70 US64 G6	403-406 METEOROLOGICAL AIDS (radiosonde) US70 US64	
406-406.1 MOBILE-SATELLITE (Earth-to-space) 5.266 5.267	406-406.1 MOBILE-SATELLITE (Earth-to-space) 5.266 5.267		Maritime (EPIRBs) (80V) Aviation (ELTs) (87F) Personal Radio (95)
406.1-410 FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY 5.149	406.1-410 FIXED MOBILE RADIO ASTRONOMY US74 US13 US117 G5 G6	406.1-410 RADIO ASTRONOMY US74 US13 US117	Private Land Mobile (90) Page 26

International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
1492-1518 FIXED MOBILE except aeronautical mobile 5.341 5.342	1492-1518 FIXED MOBILE 5.343 5.341 5.344	1492-1518 FIXED MOBILE 5.341	(see previous page)		
1518-1525 FIXED MOBILE except aeronautical mobile MOBILE-SATELLITE (space-to-Earth) 5.348 5.348A 5.348B 5.351A 5.341 5.342	1518-1525 FIXED MOBILE 5.343 MOBILE-SATELLITE (space-to-Earth) 5.348 5.348A 5.348B 5.351A 5.341 5.344	1518-1525 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.348 5.348A 5.348B 5.351A 5.341			
1525-1530 SPACE OPERATION (space-to-Earth) FIXED MOBILE-SATELLITE (space-to-Earth) 5.208B 5.351A Earth exploration-satellite Mobile except aeronautical mobile 5.349 5.341 5.342 5.350 5.351 5.352A 5.354	1525-1530 SPACE OPERATION (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) 5.208B 5.351A Earth exploration-satellite Fixed Mobile 5.343 5.341 5.351 5.354	1525-1530 SPACE OPERATION (space-to-Earth) FIXED MOBILE-SATELLITE (space-to-Earth) 5.208B 5.351A Earth exploration-satellite Mobile 5.349 5.341 5.351 5.352A 5.354	1525-1535 MOBILE-SATELLITE (space-to-Earth) US315 US380		Satellite Communications (25) Maritime (80)
1530-1535 SPACE OPERATION (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) 5.208B 5.351A 5.353A Earth exploration-satellite Fixed Mobile except aeronautical mobile 5.341 5.342 5.351 5.354	1530-1535 SPACE OPERATION (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) 5.208B 5.351A 5.353A Earth exploration-satellite Fixed Mobile 5.343 5.341 5.351 5.354		5.341 5.351		
1535-1559 MOBILE-SATELLITE (space-to-Earth) 5.208B 5.351A 5.341 5.351 5.353A 5.354 5.355 5.356 5.357 5.357A 5.359 5.362A			1535-1559 MOBILE-SATELLITE (space-to-Earth) US308 US309 US315 US380 5.341 5.351 5.356		Satellite Communications (25) Maritime (80) Aviation (87)
1559-1610 AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.208B 5.328B 5.329A 5.341 5.362B 5.362C			1559-1610 AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.341 US208 US260 US343		Aviation (87)
1610-1610.6 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION 5.341 5.355 5.359 5.364 5.366 5.367 5.368 5.369 5.371 5.372	1610-1610.6 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) 5.341 5.364 5.366 5.367 5.368 5.370 5.372	1610-1610.6 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION Radiodetermination-satellite (Earth-to-space) 5.341 5.355 5.359 5.364 5.366 5.367 5.368 5.369 5.372	1610-1610.6 MOBILE-SATELLITE (Earth-to-space) US46 US380 AERONAUTICAL RADIONAVIGATION US260 RADIODETERMINATION-SATELLITE (Earth-to-space) 5.341 5.364 5.366 5.367 5.368 5.372 US208		Satellite Communications (25) Aviation (87)

1610.6-1613.8 MOBILE-SATELLITE (Earth-to-space) 5.351A RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION 5.149 5.341 5.355 5.359 5.364 5.366 5.367 5.368 5.369 5.371 5.372	1610.6-1613.8 MOBILE-SATELLITE (Earth-to-space) 5.351A RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) 5.149 5.341 5.364 5.366 5.367 5.368 5.370 5.372	1610.6-1613.8 MOBILE-SATELLITE (Earth-to-space) 5.351A RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION Radiodetermination-satellite (Earth-to-space) 5.149 5.341 5.355 5.359 5.364 5.366 5.367 5.368 5.369 5.372	1610.6-1613.8 MOBILE-SATELLITE (Earth-to-space) US46 US380 RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION US260 RADIODETERMINATION-SATELLITE (Earth-to-space) 5.341 5.364 5.366 5.367 5.368 5.372 US208 US342	
1613.8-1626.5 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION Mobile-satellite (space-to-Earth) 5.208B 5.341 5.355 5.359 5.364 5.365 5.366 5.367 5.368 5.369 5.371 5.372	1613.8-1626.5 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) Mobile-satellite (space-to-Earth) 5.208B 5.341 5.364 5.365 5.366 5.367 5.368 5.370 5.372	1613.8-1626.5 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION Mobile-satellite (space-to-Earth) 5.208B Radiodetermination-satellite (Earth-to-space) 5.341 5.355 5.359 5.364 5.365 5.366 5.367 5.368 5.369 5.372	1613.8-1626.5 MOBILE-SATELLITE (Earth-to-space) US46 US380 AERONAUTICAL RADIONAVIGATION US260 RADIODETERMINATION-SATELLITE (Earth-to-space) Mobile-satellite (space-to-Earth) 5.341 5.364 5.365 5.366 5.367 5.368 5.372 US208	
1626.5-1660 MOBILE-SATELLITE (Earth-to-space) 5.351A 5.341 5.351 5.353A 5.354 5.355 5.357A 5.359 5.362A 5.374 5.375 5.376			1626.5-1660 MOBILE-SATELLITE (Earth-to-space) US308 US309 US315 US380 5.341 5.351 5.375	Satellite Communications (25) Maritime (80) Aviation (87)
1660-1660.5 MOBILE-SATELLITE (Earth-to-space) 5.351A RADIO ASTRONOMY 5.149 5.341 5.351 5.354 5.362A 5.376A			1660-1660.5 MOBILE-SATELLITE (Earth-to-space) US308 US309 US380 RADIO ASTRONOMY 5.341 5.351 US342	Satellite Communications (25) Aviation (87)
1660.5-1668 RADIO ASTRONOMY SPACE RESEARCH (passive) Fixed Mobile except aeronautical mobile 5.149 5.341 5.379 5.379A			1660.5-1668.4 RADIO ASTRONOMY US74 SPACE RESEARCH (passive)	
1668-1668.4 MOBILE-SATELLITE (Earth-to-space) 5.351A 5.379B 5.379C RADIO ASTRONOMY SPACE RESEARCH (passive) Fixed Mobile except aeronautical mobile 5.149 5.341 5.379 5.379A			5.341 US246	
1668.4-1670 METEOROLOGICAL AIDS FIXED MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space) 5.351A 5.379B 5.379C RADIO ASTRONOMY 5.149 5.341 5.379D 5.379E			1668.4-1670 METEOROLOGICAL AIDS (radiosonde) RADIO ASTRONOMY US74 5.341 US99 US342	Page 34

