

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

In the Matter of
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
Amendment of Parts 2 and 25 of the
Commission's Rules to Allocate Spectrum For
Government and Non-Government Use in the
Radionavigation-Satellite Service
ET Docket No. 02-305
RM-10331

NOTICE OF PROPOSED RULE MAKING

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By the Commission:

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I. INTRODUCTION

1. By this action, we propose to amend Parts 2, 25, and 87 of our Rules in order to implement domestically various allocation decisions from several World Radiocommunication Conferences (“WRCs”) concerning the frequency bands between 28 MHz and 36 GHz and to otherwise update our Rules in this frequency range. The following proposals are the most significant to non-Federal Government operations: (1) implementing generic mobile-satellite service (“MSS”) allocations in the bands 1525-1559 MHz and 1626.5-1660.5 MHz (“L-band”); (2) allocating the band 1164-1189 MHz to the radionavigation-satellite service (“RNSS”); and (3) deleting unused and limited fixed-satellite and broadcasting-satellite allocations from the band 2500-2690 MHz. In addition, at the request of the National Telecommunications and Information Administration (“NTIA”), we propose various allocation

changes for the space science services¹ and the inter-satellite service (“ISS”), most of which involve spectrum primarily used by the Federal Government.² These proposals would conform our Rules to previous WRC agreements and are expected to provide significant benefits to the American public.

II. EXECUTIVE SUMMARY

2. We propose to provide for generic MSS allocations across the bands 1525-1559 MHz and 1626.5-1660.5 MHz. Specifically, we propose to expand the primary allocation in the bands 1545-1549.5 MHz, 1558.5-1559 MHz, 1646.5-1651 MHz, and 1660-1660.5 MHz from the aeronautical mobile-satellite (route) service (“AMS(R)S”) to all services within the MSS while preserving the requirements of AMS(R)S. The effect of our proposal is that the bands 1545-1559 MHz and 1646.5-1660.5 MHz would be made available to all types of MSS communications on a primary basis, rather than segmented for specialized use. This action would permit more efficient use of this radio spectrum and would facilitate the expansion of MSS use globally. In addition, because the bands 1530-1544 MHz and 1626.5-1645.5 MHz are currently allocated to the maritime mobile-satellite service (“MMSS”) and the MSS on a co-primary basis, we propose to delete superfluous MMSS allocations. We also request comment on whether the secondary allocation for aeronautical telemetry should be deleted from the band 1525-1535 MHz.

3. We propose to allocate the band 1164-1189 MHz to the RNSS for space-to-Earth (“downlink”) and space-to-space transmissions in order to accommodate a new civil global positioning system (“GPS”) signal.³ This action would permit the addition of a new GPS signal and support the safety-of-life requirements demanded by civil aviation. We also propose to allocate the bands 1215-1240 MHz and 1559-1610 MHz, which are currently limited to RNSS downlinks, for RNSS space-to-space transmissions as well. This action would allow use of spaceborne RNSS receivers for scientific and commercial applications.

4. We propose to downgrade the primary flight test and radiolocation allocations to secondary status in the band 2320-2345 MHz because the Satellite Digital Audio Radio Service (“Satellite DARS”) has been brought into operation. We also propose to delete limited allocations for the fixed-satellite service (“FSS”) and the broadcasting-satellite service (“BSS”) from the band 2500-2690 MHz in order to remove allocations that are not compatible with two-way, point-to-multipoint fixed uses.

5. We propose to implement domestically various allocation decisions concerning the space science services and the ISS from several WRCs that have not previously been addressed by the Commission. These proposals deal with the following issues:

¹ See ¶ 53, *infra*, for a description of the space science services.

² The Commission, which is an independent agency, administers non-Federal Government spectrum and NTIA, which is an operating unit of the Department of Commerce, administers Federal Government spectrum. See 47 C.F.R. § 2.105(a). NTIA also approves the spectrum needs of new systems for use by Federal departments and agencies and maintains the Federal Government Table of Frequency Allocations in its *Manual of Regulations and Procedures for Federal Radio Frequency Management* (“NTIA Manual”).

³ RNSS is a radiocommunication service for the purpose of radiodetermination involving the use of one or more space stations. This service may also include feeder links necessary for its own operation. Radiodetermination is the determination of the position, velocity and/or other characteristics of an object, or the obtaining of information relating to these parameters, by means of the propagation properties of radio waves. See 47 C.F.R. § 2.1.

- Raising secondary allocations for the Earth exploration-satellite service (“EESS”)⁴ and the space research service (“SRS”)⁵ to primary status in 1035 megahertz of spectrum in eight frequency bands and to specify that these allocations are to be used for active sensor operations (“EESS (active)” and “SRS (active)”):⁶ 1215-1240 MHz, 1240-1300 MHz, 5250-5255 MHz, 5255-5350 MHz, 8550-8650 MHz, 9500-9800 MHz, 13.4-13.75 GHz, and 17.2-17.3 GHz. See Table 2, below, for details.
- Allocating 550 megahertz of additional spectrum to the EESS (active) and SRS (active) on a primary basis in the bands 13.25-13.4 GHz and 35.6-36 GHz. We would also change the primary footnote allocation for active spaceborne sensors in the band 35.5-35.6 GHz to a direct Table listing.
- Allocating 110 megahertz of additional spectrum to the EESS (active) on a primary basis in the band 5350-5460 MHz.
- Upgrading the allocation status of EESS uplinks and meteorological-satellite service (“METSAT”) uplinks in the band 401-403 MHz from secondary to primary.⁷
- Allocating the band 410-420 MHz to the SRS on a primary basis for space-to-space transmissions.
- Allocating the band 7750-7850 MHz for METSAT downlinks on a primary basis, limited to non-geostationary satellite systems.
- Allocating the band 8400-8450 MHz for SRS downlinks from deep space on a secondary basis.
- Allocating the band 25.25-27.5 GHz to the ISS on a primary basis.
- Raising the secondary EESS allocation to primary status in the band 25.5-27 GHz and changing its directional indicator from space-to-space to space-to-Earth.

6. In addition, we propose to: (1) delete the primary ISS allocation from the band 32-32.3 GHz; (2) delete the secondary allocation for the aeronautical mobile-satellite (route) service (“AMS(R)S”) from the band 136-137 MHz; (3) more than double the size of the geographic area in New Mexico and Texas where amateur stations in the band 420-450 MHz would be limited in power and where spread spectrum radiolocation systems in the sub-band 420-435 MHz should not expect to be accommodated; (4) reflect NTIA’s recent action, which specified that Federal Government wind profiler radar systems (“wind profilers”) will operate in the sub-band 448-450 MHz; (5) permit U.S. flagged ships to use more spectrum-efficient equipment for on-board mobile radiotelephony communications in areas outside the territorial waters of the United States; (6) delete unused allocations for the International Fixed

⁴ EESS is a radiocommunication service between earth stations and one or more space stations, which may include links between space stations, in which (1) information relating to the characteristics of the Earth and its natural phenomena, including data relating to the state of the environment, is obtained from active or passive sensors on Earth satellites; (2) similar information is collected from airborne or Earth-based platforms; (3) such information may be distributed to earth stations within the system concerned; (4) and platform interrogation may be included. This service may also include feeder links necessary for its operation. *See* 47 C.F.R. § 2.1.

⁵ SRS is a radiocommunication service in which spacecraft or other objects in space are used for scientific or technological research purposes. *Id.*

⁶ An active sensor is an EESS or SRS measuring instrument by means of which information is obtained by transmission and reception of radio waves. *See* 47 C.F.R. § 2.1.

⁷ The meteorological-satellite service is an EESS for meteorological purposes. *See* 47 C.F.R. § 2.1.

Public Radiocommunication Services (“IFPRS”) from the bands 2.1-2.2 GHz and 10.7-11.7 GHz; and (7) allocate the band 14-14.5 GHz to the mobile-satellite (Earth-to-space) except aeronautical mobile-satellite service on a secondary basis. We also propose to make numerous ministerial amendments to Part 2 of our Rules.

III. DISCUSSION

7. In the United States, radio spectrum may be allocated to either Federal Government or non-Federal Government use exclusively, or for Federal and non-Federal Government shared use.⁸ The Commission is charged with domestic implementation of both Federal and non-Federal Government allocations.

8. In response to various petitions for rulemaking, we have previously addressed in a number of other proceedings many allocation changes from the 1992 World Administrative Radio Conference (“WARC-92”) and the 1995 and 1997 World Radiocommunication Conferences (“WRC-95” and “WRC-97”).⁹ In this proceeding, we turn to many of the remaining allocation changes from these conferences that have not previously been considered, including several changes sought mainly at the request of NTIA.¹⁰ Most of the allocation changes requested by NTIA are in spectrum that is either Federal Government exclusive spectrum or in Federal and non-Federal Government shared spectrum where non-Federal Government allocations are on a secondary basis.¹¹

9. We also address the RNSS allocation changes from the 2000 World Radiocommunication Conference (“WRC-2000”).¹² On September 28, 2001, Lockheed Martin Corporation (“Lockheed Martin”) filed a Petition for Rule Making, requesting that the WRC-2000 RNSS allocations in the bands

⁸ See 47 C.F.R. § 2.105(b).

⁹ See *Final Acts of the World Administrative Radio Conference for Dealing with Frequency Allocations in Certain Parts of the Spectrum (WARC-92)*, Malaga-Torremolinos, 1992 (“*WARC-92 Final Acts*”); *Final Acts of the World Radiocommunication Conference (WRC-95)*, Geneva, 1996 (“*WRC-95 Final Acts*”); and *Final Acts of the World Radiocommunication Conference (WRC-97)*, Geneva, 1997 (“*WRC-97 Final Acts*”). In response to petitions for rule making, we initially dealt with WRC allocation changes on a piece-meal basis in order to more rapidly respond to industry needs. See, e.g., *Amendment of Parts 2 and 25 of the Commission’s Rules to Allocate the 13.75-14.0 GHz Band to the Fixed-Satellite Service*, ET Docket No. 96-20, *Report and Order*, 11 FCC Rcd 11,951 (1996).

¹⁰ Recently, we began a process to systematically consider all remaining WRC allocation changes. We divided these proceedings into the following frequency ranges: Below 28 MHz, 28 MHz-36 GHz, 36-51 GHz (“V-band”), 50.2-71 GHz, 71-76 GHz (“70/80/90 GHz NPRM”), and Above 76 GHz. With the adoption of this Notice of Proposed Rule Making, we have completed our consideration of all WRC allocation changes, except for the WRC-2000 realignment of the frequency bands above 76 GHz, which will be attended to in a separate future proceeding. See, e.g., *Amendment of Part 2 of the Commission’s Rules to Allocate Additional Spectrum to the Inter-Satellite, Fixed, and Mobile Services and to Permit Unlicensed Devices to Use Certain Segments in the 50.2-50.4 GHz and 51.4-71.0 GHz Bands*, ET Docket No. 99-261, *Report and Order*, 15 FCC Rcd 25264 (2000).

¹¹ Stations of a secondary service shall not cause harmful interference to stations of primary services to which frequencies are already assigned or to which frequencies may be assigned at a later date, and cannot claim protection from harmful interference from stations of a primary service to which frequencies are already assigned or may be assigned at a later date. See 47 C.F.R. § 2.105(c)(2).

¹² See *Final Acts of the World Radiocommunication Conference (WRC-2000)*, Istanbul, 2000 (“*WRC-2000 Final Acts*”).

1164-1215 MHz and 1559-1610 MHz be implemented domestically and that these frequency bands be added to Part 25 of our Rules.¹³

10. Further, we are taking this opportunity to address some allocation issues that were not WRC issues but which fall between 28 MHz and 36 GHz. These proposals include downgrading the primary flight test and radiolocation allocations in the band 2320-2345 MHz to secondary status, deleting the limited BSS and FSS allocations from the band 2500-2690 MHz, deleting unused IFPRS allocations from the bands 2.1-2.2 GHz and 10.7-11.7 GHz, and making various ministerial amendments that will clean-up and update our Rules. These proposals would remove confusing and unnecessary regulations and potentially prevent occurrences of interference.

A. Generic MSS at L-Band

1. Background

11. In the United States, the bands 1530-1544 MHz (downlinks) and 1626.5-1645.5 MHz (uplinks) are allocated to the MMSS and the MSS on a co-primary basis. Through its adoption of footnote US315,¹⁴ the Commission requires that MMSS distress and safety communications have priority access and real-time preemptive capability in these bands over MSS routine, non-safety related public correspondence.¹⁵ In addition, the band 1525-1530 MHz is allocated to the MSS on a primary basis and the band 1525-1535 MHz is allocated to the mobile service on a secondary basis, limited to aeronautical telemetry. Footnote US78 states, *inter alia*, that permissible use of the frequency 1525.5 MHz includes telemetry associated with launching and reentry into the Earth's atmosphere as well as any incidental orbiting prior to reentry of "manned objects" undergoing flight tests.¹⁶ Together, this spectrum is known as "lower L-band."

12. The bands 1544-1545 MHz (downlinks) and 1645.5-1646.5 MHz (uplinks) are allocated to the MSS on an exclusive primary basis. Through its adoption of footnotes 5.356 and 5.375, the Commission requires that the use of these bands be limited to distress and safety communications.¹⁷

¹³ See Lockheed Martin Petition for Rule Making, received September 28, 2001; placed on public notice on November 15, 2001, in Rep. No. 2512, therein designated as RM-10331.

¹⁴ Footnote US315 reads as follows: In the frequency bands 1530-1544 MHz and 1626.5-1645.5 MHz maritime mobile-satellite distress and safety communications, *e.g.*, GMDSS, shall have priority access with real-time preemptive capability in the mobile-satellite service. Communications of mobile-satellite system stations not participating in the GMDSS shall operate on a secondary basis to distress and safety communications of stations operating in the GMDSS. Account shall be taken of the priority of safety-related communications in the mobile-satellite service. See 47 C.F.R. § 2.106.

¹⁵ Public correspondence is any telecommunication which the offices and stations must, by reason of their being at the disposal of the public, accept for transmission. See 47 C.F.R. § 2.1.

¹⁶ Footnote US78 reads as follows: "In the mobile service, the frequencies between 1435 and 1535 MHz will be assigned for aeronautical telemetry and associated telecommand operations for flight testing of manned or unmanned aircraft and missiles, or their major components. Permissible usage includes telemetry associated with launching and reentry into the Earth's atmosphere as well as any incidental orbiting prior to reentry of manned objects undergoing flight tests. The following frequencies are shared with flight telemetry mobile stations: 1444.5, 1453.5, 1501.5, 1515.5, 1524.5 and 1525.5 MHz." See 47 C.F.R. § 2.106, footnote US78.

¹⁷ In the 2001 Edition of the ITU Radio Regulations, the "S" has been dropped from the footnote numbering. We have recently implemented this change in our Rules. See *Amendment of Part 2 of the Commission's Rules to Make Non-Substantive Revisions to the Table of Frequency Allocations*, Order, DA 02-1872, rel. August 5, 2002.

13. The bands 1545-1559 MHz (downlinks) and 1646.5-1660.5 MHz (uplinks) are allocated to the AMS(R)S¹⁸ on a primary basis and are known as “upper L-band.” Most of upper L-band is also allocated to the MSS, as follows: the bands 1545-1549.5 MHz (downlinks) and 1646.5-1651 MHz (uplinks) are allocated on a secondary basis, and the bands 1549.5-1558.5 MHz (downlinks) and 1651-1660 MHz (uplinks) are allocated on a primary basis. Through its adoption of footnote US308, the Commission requires that AMS(R)S requirements that cannot be accommodated in the dedicated AMS(R)S bands (1558.5-1559 MHz and 1660-1660.5 MHz) or in the secondary MSS bands (1545-1549.5 MHz and 1646.5-1651 MHz) have priority access and real-time preemptive capability over routine, non-safety related public correspondence in the primary MSS bands (1549.5-1558.5 MHz and 1651-1660 MHz).¹⁹

14. Prior to WRC-97, certain sub-bands within L-band were allocated internationally to various services within the MSS.²⁰ At WRC-97, the United States proposed “generic” MSS allocations throughout L-band, *i.e.*, to expand the limited AMS(R)S, land mobile-satellite service (“LMSS”), and MMSS allocations in various sub-bands into the more broadly defined category of MSS.²¹ In its WRC-97 proposals, the United States stated that the needs of the MMSS and AMS(R)S can be accommodated within the generic MSS, provided that suitable priority for the aeronautical and maritime safety services is adopted.²² The U.S. also stated that worldwide generic L-band MSS allocations would provide for more

¹⁸ AMS(R)S is an aeronautical mobile-satellite service reserved for communications relating to safety and regularity of flights, primarily along national or international civil air routes. *See* 47 C.F.R. § 2.106.

¹⁹ Footnote US308 reads as follows: In the frequency bands 1549.5-1558.5 MHz and 1651-1660 MHz, the Aeronautical-Mobile-Satellite (R) requirements that cannot be accommodated in the 1545-1549.5 MHz, 1558.5-1559 MHz, 1646.5-1651 MHz and 1660-1660.5 MHz bands shall have priority access with real-time preemptive capability for communications in the mobile-satellite service. Systems not interoperable with the aeronautical mobile-satellite (R) service shall operate on a secondary basis. Account shall be taken of the priority of safety-related communications in the mobile-satellite service. *See* 47 C.F.R. § 2.106.

²⁰ Prior to WRC-97, L-band was allocated internationally as follows:

Downlink Band (MHz)	Uplink Band (MHz)	Region 1	Regions 2 and 3	Country footnotes for the U.S. and other nations
1525-1530	1626.5-1631.5	MMSS Secondary LMSS*	MSS	N/A
1530-1533	1631.5-1634.5	MMSS LMSS		MSS, with MMSS distress & safety communications having priority access & immediate availability over all other MSS (5.353)
1533-1544	1634.5-1645.5	MMSS Secondary LMSS*		
1544-1545	1645.5-1646.5	MSS (limited to distress & safety)		N/A
1545-1555	1646.5-1656.5	AMS(R)S; public correspondence with aircraft may be authorized, but must cease immediately, if necessary, to permit transmission of messages with priority 1-6.		
1555-1559	1656.5-1660.5	LMSS; aircraft & ships may be authorized to communicate with LMSS satellites.		MSS (5.361), with AMS(R)S having priority access & immediate availability over all other MSS (5.362)

*Land mobile use of these bands were limited to non-speech low bit-rate data transmissions.

²¹ This MSS designation is termed generic in contrast to the existing specific service designations, but the specific service designations are permitted in the MSS category. That is, under a MSS allocation, a licensee can offer AMS(R)S, LMSS, and MMSS services.

²² *See* U.S. WRC-97 Proposals at 78. In the United States, the Commission has already provided for the priority of aeronautical and maritime safety communications through its adoption of footnotes US308 and US315, respectively. *See* 47 C.F.R. § 2.106, footnotes US308 and US315. The Commission has also implemented the Global Maritime Distress and Safety System (“GMDSS”). *See* 47 C.F.R. Part 80, Subpart W. The bands 1530-1544 MHz and 1626.5-1645.5 MHz are the satellite general distress and safety communications and calling frequencies.

efficient use of the radio spectrum, facilitate the introduction of MSS globally, and, with appropriate provisions, maintain priority for aeronautical and maritime safety communications. In addition, the U.S. stated that generic MSS allocations would also increase the amount of spectrum available for AMS(R)S communications on a priority basis outside the United States and would make the entire allocation available for maritime and aeronautical MSS for routine communications.

15. WRC-97 allocated the bands 1525-1559 MHz (downlinks) and 1626.5-1660.5 MHz (uplinks) to the MSS on a primary basis throughout the world.²³ The general structure of the MSS allocation emphasizes safety communications for MMSS in much of lower L-band through the adoption of footnote 5.353A²⁴ and for AMS(R)S in upper L-band through the adoption of footnotes 5.357A and 5.362A.²⁵

16. In February 2002, we established licensing policies to govern MSS use of upper and lower L-band.²⁶ Specifically, we assigned up to 20 megahertz of upper and lower L-band spectrum to Motient Services, Inc. (“Motient”), the only U.S. MSS system currently authorized in L-band. We also incorporated into Part 25 of our Rules specific operational parameters and technical requirements to ensure that the integrity of maritime distress and safety communications will not be compromised by MSS operation in the lower L-band.²⁷

2. Proposal

17. Domestically, we have previously implemented most of our WRC-97 generic MSS proposals. However, routine, non-safety related MSS public correspondence is currently precluded in the uppermost one megahertz of upper L-band spectrum (1558.5-1559 MHz and 1660-1660.5 MHz) and may be provided in nine megahertz of upper L-band spectrum only on a secondary basis (1545-1549.5 MHz and 1646.5-1651 MHz). Accordingly, we propose to expand the permitted primary services from AMS(R)S to all MSS in the bands 1545-1549.5 MHz, 1558.5-1559 MHz, 1646.5-1651 MHz, and 1660-1660.5 MHz.

18. In addition, we propose to take the following non-substantive, “clean-up” actions: (1) delete the superfluous MMSS allocations from bands 1530-1544 MHz and 1626.5-1645.5 MHz, (2) delete the now superfluous secondary MSS allocations from the bands 1545-1549.5 MHz and 1646.5-1651 MHz, and (3) delete the superfluous AMS(R)S allocations from the bands 1549.5-1558.5 MHz and 1651-1660 MHz. The effect of these proposals is that the band 1525-1559 MHz would be allocated for MSS downlinks on a primary basis and the 1626.5-1660.5 MHz would be allocated for MSS uplinks on a primary basis. We are maintaining footnotes US308 and US315 concerning the priority to be afforded distress and safety communications. We believe that these generic MSS allocations will provide Motient and others with maximum flexibility, without hindering the use of this spectrum for distress and safety communications. We request comment on our generic MSS proposals. In particular, we request

²³ See *WRC-97 Final Acts* at 27-32.

²⁴ The GMDSS priority access and immediate availability requirement has never applied to the band 1525-1530 MHz.

²⁵ See 47 C.F.R. § 2.106, footnotes 5.353A, 5.357A, and 5.362A.

²⁶ See *Establishing Rules and Policies for the use of Spectrum for Mobile Satellite Services in the Upper and Lower L-band*, IB Docket No. 96-132, *Report and Order*, FCC 02-24, released February 7, 2002 (“*L-band Policy and Rules R&O*”).

²⁷ See *L-band Policy and Rules R&O*, Appendix A, Section 25.136(d) and (e).

comment on whether footnote US308 should be maintained, modified, or replaced by international footnotes 5.357A and 5.362A. Table 1, below, summarizes these proposals.

19. We also propose to update Part 25 of our Rules by stating that the bands 1525-1559 MHz and 1626.5-1660.5 MHz are available use by L-band MSS systems. Further, we propose to state that the use of the bands 1544-1545 MHz and 1645.5-1646.5 MHz is limited to distress and safety communications.²⁸

20. We also request comment on whether the secondary mobile allocation, which is limited to aeronautical telemetry, should be deleted from the band 1525-1535 MHz in the United States Table of Frequency Allocations (“U.S. Table”). We observe that this band is used by mobile subscriber units to receive weak satellite signals and therefore, request comment on whether co-frequency transmissions from aircraft can cause harmful interference to the primary MSS. We observe that while there are no non-Federal Government flight test licensees in the band 1525-1535 MHz, there are Federal Government flight test operations in this band. We request comment on whether the aeronautical telemetry operations in the band 1525-1535 MHz can be relocated to either the band 1435-1525 MHz or to the band 2310-2385 MHz.²⁹ If the secondary mobile allocation in the band 1525-1535 MHz is deleted, then we propose to revise footnote US78 to remove the frequency 1525.5 MHz, which can be used for both aircraft and spacecraft telemetry.