International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
2200-2290 SPACE OPERATION (space-to-Earth) (space-to-space) EARTH EXPLORATION-SATELLITE (space-to-Earth) (space-to-space) FIXED MOBILE 5.391 SPACE RESEARCH (space-to-Earth) (space-to-space) 5.392			2200-2290 SPACE OPERATION (space-to-Earth) (space-to-space) EARTH EXPLORATION-SATELLITE (space-to-Earth) (space-to-space) FIXED (line-of-sight only) MOBILE (line-of-sight only including aeronautical telemetry, but excluding flight testing of manned aircraft) 5.391 SPACE RESEARCH (space-to-Earth) (space-to-space) 5.392 US303 USyyy	2200-2290 US303 USyyy	
2290-2300 FIXED MOBILE except aeronautical mobile SPACE RESEARCH (deep space) (space-to-Earth)			2290-2300 FIXED MOBILE except aeronautical mobile SPACE RESEARCH (deep space) (space-to-Earth)	2290-2300 SPACE RESEARCH (deep space) (space-to-Earth)	
2300-2450 FIXED MOBILE 5.384A Amateur Radiolocation	2300-2450 FIXED MOBILE 5.384A RADIOLOCATION Amateur		2300-2305 G122	2300-2305 Amateur	Amateur Radio (97)
			2305-2310 US97 G122	2305-2310 FIXED MOBILE except aeronautical mobile RADIOLOCATION Amateur US97	Wireless Communications (27) Amateur Radio (97)
			2310-2320 Fixed Mobile US339 Radiolocation G2 US97 US327	2310-2320 FIXED MOBILE US339 BROADCASTING-SATELLITE RADIOLOCATION 5.396 US97 US327	Wireless Communications (27) Aviation (87)
			2320-2345 Fixed Radiolocation G2 US327	2320-2345 BROADCASTING-SATELLITE 5.396 US327	Satellite Communications (25)
			2345-2360 Fixed Mobile US339 Radiolocation G2 US327	2345-2360 FIXED MOBILE US339 BROADCASTING-SATELLITE RADIOLOCATION 5.396 US327	Wireless Communications (27) Aviation (87)
			2360-2390 MOBILE US276 RADIOLOCATION G2 G120 Fixed US101	2360-2390 MOBILE US276 US101	Aviation (87) Personal Radio (95)

			US101	US101	Amateur Radio (97)
			2395-2400 US101 G122	2395-2400 AMATEUR US101	Personal Radio (95) Amateur Radio (97)
			2400-2417 5.150 G122	2400-2417 AMATEUR 5.150 5.282	ISM Equipment (18) Amateur Radio (97)
.150 5.282 5.395	5.150 5.282 5.393 5.394 5.396		2417-2450 Radiolocation G2 5.150	2417-2450 Amateur 5.150 5.282	
2450-2483.5 FIXED MOBILE Radiolocation 5.150 5.397	2450-2483.5 FIXED MOBILE RADIOLOCATION 5.150		2450-2483.5 5.150 US41	2450-2483.5 FIXED MOBILE Radiolocation 5.150 US41	ISM Equipment (18) TV Auxiliary Broadcasting (74F) Private Land Mobile (90) Fixed Microwave (101)
2483.5-2500 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.351A Radiolocation 5.150 5.371 5.397 5.398 5.399 5.400 5.402	2483.5-2500 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.351A RADIODETERMINATION-SATELLITE (space-to-Earth) 5.398 RADIOLOCATION 5.150 5.402	2483.5-2500 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.351A RADIOLOCATION Radiodetermination-satellite (space-to-Earth) 5.398 5.150 5.400 5.402	2483.5-2500 MOBILE-SATELLITE (space-to-Earth) US46 US380 US391 RADIODETERMINATION-SATELLITE (space-to-Earth) 5.398 5.150 5.402 US41	2483.5-2495 MOBILE-SATELLITE (space-to-Earth) US46 US380 RADIODETERMINATION-SATELLITE (space-to-Earth) 5.398 5.150 5.402 US41 NG147 2495-2500 FIXED MOBILE except aeronautical mobile MOBILE-SATELLITE (space-to-Earth) US46 US380 RADIODETERMINATION-SATELLITE (space-to-Earth) 5.398 5.150 5.402 US41 US391 NG147	ISM Equipment (18) Satellite Communications (25) ISM Equipment (18) Satellite Communications (25) Wireless Communications (27)
2500-2520 FIXED 5.410 MOBILE except aeronautical mobile 5.384A 5.405 5.412	2500-2520 FIXED 5.410 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A 5.404	2500-2520 FIXED 5.410 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A MOBILE-SATELLITE (space-to-Earth) 5.351A 5.407 5.414 5.414A 5.404 5.415A	2500-2655 5.339 US205	2500-2655 FIXED US205 MOBILE except aeronautical mobile 5.339	Wireless Communications (27)
2520-2655 FIXED 5.410 MOBILE except aeronautical mobile 5.384A BROADCASTING-SATELLITE 5.413 5.416 5.339 5.405 5.412 5.417C 5.417D 5.418B 5.418C	2520-2655 FIXED 5.410 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A BROADCASTING-SATELLITE 5.413 5.416 5.339 5.417C 5.417D 5.418B 5.418C	2520-2535 FIXED 5.410 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A BROADCASTING-SATELLITE 5.413 5.416 5.403 5.414A 5.415A 2535-2655 FIXED 5.410 MOBILE except aeronautical mobile 5.384A BROADCASTING-SATELLITE 5.413 5.416 5.339 5.417A 5.417B 5.417C 5.417D 5.418 5.418A 5.418B 5.418C			