Table 1: Generic MSS
(All allocations are primary, except as noted)

Band (MHz)	Existing Allocations	Proposed Allocations	Summary of Main Changes
1525-1530	MSS (downlinks) Secondary mobile (aeronautical telemetry) US78 (permissible usage includes spacecraft telemetry)	1525-1535 MHz MSS (downlinks) US315	Request comment on whether the secondary mobile allocation that is limited to aeronautical telemetry should be deleted.
1530-1535	MSS (downlinks) MMSS (downlinks) Secondary mobile (aeronautical telemetry) US78 US315 (MMSS distress & safety has priority access & real-time preemptive capability over other MSS)	Secondary mobile (aeronautical telemetry) US78	Delete unneeded MMSS allocations. Request comment on whether the secondary mobile allocation that is limited to aeronautical telemetry should be deleted.
1535-1544	MSS (downlinks) MMSS (downlinks) US315	1535-1559 MHz MSS (downlinks)	
1544-1545	MSS (downlinks) 5.356 (limits use to distress and safety communications)	5.356 US308 US309 US315	No change.
1545-1549.5	AMS(R)S (downlinks) US309 (terrestrial extension of AMS(R)S permitted) Secondary MSS (downlinks)		Expand AMS(R)S to all MSS in the bands 1545-1549.5 MHz & 1558.5-1559 MHz; delete superfluous secondary MSS allocation from 1545-1549.5 MHz; delete unneeded AMS(R)S allocation from 1549.5-1558.5 MHz.
1549.5-1558.5	AMS(R)S (downlinks) US309 MSS (downlinks) US308 (AMS(R)S has priority access & real-time preemptive capability over other MSS)		
1558.5-1559	AMS(R)S (downlinks) US309		

²⁸ See Appendix, Section 25.202(4)(iii).

²⁹ We are proposing to permit aeronautical telemetry operations in the band 2320-2345 MHz to continue on a secondary basis to Satellite DARS. See ¶¶ 47-49, *infra*.

1626.5-1645.5	MSS (uplinks) MMSS (uplinks) US315	1626.5-1660 MHz	Delete unneeded MMSS allocation.
1645.5-1646.5	MSS (uplinks) 5.375 (limits use to distress and safety communications)	MSS (uplinks) 5.375 US308 US309 US315	No change.
1646.5-1651	AMS(R)S (uplinks) US309 Secondary MSS (uplinks) US308		Expand AMS(R)S to all MSS in the bands 1646.5-1651 & 1660-1660.5 MHz; delete superfluous secondary MSS allocation from 1646.5-1651 MHz; delete unneeded AMS(R)S allocation from 1651-1660 MHz.
1651-1660	AMS(R)S (uplinks) US309 MSS (uplinks) US308		
1660-1660.5	AMS(R)S (uplinks) US308 US309 RADIO ASTRONOMY	MSS (uplinks) US308 US309 RADIO ASTRONOMY	

B. RNSS Allocations

1. Background

21. GPS, which currently consists of 24 satellites operated by the U.S. Government, is authorized under the RNSS allocation. These satellites allow any person with a GPS receiver to determine his or her precise longitude, latitude, altitude, and time anywhere on the planet.³⁰ GPS currently uses the RNSS downlink allocations in the bands 1215-1240 MHz and 1559-1610 MHz. GPS provides two levels of service: a Standard Positioning Service (“SPS”) using the L1 frequency³¹ and a Precise Positioning Service (“PPS”) using the L1 and L2 frequencies.³² SPS is available to all users on a continuous, worldwide basis, free of any direct user charge.

22. As discussed below, we propose to allocate the band 1164-1189 MHz to the RNSS (space-to-Earth, space-to-space) on a primary basis for a new GPS signal. We also propose to add a space-to-space directional indicator to the existing primary RNSS allocations in the bands 1215-1240 MHz and 1559-1610 MHz.³³

a. Current Uses of the Band 960-1215 MHz

23. Prior to WRC-2000, the band 960-1215 MHz was allocated to the aeronautical radionavigation service (“ARNS”) on a primary basis throughout the world. International footnote 5.328

³⁰ Each GPS satellite takes 12 hours to orbit the Earth. These satellites are equipped with accurate clocks so that they can broadcast signals with a precise time message. The GPS receiver uses the time signals from multiple satellites to determine precise latitude, longitude, and altitude.

³¹ The International Civil Aviation Organization (“ICAO”) has designated the L1 links of GPS and the Russian GLONASS system as the principal elements of the Global Navigation Satellite System (“GNSS”). The GPS L1 SPS ranging signal is a 2.046 megahertz null-to-null bandwidth signal centered about 1575.42 MHz. The transmitted ranging signal that comprises the GPS-SPS is not limited to a null-to-null signal and extends through the band 1563.42-1587.42 MHz. The Wide Area Augmentation System (“WAAS”), when it becomes operational, will utilize the same band and carrier frequency as GPS L1. See ¶36, *infra* for a description of WAAS.

³² The GPS L2 link shares the band 1215-1240 MHz with radiolocation services, such as military radars. The 1240-1260 MHz band is shared by GLONASS L2 and the nationwide joint surveillance system radar network operated by the Federal Aviation Administration and the Department of Defense. The GPS L2 carrier frequency is 1227.60 MHz. Although the L2 frequency is currently not part of SPS, the U.S. Government has decided to add a second non-safety-of-life coded signal at the GPS L2 frequency on satellites scheduled for launch beginning in 2005.

³³ See *WRC-2000 Final Acts* at 17 and 20.

also states that ARNS use of the band 960-1215 MHz is reserved on a worldwide basis for the operation and development of airborne electronic aids to air navigation and any directly associated ground-based facilities.

24. In the United States, the band 960-1215 MHz is Federal and non-Federal Government shared spectrum that is allocated to ARNS on a primary basis. The Commission has added international footnote 5.328 to the United States Table, thereby reserving the band 960-1215 MHz for the use and development of airborne electronic aids to air navigation and any directly associated ground-based facilities. This band is heavily used for safety-of-life services within the national and international airspace systems. Nearly all aspects of aircraft identification, tracking, control, navigation, collision avoidance, and landing guidance are carried out in this band. Major ARNS systems in this band include Distance Measuring Equipment (“DME”), Air Traffic Control Beacons (“ATCRBS”), the military’s tactical air navigation system (“TACAN”), and the Traffic Alert and Collision Avoidance System (“TCAS”). These aeronautical systems are not only essential to civil and military aircraft, but also to special users such as the U.S. Space Shuttle program. In addition, footnote US224 states that Federal Government systems utilizing spread spectrum techniques may, under limited circumstances, operate in the band 960-1215 MHz on the condition that harmful interference is not caused to ARNS.³⁴

b. Current Uses of the Band 1215-1240 MHz

25. Prior to WRC-2000, the band 1215-1240 MHz was allocated for radiolocation, RNSS downlinks, EESS (active), and SRS (active) on a co-primary basis throughout the world. However, active spaceborne sensors cannot cause interference to, claim inference from, or otherwise impose constraints on the operation or development of the radiolocation service and RNSS downlinks.³⁵ In addition, the use of the RNSS downlink allocation is subject to not causing harmful interference to the radionavigation service in certain countries.³⁶

26. In the United States, the band 1215-1240 MHz is Federal Government exclusive spectrum that is allocated for RNSS downlinks and to the radiolocation service on a co-primary basis.³⁷ Radiolocation stations installed on spacecraft may also be employed for the EESS and SRS services on a secondary basis.³⁸ The major radiolocation systems in this band are operated by the Department of Defense. Radars in this band are also mounted on tethered balloons along the southern border of the U.S. for drug interdiction purposes to detect low-flying aircraft entering U.S. airspace. GPS makes use of this RNSS downlink allocation with a center frequency at 1227.6 MHz, which is generally known as the L2 link.

c. Current Uses of the Band 1559-1610 MHz

27. Prior to WRC-2000, the band 1559-1610 MHz was allocated to the ARNS and for RNSS downlinks on a co-primary basis throughout the world. In the United States, the band 1559-1610 MHz is Federal and non-Federal Government shared spectrum and the ARNS and RNSS allocations have been implemented. GPS is the major use of the band 1559-1610 MHz.

³⁴ See 47 C.F.R. § 2.106, footnote US224.

³⁵ See 47 C.F.R. § 2.106, footnote 5.332.

³⁶ See 47 C.F.R. § 2.106, footnote 5.329.

³⁷ Radiolocation use is primarily for the military services. See 47 C.F.R. § 2.106, footnote G56.

³⁸ See 47 C.F.R. § 2.106, footnote 5.333. In this proceeding, we are also proposing to upgrade this secondary allocation to primary status and to specify that its use is limited to active spaceborne sensors. See ¶ 69, *infra*.

28. The Commission has also adopted two United States footnotes for this band. Footnote US208 states that planning and use of the band 1559-1610 MHz necessitate the development of technical and/or operational sharing criteria to ensure the maximum degree of electromagnetic compatibility with existing and planned systems within the band.³⁹ Footnote US260 states that aeronautical mobile communications, which are an integral part of ARNS systems, may be satisfied in several bands, including the band 1559-1626.5 MHz.⁴⁰

2. GPS Applications in Space

29. At WRC-2000, the U.S. proposed the addition of the space-to-space direction to the RNSS allocation in the bands 1215-1240 MHz and 1559-1610 MHz.⁴¹ In support of this proposal, the United States noted that while RNSS systems such as GPS and GNSS are primarily used in the downlink direction to provide service to terrestrial users, these systems are increasingly being used in the space-to-space direction by spaceborne users. Spaceborne uses include applications such as spacecraft three-dimensional positioning and velocity determination; three-axis attitude control; precise time synchronization; precision orbit determination, and atmospheric science. The U.S. observed that use of RNSS signals is presently protected only through a downlink allocation in the bands 1215-1240 and 1559-1610 MHz. Recognizing current and future operational use of spaceborne RNSS receivers for scientific and commercial applications, the U.S. stated that it is important to add the space-to-space direction to the existing RNSS allocations so that these uses can be taken into consideration if changes to these frequency bands are contemplated. Finally, the U.S. noted that the ITU-R has concluded that the addition of a space-to-space direction to the RNSS bands at 1215-1240 MHz and 1559-1610 MHz will not cause any additional interference to other services since it involves no change to downlink transmissions.

30. At WRC-2000, a space-to-space directional indicator was added to the existing primary RNSS allocation in the bands 1215-1240 MHz and 1559-1610 MHz.⁴² NTIA requests that the space-to-space directional indicator be added to the primary RNSS allocation in the band 1215-1240 MHz for Federal Government use and in the band 1559-1610 MHz for both Federal and non-Federal Government use.⁴³

31. Lockheed Martin states that it currently provides the geostationary component of the Wide Area Augmentation System (“WAAS”) for demonstration purposes, and that it will be necessary for a commercial operator to obtain a license to build and deploy GPS augmentation broadcast satellites.⁴⁴ Therefore, Lockheed Martin also requests that the space-to-space directional indicator be added to the primary RNSS allocation in the Federal and non-Federal Government shared band at 1559-1610 MHz and in the Federal Government exclusive band at 1215-1240 MHz. In addition, Lockheed Martin requests that the RNSS allocations in band 1559-1610 MHz be added to Section 25.202(a) of our Rules.

³⁹ See 47 C.F.R. § 2.106, footnote US208.

⁴⁰ See 47 C.F.R. § 2.106, footnote US260.

⁴¹ See United States of America Proposals for the Work of the Conference, Document 12-E, dated January 12, 2000, Proposals for agenda item 1.15.2.

⁴² See *WRC-2000 Final Acts* at 17 and 20.

⁴³ See Letter from Associate Administrator, Office of Spectrum Management, NTIA, to Acting Chief, Office of Engineering and Technology (“OET”), FCC, dated July 18, 2001 (“July 2001 NTIA Letter”).

⁴⁴ See Lockheed Martin Petition at 7-8.

3. GPS Signal and Safety-of-Life Applications

32. At WRC-2000, the U.S. proposed to add a third civil GPS signal (“L5”) that can meet the needs of critical safety-of-life applications, such as civil aviation, at 1176.45 MHz on satellites scheduled for launch beginning in 2007. In support of its L5 proposal, the U.S. stated that additional RNSS signals would greatly enhance the accuracy, reliability and robustness of the civil GPS by enabling more effective corrections to be made for the time delay effects of the ionosphere⁴⁵ on the signals from space.⁴⁶ Further, the U.S. observed that the International Civil Aviation Organization has requested an additional civil GPS signal to support requirements for the Global Navigation Satellite System (“GNSS”) and for space-based augmentation systems. The U.S. stated that aeronautical users require that the signal operate in ARNS spectrum, which would also include the possibility of RNSS augmentation systems. The U.S. also stated that the required bandwidth of its proposed L5 signal was 24 megahertz, subsequently revised to 25 megahertz (1164-1189 MHz), and that technical studies show compatibility between existing operational ARNS systems and the L5 signal.⁴⁷

33. WRC-2000 adopted international footnote 5.328A, which allocates the band 1164-1215 MHz for RNSS downlinks and space-to-space transmissions on a primary basis throughout the world and specifies provisional aggregate power flux-density (“pfd”) limits.⁴⁸

34. NTIA requests that we not propose the domestic adoption of international footnote 5.328A because the U.S. Government currently only has plans to use a portion of this RNSS allocation (1164-1189 MHz) for its GPS system, and uses for the remainder of the RNSS allocation have not been defined, nor have technical compatibility studies been performed.⁴⁹ NTIA requests that consideration of the remaining portion of this RNSS allocation (1189-1215 MHz) be deferred at this time.⁵⁰ NTIA and Federal agencies are investigating the possibility of extending to 1215 MHz this RNSS allocation within the United States, in accordance with footnote 5.328A.⁵¹ In addition, if a pfd limit needs to be adopted domestically, NTIA recommends that it be added to Part 25 of our Rules, not included in a footnote to the Table of Frequency Allocations.⁵² Therefore, NTIA recommends, at this time, that we propose to adopt the following United States footnote:

USyyy The band 1164-1189 MHz is also allocated to the radionavigation-satellite service (space-to-Earth, space-to-space) on a primary basis. In this band, stations in the radionavigation-satellite service shall not cause harmful interference to, nor claim protection from, stations of the aeronautical radionavigation service.

⁴⁵ The ionosphere is that part of the Earth’s outer atmosphere where ions and free electrons are normally present in quantities sufficient to affect the propagation of radio waves.

⁴⁶ See United States of America Proposals for the Work of the Conference, Document 12-E, dated January 12, 2000, Proposals for agenda item 1.15.1.

⁴⁷ On August 8, 2002, NTIA revised its request for the L5 bandwidth from 1164-1188 MHz to 1164-1189 MHz. See Letter from Acting Associate Administrator, Office of Spectrum Management, NTIA to Chief, OET, FCC, dated August 8, 2002 (“NTIA RNSS Letter”).

⁴⁸ See 47 C.F.R. § 2.106, footnote 5.328A.

⁴⁹ See NTIA RNSS Letter. See also July 2001 NTIA Letter.

⁵⁰ See July 2001 NTIA Letter at Attachment 1.

⁵¹ See NTIA RNSS Letter.

⁵² See July 2001 NTIA Letter.

35. In its Petition for Rule Making, Lockheed Martin requests that the entire RNSS band at 1164-1215 MHz be implemented domestically, stating that it may be more expedient for us to specify the entire RNSS band, rather than just the spectrum that the U.S. Government system needs (1164-1189 MHz).⁵³ Lockheed Martin agrees with NTIA that the provisional aggregate pfd limit should not be shown in the U.S. Table because there are significant technical and regulatory questions about the ability of an aggregate pfd limit to adequately protect ARNS receivers from interference.⁵⁴ In addition, Lockheed Martin requests that the RNSS allocations in the band 1164-1215 MHz be added to Section 25.202(a) of our Rules.

36. In late-filed comments in RM-10331, the Boeing Company (“Boeing”) also requests that the entire international RNSS band at 1164-1215 MHz be implemented domestically, stating that allocation of the entire band could facilitate spectrum sharing between multiple RNSS networks.⁵⁵

4. Proposal

37. Currently, SPS-GPS accuracy is about 20 meters (about 65.6 feet) from true position.⁵⁶ Lockheed Martin states that the Federal Aviation Administration (“FAA”) has determined that commercial aviation requires positional accuracy within 7.6 meters (about 25 feet) in both the horizontal and vertical directions to support flight navigation, from enroute through precision approach.⁵⁷ RNSS stations in the band 1164-1189 MHz, in conjunction with the transmission of differential correction data and related information, can accomplish this. Accordingly, as requested by NTIA, we propose to adopt a new United States footnote (USyyy), which would allocate the band 1164-1189 MHz for RNSS downlink and space-to-space transmissions on a primary basis.⁵⁸

38. We observe that differential RNSS correction data and related information is transmitted in a data link, and as such, is sometimes not within the RNSS. Examples of current differential RNSS systems for the purpose of augmenting GPS include WAAS, which is an RNSS system being implemented by the FAA that also provides correction information transmitted from satellites, and the Local Area Augmentation System (“LAAS”), which is a system being tested by the FAA that transmits correction information from ground stations. In order to clarify this point, we propose to add the following definitions to Part 2 of our Rules:

Differential Radionavigation Satellite Service (Differential RNSS) Station. A station used for the transmission of differential correction data and related information (such as ionospheric data and RNSS satellite integrity information) as an augmentation to an RNSS system for the purpose of improved navigation accuracy.

Differential Global Positioning System (DGPS) Station. A differential RNSS station for specific augmentation of GPS.

⁵³ See Lockheed Martin Petition for Rule Making at 12.

⁵⁴ *Id.* at 13.

⁵⁵ See Boeing’s late-filed comments, RM-10331, received June 25, 2001. We are accepting these late-filed comments in order to have a complete record.

⁵⁶ *Id.* at 5.

⁵⁷ *Id.* at 10.

⁵⁸ See ¶ 34, *supra*, for the text of USyyy.

39. These proposals would provide commercial entities with an opportunity to assist the FAA in its continuing efforts to modernize the national airspace system. In particular, we observe that several efforts are currently underway to augment the positioning information provided by GPS and to raise its level of accuracy so as to meet commercial aviation's safety-of-life requirements. Among these efforts is the WAAS, which will monitor the performance of the GPS system through a network of ground stations. Each ground station will compare its known position with its received GPS position and will transmit this differential data to one or more master stations. At the master stations, the differential data will be averaged and sent to the geostationary satellites, which will broadcast the derived correction signal and other relevant data using the same frequency as GPS (in this case the same frequency as L5). Commercial entities may operate WAAS under FAA contracts.⁵⁹

40. We request comment on whether the band 1164-1189 MHz should be added to proposed footnote US343. Proposed footnote US343 provides that DGPS stations may be authorized on a primary basis in the bands 108-117.975 MHz and 1559-1610 MHz for the specific purpose of transmitting DGPS information intended for aircraft navigation.⁶⁰

41. We also seek comment on whether we should allocate domestically the international RNSS allocation at 1189-1215 MHz at this time, and in particular on whether this allocation is needed to support U.S. requirements. We note that studies continue in the international process to determine the aggregate impact of multiple RNSS systems on incumbent ARNS systems. Given the safety-of-life aspects of these ARNS systems, we would not anticipate adopting this additional allocation unless a need is demonstrated and studies are completed.⁶¹ We are not proposing to adopt pfd limits on RNSS systems at this time because the US footnote we propose should ensure protection of ARNS. We request comment on our proposal.

42. We anticipate that numerous terrestrial applications could be offered as a side benefit of WAAS. These applications may include automated farming and mining operations, automobile navigation, automated traffic management, and enhanced maritime navigation. Additional services could be offered by integrating a user's positional information with a user generated communications message for remote tracking, theft prevention/recovery, and search and rescue. We also seek comment on whether these benefits can be achieved through the use of other satellite systems and frequency bands, such as current MSS systems.

43. In addition, we propose to add a space-to-space directional indicator to the primary RNSS allocation in the bands 1215-1240 MHz and 1559-1610 MHz, which are currently limited to downlink transmissions. This action would recognize current and future use of spaceborne RNSS receivers for scientific and commercial applications. We decline to add the RNSS frequencies to Section 25.202(a) of our Rules at this time. Such action would be more appropriate in connection with development of service and licensing rules for the RNSS frequency bands, and following development of international technical criteria for operations in these bands.

⁵⁹ Lockheed Martin currently provides the geostationary satellite component of WAAS and four ground stations under an FAA contract to demonstrate the capabilities of WAAS. Lockheed Martin has an application on file to provide a Regional Positioning System ("RPS"). Lockheed Martin intends that RPS will be the geostationary component of GNSS. See Lockheed Martin Petition at 7 and 9.

⁶⁰ Proposed footnote US343 reads as follows: "Differential-Global-Positioning-System (DGPS) stations may be authorized on a primary basis in the bands 108-117.975 MHz and 1559-1610 MHz for the specific purpose of transmitting DGPS information intended for aircraft navigation." Footnote US343 was originally proposed in *Review of Part 87 of the Commission's Rules Concerning the Aviation Radio Service*, WT Docket No. 01-289, *Notice of Proposed Rule Making*, 16 FCC Red 19005 (2001).

⁶¹ See *WRC-2000 Final Acts* at Resolution 605.

C. Satellite DARS

1. Background

44. The band 2320-2345 MHz is allocated to the broadcasting-satellite service (sound) and complementary terrestrial broadcasting service on a primary basis. This service is generally known as Satellite DARS. The Satellite DARS band is also allocated on a secondary basis to the mobile service for non-Federal Government use and to the fixed, mobile, and radiolocation services for Federal Government use. Footnote US328 states that the mobile and radiolocation services are allocated on a primary basis until Satellite DARS has been brought into use.⁶² In addition, footnote US328 states that Satellite DARS during implementation should minimize its impact on the expendable and reusable launch vehicle frequency 2332.5 MHz to the extent possible. Footnote US276 states that this mobile allocation is limited to aeronautical telemetry and associated telecommand operations (“flight testing”).⁶³ Flight test use of the Satellite DARS band remains permissible in our Rules for the Aviation Services.⁶⁴

45. The bands 2310-2320 MHz and 2345-2360 MHz are allocated to the fixed, mobile, radiolocation, and broadcasting-satellite service (sound) and complementary terrestrial broadcasting services on a co-primary basis for non-Federal Government use. In 1997, we established the Wireless Communications Service (“WCS”) on these two bands and permitted WCS licensees the flexibility to offer any of these radiocommunication services.⁶⁵ The WCS bands are also allocated to the fixed, mobile, and radiolocation services on a secondary basis for Federal Government use. Footnote US339 states that the WCS bands are also available for flight testing on a secondary basis. However, the bands 2310-2320 MHz and 2345-2360 MHz have been inadvertently removed from Part 87 (Aviation Services) of our Rules.

46. We observe that while non-Federal Government flight test use of the band 2310-2360 MHz is relatively light, many of these licenses are for wide bandwidths that may not be readily accommodated in other spectrum.⁶⁶ In contrast, Federal Government flight test, fixed, and radiolocation use of the band 2310-2360 MHz is much more extensive.

⁶² See 47 C.F.R. § 2.106, footnote US328.

⁶³ See 47 C.F.R. § 2.106, footnote US276.

⁶⁴ See 47 C.F.R. § 87.303(d)(1).

⁶⁵ See *Amendment of the Commission's Rules to Establish Part 27, the Wireless Communications Service ("WCS")*, GN Docket No. 96-228, *Report and Order*, 12 FCC Rcd 10785 (1997); *Memorandum Opinion and Order*, 12 FCC Rcd 3977 (1997).

⁶⁶ The non-Federal Government flight test licensees in the band 2310-2360 MHz are:

Company & Call Sign	Expiration Date	Aircraft Units	Area of Operation	Transmitter Output Power	Frequencies in MHz	Emission Designator
Learjet Inc. KA98091	04/02/06	10	200 mile radius around Wichita	20 watts	2320.5, 2338.5	17M0FXD
					2350.5, 2355.5	4M00F9D
Tracor Flight Systems Inc KA98056	05/07/07	20	200 mile radius around Mojave, CA	10 watts	2330.5	5M00F2D
				20 watts	2340.5, 2350.5	1M00F1D, 1M00F8D
Boeing KA98123	11/14/06	5	200 mile radius	20 watts	2316.5, 2336.5	10M00F9D
Boeing KA98142	07/07/04	8	around Saint Louis		2352.5	13M00F9D

2. Proposal

47. We note that both of our Satellite DARS licensees (Sirius and XM Radio) are offering service to the public.⁶⁷ Thus, we tentatively find that the conditions in footnote US328 have been met. We believe that flight testing can continue in the band 2320-2345 MHz without causing harmful interference to Satellite DARS reception. For example, flight test operations could be performed in remote areas such as White Sands, New Mexico or in less remote areas at lower altitudes. Therefore, we propose to revise footnote US328 to permit flight test operations to continue on a secondary basis in the band 2320-2345 MHz. We propose to delete the radiolocation service from footnote US328 because there are no non-Federal Government radiolocation operations in the Satellite DARS band and because the Federal Government already has a secondary direct Table allocation for this service. We propose to delete the requirement that Satellite DARS licensees take cognizance of the launch vehicle frequency 2332.5 MHz because their systems have been implemented. Accordingly, we propose to revise footnote US328 to read as follows:

US328 The band 2320-2345 MHz is also available for aeronautical telemetering and associated telecommand operations for flight testing of manned or unmanned aircraft, missiles or major components thereof on a secondary basis to the Satellite Digital Audio Radio Service.

48. We request comment on this proposal, including if we should designate geographic areas where flight testing may continue on a secondary basis. Alternatively, we request comment on whether all secondary allocations should be deleted from the band in order to protect Satellite DARS reception. We note that Satellite DARS is a nation-wide satellite broadcast service and that its mobile receivers could receive interference anywhere secondary operations might occur, especially near flight test ranges.

49. We propose to amend Section 87.303(d)(1) to state that frequencies in the band 2310-2360 MHz may be assigned on a secondary basis for telemetry and telecommand operations associated with the flight testing of manned or unmanned aircraft and missiles, or their major component. We also propose to delete the launch vehicle frequency 2332.5 MHz from Section 87.303(d)(1). In the Table of Frequency Allocations, we propose to add a cross-reference to Part 25, Satellite Communications, in the band 2320-2345 MHz because this band is listed in Section 25.202(a)(6).⁶⁸ Likewise, we propose to add a cross-reference to Part 87, Aviation Services, in the band 2310-2390 MHz because these bands are, or are proposed to be, listed in Section 87.303(d)(1). We would delete footnote 5.396 from the band 2310-2360 MHz from the Federal Government Table because it pertains to the broadcasting-satellite service, which is not regulated by NTIA. We would also delete footnote US338 from the band 2310-2320 MHz because it does not pertain to this band. We request comment on all of the above proposals.

D. ITFS/MDS Band

1. Background

50. In the United States, the band 2500-2690 MHz is allocated to the fixed, mobile except aeronautical mobile,⁶⁹ BSS, and FSS services on a co-primary basis for non-Federal Government use. The band 2500-2690 MHz is currently used exclusively for fixed purposes by the Instructional Television

⁶⁷ Sirius is licensed in the band 2320-2332.5 MHz and XM Radio is licensed in the band 2332.5-2345 MHz.

⁶⁸ Column 6 of the Table of Frequency Allocations, 47 C.F.R. § 2.106, contains cross references to other Commission rule parts.

⁶⁹ An allocation to the mobile except aeronautical mobile service means that land mobile and maritime mobile services may be provided, but that aeronautical mobile services are prohibited.

Fixed Service (“ITFS”) and to the Multipoint Distribution Service (“MDS”).⁷⁰ As an adjunct to the original ITFS use, the BSS allocation is limited by footnote NG101 to “community reception” of educational TV programming and public service information.⁷¹ Similarly, the FSS allocation is limited by footnote NG102 to educational FSS use throughout the United States, except that the FSS allocation may be also used for common carrier purposes in Alaska, Hawaii, and certain Pacific islands. In order to preserve spectrum for FSS use in Alaska, footnote NG47 states that the band 2655-2690 MHz is not available for use by terrestrial services. These limited BSS and FSS allocations are unused.⁷²

51. WRC-2000 identified the band 2500-2690 MHz for use by third generation wireless systems (“3G”). In order to provide ITFS and MDS licensees with additional flexibility, we recently allocated the band 2500-2690 MHz to the mobile except aeronautical mobile service as reflected above.⁷³ However, no mobile service rules were established due to sharing issues with fixed services.⁷⁴ In the *New Advanced Wireless Services First R&O and MO&O*, we found that sharing between terrestrial systems and MSS downlinks in the band 2500-2520 MHz and MSS uplinks in the band 2670-2690 MHz would not be feasible.⁷⁵ Specifically, we found that MSS use of these bands in the United States would present substantial technical challenges and that MSS already has access to a significant amount of spectrum below 3 GHz to meet its needs for the foreseeable future.

2. Proposal

52. The band 2500-2690 MHz is heavily used by the ITFS and MDS licensees to provide traditional one-way analog video services. Many MDS licensees are upgrading their systems to provide two-way digital, point-to-multipoint fixed services for the delivery of high-speed internet access to the

⁷⁰ The MDS channels that use the band 2596-2644 MHz are known as the Multichannel Multipoint Distribution Service. See 47 C.F.R. § 21.2.

⁷¹ Community reception in the broadcasting-satellite service is the reception of emissions from a BSS space station by receiving equipment, which in some cases may be complex and have antenna larger than those used for individual reception, and intended for use (1) by a group of the general public at one location; or (2) through a distribution system covering a limited area. See 47 C.F.R. § 2.1. The community reception concept appears to have been overtaken by individual reception of BSS programming, such as that offered by DirecTV and the DISH Network.

⁷² We observe that Canada has advanced published and has filed a coordination request for a seven BSS GSO satellite system with the ITU that would, if approved, provide television and other services to passengers on aircraft using the band 2535-2655 MHz. In addition, because the band 2500-2690 MHz was identified at WRC-2000 as an additional band for IMT-2000 systems, WRC-03 agenda item 1.34 is reviewing the threshold value for BSS (sound) systems using NGSO satellites in the sub-band 2630-2655 MHz. In its preliminary views, the United States recognizes the need for a thorough analysis, and review at WRC-03 of the pfd threshold values and that the result should not place undue constraints on either terrestrial or NGSO BSS (sound) systems. See United States Preliminary View for WRC-03 Agenda Item 1.34, document RCS-1363_rev3, dated February 21, 2002. In addition, because invites 2 of Resolution 539 also refers to the band 2535-2655 MHz, we anticipate that the U.S. view will consider the impact of BSS use in this band on other services, including the recent primary allocation of the band 2500-2690 MHz to the mobile except aeronautical mobile service.

⁷³ See *Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Services*, ET Docket No. 00-258, *First Report and Order and Memorandum Opinion and Order*, 16 FCC Rcd 17222 (2001) (“*New Advanced Wireless Services First R&O and MO&O*”).

⁷⁴ *Id.* at ¶ 26.

⁷⁵ *Id.* at ¶ 12.

public, which is in addition to or in lieu of traditional video programming. In addition, the new mobile allocation may be implemented in the future. When the limited FSS and BSS allocations were made, two-way, point-to-multipoint MDS data services at 2500-2690 MHz were not anticipated. We believe that FSS and BSS operations in the band 2500-2690 MHz could affect the reliability of point-to-multipoint channels and low-power consumer response channels. Therefore, we propose to delete the unused and limited FSS and BSS allocations from the band 2500-2690 MHz in order to remove regulatory uncertainty from this spectrum. As a consequence of the proposal to delete the BSS and FSS allocations, we propose to delete footnotes NG101 and NG102, which limit the use of these allocations. In addition, we propose to delete footnote NG47 so as to make the band 2655-2690 MHz available for ITFS/MDS use in Alaska.⁷⁶ This action will align spectrum use in Alaska with the rest of the nation. We request comment on these proposals.⁷⁷

E. Space Science Services

53. The space science services include the EESS, SRS, METSAT, and space operation services. These services are used to measure phenomena that can impact the Earth's habitat and its environmental quality, provide weather forecasts, and explore the planets. Human space flight includes development of the international space station with participation of a number of countries. Active and passive spaceborne microwave sensors are tools that provide environmental data on a repetitive and global scale with an ability to penetrate clouds to obtain measurements unavailable by other means. In addition to using spectrum for active and passive sensing from space, the space science services use spectrum for command, tracking, data acquisition, and communications with satellites.

1. Active Spaceborne Sensors

a. Current Allocations and U.S. WRC-97 Proposals

54. Active spaceborne sensors transmit signals that are reflected by and therefore convey useful scientific information about land, ocean, and atmospheric surfaces.⁷⁸ Prior to WRC-97, many spaceborne sensor allocations were on a secondary basis in international footnotes 5.333 and 5.551, which the Commission had adopted domestically. In its preparation for WRC-97, the United States found that secondary allocations were inadequate to provide the long-term stability and protection needed to assure the availability of the data that these sensors provide. At WRC-97, the United States proposed that existing allocations for active spaceborne sensors be changed from secondary footnote status to primary direct Table listings in seven frequency bands: 1215-1300 MHz, 3100-3300 MHz, 5250-5350 MHz, 8550-8650 MHz, 9500-9800 MHz, 13.4-13.75 GHz, and 35.5-35.6 GHz. In addition, the U.S. proposed to extend the active spaceborne sensor allocation in the band 13.4-13.75 GHz down in frequency to include the band 13.25-13.4 GHz, to upgrade the secondary direct Table allocations for EESS (active) and SRS (active) in the band 17.2-17.3 GHz to primary status, and to allocate the band 35.6-36 GHz to the EESS (active) and SRS (active) on a primary basis. The 1997 Conference Preparatory Meeting ("CPM-

⁷⁶ In December 1990, OET and the Private Radio Bureau granted a waiver so that three companies could use these frequencies for private operational fixed microwave service distribution of video and audio entertainment. At that time, the applicants stated "that the most recent [FSS] application for the use of these frequencies was filed more than 10 years ago, and that all such applications have been abandoned because the band is too limited for current Fixed-Satellite Service purposes."

⁷⁷ As a ministerial matter, we would delete footnotes 5.409 and 5.411 from the non-Federal Government Table in the band 2500-2655 MHz because footnote US205 prohibits tropospheric scatter systems in the band 2500-2690 MHz and thus these international footnotes are superfluous.

⁷⁸ See *United States Proposals for the Work of the Conference*, Document 30-E, dated September 4, 1997 ("U.S. WRC-97 Proposals").

97”) concluded that active sensors and current primary services are compatible in all of these bands, except for the band 3100-3300 MHz where no definitive finding was possible. Therefore, the U.S. proposed regulatory provisions to ensure that radar operations are not compromised in the event that they cause interference to the sensors in the band 3100-3300 MHz. In view of the importance of the radiolocation and RNSS operations in the band 1215-1300 MHz, the U.S. also proposed similar regulatory provisions in that band. Finally, the United States supported a Canadian WRC-97 proposal to allocate the band 5350-5460 MHz to the EESS (active) on a primary basis. In the paragraphs below, we discuss the current U.S. allocations and U.S. WRC-97 proposals in more detail.

55. 1215-1300 MHz. The band 1215-1240 MHz is a Federal Government exclusive band that is allocated to the radiolocation service and for RNSS downlinks on a co-primary basis.⁷⁹ The band 1240-1300 MHz is a Federal and non-Federal Government shared band that is allocated to the radiolocation service on a primary basis for Federal Government use, to the ARNS for Federal and non-Federal Government use on a primary basis,⁸⁰ and to the amateur service on a secondary basis for non-Federal Government use. Radiolocation stations installed on spacecraft are authorized by footnote 5.333 to be employed for the EESS and SRS services on a secondary basis in the band 1215-1300 MHz.

56. The band 1215-1300 MHz is one of the frequency bands currently used to obtain “multi-spectral images” through use of active spaceborne sensors operating under footnote 5.333.⁸¹ These images are used to study the Earth's ecosystems, climate and geological processes, the hydrologic cycle and ocean circulation. The band 1215-1300 MHz has been used by spaceborne synthetic aperture radars beginning in 1978 and continuing up to the present with the space shuttle imaging radar and other systems. Studies conducted in the ITU-R, coupled with operational experience gained over a period of 20 years, demonstrate that active spaceborne sensors, radiolocation, and RNSS are compatible in this band. Therefore, the United States proposed that the secondary EESS and SRS allocations in the band 1215-1300 MHz in footnote 5.333 be raised to primary status, be shown as direct Table allocations, and be designated for active spaceborne sensor use. However, in view of the importance of the radiolocation and RNSS operations in this band, the U.S. proposed that international footnote 5.332 be adopted, which requires that active spaceborne sensors not cause interference to, claim protection from, or otherwise impose constraints on the operation or development of the radiolocation service, RNSS, or ARNS.⁸²

57. 3100-3300 MHz. The band 3100-3300 MHz is a Federal and non-Federal Government shared band that is allocated to the radiolocation service on a primary basis for Federal Government use and on a secondary basis for non-Federal Government use. Radiolocation stations installed on spacecraft are authorized by footnote 5.333 to be employed for the EESS and SRS services on a secondary basis in the band 3100-3300 MHz.

58. The band 3100-3300 MHz is also used to obtain multi-spectral images through the use of active spaceborne sensors operating under footnote 5.333. While studies conducted in the ITU-R

⁷⁹ See ¶ 42, *supra*, for the RNSS (space-to-space) allocation proposal in this band.

⁸⁰ See 47 C.F.R. § 2.106, footnote 5.334

⁸¹ A multi-spectral image is a collection of several monochrome images of the same scene, each of them taken with a different sensor. A well known multi-spectral image is an “RGB” color image, consisting of a red, green, and blue image, each of them taken with a sensor sensitive to a different wavelength. In image processing, multi-spectral images are most commonly used for remote sensing applications. Satellites usually take several images from frequency bands in the visual and non-visual range. For example, Landsat 5 produces seven images with the wavelength of the bands being between 450 and 1250 nm. For more information, *see* <http://www.dai.ed.ac.uk/HIPR2/mulimage.htm>.

⁸² See *U.S. WRC-97 Proposals* at 104.

demonstrate that spaceborne sensors will not cause harmful interference to land and airborne radiolocation systems, it was not possible to conclude that there would be compatibility between shipborne radars and spaceborne sensors.⁸³ Therefore, the U.S. proposed that the secondary EESS and SRS allocations in the band 3100-3300 MHz in footnote 5.333 be raised to primary status, be shown as direct Table allocations, and be designated for active spaceborne sensor use. However, in making this proposal, the U.S. stated that active spaceborne sensors could only be given primary allocation status if an international footnote was adopted to insure that radar operations are not compromised in the event that they cause interference to the sensors.⁸⁴

59. 5250-5350 MHz, 8550-8650 MHz, 9500-9800 MHz, and 17.2-17.3 GHz. The bands 5250-5350 MHz, 8550-8650 MHz, 9500-9800 MHz, and 17.2-17.3 GHz are Federal and non-Federal Government shared bands that are allocated to the radiolocation service on a primary basis for Federal Government use and on a secondary basis for non-Federal Government use. Radiolocation stations installed on spacecraft are authorized by footnote 5.333 to be employed for the EESS and SRS services on a secondary basis in the bands 5250-5350 MHz, 8550-8650 MHz, and 9500-9800 MHz. The band 17.2-17.3 GHz is also allocated to the EESS (active) and SRS (active) on a secondary basis for Federal and non-Federal Government use. In January 1997, we made the band 5250-5350 MHz available for Unlicensed National Information Infrastructure (“U-NII”) devices.⁸⁵ In June 1998, we affirmed the U-NII power level and antenna gain limits adopted for the band 5250-5350 MHz.⁸⁶

60. The bands 5250-5350 MHz, 8550-8650 MHz, 9500-9800 MHz, and 17.2-17.3 GHz are currently used to obtain multi-spectral images through use of active spaceborne sensors operating under footnote 5.333. The images obtained at 5250-5350 MHz and 9500-9800 MHz are used to study the Earth's ecosystems, climate and geological processes, the hydrologic cycle and ocean circulation. Altimeter measurements in the band 5250-5350 MHz provide data to study ocean dynamics and their effects on climatology and meteorology. Spaceborne scatterometer measurements of ocean surface wind speeds and directions in the band 9500-9800 MHz play a key role in understanding and predicting global weather patterns and climate systems. Studies conducted in the ITU-R demonstrate that active sensors and the radiolocation service are compatible in these bands. Therefore, the United States proposed that the secondary EESS and SRS allocations in the bands 5250-5350 MHz, 8550-8650 MHz, and 9500-9800 MHz in footnote 5.333 be raised to primary status, be shown as direct Table allocations, and be designated for active spaceborne sensor use. The U.S. also proposed that the secondary direct Table

⁸³ See *U.S. WRC-97 Proposals* at 107.

⁸⁴ *Id.*

⁸⁵ See *Amendment of the Commission's Rules to Provide for Unlicensed NII/SUPERNet Operations in the 5 GHz Frequency Range*, ET Docket No. 96-102, *Report and Order*, 12 FCC Rcd 1576 (1997) (“*U-NII Report and Order*”). These devices will provide short-range, high speed wireless digital communications on an unlicensed basis. We anticipate that U-NII devices will support the creation of new wireless local area networks and will facilitate wireless access to the National Information Infrastructure (“NII”). NII is a group of networks, including the public switched telecommunications network, radio and television network, private communications networks, and other networks not yet built, which together will serve communications and information processing needs.

⁸⁶ See *Amendment of the Commission's Rule to Provide for Operation of Unlicensed NII/SUPERNet Devices in the 5 GHz Frequency Range*, ET Docket No. 96-102, *Memorandum Opinion and Order*, 13 FCC Rcd 14355 (1998). In its comments to Petitions for Reconsideration in the U-NII proceeding, NTIA stated that it supports the power level and antenna gain limits adopted by the Commission in the *U-NII Report and Order*. See NTIA Comments on Petitions for Reconsideration in ET Docket No. 96-102, dated April 18, 1997, at 15. We affirmed these limits in the *U-NII Memorandum Opinion and Order*.

allocations for EESS and SRS in the band 17.2-17.3 GHz be raised to primary status and be designated for active spaceborne sensor use.⁸⁷

61. 5350-5460 MHz. The band 5350-5460 MHz is a Federal and non-Federal Government shared band that is allocated to ARNS on a primary basis for Federal and non-Federal Government use and to the radiolocation service, with Federal Government use on a primary basis and with non-Federal Government use on a secondary basis. Footnote 5.449 states that ARNS use of the band 5350-5470 MHz is limited to airborne radars and associated airborne beacons.

62. While the band 5350-5460 MHz is not currently allocated to the EESS (active) in the United States, the European Space Agency uses this allocation on its JASON spacecraft. The National Aeronautics and Space Administration (“NASA”) benefits from the EESS (active) allocation by receiving information from the JASON spacecraft in the 8025-8400 MHz EESS downlink band. NASA wishes to have the EESS (active) allocation implemented in the United States for future uses.

63. 13.25-13.75 GHz and 35.5-36 GHz. The band 13.25-13.4 GHz is a Federal and non-Federal Government shared band that is allocated to ARNS on a primary basis and to SRS uplinks on a secondary basis. Footnote 5.497 states that ARNS use of the band 13.25-13.4 GHz is limited to Doppler navigation aids. The bands 13.4-13.75 GHz and 35.5-36 GHz are Federal and non-Federal Government shared bands that are allocated to the radiolocation service on a primary basis for Federal Government use and on a secondary basis for non-Federal Government use. Radiolocation stations installed on spacecraft are authorized by footnote 5.333 to be employed for the EESS and SRS services on a secondary basis in the band 13.4-13.75 GHz. Radars located on spacecraft are authorized by footnote 5.551 to operate on a primary basis in the band 35.5-35.6 GHz.

64. Federal agencies have long operated active spaceborne sensors in the band 13.4-14 GHz as authorized by footnote 5.333. For example, the band 13.4-14 GHz is used by active spaceborne sensors to measure tropical rainfall. Altimeter measurements in the band 13.4-14 GHz provide data to study ocean dynamics and their effects on climatology and meteorology. Spaceborne scatterometer measurements of ocean surface wind speeds and directions in the band 13.25-14 GHz play a key role in understanding and predicting global weather patterns and climate systems.

65. At WRC-97, the United States proposed to shift the active spaceborne sensor allocation at 13.4-14 GHz down to 13.25-13.75 GHz.⁸⁸ Active sensors have long used the 13.4-14 GHz band for these measurements; however, the band 13.75-14 GHz is no longer viable for this purpose due to its allocation at WARC-92 to the FSS (Earth-to-space). The necessary bandwidth can be restored by converting the SRS uplink allocation in the 13.25-13.4 GHz band, which was authorized in footnote 5.498, to one for use by active spaceborne sensors. Studies conducted in the ITU-R have determined that active spaceborne sensors and ARNS are compatible in the band 13.25-13.4 GHz. These studies have also confirmed that active sensors and the radiolocation service are compatible in the band 13.4-13.75 GHz.

66. Precise altimetry using active spaceborne sensors requires measurements at two separate frequencies in order to compensate for measurement inaccuracies introduced by propagation through the atmosphere. Studies conducted in the ITU-R confirm that a bandwidth of 500 megahertz for active

⁸⁷ See *U.S. WRC-97 Proposals* at 111, 112, and 117 for the proposals dealing with the bands 8500-8750 MHz, 9500-9800 MHz, and 17.2-17.3 GHz, respectively. For the band 5250-5350 MHz, the U.S. proposal is included as a joint proposals made by several nations of the Inter-American Telecommunications Commission (“CITEL”). See CITEL Administrations Proposals for the Work of the Conference, Document 40-E, dated September 12, 1997, at agenda item 1.9.2.

⁸⁸ See *U.S. WRC-97 Proposals* at 110-112.

sensors in each of these bands is necessary and sufficient to meet the long-term requirements for wideband altimetry. Therefore, the United States proposed to allocate the bands 13.25-13.75 GHz and 35.5-36 GHz for active spaceborne sensors.⁸⁹ The U.S. also proposed to permit passive SRS uses in the band 13.4-13.7 GHz on a secondary basis.

b. WRC-97 Results

67. At WRC-97, the U.S. proposals for active spaceborne sensors were adopted, except that active sensors in the band 3100-3300 MHz were not given a primary allocation status and the requirements to protect incumbent services in the band 13.25-13.75 GHz were strengthened.⁹⁰ Specifically, WRC-97 adopted footnotes 5.498A and 5.501B, which require that active sensors not cause harmful interference to, or constrain the use or development of, ARNS in the band 13.25-13.4 GHz and the radiolocation service in the band 13.4-13.75 GHz, respectively. In addition, the U.S. supported a Canadian proposal to allocate the band 5350-5460 MHz to the EESS (active), which WRC-97 subsequently adopted.⁹¹ This EESS (active) allocation is limited by footnote 5.448A, wherein EESS (active) operations in the band 5350-5460 MHz must not cause harmful interference to, nor constrain the future development and deployment of, the radiolocation service.

c. Proposals

68. We observe that Federal agencies, such as NASA and the National Oceanic and Atmospheric Administration (“NOAA”), are the main users of active spaceborne sensor allocations. We also observe that there are only secondary non-Federal Government allocations in the frequency bands that WRC-97 allocated for active spaceborne sensor operations, except for the primary ARNS allocations in the bands 5350-5460 MHz and 13.25-13.4 GHz. As such, NTIA has requested that the primary active spaceborne sensor allocations made at WRC-97 be added to the Federal Government Table on a primary basis and that these allocations be added to the non-Federal Government Table of Frequency Allocations (“non-Federal Government Table”) on a secondary basis.⁹²

69. We propose to allocate the bands 1215-1300 MHz, 3100-3300 MHz, 5255-5350 MHz,⁹³ 8550-8650 MHz, 9500-9800 MHz, 13.25-13.4 GHz, 17.2-17.3 GHz, and 35.5-36 GHz to the EESS (active) and SRS (active); the bands 5250-5255 MHz and 13.4-13.75 GHz to the EESS (active) and SRS; and the band 5350-5460 MHz to the EESS (active). In the Federal Government Table, we propose that all of these active spaceborne sensor allocations would have primary status, except in the band 3100-3300 MHz, where the sensors would continue to have secondary status.⁹⁴ In the non-Federal Government Table, all of these allocations are proposed to have secondary status. We tentatively find that these

⁸⁹ See *U.S. WRC-97 Proposals* at 114-117 and 120-121.