3300-3400 RADIOLOCATION 5.149 5.429 5.430	3300-3400 RADIOLOCATION Amateur Fixed Mobile 5.149	3300-3400 RADIOLOCATION Amateur 5.149 5.429	3300-3500 RADIOLOCATION US108 G2	3300-3500 Amateur Radiolocation US108	Private Land Mobile (90) Amateur Radio (97)
3400-3600 FIXED FIXED-SATELLITE (space-to-Earth) Mobile 5.430A Radiolocation	3400-3500 FIXED FIXED-SATELLITE (space-to-Earth) Amateur Mobile 5.431A Radiolocation 5.433 5.282	3400-3500 FIXED FIXED-SATELLITE (space-to-Earth) Amateur Mobile 5.432B Radiolocation 5.433 5.282 5.432 5.432A	US342	5.282 US342	
5.431	3500-3700 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile Radiolocation 5.433	3500-3600 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 5.433A Radiolocation 5.433	3500-3650 RADIOLOCATION G59 AERONAUTICAL RADIONAVIGATION (ground-based) G110	3500-3600 Radiolocation	Private Land Mobile (90)
3600-4200 FIXED FIXED-SATELLITE (space-to-Earth) Mobile		3600-3700 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile Radiolocation 5.433 5.435	US245	3600-3650 FIXED-SATELLITE (space-to-Earth) US245 Radiolocation	Satellite Communications (25) Private Land Mobile (90)
			US109 US349	3650-3700 FIXED FIXED-SATELLITE (space-to-Earth) NG169 NG185 MOBILE except aeronautical mobile US109 US349	
	3700-4200 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile		3700-4200 FIXED-SATELLITE (space-to-Earth) US107	3700-4200 FIXED FIXED-SATELLITE (space-to-Earth) US107 NG180	Satellite Communications (25) Fixed Microwave (101)
4200-4400 AERONAUTICAL RADIONAVIGATION 5.438 5.439 5.440			4200-4400 AERONAUTICAL RADIONAVIGATION US261		Aviation (87)
4400-4500 FIXED MOBILE 5.440A			4400-4500 FIXED MOBILE	4400-4500	
4500-4800 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 MOBILE 5.440A			4500-4800 FIXED MOBILE US245	4500-4800 FIXED-SATELLITE (space-to-Earth) 5.441 US245	
4800-4990 FIXED MOBILE 5.440A 5.442 Radio astronomy 5.149 5.339 5.443			4800-4940 FIXED MOBILE US203 US342	4800-4940 US203 US342	

5350-5460 EARTH EXPLORATION-SATELLITE (active) 5.448B SPACE RESEARCH (active) 5.448C AERONAUTICAL RADIONAVIGATION 5.449 RADIOLOCATION 5.448D		5350-5460 EARTH EXPLORATION-SATELLITE (active) 5.448B SPACE RESEARCH (active) AERONAUTICAL RADIONAVIGATION 5.449 RADIOLOCATION G56 US390 G130	5350-5460 AERONAUTICAL RADIONAVIGATION 5.449 Earth exploration-satellite (active) 5.448B Space research (active) Radiolocation US390	Aviation (87) Private Land Mobile (90)
5460-5470 RADIONAVIGATION 5.449 EARTH EXPLORATION-SATELLITE (active) SPACE RESEARCH (active) RADIOLOCATION 5.448D 5.448B		5460-5470 RADIONAVIGATION 5.449 US65 EARTH EXPLORATION-SATELLITE (active) SPACE RESEARCH (active) RADIOLOCATION G56 5.448B US49 G130	5460-5470 RADIONAVIGATION 5.449 US65 Earth exploration-satellite (active) Space research (active) Radiolocation 5.448B US49	Maritime (80) Aviation (87) Private Land Mobile (90)
5470-5570 MARITIME RADIONAVIGATION MOBILE except aeronautical mobile 5.446A 5.450A EARTH EXPLORATION-SATELLITE (active) SPACE RESEARCH (active) RADIOLOCATION 5.450B 5.448B 5.450 5.451		5470-5570 MARITIME RADIONAVIGATION US65 EARTH EXPLORATION-SATELLITE (active) SPACE RESEARCH (active) RADIOLOCATION G56 5.448B US50 G131	5470-5570 MARITIME RADIONAVIGATION US65 RADIOLOCATION Earth exploration-satellite (active) Space research (active) US50	RF Devices (15) Maritime (80) Private Land Mobile (90)
5570-5650 MARITIME RADIONAVIGATION MOBILE except aeronautical mobile 5.446A 5.450A RADIOLOCATION 5.450B 5.450 5.451 5.452		5570-5600 MARITIME RADIONAVIGATION US65 RADIOLOCATION G56 US50 G131 5600-5650 MARITIME RADIONAVIGATION US65 METEOROLOGICAL AIDS RADIOLOCATION G56 5.452 US50 G131	5570-5600 MARITIME RADIONAVIGATION US65 RADIOLOCATION US50 5600-5650 MARITIME RADIONAVIGATION US65 METEOROLOGICAL AIDS RADIOLOCATION 5.452 US50	
5650-5725 MOBILE except aeronautical mobile 5.446A 5.450A RADIOLOCATION Amateur Space research (deep space) 5.282 5.451 5.453 5.454 5.455		5650-5850 RADIOLOCATION G2	5650-5830 Amateur	RF Devices (15) ISM Equipment (18) Amateur Radio (97)
5725-5830 FIXED-SATELLITE (Earth-to-space) RADIOLOCATION Amateur 5.150 5.451 5.453 5.455 5.456	5725-5830 RADIOLOCATION Amateur 5.150 5.453 5.455		5.150 5.282 USzzz	
5830-5850 FIXED-SATELLITE (Earth-to-space) RADIOLOCATION Amateur Amateur-satellite (space-to-Earth) 5.150 5.451 5.453 5.455 5.456	5830-5850 RADIOLOCATION Amateur Amateur-satellite (space-to-Earth) 5.150 5.453 5.455		5830-5850 Amateur Amateur-satellite (space-to-Earth) 5.150 USzzz	Page 42

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5925-6700 FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B MOBILE 5.457C 5.149 5.440 5.458			5925-6725 FIXED-SATELLITE (Earth-to-space) US107 5.440 5.458 US342	5925-6425 FIXED FIXED-SATELLITE (Earth-to-space) US107 NG181	Satellite Communications (25) Fixed Microwave (101)
				6425-6525 FIXED-SATELLITE (Earth-to-space) US107 MOBILE 5.440 5.458	TV Broadcast Auxiliary (74F) Cable TV Relay (78) Fixed Microwave (101)
				6525-6700 FIXED FIXED-SATELLITE (Earth-to-space) US107 5.458 US342	Fixed Microwave (101)
6700-7075 FIXED FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.441 MOBILE 5.458 5.458A 5.458B 5.458C			6725-7125 5.458	6700-6875 FIXED FIXED-SATELLITE (Earth-to-space) US107 (space-to-Earth) 5.441 5.458 5.458A 5.458B	Satellite Communications (25) Fixed Microwave (101)
				6875-7025 FIXED NG118 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.441 MOBILE NG171 5.458 5.458A 5.458B	Satellite Communications (25) TV Broadcast Auxiliary (74F) Cable TV Relay (78)
				7025-7075 FIXED NG118 FIXED-SATELLITE (Earth-to-space) NG172 MOBILE NG171 5.458 5.458A 5.458B	TV Broadcast Auxiliary (74F) Cable TV Relay (78)
7075-7145 FIXED MOBILE 5.458 5.459				7075-7125 FIXED NG118 MOBILE NG171 5.458	
			7125-7145 FIXED 5.458 G116	7125-7235	