⁹⁰ See *WRC-97 Final Acts* at 37, 39, 40, 43-44, 49, 50-51, 54-55.

⁹¹ See *WRC-97 Final Acts* at 39 and 40.

⁹² See 47 C.F.R. § 2.106, column 5 of the Table of Frequency Allocations.

⁹³ The Commission and NTIA are working on a United States position regarding WRC-03 agenda item 1.5. Specifically, WRC-03 will, *inter alia*, consider an allocation of frequencies to the mobile service in the band 5150-5350 MHz for the implementation of wireless access systems including radio local area networks (“RLANs”). See ITU Council, 2000 Session, Resolution 1156 (Agenda for WRC-03), agenda item 1.5, Document C2000/88-E, dated July 26, 2000; and *WRC-2000 Final Acts*, Resolution 736. The United States is weighing all interests and is working toward an equitable solution.

⁹⁴ See 47 C.F.R. § 2.106, column 4 of the Table of Frequency Allocations.

allocations will substantially improve our nation's ability to make long-term environmental measurements with active spaceborne sensors.

70. NTIA also recommends the adoption of several international footnotes in the frequency bands where primary active spaceborne sensor allocations are proposed for Federal Government use. Specifically, NTIA recommends the adoption of footnotes 5.332, 5.335, 5.448B, 5.498A, and 5.501B, which state that active spaceborne sensors must not cause harmful interference to, or constrain the use and development of, incumbent primary services in the bands 1215-1300 MHz, 5350-5460 MHz, and 13.25-13.75 GHz. NTIA also recommends the adoption of footnotes 5.447D and 5.501A, which state that the primary SRS allocations in the bands 5250-5255 MHz and 13.4-13.75 GHz are limited to active spaceborne sensors and that other space research uses are on a secondary basis.

71. As a consequence of these proposals, footnotes 5.333 and 5.551, which provide the current secondary active spaceborne sensor allocations, would be deleted from the U.S. Table. Also, the secondary allocation for the SRS (Earth-to-space) in the band 13.25-13.4 GHz would be deleted. We request comment on all of the above proposals, which are summarized below.

Table 2: Active Spaceborne Sensor Allocation Proposals
(Allocations are primary unless otherwise specified)

Federal Government Table		non-Federal Government Table		Summary of Major Changes
Current	Proposed	Current	Proposed	
1215-1240 MHz RADIOLOCATION 5.333 (stations on spacecraft may be used for secondary EESS & SRS) G56 (primarily for use by military) RNSS (downlinks)	1215-1240 MHz RADIOLOCATION G56 RNSS (downlinks) (space-to-space) EESS (active) SRS (active) 5.332 (active sensors may not interfere with radiolocation or RNSS)	1215-1240 MHz 5.333	1215-1240 MHz Secondary EESS (active) Secondary SRS (active)	Raise 85 MHz of secondary EESS & SRS spectrum to primary status for Federal Government use. Additional directional indicator for RNSS for Federal Government use.
1240-1300 MHz RADIOLOCATION G56 5.334 (band allocated to ARNS on primary basis)	1240-1300 MHz RADIOLOCATION G56 EESS (active) SRS (active) 5.332 5.334 5.335 (active sensors may not interfere with ARNS)	1240-1300 MHz Secondary amateur 5.282 (AMSAT uplinks may operate in 1260-1270 MHz) 5.333 5.334	1240-1300 MHz Secondary amateur Secondary EESS (active) Secondary SRS (active) 5.282 5.334	
3100-3300 MHz RADIOLOCATION 5.333 US110 G59 5.149	3100-3300 MHz RADIOLOCATION G59 Secondary EESS (active) Secondary SRS (active) US342	3100-3300 MHz Secondary radiolocation 5.333 US110 5.149	3100-3300 MHz Secondary radiolocation Secondary EESS (active) Secondary SRS (active) US342	Convert 200 MHz of secondary EESS & SRS spectrum from footnote allocation to direct Table listing.
5250-5350 MHz RADIOLOCATION 5.333 US110 G59	5250-5255 MHz RADIOLOCATION G59 EESS (active) SRS 5.447D (active; other uses secondary)	5250-5350 MHz Secondary radiolocation 5.333 US110 Available for U-NII devices.	5250-5255 MHz Secondary radiolocation Secondary EESS (active) Secondary SRS	Raise 100 MHz of secondary EESS & SRS spectrum (footnote 5.333) to primary status for Federal Government use.
	5255-5350 MHz RADIOLOCATION G59 EESS (active) SRS (active)		5255-5350 MHz Secondary radiolocation Secondary EESS (active) Secondary SRS (active) Available for U-NII devices.	Convert 100 MHz of secondary non-Gov't EESS & SRS spectrum from footnote allocation to direct Table listings.

<p>5350-5460 MHz ARNS 5.449 (limited to airborne radars & beacons) RADIOLOCATION G56 US48</p>	<p>5350-5460 MHz ARNS 5.449 RADIOLOCATION G56 EESS (active) 5.448B</p>	<p>5350-5460 MHz ARNS 5.449 (limited to airborne radars & beacons) Secondary Radiolocation US48</p>	<p>5350-5460 MHz ARNS 5.449 Secondary radiolocation Secondary EESS (active)</p>	<p>Additional 110 MHz for EESS (active), with Federal Government use on a primary basis & non-Federal Government use on a secondary basis.</p>
<p>8550-8650 MHz RADIOLOCATION 5.333 US110 G59</p>	<p>8550-8650 MHz RADIOLOCATION G59 EESS (active) SRS (active)</p>	<p>8550-8650 MHz Secondary radiolocation 5.333 US110</p>	<p>8550-8650 MHz Secondary radiolocation Secondary EESS (active) Secondary SRS (active)</p>	<p>Raise 100 MHz of secondary EESS & SRS spectrum to primary status for Federal Gov't use.</p>
<p>9500-9800 MHz RADIOLOCATION 5.333 US110</p>	<p>9500-9800 MHz RADIOLOCATION EESS (active) SRS (active)</p>	<p>9500-9800 MHz Secondary radiolocation 5.333 US110</p>	<p>9500-9800 MHz Secondary radiolocation Secondary EESS (active) Secondary SRS (active)</p>	<p>Raise 300 MHz of secondary EESS & SRS spectrum to primary status for Federal Gov't use.</p>

Table 2 Continued: Active Spaceborne Sensor Allocation Proposals
(Allocations are primary unless otherwise specified)

Federal Government Table		non-Federal Government Table		Summary of Major Changes
Current	Proposed	Current	Proposed	
13.25-13.4 GHz ARNS 5.497 (limited to doppler navigation aids) Secondary SRS (uplinks)	13.25-13.4 GHz ARNS 5.497 EESS (active) SRS (active) 5.498A (active spaceborne sensors may not cause harmful interference to ARNS)	13.25-13.4 GHz ARNS 5.497 Secondary SRS (uplinks)	13.25-13.4 GHz ARNS 5.497 Secondary EESS (active) Secondary SRS (active)	Additional 500 MHz for EESS (active), with primary status for Federal Government use & secondary status for non-Federal Government use.
13.4-13.75 GHz RADIOLOCATION 5.333 US110 G59 Secondary SRS Secondary Standard frequency & time signal-satellite (uplinks) ("SF&TS (uplinks)")	13.4-13.75 GHz RADIOLOCATION G59 EESS (active) SRS 5.501A (active; other uses secondary) Secondary SF&TS (uplinks) 5.501B (active spaceborne sensors may not cause harmful interference to radiolocation)	13.4-13.75 GHz Secondary radiolocation 5.333 US110 Secondary SRS Secondary SF&TS (uplinks)	13.4-13.75 GHz Secondary radiolocation Secondary EESS (active) Secondary SRS Secondary SF&TS (uplinks)	Raise 500 MHz of secondary SRS spectrum to primary status for Federal Government use.
17.2-17.3 GHz RADIOLOCATION US110 G59 Secondary EESS (active) Secondary SRS (active)	17.2-17.3 GHz RADIOLOCATION EESS (active) SRS (active)	17.2-17.3 GHz Secondary radiolocation US110 (band proposed for deletion from US110 in NPRM) Secondary EESS (active) Secondary SRS (active)		Raise 100 MHz of secondary EESS (active) & SRS (active) to primary status for Federal Government use.
35.5-36 GHz RADIOLOCATION US110 G34 (all non-military radiolocation is secondary to military) 5.551 (radars located on spacecraft may be operated on a primary basis in the band 35.5-35.6 GHz) US360 (33-36 GHz is allocated to the Gov't FSS on a primary basis) G117 (Gov't FSS is limited to military)	35.5-36 GHz RADIOLOCATION EESS (active) SRS (active) US360 G117	35.5-36 GHz Secondary radiolocation US110 5.551 US360	35.5-36 GHz Secondary radiolocation Secondary EESS (active) Secondary SRS (active) US360	Additional 400 MHz for EESS (active) & SRS (active), with Gov't use on primary basis & non-Gov't use on secondary basis; convert footnote allocation for radar use in 100 MHz (footnote 5.551) to EESS & SRS direct Table listing for Gov't use; downgrade primary status (as provided for in footnote 5.551) to secondary for non-Government use in 100 MHz.

2. EESS Uplink and METSAT Uplink Allocations in the Band 401-403 MHz

72. In the United States, the band 401-403 MHz is Federal and non-Federal Government shared spectrum that is allocated to the meteorological aids service (radiosonde)⁹⁵ on a primary basis and

⁹⁵ A radiosonde is an automatic radio transmitter in the meteorological aids service usually carried on an aircraft, free balloon, kite, or parachute, and which transmits meteorological data. See 47 C.F.R. § 2.1.

to EESS uplinks and METSAT uplinks on a secondary basis. Frequencies in the band 401-403 MHz are, *inter alia*, used by airborne, land-based, and maritime data collection platforms for reporting to satellites. The sub-band 401-402 MHz is also allocated to the space operations service on a primary basis.

73. At WRC-97, the secondary EESS and METSAT uplink allocations in the band 401-403 MHz were upgraded to primary status.⁹⁶ This action addressed some of the shortfall in telecommand uplink spectrum compared to available downlink spectrum in the frequency range from 100 MHz to 1 GHz. Prior to WRC-97's action, international downlink allocations equaled 14.45 megahertz, while international uplink allocations equaled only 2.4 megahertz. NTIA requests that the secondary EESS uplink and METSAT uplink allocations in the band 401-403 MHz be upgraded to primary status in the Federal Government Table.⁹⁷ NTIA also recommends that we adopt the following United States footnote:

USxxx In the band 401-403 MHz, the non-Federal Government Earth exploration-satellite (Earth-to-space) and meteorological-satellite (Earth-to-space) services are limited to earth stations transmitting to Federal Government space stations.

74. We believe that in order for continuous reliable observations to be made, it is essential that data transmitted in the band 401-403 MHz not receive harmful interference.⁹⁸ Accordingly, we propose to upgrade the secondary EESS and METSAT allocations in the band 401-403 MHz to primary status for Federal Government use and to limit non-Federal Government use of these allocations to earth stations transmitting to Federal Government space stations. We request comment on these proposals, and in particular on whether we should limit non-Federal Government use of these allocations to earth stations transmitting to Federal Government space stations.

3. EVA Communications at 410-420 MHz

75. The band 410-420 MHz is Federal Government exclusive spectrum that is allocated to the fixed and mobile services on a primary basis in the Commission's Table of Frequency Allocations.⁹⁹ At WARC-92, the United States proposed that the band 410-420 MHz be allocated to the SRS (space-to-space) on a primary basis, accompanied by a suitable footnote to ensure that the allocation would not result in constraints on the operation of fixed and mobile systems.¹⁰⁰ The purpose of this proposal was to provide a primary allocation in an appropriate service for communications during scheduled extra-vehicular activities ("EVA").¹⁰¹ Instead, WARC-92 allocated the band 410-420 MHz to the SRS (space-

⁹⁶ See *WRC-97 Final Acts* at 18.

⁹⁷ See Letter from Acting Associate Administrator, Office of Spectrum Management, NTIA, to Chief, OET, FCC, dated January 6, 2000 ("January 2000 NTIA Letter") at 2, 8.

⁹⁸ See *WARC-92 Final Acts* at 245 (Resolution No. 710).

⁹⁹ For the specific purpose of transmitting hydrological and meteorological data in cooperation with Federal agencies, four frequencies in the band 410-420 MHz may be authorized to non-Federal Government fixed stations on the condition that harmful interference will not be caused to Federal Government stations. See 47 C.F.R. § 2.106, footnote US13.

¹⁰⁰ This U.S. proposed footnote would have limited the use of the SRS allocation to communications within 5 kilometers of an orbiting, manned space vehicle and would have required that the SRS allocation not cause harmful interference to the fixed and mobile services. See *An Inquiry Relating to Preparation for the International Telecommunication Union World Administrative Radio Conference for Dealing with Frequency Allocations in Certain Parts of the Spectrum*, Gen. Docket No. 89-554, *Second Notice of Inquiry*, 5 FCC Rcd 6062 (1990); *Report*, 6 FCC Rcd 3930-3931 (1991).

¹⁰¹ EVA is described as work activities undertaken by astronauts outside the shelter of their base space vehicle, protected only by a life support space suit.

to-space) on a secondary basis. WARC-92 also adopted footnote 651A, which limited the use of the SRS to communications within 5 km of an orbiting, manned space vehicle.¹⁰² In 1993, NTIA modified its *Manual* to add this secondary SRS allocation and footnote 651A to the Federal Government Table in the band 410-420 MHz.¹⁰³

76. At WRC-97, the United States proposed to upgrade this secondary SRS allocation to primary status, accompanied by a suitable footnote, which later was numbered 5.268, to ensure that the allocation would not result in constraints on the operation of fixed and mobile systems.¹⁰⁴ WRC-97 made the requested allocation changes.¹⁰⁵ In its recommendations for WRC-97 implementation, NTIA requests that we revise the Federal Government Table in our Rules to incorporate these allocation changes.¹⁰⁶ Accordingly, we propose to allocate the band 410-420 MHz to the SRS (space-to-space) on a primary basis for Federal Government use and to limit its use through the adoption of footnote 5.268. This SRS allocation will permit the EVA system to provide communication among astronauts and their base spacecraft while those astronauts are performing activities outside the base spacecraft, *e.g.*, construction, assembly, inspection, and maintenance.¹⁰⁷ We observe that the “operating range for an EVA communication link would normally be confined to within about 100 meters of the primary spacecraft, though reliable operation at distances not to exceed 5 km is required to support contingency operations.”¹⁰⁸

4. METSAT NGSO Downlinks at 7750-7850 MHz

77. The band 7750-7850 MHz is Federal Government exclusive spectrum that is allocated to the fixed service on a primary basis. At WRC-97, the band 7750-7850 MHz was allocated to the METSAT (space-to-Earth) on a primary basis, and, through the adoption of footnote 5.5461B, limited to non-geostationary satellite orbit (“NGSO”) systems.¹⁰⁹ NTIA requests that the band 7750-7850 MHz be

¹⁰² See *WARC-92 Final Acts* at 40.

¹⁰³ See Memorandum from Chairman, IRAC, to Executive Secretary, IRAC, dated February 2, 1993. See also note 2, *supra*.

¹⁰⁴ See CITELE Administrations Proposals for the Work of the Conference, Document 40-E, dated September 12, 1997. CITELE stands for the Inter-American Telecommunications Commission. Specifically, Argentina, Brazil, Canada, the United States, and Uruguay jointly formulated this proposal.

¹⁰⁵ See *WARC-97 Final Acts* at pp. 18-19. Footnote 5.268 reads as follows: "Use of the band 410-420 MHz by the space research service is limited to communications within 5 km of an orbiting, manned space vehicle. The power flux-density at the surface of the Earth produced by emissions from extra-vehicular activities shall not exceed -153 dB(W/m²) for 0° ≤ δ ≤ 5°, -153 + 0.077 (δ - 5) dB(W/m²) for 5° ≤ δ ≤ 70° and -148 dB(W/m²) for 70° ≤ δ ≤ 90°, where δ is the angle of arrival of the radio-frequency wave and the reference bandwidth is 4 kHz. No. S4.10 does not apply to extra-vehicular activities. In this frequency band the space research (space-to-space) service shall not claim protection from, nor constrain the use and development of, stations of the fixed and mobile services."

¹⁰⁶ See January 2000 NTIA Letter at 9.

¹⁰⁷ See note 7, *supra*, at "Proposal for agenda item 1.9.5 - Allocation to the space research service (space-to-space) near 400 MHz."

¹⁰⁸ *Id.*

¹⁰⁹ See *WARC-97 Final Acts* at 41-42.

allocated for METSAT downlinks in the Federal Government Table, limited to NGSO satellites.¹¹⁰ Accordingly, we propose to adopt the requested METSAT allocation.

5. Deep Space Communications

78. NASA uses its Deep Space Network (“DSN”) for radio communications with interplanetary spacecraft. In the U. S., NASA’s deep-space communications facility is at Goldstone, in California’s Mojave Desert.¹¹¹ As a spacecraft travels outward from Earth, the received signal steadily decreases in power so that by the time it reaches Earth from an outer planet encounter, it can be an extremely weak signal, *e.g.*, 20 billion times weaker than the power required for a digital wristwatch, or about 1,000 billion times weaker than the signal received by a TV set.

a. Deep Space Downlinks at 8400-8450 MHz

79. The band 8400-8450 MHz is Federal Government exclusive spectrum that is allocated to the fixed service and the SRS (space-to-Earth) (deep space) on a co-primary basis. NTIA recommends that the band 8400-8450 MHz be allocated to the non-Federal Government SRS on a secondary basis, limited to the reception of transmissions from deep space.¹¹² Accordingly, we propose to allocate the band 8400-8450 MHz to the SRS (space-to-Earth) (deep space) on a secondary basis for non-Federal Government use. This allocation will allow non-Federal Government entities, such as educational institutions, to perform scientific research in cooperation with NASA.

b. Protection for Deep Space Reception at 31.8-32.3 GHz

80. The band 31.8-32.3 GHz is allocated to the SRS (deep space) (space-to-Earth) on a primary basis for Federal and non-Federal Government use, limited to NASA’s deep space facility at Goldstone, California.¹¹³ In addition, the sub-band 31.8-32 GHz is allocated to the radionavigation service on a primary basis for Federal Government use. The sub-band 32-32.3 GHz is also allocated to the ISS on a primary basis for Federal and non-Federal Government use.

81. In order to protect the Goldstone facility from potential interference, NTIA has deleted the ISS allocation in the band 32-32.3 GHz from the Federal Government Table and requests that we also delete this ISS allocation from the non-Federal Government Table.¹¹⁴ NTIA submits that ITU-R Recommendation SA.1016 clearly documents that deep space reception cannot share spectrum with ISS operations. NTIA states that signals received on Earth from spacecraft in deep space are extremely weak and are highly susceptible to interference of all kinds. In particular, it indicates that the presence of near-

¹¹⁰ See January 2000 NTIA Letter at 22.

¹¹¹ The DSN is an international network of antennas that supports interplanetary spacecraft missions and radio and radar astronomy observations for the exploration of the solar system and the universe. The network also supports selected Earth-orbiting missions. The DSN consists of three deep-space communications facilities placed approximately 120 degrees apart around the world: at Goldstone; near Madrid, Spain; and near Canberra, Australia. This strategic placement permits constant observation of spacecraft as the Earth rotates, and helps to make the DSN the largest and most sensitive scientific telecommunications system in the world. For more information, see <http://deepspace.jpl.nasa.gov/dsn/brochure/index.html>.

¹¹² See NTIA RNSS Letter.

¹¹³ The Goldstone site limitation is codified in footnote US262.

¹¹⁴ See Letter from Associate Administrator for Spectrum Management, NTIA, U.S. Department of Commerce, to Acting Chief, OET, FCC, dated April 6, 2001.

Earth spaceborne interference sources easily overwhelms the desired signals from deep space. Large space research earth station antennas, equipped with cryogenic preamplifiers and specialized receivers, are required to successfully communicate with spacecraft operating in deep space regions. These earth stations are usually sited to provide shielding from potentially interfering terrestrial sources. However, NTIA observes that such isolation is not possible in the case of orbiting spacecraft sharing the same frequency band with deep space operations.

82. To satisfy present and future scientific data return requirements, NASA is placing heavy reliance on space-to-Earth links in the band 31.8-32.3 GHz.¹¹⁵ Currently, NASA has three operational spacecraft using the 32 GHz band.¹¹⁶ The space agencies of other administrations are also studying the use of the 32 GHz band for those missions requiring wider bandwidth than is achievable in the 2 GHz or 8 GHz bands. We have reviewed our licensing files and the ISS allocation in the band 32-32.3 GHz is unused. Accordingly, we propose to delete the ISS allocation from the band 32-32.3 GHz in order to protect deep space reception at Goldstone, California.

83. In its WRC-2003 proposals, the United States anticipates proposing that the ISS allocation from 32-33 GHz be modified to exclude the band 32-32.3 GHz, stating that sharing with deep space downlinks does not appear feasible.¹¹⁷ Until such time as this ISS allocation has been removed internationally, we believe that it is necessary to move the text of footnote 5.548 into a United States footnote. The text of the proposed United States footnote is the same as footnote 5.548, except for the deletion of the band 32-32.3 GHz. The proposed United States footnote would read as follows:

USzzz In designing systems for the inter-satellite service in the band 32.3-33 GHz, for the radionavigation service in the band 32-33 GHz, and for the space research service (deep space) (space-to-Earth) in the band 31.8-32.3 GHz, all necessary measures shall be taken to prevent harmful interference between these services, bearing in mind the safety aspects of the radionavigation service.

c. Deep Space Uplinks at 34.2-34.7 GHz

84. In the United States, the band 33.4-36 GHz is allocated to the radiolocation service on a primary basis for Federal Government use and on a secondary basis for non-Federal Government use.¹¹⁸ The band 33.4-36 GHz is also allocated for FSS downlinks on a primary basis for Federal Government use.¹¹⁹ Footnote US252 states that the band 34.2-34.7 GHz is also allocated for SRS uplinks, limited to deep space communications at Goldstone, California.¹²⁰

¹¹⁵ Improved performance for deep space links employing area-limited antennas accrue at frequencies higher than the traditional 2 GHz and 8 GHz space research downlink bands because of increased directivity. Propagation is also improved as a result of decreased effects of charged particles in the interplanetary regions. The improved link performance in this band enables increased data transmission rates, thus increasing the efficiency of deep space operations.

¹¹⁶ Surfsat, the Mars Global Surveyor, and the large international Cassini spacecraft have data return links in the 32 GHz band.