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10.45-10.5 RADIOLOCATION Amateur Amateur-satellite 5.481				10.45-10.5 Amateur Amateur-satellite Radiolocation US108 US128 NG50	
10.5-10.55 FIXED MOBILE Radiolocation	10.5-10.55 FIXED MOBILE RADIOLOCATION		10.5-10.55 RADIOLOCATION US59		Private Land Mobile (90)
10.55-10.6 FIXED MOBILE except aeronautical mobile Radiolocation			10.55-10.6	10.55-10.6 FIXED	Fixed Microwave (101)
10.6-10.68 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH (passive) Radiolocation 5.149 5.482 5.482A			10.6-10.68 EARTH EXPLORATION-SATELLITE (passive) SPACE RESEARCH (passive) US130 US131 US265	10.6-10.68 EARTH EXPLORATION-SATELLITE (passive) FIXED US265 SPACE RESEARCH (passive) US130 US131	
10.68-10.7 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) 5.340 5.483			10.68-10.7 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) US131 US246		
10.7-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 5.484A (Earth-to-space) 5.484 MOBILE except aeronautical mobile	10.7-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 5.484A MOBILE except aeronautical mobile		10.7-11.7 FIXED-SATELLITE (space-to-Earth) 5.441 US107 US131 US211	10.7-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 US107 US131 US211 NG52	Satellite Communications (25) Fixed Microwave (101)
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 5.488 Mobile except aeronautical mobile 5.485 12.1-12.2 FIXED-SATELLITE (space-to-Earth) 5.484A 5.488 5.485 5.489	11.7-12.2 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 5.492 5.487 5.487A	11.7-12.2 FIXED-SATELLITE (space-to-Earth) 5.485 5.488 US107	11.7-12.2 FIXED-SATELLITE (space-to-Earth) 5.485 5.488 US107 NG55 NG143 NG183 NG187	Satellite Communications (25)

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) MOBILE except aeronautical mobile BROADCASTING 5.484A 5.487	12.2-12.7	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 (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 MOBILE except aeronautical mobile BROADCASTING-SATELLITE 5.493	12.7-13.25 FIXED-SATELLITE (Earth-to-space) 5.441 US107	12.7-12.75 FIXED NG118 FIXED-SATELLITE (Earth-to-space) US107 MOBILE	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 FIXED NG118 FIXED-SATELLITE (Earth-to space) 5.441 US107 NG52 MOBILE	Satellite Communications (25) TV Broadcast Auxiliary (74F) Cable TV Relay (78) Fixed Microwave (101)
			US251	US251	
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)
13.4-13.75 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH 5.501A Standard frequency and time signal-satellite (Earth-to-space) 5.499 5.500 5.501 5.501B			13.4-13.75 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH 5.501A Standard frequency and time signal-satellite (Earth-to-space) 5.501B	13.4-13.75 Earth exploration-satellite (active) Radiolocation Space research Standard frequency and time signal-satellite (Earth-to-space)	Private Land Mobile (90)
13.75-14 FIXED-SATELLITE (Earth-to-space) 5.484A RADIOLOCATION Earth exploration-satellite Standard frequency and time signal-satellite (Earth-to-space) Space research 5.499 5.500 5.501 5.502 5.503			13.75-14 FIXED-SATELLITE (Earth-to-space) US107 US337 RADIOLOCATION G59 Standard frequency and time signal-satellite (Earth-to-space) Space research US337 US356 US357	13.75-14 FIXED-SATELLITE (Earth-to-space) US107 US337 Standard frequency and time signal-satellite (Earth-to-space) Space research Radiolocation US356 US357	Satellite Communications (25) Private Land Mobile (90) Page 48

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14.25-14.3 FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B RADIONAVIGATION 5.504 Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.508A Space research 5.504A 5.505 5.508			14.2-14.4 FIXED-SATELLITE (Earth-to-space) US107	14.2-14.47 FIXED-SATELLITE (Earth-to-space) US107 NG54 NG183 NG187 Mobile-satellite (Earth-to-space)	
14.3-14.4 FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Radionavigation-satellite 5.504A	14.3-14.4 FIXED-SATELLITE (Earth-to-space) 5.457A 5.484A 5.506 5.506B Mobile-satellite (Earth-to-space) 5.506A Radionavigation-satellite 5.504A	14.3-14.4 FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.484A 5.506 5.506B MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Radionavigation-satellite 5.504A			
14.4-14.47 FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Space research (space-to-Earth) 5.504A			14.4-14.47 FIXED-SATELLITE (Earth-to-space) US107 Fixed Mobile		
14.47-14.5 FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Radio astronomy 5.149 5.504A			14.47-14.5 FIXED-SATELLITE (Earth-to-space) US107 Fixed Mobile US203 US133 US342	14.47-14.5 FIXED-SATELLITE (Earth-to-space) US107 NG54 NG183 NG187 Mobile-satellite (Earth-to-space) US203 US133 US342	
14.5-14.8 FIXED FIXED-SATELLITE (Earth-to-space) 5.510 MOBILE Space research			14.5-14.7145 FIXED Mobile Space research 14.7145-14.8 MOBILE Fixed Space research	14.5-14.8	
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	17.8-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.516 MOBILE 5.519		17.8-18.3 FIXED-SATELLITE (space-to-Earth) US334 G117 US519	17.8-18.3 FIXED NG144 US334 US519	TV Broadcast Auxiliary (74F) Cable TV Relay (78) Fixed Microwave (101)
18.1-18.4 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B (Earth-to-space) 5.520 MOBILE 5.519 5.521			18.3-18.6 FIXED-SATELLITE (space-to-Earth) US107 US334 G117	18.3-18.6 FIXED-SATELLITE (space-to-Earth) US107 NG164	Satellite Communications (25)
18.4-18.6 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B MOBILE				US334 NG144	
18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.522B MOBILE except aeronautical mobile Space research (passive) 5.522A 5.522C	18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.516B 5.522B MOBILE except aeronautical mobile SPACE RESEARCH (passive) 5.522A	18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.522B MOBILE except aeronautical mobile Space research (passive) 5.522A	18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED-SATELLITE (space-to-Earth) US107 US255 US334 G117 SPACE RESEARCH (passive) US254	18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED-SATELLITE (space-to-Earth) US107 US255 NG164 SPACE RESEARCH (passive) US254 US334 NG144	
18.8-19.3 FIXED FIXED-SATELLITE (space-to-Earth) 5.516B 5.523A MOBILE			18.8-19.3 FIXED-SATELLITE (space-to-Earth) US107 US334 G117	18.8-19.3 FIXED-SATELLITE (space-to-Earth) US107 NG165 US334 NG144	
19.3-19.7 FIXED FIXED-SATELLITE (space-to-Earth) (Earth-to-space) 5.523B 5.523C 5.523D 5.523E MOBILE			19.3-19.7 FIXED-SATELLITE (space-to-Earth) US334 G117	19.3-19.7 FIXED NG144 FIXED-SATELLITE (space-to-Earth) NG166 US334	Satellite Communications (25) TV Broadc't Auxiliary (74F) Cable TV Relay (78) Fixed Microwave (101)
19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B Mobile-satellite (space-to-Earth) 5.524	19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B MOBILE-SATELLITE (space-to-Earth) 5.524 5.525 5.526 5.527 5.528 5.529	19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B Mobile-satellite (space-to-Earth) 5.524	19.7-20.2 FIXED-SATELLITE (space-to-Earth) US107 MOBILE-SATELLITE (space-to-Earth) US46		Satellite Communications (25)

20.1-20.2 FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B MOBILE-SATELLITE (space-to-Earth) 5.524 5.525 5.526 5.527 5.528			5.525 5.526 5.527 5.528 5.529 US334		
20.2-21.2 FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Standard frequency and time signal-satellite (space-to-Earth) 5.524			20.2-21.2 FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Standard frequency and time signal-satellite (space-to-Earth) G117	20.2-21.2 Standard frequency and time signal-satellite (space-to-Earth)	
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22.21-22.5 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH (passive) 5.149 5.532			22.21-22.5 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH (passive) US263 US342		
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22.55-23.55 FIXED INTER-SATELLITE 5.338A MOBILE 5.149			22.55-23.55 FIXED INTER-SATELLITE US278 MOBILE US342		Satellite Communications (25) Fixed Microwave (101)
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28.5-29.1 FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.523A 5.539 MOBILE Earth exploration-satellite (Earth-to-space) 5.541 5.540					
29.1-29.5 FIXED FIXED-SATELLITE (Earth-to-space) 5.516B 5.523C 5.523E 5.535A 5.539 5.541A MOBILE Earth exploration-satellite (Earth-to-space) 5.541 5.540					
29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542	29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.525 5.526 5.527 5.529 5.540 5.542	29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542	29.5-30 FIXED-SATELLITE (Earth-to-space) US107 MOBILE-SATELLITE (Earth-to-space) US46		Satellite Communications (25)
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33.4-34.2 RADIOLOCATION 5.549	33.4-34.2 RADIOLOCATION US360 G117	33.4-34.2 Radiolocation US360	Private Land Mobile (90)
34.2-34.7 RADIOLOCATION SPACE RESEARCH (deep space) (Earth-to-space) 5.549	34.2-34.7 RADIOLOCATION SPACE RESEARCH (deep space) (Earth-to-space) US262 US360 G34 G117	34.2-34.7 Radiolocation Space research (deep space) (Earth-to-space) US262 US360	
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5.547	38.6-39.5 FIXED-SATELLITE (space-to-Earth) US107	38.6-39.5 FIXED FIXED-SATELLITE (space-to-Earth) US107 MOBILE NG175	Satellite Communications (25) Fixed Microwave (101)

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UNITED STATES (US) FOOTNOTES

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US46 In the bands 137-138 MHz, 148-150.05 MHz, 400.15-401 MHz, 1610-1626.5 MHz, 2483.5-2500 MHz, 19.7-20.2 GHz, and 29.5-30 GHz, Federal stations in the mobile-satellite service shall be restricted to earth stations operating with non-Federal space stations and that comply with Part 25 of the Commission's rules.

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US107 In the bands 3700-4200 MHz, 5850-6725 MHz, 10.7-12.2 GHz, 12.7-13.25 GHz, 13.75-14.5 GHz, 18.3-19.3 GHz (except as provided for in US334), 19.7-20.2 GHz (except as provided for in US334), 27.5-30 GHz, 37.5-39.5 GHz, and 47.2-48.2 GHz, Federal stations in the fixed-satellite service shall be restricted to earth stations operating with non-Federal space stations and that comply with Part 25 of the Commission's rules.

* * * * *

USyyy In the band 2200-2290 MHz, non-Federal stations in the space operation service may also be authorized on a primary basis and such use shall be:

(a) restricted to transmissions in the sub-bands 2207-2219 MHz, 2270.5-2274.5 MHz, and 2285-2290 MHz (necessary bandwidth shall be contained within these ranges);

(b) limited to no greater than 5 MHz necessary bandwidth per channel by launch vehicles during pre-launch testing and launches at Federal ranges; and

(c) subject to successful coordination of the assignment and use with Federal operations through NTIA.

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USzzz In the band 5650-5925 MHz, non-Federal stations operating in the radiolocation service may also be authorized on a primary basis and such use shall be:

(a) restricted to use in the tracking of launch vehicles during launches and pre-launch testing of launch vehicles subject to; and

(b) subject to successful coordination of the assignment and use with federal operations through NTIA.

APPENDIX B

Initial Regulatory Flexibility Analysis

1. As required by the Regulatory Flexibility Act (RFA),[1] the Commission has prepared this present Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on small entities by the policies and rules proposed in this Notice of Proposed Rule Making (NPRM). 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 provided on the first page of this NPRM. The Commission will send a copy of this NPRM, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA).[2] In addition, the NPRM and IRFA (or summaries thereof) will be published in the Federal Register.[3]

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

2. The United States government and commercial entities have filled distinct roles in regard to activities in space. However, in recent years the roles of the Federal Government and private sector have become blurred. Federal policy directs agencies to use commercial satellite services unless specific mission requirements cannot be met, and many Federal agencies now rely on commercial communication satellites for service. NASA has contracted with commercial entities to carry cargo to the International Space Station (ISS), and in the future commercial spacecraft are expected to carry crew members to the ISS. Also, several privately owned spaceports have been licensed for future launches. As a result, the Commission's rules must evolve to reflect the increased reliance of Federal agencies on commercial space services and the continued development of the commercial space sector. The Notice of Proposed Rulemaking (NPRM), proposes several modifications to the Table of Frequency Allocations in Section 2.106 of our rules (Allocation Table) to reflect this new reality.

3. The NPRM makes two alternative proposals to modify the Allocation Table to provide interference protection for Fixed-Satellite Service (FSS) and Mobile-Satellite Service (MSS) earth stations operated by Federal agencies under authorizations granted by the National Telecommunications and Information Administration (NTIA) in certain frequency bands. These frequency bands which are used to provide commercial satellite service are: 3.6-4.2 GHz, 5.85-6.725 GHz, 10.7-12.2 GHz, 12.7-13.25 GHz, 13.75-14.5 GHz, 18.3-19.3 GHz, 19.7-20.2 GHz, 27.5-30.0 GHz, 37.5-39.5 GHz and 47.2-50.2 GHz. Federal agencies are not, for the most part, currently able to operate their own earth stations on an interference-protected basis in these bands to use commercial satellite services. Under a first proposal, the Commission would add a co-primary Federal FSS or Federal MSS allocation in the Allocation Table for these frequency bands. In conjunction with this modification of the Allocation Table, we would add a footnote to the Allocation Table restricting primary use of Federal earth stations in these bands to communication with non-Federal satellites. A second alternative proposal would modify the Allocation Table by adding a footnote that gives Federal earth stations communicating with non-Federal satellites in these frequency bands interference protection equivalent to that afforded to non-Federal earth stations. The Federal earth stations will receive interference protection only if they operate in accordance with the Commission's rules. Either of these proposals would allow Federal agencies to obtain the same rights to interference protection accorded to Commission licensees when using earth stations to communicate with commercial satellite networks.