¹¹⁷ See United States Preliminary Views for WRC-03 (as of February 21, 2002, Agenda Item 1.12D, p. 21).

¹¹⁸ In ¶ 69, above, we proposed to allocate the band 35.5-36 GHz to the EESS (active) and SRS (active).

¹¹⁹ See 47 C.F.R. § 2.106, footnote US360.

¹²⁰ Currently footnote US252 reads as follows: "The bands 2110-2120 and 7145-7190 MHz, and 34.2-34.7 GHz are also allocated for Earth-to-space transmissions in the space research service, limited to deep space communications at Goldstone, California."

85. At WRC-95, the band 34.2-34.7 GHz was allocated to the SRS (deep space) (Earth-to-space) on a primary basis.¹²¹ NTIA requests that the SRS deep space uplink allocation in footnote US252 be changed to a direct Table entry on a primary basis in the Federal Government Table and a secondary basis in the non-Federal Government Table.¹²²

86. Accordingly, we propose to move the SRS (deep space) (Earth-to-space) allocation at 34.2-34.7 GHz from footnote US252 into the U.S. Table as a direct Table allocation, with Federal Government use on a primary basis and with non-Federal Government use on a secondary basis. We observe that NASA uses the band 34.2-34.7 GHz in conjunction with the band 31.8-32.3 GHz, which is allocated by footnote US262 for SRS downlinks, limited to deep space communications at Goldstone.¹²³ Therefore, we propose to move the Goldstone site restriction for the band 34.2-34.7 GHz from footnote US252 to footnote US262, which would read as follows:

US262 The use of the band 31.8-32.3 GHz by the space research service (deep space) (space-to-Earth) and of the band 34.2-34.7 GHz by the space research service (deep space) (Earth-to-space) are limited to Goldstone, California.

F. The Band 25.25-27.5 GHz

87. At WARC-92, the United States proposed a primary ISS allocation in the band 25.25-27.5 GHz. The objective of this proposal was to provide a primary allocation for wide-bandwidth space-to-space data return links from low-orbiting user spacecraft to geostationary data relay satellites, *e.g.*, TRDSS.¹²⁴ In addition, the United States stated that this ISS allocation would be used to provide for wideband space-to-space links between permanent space stations and a variety of co-orbiting space vehicles in close proximity to such stations.¹²⁵

88. WARC-92 adopted this ISS allocation and, through the adoption of footnote 881A, limited its use to SRS and EESS applications, as well as transmissions of data from industrial and medical activities in space.¹²⁶ With regard to the secondary allocation for the EESS (space-to-space) in the band 25.25-27.5 GHz, WARC-92 changed the directional indicator to (space-to-Earth) in the sub-band 25.5-27 GHz and deleted the remainder of the EESS allocation (25.25-25.5 GHz and 27-27.5 GHz).

89. In the United States, the band 25.25-27.5 GHz is used primarily by the Federal Government. Specifically, in the Federal Government Table, the band 25.25-27.5 GHz is allocated to the

¹²¹ See *WRC-95 Final Acts* at 204.

¹²² See Letter from Acting Associate Administrator, Office of Spectrum Management, NTIA, to Chief, OET, FCC, dated June 10, 1998. See also Correction Letter, dated September 24, 1998.

¹²³ Footnote US262 currently reads as follows: "The use of the band 31.8-32.3 GHz by the space research service (deep space) (space-to-Earth) is limited to Goldstone, California."

¹²⁴ The geostationary data relay satellite would transmit to the low-orbiting user spacecraft in the existing ISS band at 22.55-23.55 GHz

¹²⁵ These "proximity" links would operate in the sub-band 25.25-25.55 GHz for space station transmit and in the sub-band 27.1-27.5 GHz for "free flyer" transmit. See *In the Matter of An Inquiry Relating to Preparation for the International Telecommunication Union World Administrative Radio Conference for Dealing with Frequency Allocations in Certain Parts of the Spectrum*, Gen. Docket No. 89-554, *Second Notice of Inquiry*, 5 FCC Rcd 6067 (1990); *Report*, 6 FCC Rcd 3910 and 3955 (1991).

¹²⁶ See *ITU Final Acts of the World Administrative Radio Conference for Dealing with Frequency Allocations in Certain Parts of the Spectrum (WARC-92)*, Malaga-Torremolinos, 1992 at 85-86.

fixed and mobile services on a co-primary basis and to the EESS (space-to-space) on a secondary basis, and the sub-band 25.25-27 GHz is allocated to the standard frequency and time signal-satellite service (Earth-to-space) on a secondary basis. In the non-Federal Government Table, the band 25.25-27.5 GHz is allocated to the EESS (space-to-space) and the sub-band 25.25-27 GHz is allocated to the standard frequency and time signal-satellite service (Earth-to-space), both on a secondary basis.

90. On May 14, 1996, NTIA notified the Commission that it had implemented the WARC-92 allocation changes in its *Manual*.¹²⁷ Specifically, NTIA added a primary ISS allocation to the band 25.25-27.5 GHz, limited the use of this ISS allocation through the adoption of international footnote 881A, changed the directional indicator for the secondary EESS (space-to-space) allocation to (space-to-Earth) in the sub-band 25.5-27 GHz, and deleted the remainder of this secondary EESS allocation (25.25-25.5 GHz and 27-27.5 GHz).

91. At WRC-97, the United States proposed to upgrade the secondary EESS (space-to-Earth) allocation in the band 25.25-27 GHz to primary status, stating that these downlinks of EESS data to Earth needed to be on a protected basis.¹²⁸ The United States stated that advanced technology EESS spacecraft will require wider bandwidths to download their data and that the band 25.5-27 GHz is suitable for this purpose.¹²⁹ WRC-97 upgraded the EESS (space-to-Earth) allocation as requested.¹³⁰ In its WRC-97 recommendations, NTIA proposed to change the status of the EESS allocation from secondary to primary status in the Federal Government Table.¹³¹

92. There are currently no FCC licensees using the secondary EESS (space-to-space) allocation in the band 25.25-27.5 GHz. We believe that conforming the non-Federal Government Table to the *WARC-92 Final Acts* and thus aligning with the Federal Government Table will increase the utility of this band for future non-Federal Government use. We anticipate that the EESS (space-to-Earth) allocation would be used for data downlinking from non-Federal Government remote sensing satellite systems. Moreover, we believe that the upgrade of the EESS allocation in the band 25.5-27 GHz to primary status will provide Federal agencies with a reliable wideband data transfer capability for future EESS requirements, and that intensive Federal Government use of this band may lower equipment cost for non-Federal Government entities. Accordingly, we propose to: (1) reflect the changes previously made to the Federal Government Table in the *NTIA Manual*, except that footnote 881A is updated to 5.536; (2) upgrade the EESS (space-to-Earth) allocation to primary status in the Federal Government Table; (3) change the directional indicator for the secondary EESS (space-to-space) allocation in the non-Federal Government Table to (space-to-Earth) in the sub-band 25.5-27 GHz; and (4) delete the remainder of this secondary EESS allocation (25.25-25.5 GHz and 27-27.5 GHz). We request comment on all of the above proposals and on whether the band 25.5-27 GHz should be allocated to the ISS on a secondary basis for non-Federal Government use. Table 3, below, summarizes our proposals for this band.

¹²⁷ See Letter from Associate Administrator, NTIA, to Chief, OET, dated May 14, 1996.

¹²⁸ The United States stated that the band 8025-8400 MHz, which is currently used for this purpose, is becoming heavily used by the allocated space services in that band.

¹²⁹ Advances in technology are providing higher resolution instruments which in turn require ever larger bandwidths to download their data from the spacecraft. Present data rates are in the 75-150 Mbps range (requiring up to 300 megahertz of bandwidth) in the band 8025-8400 MHz. Bandwidths as high as 400-800 megahertz are forecast for some EES sensors and cannot be accommodated in the current band.

¹³⁰ See *Final Acts of the World Radiocommunication Conference (WRC-97)* at 59.

¹³¹ See January 2000 NTIA Letter at 32.

Table 3: The Band 25.25-27.5 GHz

Federal Government Table		non-Federal Government Table		Summary of Changes
Current	Proposed	Current	Proposed	
25.25-27 GHz FIXED MOBILE Secondary EESS (space-to-space) Secondary standard frequency & time signal-satellite (uplinks) (“SF&TSS uplinks”)	25.25-25.5 GHz FIXED MOBILE ISS 5.536 (use limited to SRS & EESS applications, & also transmissions of data originating from industrial & medical activities in space) Secondary SF&TSS uplinks	25.25-27 GHz Secondary EESS (space-to-space) Secondary SF&TSS uplinks	25.25-25.5 GHz Secondary SF&TSS uplinks	Additional 250 MHz of Gov’t ISS. Reduction of 250 MHz for EESS.
	25.5-27 GHz FIXED MOBILE ISS 5.536 EESS (downlinks) Secondary SF&TSS uplinks		25.5-27 GHz Secondary EESS (downlinks) Secondary SF&TSS uplinks	Additional 1.5 GHz of Gov’t ISS & EESS; change directional indicator for non- Gov’t EESS.
27-27.5 GHz FIXED MOBILE Secondary EESS (space-to-space)	27-27.5 GHz FIXED MOBILE ISS 5.536	27-27.5 GHz Secondary EESS (space-to-space)	27-27.5 GHz	Additional 500 MHz of Gov’t ISS. Reduction of 500 MHz for EESS.

G. Other Allocation Issues

1. Secondary AMS(R)S Allocation in the Band 136-137 MHz

93. At the 1979 World Administrative Radio Conference (“WARC-79”), the band 136-137 MHz was reallocated to the AM(R)S on a primary basis throughout the world, effective January 1, 1990. This action extended the primary allocation for the AM(R)S in the band 117.975-136 MHz by one megahertz and gave incumbent services ten years to evacuate the band. In the United States, the band 136-137 MHz is allocated to the AM(R)S on a primary basis for non-Federal Government use. Footnote US244 states that certain of the frequencies in the band 136-137 MHz are available on a shared basis to the FAA for air traffic control purposes. Footnote US244 also states that existing METSATS in the band 136-137 MHz may continue to operate on a not-to-interfere basis until January 1, 2002. In addition, the Commission has adopted international footnote 591, which allocates the band 117.975-137 MHz to the AMS(R)S on a secondary basis and on the condition that harmful interference is not caused to the AM(R)S.

94. At WRC-97, the United States proposed to delete all secondary allocations from the band 136-137 MHz in order to make the band available exclusively to the AM(R)S in an attempt to satisfy existing and future AM(R)S requirements.¹³² In particular, the U.S. proposed that footnote 5.198 (previously numbered as footnote 591) be modified to delete the secondary allocation for the AMS(R)S from the band 136-137 MHz. The U.S. stated that there are no plans to implement AMS(R)S in the band 136-137 MHz. WRC-97 modified footnote 5.198 as requested.

95. We have previously deleted all secondary allocations from the band 136-137 MHz, except for the AMS(R)S allocation. Accordingly, we propose to replace international footnote 591 with footnote 5.198 in the U.S. Table for the band 117.975-136 MHz.¹³³ The effect of this proposal is to delete

¹³² See U.S. WRC-97 Proposals at 66.

¹³³ Footnote 5.198 reads as follows: *Additional allocation:* the band 117.975-136 MHz is also allocated to the aeronautical mobile-satellite (R) service on a secondary basis, subject to agreement obtained under No. 9.21.

the unused AMS(R)S allocation from the band 136-137 MHz. In addition, we propose to revise footnote US244 to remove the expired transition plan for METSAT use of the band 136-137 MHz. We request comment on these proposals.

2. The Band 420-450 MHz

96. The band 420-450 MHz is allocated to the radiolocation service on a primary basis for Federal Government use and footnote G2 generally limits such operations to military applications.¹³⁴ Additionally, footnote US217 states that, along the shorelines of the contiguous 48 States and Alaska, pulse-ranging radiolocation systems in the band 420-450 MHz and spread spectrum radiolocation systems in the sub-band 420-435 MHz may be authorized for Federal and non-Federal Government use on a secondary basis. However, systems authorized under footnote US217 that are proposed to be located within the geographic areas listed in footnote US228 should not be expected to be accommodated.¹³⁵ The band 420-450 MHz is also allocated to the amateur service on a secondary basis. Moreover, footnote US7 states that transmitters in the amateur service operating in the band 420-450 MHz in certain geographic areas are limited to 50 watts peak envelop power (“PEP”) unless the Commission can reach an agreement with the applicable military frequency coordinator.¹³⁶

97. On August 8, 2002, NTIA requested that footnotes US7 and US217 be modified and that footnote US228 be deleted.¹³⁷ Specifically, NTIA states that footnotes US217 and US228 should be combined as one footnote; and that the geographical areas in footnotes US7 and US228 should be made identical. In addition, NTIA states that the Army requests an increase in the geographic area listed in subparagraph (a) of footnotes US7 and US228 for New Mexico and Texas. Specifically, the Army requests that the current area in footnotes US7 and US228 be expanded to include all of New Mexico and Texas west of longitude 104° 00' West. The Army states the following in support of its request:

“The new proposed protection criteria is necessary to cover the entire test range operational area. The old restriction boundaries only include the northern half of El Paso, which is located very close to the south end of WSMR (White Sands Missile Range) and to McGregor Range at Fort Bliss. Amateur operations in the metropolitan area of Albuquerque and Santa Fe present a threat to missiles launched at Fort Wingate, NM aimed at the airspace over WSMR. Kirtland Air Force Base, with AF Research Lab (Directed RF Energy Programs), DoD NAG (National Assessment Group), and AFOTEC (Air Force Operational Test and Evaluation Command), is now a DOD test and evaluation center using areas both South (Manzano Mountain range) and West (Fort Sumner) of Albuquerque. Some testing in this area is vulnerable to higher power Amateur operations.”

98. The effect of Army’s request would be to more than double the combined size of those areas of Texas and New Mexico where (1) the maximum transmitter power that amateur stations may use is generally limited to 50 watts PEP rather than the general limit of 1.5 kW PEP; and (2) spread spectrum

¹³⁴ See 47 C.F.R. § 2.106, footnote G2.

¹³⁵ See 47 C.F.R. § 2.106, footnotes US217, US228.

¹³⁶ See 47 C.F.R. § 2.106, footnote US7. Sub-bands within the band 420-450 MHz are also allocated to the amateur-satellite, land mobile, and space operation services and for space telecommand and low power radio control operations. These allocations are not material to the changes we propose herein.

¹³⁷ See Letter for Acting Associate Administrator, Office of Spectrum Management, NTIA, to Chief, OET, FCC, dated August 8, 2002 (“NTIA Amateur/Radiolocation Letter”).

radiolocation systems operating in the sub-band 420-435 MHz should not expect to be accommodated.¹³⁸ We propose to make the changes requested by NTIA. See the Appendix for the proposed revisions to footnotes US7 and US217. Footnote US228 would be deleted. We request comment on these proposals.

99. As stated above, the band 420-450 MHz is allocated to the radiolocation service on a primary basis for Federal Government use. On August 13, 2002, NTIA notified us that it had recently specified that Federal Government wind profilers would operate in the sub-band 448-450 MHz.¹³⁹ Wind profilers are sensitive Doppler radars that measure wind speed and direction at a variety of altitudes. Specifically, NTIA has added the following Federal Government footnote to its *Manual*:

G129 Government wind profilers are authorized to operate on a primary basis in the radiolocation service in the frequency band 448-450 MHz with an authorized bandwidth of no more than 2 MHz centered on 449 MHz, subject to the following conditions: 1) wind profiler locations must be pre-coordinated with the military services to protect fixed military radars; and 2) wind profiler operations shall not cause harmful interference to, nor claim protection from, military mobile radiolocation stations that are engaged in critical national defense operations.

100. Because these operations are permitted under the existing radiolocation allocation, we will place this informational footnote in the Federal Government Table of our Rules. Further, we request comment on whether non-Federal Government wind profilers should also be allowed in this spectrum and if so, whether such an allocation should be on a primary or secondary basis. We also request comment on the impact of wind profiler operations on non-Federal Government operations permitted in this frequency range.

3. On-board Mobile Radiotelephony Communications

101. In most of the world, the maritime mobile frequencies that may be used for on-board mobile radiotelephony communications are listed in footnote 5.287 (previously numbered as 669).¹⁴⁰ However, in the territorial waters of the United States and the Philippines, some of the frequencies used for on-board communications differ from the frequencies used in rest of the world.¹⁴¹ At WRC-97, footnote 5.287 was revised to permit the use of equipment designed for 12.5 kHz channel spacing. Such

¹³⁸ See 47 C.F.R. § 97.313.

¹³⁹ See Letter from Acting Associate Administrator, Office of Spectrum Management, NTIA to Chief, OET, FCC, dated August 13, 2002.

¹⁴⁰ Footnote 5.287 reads as follows: “In the maritime mobile service, the frequencies 457.525 MHz, 457.550 MHz, 457.575 MHz, 467.525 MHz, 467.550 MHz and 467.575 MHz may be used by on-board communication stations. Where needed, equipment designed for 12.5 kHz channel spacing using also the additional frequencies 457.5375 MHz, 457.5625 MHz, 467.5375 MHz and 467.5625 MHz may be introduced for on-board communications. The use of these frequencies in territorial waters may be subject to the national regulations of the administration concerned. The characteristics of the equipment used shall conform to those specified in Recommendation ITU-R M.1174 (see Resolution 341 (WRC-97)).”

¹⁴¹ Footnote 5.288 (previously numbered as 670) reads as follows: “In the territorial waters of the United States and the Philippines, the preferred frequencies for use by on-board communication stations shall be 457.525 MHz, 457.550 MHz, 457.575 MHz and 457.600 MHz paired, respectively, with 467.750 MHz, 467.775 MHz, 467.800 MHz and 467.825 MHz. The characteristics of the equipment used shall conform to those specified in Recommendation ITU-R M.1174.” See 47 C.F.R. § 80.373 (g), wherein these frequencies are listed in our Rules for private communications, limited to on-board communications. We note that Canada is no longer listed in footnote 5.288.

“narrowbanded” on-board mobile radiotelephony equipment may also use the following additional carrier frequencies: 457.5375 MHz, 457.5625 MHz, 467.5375 MHz and 467.5625 MHz.¹⁴²

102. In the United States, the frequencies 457.5375 MHz and 457.5625 MHz are used by eligibles in the Industrial/Business Pool.¹⁴³ However, because the additional carrier frequencies are to be used outside U.S. territorial waters, we do not believe that their use will cause harmful interference to these land mobile users. Accordingly, we propose to replace international footnote 669 with footnote 5.287 in the U.S. Table for the band 456-470 MHz. The effect of this proposal would be to permit maritime mobile equipment that is more spectrum-efficient to have access to ten instead of six channels for on-board communications in areas outside U.S. territorial waters. We request comment on this proposal.

4. IFPRS Use in the Bands 2.1-2.2 GHz and 10.7-11.7 GHz

103. We have recently reviewed our licensing files for Part 23, the International Fixed Public Radiocommunication Services.¹⁴⁴ Footnotes NG23 and NG41 state that frequencies in the band 2100-2200 MHz and in the bands 3700-4200 MHz, 5925-6425 MHz, and 10.7-11.7 GHz, respectively, may also be used for IFPRS communications.¹⁴⁵ There are only three licensees using the bands 3700-4200 MHz and 5925-6425 MHz (“C-band”) on several Caribbean islands. There are no IFPRS operations currently in the bands 2100-2200 MHz and 10.7-11.7 GHz. In order to remove regulations that are no longer needed, we propose to delete footnote NG23, which pertains to the band 2100-2200 MHz, and to revise footnote NG41 to remove the band 10.7-11.7 GHz because we no longer have any IFPRS licensees operating in these bands. We also propose to delete all cross-references to Part 23, except in C-band, from column 6 of our Table of Frequency Allocations because Part 23 does not list any frequencies, which is the purpose of a rule part cross reference.¹⁴⁶ We make this proposal on our own initiative to remove outdated regulations from our Rules. We request comment on this proposal.

5. Secondary MMSS Use of the band 14-14.5 GHz

104. The 14-14.5 GHz band is allocated for FSS uplinks on a primary basis for non-Federal Government use. The band 14-14.5 GHz is heavily used by Very Small Aperture Terminals (“VSATs”) for uplinking to geostationary satellites.¹⁴⁷ These VSAT systems provide video and data communications and are widely deployed at business locations, ranging from the largest corporate headquarters to the smallest convenience stores. Recently, we authorized NGSO FSS gateway and user terminal uplinks to operate in the band 14-14.5 GHz.¹⁴⁸ The band 14-14.5 GHz is also allocated for LMSS uplinks on a

¹⁴² Previously, all on-board mobile radiotelephony equipment used 25 kHz channel spacing.

¹⁴³ See 47 C.F.R. § 90.35.

¹⁴⁴ See 47 C.F.R. Part 23. The IFPTS service was the original means by which international telephone calls were completed. Since 1956, the IFPTS service has atrophied as first overseas voice cables, then FSS links, and now fiber optic cables have essentially replaced radio for international calling.

¹⁴⁵ See 47 C.F.R. 2.106, footnotes NG23 and NG41.

¹⁴⁶ See 47 C.F.R. § 2.106, column 6.

¹⁴⁷ Our database indicates that there are 2672 authorizations issued for GSO FSS earth stations in the 14-14.5 GHz band. The authorizations do not indicate the actual number of earth stations or antennas that a licensee might deploy. For example, since this is a VSAT band, a single GSO FSS authorization could cover several hundred VSAT antennas.

¹⁴⁸ See *Amendment of Parts 2 and 25 of the Commission’s Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range*, ET Docket No. 98-206, *First Report and Order and Further Notice of Proposed Rule Making*, 16 FCC Rcd 4096 (2001).

secondary basis for non-Federal Government use. This LMSS allocation is used by OmniTracs, a satellite-based mobile communications and tracking system that provides real-time messaging and position reporting between fleets and their operations centers.¹⁴⁹

105. The sub-band 14-14.2 GHz is allocated to the radionavigation service on a primary basis for Federal and non-Federal Government use; however, stations in the radionavigation service operate on a secondary basis to FSS uplinks.¹⁵⁰ The sub-band 14-14.2 GHz is also allocated to the space research service on a secondary basis for Federal and non-Federal Government use. In addition, the sub-band 14.2-14.4 GHz is allocated to the mobile except aeronautical mobile service on a secondary basis for non-Federal Government use. The Commission has made this spectrum available for assignment to television pickup and television non-broadcast pickup stations in the Local Television Transmission Service.¹⁵¹ The sub-band 14.4-14.5 GHz is allocated to the fixed and mobile services on a secondary basis for Federal Government use. Footnote US203 states that radio astronomy observations of the formaldehyde line frequencies 14.47-14.5 GHz may be made at certain observatories.¹⁵²

106. At WRC-97, the U.S. proposed to allocate the band 14-14.5 GHz for MMSS uplinks on a secondary basis. The U.S. stated that "several hundred thousand land mobile-satellite terminals have been in operation around the world on a secondary basis for many years. They have proven to be compatible with other services in the band. In recent years, the same terminals have been permitted by many administrations to offer maritime mobile-satellite service in the same band. Such operation has proven to be compatible with other services in this band. It can be concluded that maritime mobile-satellite service is compatible in this band. Aeronautical mobile-satellite applications in this band will require further studies."¹⁵³ WRC-97 allocated the band 14-14.5 GHz to the mobile-satellite (Earth-to-space) except aeronautical mobile-satellite service on a secondary basis.