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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] *See* 5 U.S.C. § 603(a).

[3] *See id.*

4. The NPRM also proposes to amend a footnote to the Allocation Table to permit a Federal MSS system to operate in the 399.9-400.05 MHz band. Deployment of this Federal system will allow traffic to be migrated from the existing Argos Federal MSS system, thereby resulting in less interference and improved service and reliability for users of both the existing Argos and the new Federal MSS systems. No Federal or non-Federal MSS systems have been deployed in this band since it was allocated in 1993. This proposed allocation will permit long vacant spectrum to be put to an important use.

5. The NPRM also makes alternative proposals to modify the Allocation Table to provide access to spectrum on an interference protected basis to Commission licensees for use during the launch of launch vehicles (*i.e.* rockets).[4] During launches, spectrum in three frequency bands is typically used to send information from the launch vehicle to controllers on ground (2200-2290 MHz), send a self-destruct signal to the launch vehicle if needed (420-430 MHz), and to track the launch vehicle by radar (5650-5925 MHz). Because all of these frequency bands have only Federal allocations for these purposes, the Commission can not issue licenses for these bands except on a non-interference basis. As a result, commercial space launch operators are not allowed to cause interference to and must accept interference from Federal users in these bands. Under a first proposal, the Commission would add a footnote to the Allocation Table providing primary non-Federal allocations to the 2200-2290 MHz and 5650-5925 MHz bands. The footnote would restrict the allocations to use during space launches and pre-launch testing at Federal ranges and would require successful coordination of the assignment and use of the band for space launches with NTIA. Under a second proposal the Commission would add a non-Federal allocation to the Allocation Table along with a footnote with the same restrictions as the first proposal. In addition, the NPRM seeks comment on whether to make a non-Federal allocation for the 420-430 MHz band. Co-primary non-Federal allocations for these bands would allow the Commission to later adopt service and technical rules that facilitate the issuance of licenses to commercial entities for these bands that provide them with interference protection. This will provide commercial entities access to these important spectrum resources as more commercial launches are conducted and private spaceports are established.

B. Legal Basis.

6. The proposed action is authorized under Sections 4(i), 301, 303(c), 303(f), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 301, 303(c), 303(f), and 303(r).

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.[5] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[6] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[7] A small business

[4] A launch vehicle is a rocket used to launch a payload into space. *See supra* paragraph 67.

[5] 5 U.S.C. § 603(b)(3).

[6] 5 U.S.C. § 601(6).

[7] 5 U.S.C. § 601(3) (incorporating by reference the definition of "small business concern" in 15 U.S.C. § 632). Pursuant to the RFA, 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." 5 U.S.C. § 601(3).

concern is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.[8].

8. ***Satellite Telecommunications and All Other Telecommunications***. Two economic census categories address the satellite industry. The first category has a small business size standard of $15 million or less in average annual receipts, under SBA rules.[9] The second has a size standard of $25 million or less in annual receipts.[10]

9. The category of Satellite Telecommunications "comprises establishments 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."[11] Census Bureau data for 2007 show that 512 Satellite Telecommunications firms operated for the entire year.[12] Of this total, 464 firms had annual receipts of under $10 million, and 18 firms had receipts of $10 million to $24,999,999.[13] Consequently, the Commission estimates that the majority of Satellite Telecommunications firms are small entities that might be affected by our action.

10. The second category, *i.e.* "All Other Telecommunications" comprises "establishments primarily engaged in providing specialized telecommunications services, such as satellite tracking, communications telemetry, and radar station operation. 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. Establishments providing Internet services or voice over Internet protocol (VoIP) services via client-supplied telecommunications connections are also included in this industry."[14] For this category, Census Bureau data for 2007 shows that there were a total of 2,383 firms that operated for the entire year.[15] Of this total, 2,347 firms had annual receipts of under $25 million and 12 firms had annual receipts of $25 million to $49, 999,999.[16] Consequently, the Commission estimates that the majority of All Other Telecommunications firms are small entities that might be affected by our action.

11. ***Commercial Space Transportation.*** The North American Industry Classification System does not have a discrete code for commercial space transportation per se. However, it does have the following codes that collectively capture entities engaged in commercial space transportation: 336414, "Guided Missile and Space Vehicle Manufacturing," 336415, "Guided Missile and Space Vehicle

[8] Small Business Act, 15 U.S.C. § 632 (1996).

[9] 13 C.F.R. § 121.201, NAICS code 517410.

[10] 13 C.F.R. § 121.201, NAICS code 517919.

[11] U.S. Census Bureau, 2007 NAICS Definitions, 517410 Satellite Telecommunications.

[12] See http://factfinder.census.gov/servlet/IBQTable?_bm=y&-geo_id=&-_skip=900&-ds_name=EC0751SSSZ4&-_lang=en.

[13] See http://factfinder.census.gov/servlet/IBQTable?_bm=y&-geo_id=&-_skip=900&-ds_name=EC0751SSSZ4&-_lang=en.

[14] http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517919&search=2007%20NAICS%20Search.

[15] http://factfinder.census.gov/servlet/IBQTable?_bm=y&-geo_id=&-_skip=900&-ds_name=EC0751SSSZ4&-_lang=en.

[16] http://factfinder.census.gov/servlet/IBQTable?_bm=y&-geo_id=&-_skip=900&-ds_name=EC0751SSSZ4&-_lang=en.

Propulsion Unit and Parts Manufacturing," and 336419, "Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Manufacturing." The Small Business Administration (SBA) has defined small business entities engaged in the aforementioned activities as those employing no more than 1,000 employees.[17] Further, the SBA does not apply a size standard based on maximum annual receipts to define small business entities engaged in the above industries.

12. The FCC believes that the following business entities are the principle entities currently comprising the commercial space transportation launch operator industry in the United States: The Boeing Company, Lockheed Martin Corporation, Space Exploration Technologies, Orbital Sciences Corporation, and Sea Launch Company, L.L.C. In addition, Virgin Galactic and XCOR Aerospace have announced plans for suborbital manned space flights.[18] NASA has agreements with three companies to design and develop human space flight capabilities: Sierra Nevada Corporation, Space Exploration Technologies, and The Boeing Company.[19] Because the commercial space industry is a nascent industry, it is difficult to state whether additional entities will enter the industry and how many and which entities will succeed. We do not have data on the size of these entities, and consequently, cannot classify them as large or small entities. We therefore cannot reach definite conclusions as to the number of small entities that will be affected by the rules proposed in this NPRM and we shall assume that a significant number of small entities will be affected by these regulations. We request comment on this assumption.

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

13. The NPRM proposes no reporting and recordkeeping requirements.

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

14. The RFA requires an agency to describe any significant 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 or reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.[20]

15. In a first of two alternative proposals, the NPRM proposes to add a co-primary Federal FSS or Federal MSS allocation in the Table of Frequency Allocations in Section 2.106 of our rules (Allocation Table) for a number of spectrum bands used for commercial satellite service. In conjunction with this modification of the Allocation Table, we will add a footnote to the Allocation Table restricting primary use of Federal earth stations in these bands to communication with non-Federal satellites. This will not directly change the regulatory burdens on Commission licensees. Commission licensees will continue to follow the same licensing procedures and be subject to the existing technical rules when operating in these bands. Because the bands will have a co-primary Federal allocation, under existing coordination procedures the Commission would be expected to coordinate license applications in these bands with

[17] 13 C.F.R. § 121.201, NAICS codes 336414, 336415, 336419.

[18] *See* Virgin Galactic, http://www.virgingalactic.com; XCOR Aerospace: New Technology for Space, http://www.xcor.com/.

[19] Bob Granath, *NASA Takes Strides Forward to Launch Americans from U.S. Soil*, Jan. 25, 2013, available at http://www.nasa.gov/exploration/commercial/crew/cpc_apollo_5_prt.htm.

[20] *See* 5 U.S.C. § 603(c).

NTIA. This will result in increased processing time for applications for Commission licenses for these bands. We are not able to quantify the economic impact this increased processing time will have on small entities applying for Commission licenses.

16. Alternatively, the NPRM proposes to modify the Allocation Table by adding a footnote that gives Federal earth stations communicating with non-Federal satellites in a number of bands used for commercial satellite service interference protection equivalent to that afforded to non-Federal earth stations. The Federal earth stations will receive interference protection only if they operate in accordance with the Commission's rules. This proposal does not change the regulatory burdens on Commission licensees. Commission licensees will continue to follow the same licensing procedures and be subject to the existing technical rules when operating in these bands. Unlike the first proposal, a Federal allocation will not be added to these bands and there will be no new requirement to coordinate Commission licenses with NTIA. This alternate proposal should have no significant economic impact on small entities.

17. The NPRM also proposes to amend a footnote to the Allocation Table to permit a Federal MSS system to operate in the 399.9-400.05 MHz band. Although this band currently has a non-Federal MSS allocation and the Commission has adopted service and technical rules for the band, the Commission has issued no MSS licenses for the band and no one has applied to use this band. While it is possible that a small entity may apply for a license for this band in the future, considering that it has been allocated for the MSS since 1993 with no interest from satellite operators we believe it is unlikely. However, on the chance that a satellite operator may desire to deploy a system in the band in the future the NPRM does ask whether operation of a Federal MSS system in the band will preclude a non-Federal MSS system from also being licensed. There is a possibility that a Federal MSS system deployed in the band may cause harmful interference to Commission licensees in nearby spectrum. The NPRM asks whether such interference could be an issue. Given the lack of commercial interest in the band we expect that this proposal shall not have a significant economic impact on any small entity.

18. The final section of the NPRM makes several proposals to amend the Allocation Table to provide interference protected access to spectrum for Commission licensees for the launch of launch vehicles (*i.e*. rockets). These bands do not currently have a non-Federal allocation for this purpose. Consequently, the Commission may only issue licenses for these bands on a non-interference basis. A licensee with non-interference status may not cause interference and must accept interference from those using the band in accordance with the Allocation Table. Adopting any of these proposals would be only a first step toward the Commission issuing licenses for these bands because the Commission would later have to adopt service and technical rules for the bands. However, once the Commission is able to issue licenses for these bands, small entities who manufacture and/or develop launch vehicles and spacecraft will benefit because they will be able to obtain licenses for spectrum that provide them with interference protection during launches. Consequently, we expect that these proposals will provide only a benefit to small entities and will have no significant harmful economic impact on any small entity.

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

19. None.

STATEMENT OF
CHAIRMAN JULIUS GENACHOWSKI

Re: *Amendment of Part 2 of the Commission's Rules for Federal Earth Stations Communicating with Non-Federal Fixed Satellite Service Space Stations; Federal Space Station Use of the 399.9-400.05 MHz band; and Allocation of Spectrum for Non-Federal Space Launch Operations, ET Docket No. 13-115, RM-11341.*

For the record, it's only coincidence that this is on the agenda the week before the new Star Trek movie – and that it is my final meeting item.

While we associate rockets and space exploration with TV, movies, and science fiction, the fact is the economic potential of the commercial space industry is large and real, and today we're taking a big step to spur growth in U.S. commercial space launch services and make the U.S. more competitive in this growing global marketplace.

The commercial space launch industry encompasses human spaceflight, research, education, and so much more.

Thanks to powerfully innovative American companies like SpaceX, commercial launches are becoming increasingly common, and are expected to increase significantly over time.

SpaceX, for instance, currently has more than 40 launches on its manifest.

Several billion dollars' worth of U.S. commercial space launch activity is scheduled, and this industry has already created thousands of jobs directly, and many more indirect jobs in related industries.

From a global competition standpoint, the U.S. is moving in a strong direction, and rapidly. At the start of 2012, America's global share of launches to geosynchronous orbit was zero percent. Within two years, it's projected to top 30 percent.

So where does the FCC fit into this equation?

Companies can't launch or operate space vehicles without spectrum.

Operators need spectrum to communicate with space vehicles, to receive and send data, and to destroy rockets if necessary.

We have been facilitating commercial launches on an ad hoc basis, as NASA ramps down in this area and commercial space launches ramp up.

With today's Notice the U.S. is leading the way in developing transparent rules for commercial space launches – rules that will provide certainty and predictability for this important and growing industry.

This Notice, along with guidance released earlier this year on how to obtain special temporary authority for commercial launches, are aimed at streamlining processes, eliminating unnecessary burdens and increasing predictability for spectrum needed for commercial space launches.

This action will help boost U.S. leadership in the commercial space industry, and make the U.S. more competitive in the global marketplace for space launch services.

Specifically, this item will ease access for commercial operators to spectrum used for communications services to control, monitor, and track launch vehicles.

This is an important first step towards enabling commercial operators to directly obtain licenses needed for use during launches, using a well-defined application and coordination processes.

The item also seeks input on the long-term communication and spectrum needs of the commercial space sector.

The item also proposes to better facilitate federal government use of commercial satellite services.

The fixed satellite service is the backbone of the U.S. commercial satellite industry and is widely used for a variety of commercial and Federal government services.

Today, federal earth stations obtain interference protection only under the umbrella of a commercial licensee.