107. We observe that LMSS operates in the United States on a secondary basis without causing harmful interference to ubiquitously deployed VSATs. As indicated above, other nations have implemented MMSS uplinks in the band 14-14.5 GHz on a secondary basis. We agree with the *U.S. WRC-97 Proposals* that using the same or similar terminals to offer MMSS services in the band 14-14.5 GHz should be compatible with other services in this band, especially since the LMSS allocation has been successfully used in the United States for some time.¹⁵⁴ Accordingly, we propose to allocate the band 14-14.5 GHz to the mobile-satellite (Earth-to-space) except aeronautical mobile-satellite service on a secondary basis for non-Federal Government use.¹⁵⁵ We request comment on this proposal.

¹⁴⁹ Qualcomm's OmniTracs service processes more than six million transactions each day sent to and from a quarter-million trucks. See Qualcomm Service Keeps on Trucking, July 13, 2001 at <http://www.business2.com/articles/web/print/0,1650,16490,FF.html>.

¹⁵⁰ See 47 C.F.R. § 2.106, footnote US292.

¹⁵¹ See 47 C.F.R. Part 101, Subpart J. Our licensing database shows 24 Local Television Transmission, 1 TV pickup, 1 Industrial/ Business Pool, 1 point-to-point microwave, and 2 land mobile radiolocation records for the band 14.2-14.4 GHz.

¹⁵² See 47 C.F.R. § 2.106, footnote US203.

¹⁵³ See *United States of America Proposals for the Work of the Conference*, Document 30-E, dated September 4, 1997, summary of the United States proposals for agenda item 1.9.1.

¹⁵⁴ The OmniTracs service was first offered to the public in 1988.

¹⁵⁵ The unneeded secondary allocation for LMSS (uplinks) would be deleted.

H. Ministerial Amendments

108. We propose to make the following ministerial amendments to Part 2 of our Rules. In the “Little LEO” bands of the U.S. Table,¹⁵⁶ we would replace international footnotes 599A, 608A, 608B, and 647B with footnotes 5.208, 5.219, 5.220, and 5.264, respectively, which are non-substantive changes. We would merge footnote US322 into US320, that is, add the bands 149.9-150.05 MHz and 399.9-400.05 MHz to footnote US320, and delete superfluous footnotes US322 and 599B from the U.S. Table.¹⁵⁷ We would also delete expired footnote US318 from the band 137-138 MHz and the Part 25 cross reference from the band 136-137 MHz. In addition, we would delete expired text from Section 25.202(a)(3), which concerns the allocation status of certain of the Little LEO bands. These changes would merely clean up our rules to remove confusion and outdated provisions.

109. In WT Docket No. 01-289, we proposed to delete the Civil Air Patrol from Part 87 of our Rules because we have no formal relationship with the Civil Air Patrol, which is currently authorized by the U.S. Air Force and NTIA.¹⁵⁸ We did not propose to amend Part 2 in that proceeding. Therefore, we would delete footnote US10, which states that several frequencies in the band 138-144 MHz are available for use to the Civil Air Patrol, herein.

110. We would delete international footnote 510 from the band 144-146 MHz in the non-Federal Government Table. This footnote, through its reference of Resolution 640, invited administrations to provide for the needs of international disaster communications and for the needs of emergency communications using the certain amateur bands. At WRC-2000, footnote 510, which had been renumbered as 5.120, was deleted.¹⁵⁹ We have recently proposed to delete footnote 510 from the amateur bands below 28 MHz.¹⁶⁰

111. We would revise footnote US48 to remove a requirement that is already shown in the Table. That is, there is a primary direct Table allocation for Federal Government radiolocation and a secondary direct Table allocation for non-Federal Government radiolocation in the band 5350-5460 MHz. Thus, it is unnecessary and confusing to include the band 5350-5460 MHz in footnote US48. In contrast, the band 9000-9200 MHz is allocated to the radiolocation service on a secondary basis for both Federal and non-Federal Government use. Therefore, we would revise footnote US48 to read as follows:

US48 In the band 9000-9200 MHz, the use of the radiolocation service by non-Federal Government licensees may be authorized on the condition that harmful interference is not caused to the aeronautical radionavigation service or to the Federal Government radiolocation service.

¹⁵⁶ Little LEOs is the common name for Non-Voice Non-Geostationary MSS systems. Little LEO downlink spectrum is allocated on a primary basis in the bands 137-137.025 MHz, 137.175-137.825 MHz, and 400.15-401 MHz and on a secondary basis in the bands 137.025-137.175 MHz and 137.825-138 MHz. Little LEO uplink spectrum is allocated on a primary basis in the bands 148-150.05 MHz and 399.9-400.05 MHz.

¹⁵⁷ We cannot replace international footnote 599B with 5.209 because we have not allocated the bands 455-456 MHz and 459-460 MHz for Little LEO operations.

¹⁵⁸ See *Review of Part 87 of the Commission's Rules Concerning the Aviation Radio Service*, WT Docket No. 01-289, *Notice of Proposed Rule Making*, 16 FCC Rcd 19,005 at ¶ 35.

¹⁵⁹ See *WRC-2000 Final Acts* at 7.

¹⁶⁰ See *Amendment of Parts 2, 73, 74, 80, 90, and 97 of the Commission's Rules to Implement Decisions from World Radiocommunication Conferences Concerning Frequency Bands Below 28000 kHz*, ET Docket No. 02-16, *Notice of Proposed Rule Making and Order*, FCC 02-23, rel. February 7, 2002, at ¶ 35.

112. We would revise footnote US110 to remove requirements that are already shown in the Table. That is, there are primary direct Table allocations for Federal Government radiolocation and secondary direct Table allocations for non-Federal Government radiolocation in all of the bands listed in footnote US110, except for the band 9200-9300 MHz, which is allocated to both the Federal and non-Federal Government radiolocation service on a secondary basis. The protection requirement with regard to airborne doppler radars at 8800 MHz and to airport surface detection equipment (“ASDE”) operating between 15.7-16.2 GHz is not needed because both of these functions are covered under the radiolocation allocation. Therefore, we would revise footnote US110 to read as follows:

US110 In the band 9200-9300 MHz, the use of the radiolocation service by non-Federal Government licensees may be authorized on the condition that harmful interference is not caused to the maritime radionavigation service or to the Federal Government radiolocation service.

113. We would revise footnote US310 by specifying the pfd limits for all angles of arrival. Currently US310 specifies only the maximum and minimum pfd limits and references CCIR Recommendation 510-1, which has been renumbered as Recommendation ITU-R SA.510-2, for the specific requirements. Rather than reference ITU Recommendations that could be changed, therefore changing our regulations without notice and comment, we would place the requirements of Recommendation ITU-R SA.510-2 into our rules.

114. We would add a reference to footnote NG167 in the band 17.3-17.7 GHz in order to explicitly tie the allocation for the broadcasting-satellite service in the band 17.3-17.7 GHz to its feeder link allocation in the band 24.75-25.25 GHz. While this requirement already exists, we believe that having reference to footnote NG167 in both bands makes the requirement clearer.

115. We would make the following changes to the rule part cross-references in column 6 of the Table of Frequency Allocations:¹⁶¹ (1) delete Part 87, the Aviation Services, from the band 29.8-30 MHz and add Part 87 to the bands 72-73 MHz, 74.6-74.8 MHz, and 156.2475-157.0375 MHz; (2) add Part 90, the Private Land Mobile Radio Services, to the band 410-420 MHz; (3) add Part 80, the Maritime Services, to the band 1525-1535 MHz; and (4) add Part 25, Satellite Communications, to the band 1660-1660.5 MHz. This action would update the rule part cross-references, thus making our Rules more useful to the public.

116. We would also make the following changes to eliminate outdated requirements or correct typographical errors: (1) clarify in footnote US217 that spread spectrum radiolocation systems may be authorized for Federal and non-Federal Government use in the sub-band 420-435 MHz within Alaska and the contiguous 48 states and correct several typographical errors; (2) correct a typographical error in footnote US316 by changing the NEXRAD expansion band from 2900-3100 MHz to 2900-3000 MHz; (3) delete the references to footnote NG30 in the band 806-894 MHz and to footnote NG43 in the band 806-849 MHz from the non-Federal Government Table because these footnotes have previously been deleted, but were not fully removed from the non-Federal Government Table;¹⁶² (4) delete footnote NG63 because our licensing files show that there are no television broadcast translator stations still authorized to operate in the band 806-890 MHz (old TV channels 70-83); and (5) delete footnote US54 because Federal Government radiolocation systems that could cause harmful interference to ARNS have had at least since

¹⁶¹ The FCC rule part cross-references are not allocations and are provided for informational purposes. *See* 47 C.F.R. § 2.105(d)(6).

¹⁶² *See Reallocation of Television Channels 60-69, the 746-806 MHz Band*, ET Docket No. 97-157, *Report and Order*, 12 FCC Rcd 22,953 (1998).

1961 to move to other frequency bands.¹⁶³

117. International footnote 5.149 states that, in making assignments to stations of other services to which the bands listed in the footnote are allocated, administrations are urged to take all practicable steps to protect the RAS from harmful interference.¹⁶⁴ The Commission has domestically implemented international footnote 5.149 in many of the bands listed in this footnote by adding it to the U.S. Table. Recently, in the *V-band Report and Order*, we decided to employ a new similarly worded United States footnote US342 (instead of footnote 5.149) in the frequency range from 36 GHz to 51 GHz in order to more clearly state which bands Commission licensees should protect the RAS from harmful interference.¹⁶⁵ We took this action because different domestic requirements have been adopted in certain of the frequency bands listed in footnote 5.149.¹⁶⁶ In addition, several of the bands listed in footnote 5.149 are passive bands in the United States and therefore, the urgings of 5.149 are moot.¹⁶⁷ With regard to the frequency range from 28 MHz to 36 GHz, we observe that footnote 5.149 has previously been added to the U.S. Table in the bands 37.5-38.25 MHz, 322-328.6 MHz, 1330-1400 MHz, 1610.6-1613.8 MHz, 1660-1660.5 MHz, 1668.5-1670 MHz, 3260-3267 MHz, 3332-3339 MHz, 3345.8-3352.5 MHz, 4825-4835 MHz, 4950-4990 MHz, 6650-6675.2 MHz, 14.47-14.5 GHz, 22.01-22.5 GHz, 22.81-22.86 GHz, 23.07-23.12 GHz, and 31.2-31.3 GHz. We propose to replace the reference to footnote 5.149 with US342 in the U.S. Table for these frequency bands. We also propose to add the bands 4950-4990 MHz and 6650-6675.2 MHz to the text of footnote US342; all other bands in the frequency range from 28 MHz to 36 GHz have previously been added to footnote US342.¹⁶⁸ In addition, we propose to delete footnote 5.149 from the passive band 1660.5-1668.4 MHz because no station may transmit in this frequency band.¹⁶⁹ Consistent with WRC-2000's revision of footnote 5.149, we also propose to revise footnote US342 by deleting the indication showing which frequency bands are used for spectral line observations. See the Appendix for the proposed revision of footnote US342. In addition, we request comment on whether footnote US342 should be revised to state that licensees are "urged" (similar to footnote 5.149), instead of required (as currently indicated in footnote US342), to take all practicable steps to protect the RAS from harmful interference.

¹⁶³ We observe that as a condition of its allocation, the non-Federal Government radiolocation service may not cause interference to ARNS or to the Federal Government radiolocation service. See 47 C.F.R. § 2.106, footnote US48.

¹⁶⁴ See 47 C.F.R. § 2.106, footnote 5.149.

¹⁶⁵ 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, *Report and Order*, 13 FCC Rcd 24649 (1999) ("*V-band Report and Order*").

¹⁶⁶ Specifically, the Commission has adopted different requirements in the bands 406.1-410 MHz, 1718.8-1722.2 MHz, 2655-2690 MHz, 10.6-10.68 GHz, and 72.77-72.91 GHz. See 47 C.F.R. § 2.106, footnotes US117, US256, US269, US277, and US270, respectively.

¹⁶⁷ In the United States, no station will be authorized to transmit in the bands 608-614 MHz (except for medical telemetry equipment), 1660.5-1668.4 MHz, 4990-5000 MHz, and 31.5-31.8 GHz. See 47 C.F.R. § 2.106, footnote US246. In addition, the band 73-74.6 MHz is allocated exclusively to the RAS.

¹⁶⁸ The text of footnote US342 that was adopted in the *V-band Report and Order* should have included all frequency bands from footnote 5.149 that were applicable to the United States; however, by oversight, the bands 4940-4990 MHz and 6650-6675.2 MHz were not listed. In addition, references to footnote 5.149 were replaced by reference to footnote US342 in the U.S. Table only in the frequency range from 36 GHz to 51 GHz.

¹⁶⁹ See 47 C.F.R. § 2.106, footnote US246.

118. We note that the band 73-74.6 MHz is allocated exclusively to the RAS. In the United States, passive bands are listed in footnote US246, which states that no station will be authorized to transmit in the bands listed therein. Accordingly, we propose to add the band 73-74.6 MHz to footnote US246.

IV. PROCEDURAL MATTERS

A. Initial Regulatory Flexibility Certification

119. The Regulatory Flexibility Act of 1980, as amended (“RFA”),¹⁷⁰ requires that an initial regulatory analysis be prepared for notice-and-comment rule making proceedings, unless the agency certifies that the “the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities.”¹⁷¹ The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”¹⁷² In addition, the term “small business” has the same meaning as the term “small business concern” under the Small Business Act.¹⁷³ A “small business concern” is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (“SBA”).¹⁷⁴

120. This *Notice of Proposed Rule Making* (“Notice”) proposes to amend Parts 2, 25, and 87 of our Rules in order to implement domestically various allocation decisions from several World Radiocommunication Conferences concerning the frequency bands between 28 MHz and 36 GHz and to otherwise update our Rules in this frequency range. These allocation proposals mainly affect Federal agencies.¹⁷⁵ Those proposals that are most significant to non-Federal Government operations are: (1) implementing generic L-band MSS allocations; (2) allocating the band 1164-1189 MHz to the RNSS; and (3) deleting unused and limited FSS and BSS allocations from the band 2500-2690 MHz. Concerning L-band MSS, currently there is only one U.S. licensee. Concerning the RNSS allocation, only one or at most a few large companies are expected to be able to launch and maintain RNSS systems, which are expensive. The last proposal merely deletes unused allocations, with no direct effect on licensees or regulatees.

121. We have determined that the rules proposed in this *Notice* will not, if promulgated, have a significant economic impact on a substantial number of small entities. Accordingly, we hereby certify that this *Notice* will not have a significant economic impact on a substantial number of small entities. The Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, will send a

¹⁷⁰ See 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. Law No. 104-121, Title II, 110 Stat. 857 (1996).

¹⁷¹ 5 U.S.C. § 605(b).

¹⁷² 5 U.S.C. § 601(6).

¹⁷³ 5 U.S.C. § 601(3) (incorporating by reference the definition of “small business concern” in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies “unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register.”

¹⁷⁴ 15 U.S.C. § 632.

¹⁷⁵ See paras. 5-6, *supra*.

copy of this *Notice*, including this certification, to the Chief Counsel for Advocacy of the Small Business Administration.¹⁷⁶ A copy will also be published in the Federal Register.¹⁷⁷

B. *Ex Parte* Rules - - Permit-But-Disclose Proceeding

122. This is a permit-but-disclose notice and comment rule making proceeding. *Ex parte* presentations are permitted, except during the Sunshine Agenda period, provided they are disclosed as provided in the Commission's rules. *See generally* 47 C.F.R. §§ 1.1202, 1.1203, and 1.2306(a).

C. Comments

123. Pursuant to Sections 1.415 and 1.419 of the Commission's rules, 47 C.F.R. §§ 1.415 and 1.419, interested parties may file comments on or before [60 days from date of publication in the Federal Register] and reply comments on or before [90 days from date of publication in the Federal Register]. Comments may be filed using the Commission's Electronic Comment Filing System ("ECFS"), <http://www.fcc.gov/e-file/ecfs.html>, or by filing paper copies. *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 Fed. Reg. 23,121 (1998).

124. Comments filed through the ECFS can be sent as an electronic file via the Internet to <http://www.fcc.gov/e-file/ecfs.html>. Generally, only one copy of an electronic submission must be filed. If multiple docket or rulemaking numbers appear in the caption of this proceeding, however, commenters must transmit one electronic copy of the comments to each docket or rulemaking number referenced in the caption. In completing the transmittal screen, commenters should include their full name, U.S. Postal Service mailing address, and the applicable docket or rulemaking number. Parties may also submit an electronic comment by Internet e-mail. To get filing instructions for e-mail comments, commenters should send an e-mail to ecfs@fcc.gov, and should include the following words in the body of the message, "get form <your e-mail address.>" A sample form and directions will be sent in reply. Parties who choose to file by paper must file an original and four copies of each filing. If more than one docket or rulemaking number appear in the caption of this proceeding, commenters must submit two additional copies for each additional docket or rulemaking number.

125. Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail (although we continue to experience delays in receiving U.S. Postal Service mail). The Commission's contractor, Vistronix, Inc., will receive hand-delivered or messenger-delivered paper filings for the Commission's Secretary at 236 Massachusetts Avenue, N.E., Suite 110, Washington, D.C. 20002. The filing hours at this location are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes 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 mail, Express Mail, and Priority Mail should be addressed to 445 12th Street, SW, Washington, D.C. 20554. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

126. Parties who choose to file by paper should also submit their comments on diskette. Such a submission should be on a 3.5-inch diskette formatted in an IBM compatible format using Microsoft Word or compatible software. The diskette should be accompanied by a cover letter and should be submitted in "read only" mode. The diskette should be clearly labeled with the commenter's name, proceeding (including the lead docket number, type of pleading (comment or reply comment), date of

¹⁷⁶ 5 U.S.C. § 605(b).

¹⁷⁷ 5 U.S.C. § 605(b).

submission, and the name of the electronic file on the diskette. The label should also include the following phrase "Disk Copy – Not an Original." Each diskette should contain only party's pleading, preferably in a single electronic file. In addition, commenters must send diskette copies to the Commission's copy contractor, Qualex International, Portals II, 445 12th Street, SW, Room CY-B402, Washington, DC, 20554.

127. Alternative formats (computer diskette, large print, audio cassette and Braille) are available to persons with disabilities by contacting Brian Millin at (202) 418-7426, TTY (202) 418-2555, or via e-mail to bmillin@fcc.gov. This *Notice* can also be downloaded at <http://www.fcc.gov/oet>.

D. Contact Person

128. For further information concerning this rule making proceeding contact Tom Mooring at (202) 418-2450, tmooring@fcc.gov, Office of Engineering and Technology.

V. ORDERING CLAUSES

129. Accordingly, IT IS ORDERED that pursuant to Sections 1, 4, 301, 302(a), 303, 307, 309, 316, 332, 334, and 336 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 151, 154, 301, 302(a), 303, 307, 309, 316, 332, 334, and 336, the NOTICE OF PROPOSED RULE MAKING is hereby ADOPTED.

130. 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 RULE MAKING, including the Initial Regulatory Flexibility Certification, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX: PROPOSED RULES

For the reasons discussed in the preamble, the Federal Communications Commission proposes to amend 47 CFR parts 2, 25, and 87 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 2.1 is revised by adding the following definitions in alphabetic order:

§ 2.1 Terms and definitions.

* * * * *

Differential Global Positioning System (DGPS) Station. A differential RNSS station for specific augmentation of GPS.

Differential Radionavigation Satellite Service (Differential RNSS) Station. A station used for the transmission of differential correction data and related information (such as ionospheric data and RNSS satellite integrity information) as an augmentation to an RNSS system for the purpose of improved navigation accuracy.

* * * * *

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

- a. Revise pages 22-75.

- b. In the list of International Footnotes under heading II., remove footnotes 591, 599A, 599B, 608A, 608B, 647B, 669, and 792A.

- c. In the list of United States (US) Footnotes, revise US7, US48, US110, US217, US244, US246, US262, US276, US277, US278, US310, US316, US320, US328, and US342; remove US10, US54, US228, US269, US318, and US322; and add footnotes USxxx, USyyy, and USzzz.

- d. In the list of Non-Federal Government (NG) Footnotes, remove NG23, NG47, NG63, NG101, and NG102; and revise NG41.

- e. In the list of Federal Government (G) Footnotes, revise footnote G2 and add footnote G129.

§ 2.106 Table of Frequency Allocations.

The revisions and additions read as follows:

* * * * *

28-33 MHz (HF/VHF)

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
28-29.7 AMATEUR AMATEUR-SATELLITE			28-29.89	28-29.7 AMATEUR AMATEUR-SATELLITE US340	Amateur (97)
29.7-30.005 FIXED MOBILE			US340	29.7-29.8 LAND MOBILE	Private Land Mobile (90)
				29.8-29.89 FIXED	
				29.89-29.91 FIXED MOBILE	
				29.91-30	
30.005-30.01 SPACE OPERATION (satellite identification) FIXED MOBILE SPACE RESEARCH			30-30.56 FIXED MOBILE	30-30.56	
			30.01-37.5 FIXED MOBILE		
			32-33 FIXED MOBILE	32-33	
			See next page for 33-37.5 MHz		See next page for 33-37.5 MHz

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
See previous page for 30.01-37.5 MHz			33-34	33-34 FIXED LAND MOBILE NG124	Private Land Mobile (90)
			34-35 FIXED MOBILE	34-35	
			35-36	35-36 FIXED LAND MOBILE	Public Mobile (22) Private Land Mobile (90)
			36-37 FIXED MOBILE US220	36-37 US220	
			37-37.5	37-37.5 LAND MOBILE NG124	Private Land Mobile (90)
37.5-38.25 FIXED MOBILE Radio astronomy			37.5-38 Radio astronomy US342	37.5-38 LAND MOBILE Radio astronomy US342 NG59 NG124	
			38-38.25 FIXED MOBILE RADIO ASTRONOMY	38-38.25 RADIO ASTRONOMY	
5.149			US81 US342	US81 US342	
38.25-39.986 FIXED MOBILE			38.25-39 FIXED MOBILE	38.25-39	
			39-40	39-40 LAND MOBILE NG124	Private Land Mobile (90)
39.986-40.02 FIXED MOBILE Space research			40-42 FIXED MOBILE	40-40.98	ISM Equipment (18) Private Land Mobile (90)

40.02-40.98 FIXED MOBILE					
5.150				5.150 US210	
40.98-41.015 FIXED MOBILE Space research				40.98-42	
5.160 5.161					
41.015-44 FIXED MOBILE			5.150 US210 US220	US220	
5.160 5.161			42-46.6	42-43.69 FIXED LAND MOBILE NG124 NG141	Public Mobile (22) Private Land Mobile (90)
				43.69-46.6 LAND MOBILE	Private Land Mobile (90)
44-47 FIXED MOBILE				NG124 NG141	
5.162 5.162A			46.6-47 FIXED MOBILE	46.6-47	
47-68 BROADCASTING	47-50 FIXED MOBILE	47-50 FIXED MOBILE BROADCASTING 5.162A	47-49.6	47-49.6 LAND MOBILE NG124	Private Land Mobile (90)
			49.6-50 FIXED MOBILE	49.6-50	
5.162A 5.163 5.164 5.165 5.169 5.171	See next page for 50-68 MHz		See next page for 50-73 MHz	See next page for 50-72 MHz	See next page for 50-72 MHz