The item proposes to provide federal earth stations with interference protection directly when communicating with commercial satellites.

In addition, the item proposes to make a small amount of spectrum available for a new Federal mobile satellite system.

The Commission is committed to supporting the commercial launch sector, while working with our federal partners to successfully share the spectrum required for space launches, and to enable their use of commercial satellite services.

Thank you to Renee Gregory in my office, and OET, IB, and WTB for your great work on this item.

STATEMENT OF
COMMISSIONER MIGNON L. CLYBURN

Re: *Amendment of Part 2 of the Commission's Rules for Federal Earth Stations Communicating with Non-Federal Fixed Satellite Service Space Stations; Federal Space Station Use of the 399.9 400.05 MHz Band; and Allocation of Spectrum for Non-Federal Space Launch Operations, ET Docket No. 13-115; RM-11341.*

Let me begin by expressing my sincere thanks to Chairman Genachowski for elevating this agency's profile and re-energizing the dedicated and talented career staff, here, at the FCC.

This proceeding began with two NTIA requests. First, it asked the Commission to consider rule changes, which would allow the federal government to use earth stations, in the FSS bands, with more protection from interference, than they currently have. Second, it requested changes, which would allow federal agencies to deploy a new satellite system of unused spectrum, in the MSS band. The OET staff could have presented an item that simply addressed the complex issues necessary to advance these two requests. Instead, the team took a more ambitious approach, and found a creative way, to also promote our Nation's vital interest in communications services during space travel.

For nearly a half a century, space travel and communications industry collaboration has brought us some of the most exciting scientific breakthroughs. The American public's first glimpse of this probably came, on July 20, 1969, with the television broadcast of Neil Armstrong's giant leap for mankind. But millions of Americans now enjoy satellite TV and radio services as a result of this collaboration. It also produced services that save lives, by aiding search and rescue operations, as well as global access to advanced medicine, geospatial information, and broadband.

Now, our country has reached a point where this collaboration between space aviation and communications must leap to the next level. The ending of NASA's space shuttle program means that we must explore even more innovative ways to continue our Nation's leadership in space education, exploration and discovery. That is why, in 2010, President Obama made crystal clear that we should be "committed to encouraging and facilitating the growth, of a commercial space sector," that "advances U.S. leadership, in the generation of new markets." The good news, here, is that several private companies have been working for years, and in some cases for decades, to make substantial investments in companies that can transport cargo, and in the future, our fellow citizens, into space, to support the International Space Station and other NASA initiatives.

The Commission's allocation and service rules must support the growing communications needs of the private space launch industry. To assist prior launches, we issued Special Temporary Authorities, or STAs, under our Part 5 experimental rules. But these STAs, only allow for non-interference operation. Given the high cost of launches and the safety concerns of manned spaceflights, relying on non-interference use of spectrum, is not a practical, long-term solution. Therefore, this NPRM offers well-defined application and coordination processes, to enable commercial operators, to directly acquire the optimal type of licenses needed, for communications during space launches. The Notice of Inquiry (NOI) section of the item properly tries to anticipate other communications needs of commercial space missions, such as re-entry, or the "on orbit" phase of a mission, that could require changes in spectrum allocations.

I thank Julie Knapp, Mark Settle, and the staff in the Office of Engineering and Technology, for their outstanding work on this item.

STATEMENT OF
COMMISSIONER JESSICA ROSENWORCEL

Re: *Amendment of Part 2 of the Commission's Rules for Federal Earth Stations Communicating with Non-Federal Fixed Satellite Service Space Stations; Federal Space Station Use of the 399.9-400.05 MHz Band; and Allocation of Spectrum for Non-Federal Space Launch Operations*, *ET Docket No. 13-115, RM-11341.*

We are in the early stages of a new era in space exploration. What was once just the airy province of science fiction is now grounded in reality. As our space missions expand, our aerospace technologies advance, and as a result, a commercial market for space travel is now emerging. Going forward, access to space will no longer be limited to those few federal workers with the right stuff.

So it is no surprise that the National Space Policy released by President Obama calls for the government to take steps to develop a robust commercial space industry. Though limited, the Commission has a role to play in helping achieve this objective for space. In fact, the steps we take in today's inquiry and rulemaking will bring us closer to this goal. First, we propose rules that will allow the commercial space launch industry better access to the 420-430 MHz, 2200-2290 MHz, and 5650-5925 MHz spectrum bands while beginning an inquiry into the industry's broader spectrum needs. Second, we propose options to provide improved interference protection for communications between commercial satellites and federal users on the ground.

Taken together, these efforts are onboard with fulfilling the objectives of the National Space Policy. I support them, and I thank the Office of Engineering and Technology for their work on these big, important, and galactic matters.

STATEMENT OF
COMMISSIONER AJIT PAI

RE: *Amendment of Part 2 of the Commission's Rules for Federal Earth Stations Communicating with Non-Federal Fixed Satellite Service Space Stations; Federal Space Station Use of the 399.9–400.05 MHz Band; Allocation of Spectrum for Non-Federal Space Launch Operations*, *ET Docket No. 13-115; RM-11341.*

50 years ago this month, the last of our country's pioneering Mercury astronauts went into space. His name was Gordon Cooper, and his "Faith 7" spacecraft orbited the Earth 22 times. "Gordo" was the first American to sleep in space, and he would go on to be played memorably on the silver screen by Dennis Quaid in "The Right Stuff." Back then, in the 1960s, space was a big deal. The United States launched rockets and put a man on the moon. Astronauts were our heroes, and space exploration was a national priority.

Today, space is even more important to the American way of life. Satellites, for example, play a vital role in connecting remote communications links with the network, whether you're a consumer swiping your credit card at a rural gas station or a first responder using a satellite phone to keep working through a disaster. But we just don't think about space that much anymore. Space—it may be the forgotten frontier.

Not after today. With this item, we advance a bevy of proposals with one overarching aim: ensuring the efficient use of spectrum for space-related communications. For instance, I am excited that the Notice proposes to let the federal Argos satellite system use the 399.9–400.05 MHz band. Argos directs its all-seeing eyes on the global ecosystem, and bringing this long-fallow spectrum into use promises better environmental data for American scientists.

Another part of the Notice arises from a quirk of federal law, which divides authority over spectrum use between the FCC and the National Telecommunications and Information Administration. The Notice proposes amendments to our Table of Allocations in order to provide interference protection to both federal earth stations operating in commercial spectrum and the commercial space industry operating in federal spectrum. I look forward to reviewing the record that will be compiled in response. And as we move forward, I hope all parties will remain open to ways to resolve these matters informally, perhaps through a Memorandum of Understanding.

I would like to thank Julie Knapp, Geraldine Matisse, Mark Settle, Jamison Prime, and Nick Oros in the Office of Engineering Technology for their work on this item and their thoughtful approach to these issues. We should all be thankful that space remains at the forefront of their minds.