	75.4-76 FIXED MOBILE	75.4-87 FIXED MOBILE	75.4-88	75.4-76 FIXED MOBILE NG3 NG49 NG56	Public Mobile (22) Private Land Mobile (90) Personal Radio (95)
5.175 5.179 5.184 5.187	76-88 BROADCASTING Fixed Mobile	5.182 5.183 5.188		76-88 BROADCASTING	Broadcast Radio (TV) (73) Auxiliary Broadcasting (74)
87.5-100 BROADCASTING	5.185	87-100 FIXED MOBILE BROADCASTING		NG128 NG129 NG149	
5.190	88-100 BROADCASTING		88-108	88-108 BROADCASTING	Broadcast Radio (FM) (73) Auxiliary Broadcasting (74)
100-108 BROADCASTING			US93	US93 NG2 NG128 NG129	
5.192 5.194			108-117.975 AERONAUTICAL RADIONAVIGATION		Aviation (87)
108-117.975 AERONAUTICAL RADIONAVIGATION			US93 US343		
5.197			117.975-121.9375 AERONAUTICAL MOBILE (R)		
117.975-137 AERONAUTICAL MOBILE (R)			5.111 5.198 5.199 5.200 US26 US28		
			121.9375-123.0875	121.9375-123.0875 AERONAUTICAL MOBILE	
			5.198 US30 US31 US33 US80 US102 US213	5.198 US30 US31 US33 US80 US102 US213	
			123.0875-123.5875 AERONAUTICAL MOBILE		
			5.198 5.200 US32 US33 US112		
5.111 5.198 5.199 5.200 5.201 5.202 5.203 5.203A 5.203B			See next page for 123.5875-137 MHz		See next page for 123.5875-137 MHz

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
See previous page for 117.975-137 MHz			123.5875-128.8125 AERONAUTICAL MOBILE (R) 5.198 US26		Aviation (87)
			128.8125-132.0125 5.198	128.8125-132.0125 AERONAUTICAL MOBILE (R) 5.198	
			132.0125-136.00 AERONAUTICAL MOBILE (R) 5.198 US26		
			136-137 US244	136-137 AERONAUTICAL MOBILE (R) US244	
137-137.025 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) 5.208A 5.209 SPACE RESEARCH (space-to-Earth) Fixed Mobile except aeronautical mobile (R)			137-137.025 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) US319 US320 SPACE RESEARCH (space-to-Earth)		Satellite Communications (25)
5.204 5.205 5.206 5.207 5.208			5.208		
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 5.209 Mobile except aeronautical mobile (R)			137.025-137.175 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Mobile-satellite (space-to-Earth) US319 US320		
5.204 5.205 5.206 5.207 5.208			5.208		
137.175-137.825 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) 5.208A 5.209 SPACE RESEARCH (space-to-Earth) Fixed			137.175-137.825 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) US319 US320 SPACE RESEARCH (space-to-Earth)		

Mobile except aeronautical mobile (R)					
5.204 5.205 5.206 5.207 5.208			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 5.209 Mobile except aeronautical mobile (R)			137.825-138 SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Mobile-satellite (space-to-Earth) US319 US320		
5.204 5.205 5.206 5.207 5.208			5.208		
138-143.6 AERONAUTICAL MOBILE (OR)	138-143.6 FIXED MOBILE RADIOLOCATION Space research (space-to-Earth)	138-143.6 FIXED MOBILE Space research (space-to-Earth)	138-144 FIXED MOBILE	138-144	
5.210 5.211 5.212 5.214		5.207 5.213			
143.6-143.65 AERONAUTICAL MOBILE (OR) SPACE RESEARCH (space-to-Earth)	143.6-143.65 FIXED MOBILE RADIOLOCATION SPACE RESEARCH (space-to-Earth)	143.6-143.65 FIXED MOBILE SPACE RESEARCH (space-to-Earth)			
5.211 5.212 5.214		5.207 5.213			
143.65-144 AERONAUTICAL MOBILE (OR)	143.65-144 FIXED MOBILE RADIOLOCATION Space research (space-to-Earth)	143.65-144 FIXED MOBILE Space research (space-to-Earth)	G30		
5.210 5.211 5.212 5.214		5.207 5.213			
144-146 AMATEUR AMATEUR-SATELLITE			144-148	144-146 AMATEUR AMATEUR-SATELLITE	Amateur (97)
5.216					
146-148 FIXED MOBILE except aeronautical mobile (R)	146-148 AMATEUR	146-148 AMATEUR FIXED MOBILE		146-148 AMATEUR	
	5.217	5.217			

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
148-149.9 FIXED MOBILE except aeronautical mobile (R) MOBILE-SATELLITE (Earth-to-space) 5.209	148-149.9 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) 5.209		148-149.9 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) US319 US320 US323 US325	148-149.9 MOBILE-SATELLITE (Earth-to-space) US319 US320 US323 US325	Satellite Communications (25)
5.218 5.219 5.221	5.218 5.219 5.221		5.218 5.219 G30	5.218 5.219	
149.9-150.05 MOBILE-SATELLITE (Earth-to-space) 5.209 5.224A RADIONAVIGATION-SATELLITE 5.224B			149.9-150.05 MOBILE-SATELLITE (Earth-to-space) US319 US320 RADIONAVIGATION-SATELLITE		
5.220 5.222 5.223			5.223		
150.05-153 FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY	150.05-156.7625 FIXED MOBILE		150.05-150.8 FIXED MOBILE US216 G30	150.05-150.8 US216	
			150.8-152.855 US216	150.8-152.855 FIXED LAND MOBILE NG112 US216 NG4 NG51 NG124	Public Mobile (22) Private Land Mobile (90) Personal Radio (95)
5.149			152.855-154	152.855-154 LAND MOBILE NG4 NG124	Auxiliary Broadcasting (74) Private Land Mobile (90)
153-154 FIXED MOBILE except aeronautical mobile (R) Meteorological aids			154-156.2475 5.226	154-156.2475 FIXED LAND MOBILE NG112 5.226 NG117 NG124 NG148	Maritime (80) Private Land Mobile (90) Personal Radio (95)
154-156.7625 FIXED MOBILE except aeronautical mobile (R)			156.2475-157.0375	156.2475-157.0375 MARITIME MOBILE	Aviation (87)
5.226 5.227	5.225 5.226 5.227				

156.7625-156.8375 MARITIME MOBILE (distress and calling)			
5.111 5.226		5.226 5.227 US77 US106 US107 US266	5.226 5.227 US77 US106 US107 US266 NG117
156.8375-174 FIXED MOBILE except aeronautical mobile	156.8375-174 FIXED MOBILE	157.0375-157.1875 MARITIME MOBILE	157.0375-157.1875 Private Land Mobile (90)
		5.226 US214 US266 G109	5.226 US214 US266
		157.1875-157.45	157.1875-157.45 LAND MOBILE MARITIME MOBILE Maritime (80) Private Land Mobile (90)
		5.226 US223 US266	5.226 US223 US266 NG111
		157.45-161.575	157.45-161.575 FIXED LAND MOBILE Public Mobile (22) Maritime (80) Private Land Mobile (90)
		5.226 US266	5.226 US266 NG6 NG28 NG70 NG111 NG112 NG124 NG148 NG155
		161.575-161.625	161.575-161.625 MARITIME MOBILE Public Mobile (22) Maritime (80)
		5.226 US77	5.226 US77 NG6 NG17
		161.625-161.775	161.625-161.775 LAND MOBILE Public Mobile (22) Auxiliary Broadcasting (74)
		5.226	5.226 NG6
161.775-162.0125	161.775-162.0125 LAND MOBILE MARITIME MOBILE Public Mobile (22) Maritime (80) Private Land Mobile (90)		
5.226 US266	5.226 US266 NG6		
5.226 5.229	5.226 5.230 5.231 5.232	See next page for 162.0125-174 MHz	See next page for 162.0125-174 MHz

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
See previous page for 156.8375-174 MHz			162.0125-173.2 FIXED US13 MOBILE	162.0125-173.2	Auxiliary Broadcasting (74) Private Land Mobile (90)
			5.226 US8 US11 US216 US223 US300 US312 G5	5.226 US8 US11 US13 US216 US223 US300 US312	
			173.2-173.4	173.2-173.4 FIXED Land mobile	Private Land Mobile (90)
			173.4-174 FIXED MOBILE	173.4-174	
			G5		
174-223 BROADCASTING	174-216 BROADCASTING Fixed Mobile	174-223 FIXED MOBILE BROADCASTING	174-216	174-216 BROADCASTING	Broadcast Radio (TV) (73) Auxiliary Broadcasting (74)
	5.234		NG115 NG128 NG149		
	216-220 FIXED MARITIME MOBILE Radiolocation 5.241		216-220 Fixed Mobile Radiolocation 5.241 G2	216-220 FIXED MOBILE except aeronautical mobile	Maritime (80) Private Land Mobile (90) Personal Radio (95) Amateur (97)
	5.242		US210 US229	US210 US229 NG152 NG173	
	220-225 AMATEUR FIXED MOBILE Radiolocation 5.241		220-222 FIXED LAND MOBILE Radiolocation 5.241 G2	220-222 FIXED LAND MOBILE	Private Land Mobile (90)
			US335	US335	
5.235 5.237 5.243		5.233 5.238 5.240 5.245	222-225 Radiolocation 5.241 G2	222-225 AMATEUR	Amateur (97)

223-230 BROADCASTING Fixed Mobile	225-235 FIXED MOBILE	223-230 FIXED MOBILE BROADCASTING AERONAUTICAL RADIONAVIGATION Radiolocation	225-235 FIXED MOBILE	225-235	
5.243 5.246 5.247		5.250			
230-235 FIXED MOBILE		230-235 FIXED MOBILE AERONAUTICAL RADIONAVIGATION			
5.247 5.251 5.252		5.250	G27		
235-267 FIXED MOBILE			235-267 FIXED MOBILE	235-267	
5.111 5.199 5.252 5.254 5.256			5.111 5.199 5.256 G27 G100	5.111 5.199 5.256	
267-272 FIXED MOBILE Space operation (space-to-Earth)			267-322 FIXED MOBILE	267-322	
5.254 5.257					
272-273 SPACE OPERATION (space-to-Earth) FIXED MOBILE					
5.254					
273-312 FIXED MOBILE					
5.254					
312-315 FIXED MOBILE Mobile-satellite (Earth-to-space) 5.254 5.255					
315-322 FIXED MOBILE					
5.254			G27 G100		

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
322-328.6 FIXED MOBILE RADIO ASTRONOMY			322-328.6 FIXED MOBILE	322-328.6	
5.149			US342 G27	US342	
328.6-335.4 AERONAUTICAL RADIONAVIGATION 5.258			328.6-335.4 AERONAUTICAL RADIONAVIGATION 5.258		
5.259					
335.4-387 FIXED MOBILE			335.4-399.9 FIXED MOBILE	335.4-399.9	
5.254					
387-390 FIXED MOBILE Mobile-satellite (space-to-Earth) 5.208A 5.254 5.255					
390-399.9 FIXED MOBILE					
5.254			G27 G100		
399.9-400.05 MOBILE-SATELLITE (Earth-to-space) 5.209 5.224A RADIONAVIGATION-SATELLITE 5.222 5.224B 5.260			399.9-400.05 MOBILE-SATELLITE (Earth-to-space) US319 US320 RADIONAVIGATION-SATELLITE 5.260		
5.220					
400.05-400.15 STANDARD FREQUENCY AND TIME SIGNAL-SATELLITE (400.1 MHz)			400.05-400.15 STANDARD FREQUENCY AND TIME SIGNAL-SATELLITE (400.1 MHz)		
5.261 5.262			5.261		
400.15-401 METEOROLOGICAL AIDS METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) 5.208A 5.209 SPACE RESEARCH (space-to-Earth) 5.263 Space operation (space-to-Earth)			400.15-401 METEOROLOGICAL AIDS (radiosonde) US70 METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) US319 US320 US324	400.15-401 METEOROLOGICAL AIDS (radiosonde) US70 MOBILE-SATELLITE (space-to-Earth) US319 US320 US324 SPACE RESEARCH (space-to-Earth) 5.263	Satellite Communications (25)

5.262 5.264	SPACE RESEARCH (space-to-Earth) 5.263 Space operation (space-to-Earth)	Space operation (space-to-Earth)	
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-SAT- ELLITE (Earth-to-space) USxxx	401-402 METEOROLOGICAL AIDS (radiosonde) US70 SPACE OPERATION (space-to-Earth) Earth exploration-satellite (Earth-to-space) Meteorological-satellite (Earth-to-space) USxxx	
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-SAT- ELLITE (Earth-to-space) US345 USxxx	402-403 METEOROLOGICAL AIDS (radiosonde) US70 Earth exploration-satellite (Earth-to-space) Meteorological-satellite (Earth-to-space) US345 USxxx	Personal Radio (95)
403-406 METEOROLOGICAL AIDS Fixed Mobile except aeronautical mobile	403-406 METEOROLOGICAL AIDS (radiosonde) US70 US345 G6	403-406 METEOROLOGICAL AIDS (radiosonde) US70 US345	
406-406.1 MOBILE-SATELLITE (Earth-to-space) 5.266 5.267	406-406.1 MOBILE-SATELLITE (Earth-to-space) 5.266 5.267		
406.1-410 FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY 5.149	406.1-410 FIXED US13 MOBILE RADIO ASTRONOMY US74 US117 G5 G6	406.1-410 RADIO ASTRONOMY US74 US13 US117	

410-470 MHz (UHF)

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
410-420 FIXED MOBILE except aeronautical mobile SPACE RESEARCH (space-to-space) 5.268			410-420 FIXED US13 MOBILE SPACE RESEARCH (space-to-space) 5.268 G5	410-420 US13	Private Land Mobile (90)
420-430 FIXED MOBILE except aeronautical mobile Radiolocation 5.269 5.270 5.271			420-450 RADIOLOCATION US217 US228 G2 G129	420-450 Amateur US7 NG135	Private Land Mobile (90) Amateur (97)
430-440 AMATEUR RADIOLOCATION 5.138 5.271 5.272 5.273 5.274 5.275 5.276 5.277 5.280 5.281 5.282 5.283	430-440 RADIOLOCATION Amateur 5.271 5.276 5.277 5.278 5.279 5.281 5.282				
440-450 FIXED MOBILE except aeronautical mobile Radiolocation 5.269 5.270 5.271 5.284 5.285 5.286			5.286 US7 US87 US230 G8	5.282 5.286 US87 US217 US228 US230	
450-455 FIXED MOBILE			450-454 5.286 US87	450-454 LAND MOBILE 5.286 US87 NG112 NG124	Auxiliary Broadcasting (74) Private Land Mobile (90)
5.209 5.271 5.286 5.286A 5.286B 5.286C 5.286D 5.286E			454-456	454-455 FIXED LAND MOBILE NG12 NG112 NG148	Public Mobile (22) Maritime (80)
455-456 FIXED MOBILE 5.209 5.271 5.286A 5.286B 5.286C 5.286E	455-456 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) 5.286A 5.286B 5.286C 5.209	455-456 FIXED MOBILE 5.209 5.271 5.286A 5.286B 5.286C 5.286E		455-456 LAND MOBILE	Auxiliary Broadcasting (74)

456-459 FIXED MOBILE 5.271 5.287 5.288			456-460	456-460 FIXED LAND MOBILE	Public Mobile (22) Maritime (80) Private Land Mobile (90)
459-460 FIXED MOBILE 5.209 5.271 5.286A 5.286B 5.286C 5.286E	459-460 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) 5.286A 5.286B 5.286C 5.209	459-460 FIXED MOBILE 5.209 5.271 5.286A 5.286B 5.286C 5.286E			
460-470 FIXED MOBILE Meteorological-satellite (space-to-Earth)			460-470 Meteorological-satellite (space-to-Earth) 5.287 5.288 5.289 US201 US209 US216	460-462.5375 FIXED LAND MOBILE 5.289 US201 US209 NG124	Private Land Mobile (90)
				462.5375-462.7375 LAND MOBILE 5.289 US201	Personal Radio (95)
				462.7375-467.5375 FIXED LAND MOBILE 5.287 5.289 US201 US209 US216 NG124	Private Land Mobile (90)
				467.5375-467.7375 LAND MOBILE 5.287 5.289 US201	Personal Radio (95)
				467.7375-470 FIXED LAND MOBILE 5.288 5.289 US201 US216 NG124	Private Land Mobile (90)
5.287 5.288 5.289 5.290					

International Table			United States Table		FCC Rule Part(s)	
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government		
470-790 BROADCASTING	470-512 BROADCASTING Fixed Mobile 5.292 5.293	470-585 FIXED MOBILE BROADCASTING	470-608	470-512 BROADCASTING NG128 NG149 FIXED NG127 LAND MOBILE NG66 NG114	Public Mobile (22) Broadcast Radio (TV) (73) Auxiliary Broadcasting (74) Private Land Mobile (90)	
	512-608 BROADCASTING 5.297	5.291 5.298 585-610 FIXED MOBILE BROADCASTING RADIONAVIGATION		512-608 BROADCASTING NG128 NG149	Broadcast Radio (TV) (73) Auxiliary Broadcasting (74)	
	608-614 RADIO ASTRONOMY Mobile-satellite except aeronautical mobile-satellite (Earth-to-space)	5.149 5.305 5.306 5.307 610-890 FIXED MOBILE 5.317A BROADCASTING	608-614 RADIO ASTRONOMY US74 LAND MOBILE US350	608-614 RADIO ASTRONOMY US74 LAND MOBILE US350	Personal (95)	
	614-806 BROADCASTING Fixed Mobile			US246		
				614-890	614-890	614-698 BROADCASTING NG128 NG149
					698-746 BROADCASTING NG128 NG159 FIXED MOBILE	Wireless Communications (27) Broadcast Radio (TV) (73) Auxiliary Broadcast. (74)
				746-764 FIXED MOBILE BROADCASTING NG128 NG159	Wireless Communications (27) Broadcast Radio (TV) (73) Auxiliary Broadcasting (74) Private Land Mobile (90)	

5.149 5.291A 5.294 5.296 5.300 5.302 5.304 5.306 5.311 5.312			764-776 FIXED MOBILE NG128 NG158 NG159	Auxiliary Broadcasting (74) Private Land Mobile (90)
790-862 FIXED BROADCASTING	5.293 5.309 5.311		776-794 FIXED MOBILE BROADCASTING NG128 NG159	Wireless Communications (27) Broadcast Radio (TV) (73) Auxiliary Broadcast. (74) Private Land Mobile (90)
5.312 5.314 5.315 5.316 5.319 5.321	806-890 FIXED MOBILE BROADCASTING		794-806 FIXED MOBILE NG128 NG158 NG159	Auxiliary Broadcasting (74) Private Land Mobile (90)
See next page for 862-890 MHz	5.317 5.318	5.149 5.305 5.306 5.307 5.311 5.320	806-821 FIXED LAND MOBILE NG31	Public Mobile (22) Private Land Mobile (90)
			821-824 LAND MOBILE	Private Land Mobile (90)
			824-849 FIXED LAND MOBILE NG151	Public Mobile (22)
			See next page for 849-894 MHz	See next page for 866-896 MHz

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
See previous pages for 470-862 MHz	See previous pages for 614-890 MHz	See previous pages for 585-890 MHz	See previous pages for 614-890 MHz	See previous pages for 614-849 MHz	See previous pages for 614-849 MHz
862-890 FIXED MOBILE except aeronautical mobile BROADCASTING 5.322				849-851 AERONAUTICAL MOBILE	Public Mobile (22)
				851-866 FIXED LAND MOBILE	Public Mobile (22) Private Land Mobile (90)
				NG31	
5.319 5.323			866-869 LAND MOBILE	Private Land Mobile (90)	
890-942 FIXED MOBILE except aeronautical mobile 5.317A BROADCASTING 5.322 Radiolocation	890-902 FIXED MOBILE except aeronautical mobile 5.317A Radiolocation	890-942 FIXED MOBILE 5.317A BROADCASTING Radiolocation	890-902	869-894 FIXED LAND MOBILE	Public Mobile (22)
				US116 US268 NG151	
				894-896 AERONAUTICAL MOBILE	
				US116 US268	
				896-901 FIXED LAND MOBILE	Private Land Mobile (90)
			US116 US268		
			901-902 FIXED MOBILE	Personal Communications (24)	
	5.318 5.325		US116 US268 G2	US116 US268	

902-928 FIXED Amateur Mobile except aeronautical mobile 5.325A Radiolocation 5.150 5.325 5.326	902-928 RADIOLOCATION G59	902-928	ISM Equipment (18) Private Land Mobile (90) Amateur (97)
	5.150 US215 US218 US267 US275 G11	5.150 US215 US218 US267 US275	
928-942 FIXED MOBILE except aeronautical mobile 5.317A Radiolocation	928-932	928-929 FIXED US116 US215 US268 NG120	Public Mobile (22) Private Land Mobile (90) Fixed Microwave (101)
		929-930 FIXED LAND MOBILE US116 US215 US268	Private Land Mobile (90)
		930-931 FIXED MOBILE US116 US215 US268	Personal Communications (24)
		931-932 FIXED LAND MOBILE US116 US215 US268 G2	Public Mobile (22)
	932-935 FIXED US215 US268 G2	932-935 FIXED US215 US268 NG120	Public Mobile (22) Fixed Microwave (101)
	935-940 US116 US215 US268 G2	935-940 FIXED LAND MOBILE US116 US215 US268	Private Land Mobile (90)
	940-941 US116 US268 G2	940-941 FIXED MOBILE US116 US268	Personal Communications (24)
	See next page for 941-944 MHz		See next page for 941-944 MHz

5.323

5.325

5.327

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
See previous page for 890-942 MHz	See previous page for 928-942 MHz	See previous page for 890-942 MHz	941-944 FIXED	941-944 FIXED	Public Mobile (22) Fixed Microwave (101)
942-960 FIXED MOBILE except aeronautical mobile 5.317A BROADCASTING 5.322	942-960 FIXED MOBILE 5.317A	942-960 FIXED MOBILE 5.317A BROADCASTING	US268 US301 US302 G2	US268 US301 US302 NG120	
5.323		5.320	944-960	944-960 FIXED NG120	Public Mobile (22) Auxiliary Broadcast. (74) Fixed Microwave (101)
960-1215 AERONAUTICAL RADIONAVIGATION 5.328			960-1215 AERONAUTICAL RADIONAVIGATION 5.328		Aviation (87)
5.328A			US224 USyyy		
1215-1240 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.329 5.329A SPACE RESEARCH (active)			1215-1240 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G56 RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) SPACE RESEARCH (active)	1215-1240 Earth exploration-satellite (active) Space research (active)	
5.330 5.331 5.332			5.332		
1240-1260 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.329 5.329A SPACE RESEARCH (active) Amateur			1240-1300 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G56 SPACE RESEARCH (active)	1240-1300 Earth exploration-satellite (active) Space research (active) Amateur	Amateur (97)
5.330 5.331 5.332 5.334 5.335					
1260-1300 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.329 5.329A SPACE RESEARCH (active) Amateur					
5.282 5.330 5.331 5.334 5.335 5.335A			5.332 5.334 5.335	5.282 5.334	

1300-1350 AERONAUTICAL RADIONAVIGATION 5.337 RADIOLOCATION RADIONAVIGATION-SATELLITE (Earth-to-space) 5.149 S5337A		1300-1350 AERONAUTICAL RADIO- NAVIGATION 5.337 Radiolocation G2 US342	1300-1350 AERONAUTICAL RADIO- NAVIGATION 5.337 US342	Aviation (87)
1350-1400 FIXED MOBILE RADIOLOCATION	1350-1400 RADIOLOCATION	1350-1390 FIXED MOBILE RADIOLOCATION G2 5.334 5.339 US311 US342 G27 G114	1350-1390 5.334 5.339 US311 US342	
		1390-1395	1390-1392 FIXED MOBILE except aeronautical mobile FIXED-SATELLITE (Earth-to-space) US368 5.339 US311 US342 US351	Wireless Communications (27)
		5.339 US311 US342 US351	1392-1395 FIXED MOBILE except aeronautical mobile 5.339 US311 US342 US351	
5.149 5.338 5.339	5.149 5.334 5.339	1395-1400 LAND MOBILE US350 5.339 US311 US342 US351		Personal (95)
1400-1427 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) 5.340 5.341		1400-1427 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) 5.341 US246		

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International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
1427-1429 SPACE OPERATION (Earth-to-space) FIXED MOBILE except aeronautical mobile 5.341			1427-1429.5 LAND MOBILE US350 5.341 US352	1427-1429.5 LAND MOBILE Fixed (telemetry) 5.341 US350 US352	Private Land Mobile (90) Personal (95)
1429-1452 FIXED MOBILE except aeronautical mobile	1429-1452 FIXED MOBILE 5.343		1429.5-1432 5.341 US350 US352	1429.5-1430 FIXED (telemetry) LAND MOBILE (telemetry) 5.341 US350 US352 1430-1432 FIXED (telemetry) LAND MOBILE (telemetry) FIXED-SATELLITE (space-to-Earth) US368 5.341 US350 US352	
5.341 5.342	5.341		1432-1435 5.341 US361	1432-1435 FIXED MOBILE except aeronautical mobile 5.341 US361	Wireless Communications (27)
1452-1492 FIXED MOBILE except aeronautical mobile BROADCASTING 5.345 5.347 BROADCASTING- SATELLITE 5.345 5.347 5.341 5.342	1452-1492 FIXED MOBILE 5.343 BROADCASTING 5.345 5.347 BROADCASTING-SATELLITE 5.345 5.347 5.341 5.344		1435-1525 MOBILE (aeronautical telemetry)		Aviation (87)
1492-1525 FIXED MOBILE except aeronautical mobile 5.341 5.342	1492-1525 FIXED MOBILE 5.343 MOBILE-SATELLITE (space-to-Earth) 5.348A 5.341 5.344 5.348	1492-1525 FIXED MOBILE 5.341 5.348A	5.341 US78		

1525-1530 SPACE OPERATION (space-to-Earth) FIXED MOBILE-SATELLITE (space-to-Earth) 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) 5.351A 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) 5.351A Earth exploration-satellite Mobile 5.349 5.341 5.351 5.352A 5.354	1525-1535 MOBILE-SATELLITE (space-to-Earth) US315 Mobile (aeronautical telemetry) US78 5.341 5.351	Satellite Communications (25) Maritime (80) Aviation (87)
1530-1535 SPACE OPERATION (space-to-Earth) MOBILE-SATELLITE (space- to-Earth) 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) 5.351A 5.353A Earth exploration-satellite Fixed Mobile 5.343 5.341 5.351 5.354			
1535-1559 MOBILE-SATELLITE (space-to-Earth) 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 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) 5.329A 5.341 5.362B 5.362C 5.363			1559-1610 AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.341 US208 US260 US343	Aviation (87)

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
1610-1610.6 MOBILE-SATELLITE (Earth-to-space) 5.351A AERONAUTICAL RADIONAVIGATION 5.341 5.355 5.359 5.363 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) US319 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 5.363 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) US319 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) 5.341 5.355 5.359 5.363 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) 5.341 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) 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) US319 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 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 RADIO ASTRONOMY 5.341 5.351 US342	Satellite Communications (25) Aviation (87)
1660.5-1668.4 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) 5.341 US246	
1668.4-1670 METEOROLOGICAL AIDS FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY 5.149 5.341	1668.4-1670 METEOROLOGICAL AIDS (radiosonde) RADIO ASTRONOMY US74 5.341 US99 US342	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
1670-1675 METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE 5.380			1670-1675	1670-1675 FIXED MOBILE except aeronautical mobile	Wireless Communications (27)
5.341			5.341 US211 US362	5.341 US211 US362	
1675-1690 METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SAT- ELLITE (space-to-Earth) MOBILE except aeronautical mobile	1675-1690 METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SAT- ELLITE (space-to-Earth) MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space)	1675-1690 METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SAT- ELLITE (space-to-Earth) MOBILE except aeronautical mobile	1675-1700 METEOROLOGICAL AIDS (radiosonde) METEOROLOGICAL-SATELLITE (space-to-Earth)		
5.341	5.341 5.377	5.341			
1690-1700 METEOROLOGICAL AIDS METEOROLOGICAL-SAT- ELLITE (space-to-Earth) Fixed Mobile except aeronautical mobile	1690-1700 METEOROLOGICAL AIDS METEOROLOGICAL-SAT- ELLITE (space-to-Earth) MOBILE-SATELLITE (Earth-to-space)	1690-1700 METEOROLOGICAL AIDS METEOROLOGICAL-SAT- ELLITE (space-to-Earth)			
5.289 5.341 5.382	5.289 5.341 5.377 5.381	5.289 5.341 5.381	5.289 5.341 US211		
1700-1710 FIXED METEOROLOGICAL-SAT- ELLITE (space-to-Earth) MOBILE except aeronautical mobile	1700-1710 FIXED METEOROLOGICAL-SAT- ELLITE (space-to-Earth) MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth- to-space)	1700-1710 FIXED METEOROLOGICAL-SAT- ELLITE (space-to-Earth) MOBILE except aeronautical mobile	1700-1710 FIXED G118 METEOROLOGICAL-SAT- ELLITE (space-to-Earth)	1700-1710 METEOROLOGICAL-SAT- ELLITE (space-to-Earth) Fixed	
5.289 5.341	5.289 5.341 5.377	5.289 5.341 5.384	5.289 5.341	5.289 5.341	
1710-1930 FIXED MOBILE 5.380 5.384A 5.388A			1710-1755 FIXED MOBILE	1710-1755	
			5.341 US311	5.341 US311	

5.149 5.341 5.385 5.386 5.387 5.388			1755-1850 FIXED MOBILE G42	1755-1850	
1930-1970 FIXED MOBILE 5.388A	1930-1970 FIXED MOBILE 5.388A Mobile-satellite (Earth-to-space)	1930-1970 FIXED MOBILE 5.388A	1850-2025	1850-1990 FIXED MOBILE	RF Devices (15) Personal Communications (24) Fixed Microwave (101)
5.388	5.388	5.388			
1970-1980 FIXED MOBILE 5.388A 5.388					
1980-2010 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) 5.351A 5.388 5.389A 5.389B 5.389F			1850-2025	1990-2025 MOBILE-SATELLITE (Earth-to-space)	Satellite Communications (25)
2010-2025 FIXED MOBILE 5.388A	2010-2025 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space)	2010-2025 FIXED MOBILE 5.388A		NG156	
5.388	5.388 5.389C 5.389D 5.389E 5.390	5.388			
2025-2110 SPACE OPERATION (Earth-to-space) (space-to-space) EARTH EXPLORATION-SATELLITE (Earth-to-space) (space-to-space) FIXED MOBILE 5.391 SPACE RESEARCH (Earth-to-space) (space-to-space)			2025-2110 SPACE OPERATION (Earth-to-space) (space-to-space) EARTH EXPLORATION- SATELLITE (Earth-to- space) (space-to-space) SPACE RESEARCH (Earth- to-space) (space-to-space)	2025-2110 FIXED NG118 MOBILE 5.391	TV Auxiliary Broadcasting (74F) Cable TV Relay (78) Local TV Transmission (101J)
5.392			5.391 5.392 US90 US222 US346 US347	5.392 US90 US222 US346 US347	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
2110-2120 FIXED MOBILE 5.388A SPACE RESEARCH (deep space) (Earth-to-space)			2110-2120	2110-2150 FIXED MOBILE	Public Mobile (22) Fixed Microwave (101)
5.388			US252		
2120-2160 FIXED MOBILE 5.388A	2120-2160 FIXED MOBILE 5.388A Mobile-satellite (space-to-Earth)	2120-2160 FIXED MOBILE 5.388A	2120-2200	US252 NG153	Domestic Public Fixed (21) Fixed Microwave (101)
5.388	5.388	5.388		2150-2160 FIXED	
2160-2170 FIXED MOBILE 5.388A	2160-2170 FIXED MOBILE 5.388A MOBILE-SATELLITE (space-to-Earth)	2160-2170 FIXED MOBILE 5.388A		2160-2165 FIXED MOBILE NG153	
5.388 5.392A	5.388 5.389C 5.389D 5.389E 5.390	5.388		2165-2200 MOBILE-SATELLITE (space-to-Earth)	Satellite Communications (25)
2170-2200 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.351A				NG168	
5.388 5.389A 5.389F 5.392A					
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)			2200-2290 SPACE OPERATION (space-to-Earth) (space-to-space) EARTH EXPLORATION- SATELLITE (space-to- Earth) (space-to-space) FIXED (line-of-sight only)	2200-2290	

		MOBILE (line-of-sight only including aeronautical tele-metry, but excluding flight testing of manned aircraft) SPACE RESEARCH (space-to-Earth) (space-to-space)		
5.392		5.392 US303	US303	
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 Amateur Radiolocation	2300-2450 FIXED MOBILE RADIOLOCATION Amateur	2300-2305	2300-2305 Amateur	Amateur (97) Note: 2300-2305 MHz became non-Federal Government exclusive spectrum in August 1995
		G123		
		2305-2310	2305-2310 FIXED MOBILE except aeronautical mobile RADIOLOCATION Amateur	Wireless Communications (27) Amateur (97)
		US338 G123	US338	
5.150 5.282 5.395	5.150 5.282 5.393 5.394 5.396	2310-2345 Fixed Mobile US328 US339 Radiolocation G2 G120	2310-2320 FIXED MOBILE US339 RADIOLOCATION BROADCASTING-SATELLITE 5.396 US327	Wireless Communications (27) Aviation (87)
		US327	2320-2345 BROADCASTING-SATELLITE 5.396 US327 US328	Satellite Communications (25) Aviation (87)
		See next page for 2345-2450 MHz		See next page for 2345-2450 MHz

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
See previous page for 2300-2450 MHz			2345-2360 Fixed Mobile US339 Radiolocation G2 G120 US327	2345-2360 FIXED MOBILE US339 RADIOLOCATION BROADCASTING- SATELLITE 5.396 US327	Wireless Communications (27) Aviation (87)
			2360-2385 MOBILE US276 RADIOLOCATION G2 G120 Fixed	2360-2385 MOBILE US276	Aviation (87)
			2385-2390 US363	2385-2390 FIXED MOBILE NG174 US363	Wireless Communications (27)
			2390-2400 G122	2390-2400 AMATEUR	RF Devices (15) Amateur (97)
			2400-2402 5.150 G123	2400-2402 Amateur 5.150 5.282	ISM Equipment (18) Amateur (97)
			2402-2417 5.150 G122	2402-2417 AMATEUR 5.150 5.282	RF Devices (15) ISM Equipment (18) Amateur (97)
			2417-2450 Radiolocation G2 5.150 G124	2417-2450 Amateur 5.150 5.282	ISM Equipment (18) Amateur (97)
2450-2483.5 FIXED MOBILE Radiolocation 5.150 5.397	2450-2483.5 FIXED MOBILE RADIOLOCATION 5.150 5.394		2450-2483.5 5.150 US41	2450-2483.5 FIXED MOBILE Radiolocation 5.150 US41	ISM Equipment (18) 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 RADIOLOCATION RADIODETERMINATION- SATELLITE (space-to- Earth) 5.398 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) US319 RADIODETERMINATION- SATELLITE (space-to- Earth) 5.398 5.150 5.402 US41	2483.5-2500 MOBILE-SATELLITE (space-to-Earth) US319 RADIODETERMINATION- SATELLITE (space-to- Earth) 5.398 5.150 5.402 US41 NG147	ISM Equipment (18) Satellite Communications (25) Private Land Mobile (90) Fixed Microwave (101)
2500-2520 FIXED 5.409 5.410 5.411 MOBILE except aeronautical mobile 5.384A MOBILE-SATELLITE (space- to-Earth) 5.403 5.351A 5.405 5.407 5.412 5.414	2500-2520 FIXED 5.409 5.411 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A MOBILE-SATELLITE (space-to-Earth) 5.403 5.351A 5.404 5.407 5.414 5.415A		2500-2655	2500-2655 FIXED US205 MOBILE except aeronautical mobile	Domestic Public Fixed (21) Auxiliary Broadcasting (74)
2520-2655 FIXED 5.409 5.410 5.411 MOBILE except aeronautical mobile 5.384A BROADCASTING- SATELLITE 5.413 5.416 5.339 5.403 5.405 5.412 5.418 5.418B 5.418C	2520-2655 FIXED 5.409 5.411 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A BROADCASTING- SATELLITE 5.413 5.416 5.339 5.403 5.418B 5.418C	2520-2535 FIXED 5.409 5.411 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A BROADCASTING- SATELLITE 5.413 5.416 5.403 5.415A 2535-2655 FIXED 5.409 5.411 MOBILE except aeronautical mobile 5.384A BROADCASTING- SATELLITE 5.413 5.416 5.339 5.418 5.418A 5.418B 5.418C	5.339 US205 US269	5.339 US269	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
2655-2670 FIXED 5.409 5.410 5.411 MOBILE except aeronautical mobile 5.384A BROADCASTING SATELLITE 5.413 5.416 Earth exploration-satellite (passive) Radio astronomy Space research (passive)	2655-2670 FIXED 5.409 5.411 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A BROADCASTING-SATELLITE 5.413 5.416 Earth exploration-satellite (passive) Radio astronomy Space research (passive)	2655-2670 FIXED 5.409 5.411 FIXED-SATELLITE (Earth-to-space) 5.415 MOBILE except aeronautical mobile 5.384A BROADCASTING-SATELLITE 5.413 5.416 Earth exploration-satellite (passive) Radio astronomy Space research (passive)	2655-2690 Earth exploration-satellite (passive) Radio astronomy Space research (passive)	2655-2690 FIXED US205 MOBILE except aeronautical mobile Earth exploration-satellite (passive) Radio astronomy Space research (passive)	Domestic Public Fixed (21) Auxiliary Broadcasting (74)
5.149 5.412 5.420	5.149 5.420	5.149 5.420			
2670-2690 FIXED 5.409 5.410 5.411 MOBILE except aeronautical mobile 5.384A MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (passive) Radio astronomy Space research (passive)	2670-2690 FIXED 5.409 5.411 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (passive) Radio astronomy Space research (passive)	2670-2690 FIXED 5.409 5.411 FIXED-SATELLITE (Earth-to-space) 5.415 MOBILE except aeronautical mobile 5.384A MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (passive) Radio astronomy Space research (passive)			
5.149 5.419 5.420	5.149 5.419 5.420	5.149 5.419 5.420 5.420A	US205 US269	US269	
2690-2700 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive)			2690-2700 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive)		
5.340 5.421 5.422			US246		
2700-2900 AERONAUTICAL RADIONAVIGATION 5.337 Radiolocation			2700-2900 AERONAUTICAL RADIO-NAVIGATION 5.337 METEOROLOGICAL AIDS Radiolocation G2	2700-2900	
5.423 5.424			5.423 US18 G15	5.423 US18	

2900-3100 RADIONAVIGATION 5.426 Radiolocation			2900-3100 MARITIME RADIONAVIGATION Radiolocation G56	2900-3100 MARITIME RADIONAVIGATION Radiolocation US44	Maritime (80) Private Land Mobile (90)
5.425 5.427			5.427 US44 US316	5.5427 US316	
3100-3300 RADIOLOCATION Earth exploration-satellite (active) Space research (active)			3100-3300 RADIOLOCATION G59 Earth exploration-satellite (active) Space research (active)	3100-3300 Radiolocation Earth exploration-satellite (active) Space research (active)	Private Land Mobile (90)
5.149 5.428			US342	US342	
3300-3400 RADIOLOCATION	3300-3400 RADIOLOCATION Amateur Fixed Mobile	3300-3400 RADIOLOCATION Amateur	3300-3500 RADIOLOCATION US108 G31	3300-3500 Amateur Radiolocation US108	Private Land Mobile (90) Amateur (97)
5.149 5.429 5.430	5.149 5.430	5.149 5.429			
3400-3600 FIXED FIXED-SATELLITE (space-to-Earth) Mobile Radiolocation	3400-3500 FIXED FIXED-SATELLITE (space-to-Earth) Amateur Mobile Radiolocation 5.433				
	5.282 5.432		US342	US342 5.282	
5.431	3500-3700 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 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			US245	3600-3650 FIXED-SATELLITE (space-to-Earth) US245 Radiolocation	
			3650-3700	3650-3700 FIXED FIXED-SATELLITE (space-to-Earth) NG169 MOBILE except aeronautical mobile NG170	
	5.435		US245 US348 US349	US245 US348 US349	
	See next page for 3700-4200 MHz		See next page for 3700-4200 MHz	See next page for 3700-4200 MHz	See next page for 3700-4200 MHz

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
See previous page for 3600-4200 MHz	3700-4200 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile		3700-4200	3700-4200 FIXED NG41 FIXED-SATELLITE (space-to-Earth)	International Fixed (23) Satellite Communications (25) Fixed Microwave (101)
4200-4400 AERONAUTICAL RADIONAVIGATION 5.438			4200-4400 AERONAUTICAL RADIONAVIGATION		Aviation (87)
5.437 5.439 5.440			5.440 US261		
4400-4500 FIXED MOBILE			4400-4500 FIXED MOBILE	4400-4500	
4500-4800 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 MOBILE			4500-4800 FIXED MOBILE US245	4500-4800 FIXED-SATELLITE (space-to-Earth) 5.441 US245	
4800-4990 FIXED MOBILE 5.442 Radio astronomy			4800-4940 FIXED MOBILE US203 US342	4800-4940 US203 US342	
5.149 5.339 5.443			4940-4990	4940-4990 FIXED MOBILE except aeronautical mobile	Private Land Mobile (90) Fixed Microwave (101)
4990-5000 FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY Space research (passive)			5.339 US311 US342 G122	5.339 US311 US342	
5.149			4990-5000 RADIO ASTRONOMY US74 Space research (passive)		
5000-5150 AERONAUTICAL RADIONAVIGATION			US246		
5.367 5.443A 5.443B 5.444 5.444A			5000-5250 AERONAUTICAL RADIO- NAVIGATION US260	5000-5150 AERONAUTICAL RADIO- NAVIGATION US260 5.367 5.444A US211 US344 US370	Satellite Communications (25) Aviation (87)

5150-5250 AERONAUTICAL RADIONAVIGATION FIXED-SATELLITE (Earth-to-space) 5.447A		5150-5250 AERONAUTICAL RADIO- NAVIGATION US260 FIXED-SATELLITE (Earth- to-space) 5.447A US344	
5.446 5.447 5.447B 5.447C	5.367 US211 US307 US344 US370	5.447C US211 US307	
5250-5255 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH 5.447D	5250-5255 EARTH EXPLORATION- SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH 5.447D	5250-5255 Earth exploration-satellite (active) Radiolocation Space research	
5.448 5.448A			
5255-5350 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active)	5255-5350 EARTH EXPLORATION- SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH (active)	5255-5350 Earth exploration-satellite (active) Radiolocation Space research (active)	
5.448 5.448A			
5350-5460 EARTH EXPLORATION-SATELLITE (active) 5.448B AERONAUTICAL RADIONAVIGATION 5.449 Radiolocation	5350-5460 EARTH EXPLORATION- SATELLITE (active) 5.448B AERONAUTICAL RADIO- NAVIGATION 5.449 RADIOLOCATION G56	5350-5460 AERONAUTICAL RADIO- NAVIGATION 5.449 Earth exploration-satellite (active) Radiolocation	Aviation (87)
5460-5470 RADIONAVIGATION 5.449 Radiolocation	5460-5470 RADIONAVIGATION 5.449 Radiolocation G56	5460-5470 RADIONAVIGATION 5.449 Radiolocation	
	US49 US65	US49 US65	
5470-5650 MARITIME RADIONAVIGATION Radiolocation	5470-5600 MARITIME RADIONAVIGATION Radiolocation G56	5470-5600 MARITIME RADIONAVIGATION Radiolocation	Maritime (80)
	US50 US65	US50 US65	
	5600-5650 MARITIME RADIONAVIGATION METEOROLOGICAL AIDS Radiolocation US51 G56	5600-5650 MARITIME RADIONAVIGATION METEOROLOGICAL AIDS Radiolocation US51	
5.450 5.451 5.452	5.452 US65	5.452 US65	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
5650-5725 RADIOLOCATION Amateur Space research (deep space) 5.282 5.451 5.453 5.454 5.455			5650-5925 RADIOLOCATION G2	5650-5830 Amateur	ISM Equipment (18) Amateur (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	
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	
5850-5925 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE 5.150	5850-5925 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE Amateur Radiolocation 5.150	5850-5925 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE Radiolocation 5.150	5.150 US245	5850-5925 FIXED-SATELLITE (Earth-to-space) US245 MOBILE NG160 Amateur 5.150	ISM Equipment (18) Private Land Mobile (90) Amateur (97)
5925-6700 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE			5925-6425	5925-6425 FIXED NG41 FIXED-SATELLITE (Earth-to-space)	International Fixed (23) Satellite Communications (25) Fixed Microwave (101)
			6425-6525 5.440 5.458	6425-6525 FIXED-SATELLITE (Earth-to-space) MOBILE 5.440 5.458	Auxiliary Broadcasting (74) Cable TV Relay (78) Fixed Microwave (101)

5.149 5.440 5.458	6525-6700 FIXED FIXED-SATELLITE (Earth-to-space) 5.458 US342	6525-6700 FIXED FIXED-SATELLITE (Earth-to-space) 5.458 US342	Satellite Communications (25) Fixed Microwave (101)
6700-7075 FIXED FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.441 MOBILE	6700-7125	6700-6875 FIXED FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.441 5.458 5.458A 5.458B	
5.458 5.458A 5.458B 5.458C		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) Auxiliary Broadcasting (74) Cable TV Relay (78)
7075-7250 FIXED MOBILE		7025-7075 FIXED NG118 FIXED-SATELLITE (Earth-to-space) NG172 MOBILE NG171 5.458 5.458A 5.458B	
7075-7250 FIXED MOBILE	5.458	7075-7125 FIXED NG118 MOBILE NG171 5.458	Auxiliary Broadcasting (74) Cable TV Relay (78)
	7125-7190 FIXED 5.458 US252 G116	7125-7190 5.458 US252	
5.458 5.459 5.460	7190-7235 FIXED SPACE RESEARCH (Earth-to-space) 5.458 7235-7250 FIXED 5.458	7190-7250 5.458	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
7250-7300 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE			7250-7300 FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Fixed	7250-8025	
5.461			G117		
7300-7450 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile			7300-7450 FIXED FIXED-SATELLITE (space-to-Earth) Mobile-satellite (space-to-Earth)		
5.461			G117		
7450-7550 FIXED FIXED-SATELLITE (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile			7450-7550 FIXED FIXED-SATELLITE (space-to-Earth) METEOROLOGICAL-SAT- ELLITE (space-to-Earth) Mobile-satellite (space-to-Earth)		
5.461A			G104 G117		
7550-7750 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile			7550-7750 FIXED FIXED-SATELLITE (space-to-Earth) Mobile-satellite (space-to-Earth)		
			G117		
7750-7850 FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) 5.461B MOBILE except aeronautical mobile			7750-7850 FIXED METEOROLOGICAL-SAT- ELLITE (space-to-Earth)		
			5.461B		
7850-7900 FIXED MOBILE except aeronautical mobile			7850-7900 FIXED		

7900-8025 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE	7900-8025 FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) Fixed	
5.461	G117	
8025-8175 EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) MOBILE 5.463	8025-8175 EARTH EXPLORATION- SATELLITE (space-to- Earth) FIXED FIXED-SATELLITE (Earth-to-space) Mobile-satellite (Earth-to- space) (no airborne transmissions)	8025-8215
5.462A	US258 G117	
8175-8215 EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) METEOROLOGICAL-SATELLITE (Earth-to-space) MOBILE 5.463	8175-8215 EARTH EXPLORATION- SATELLITE (space-to- Earth) FIXED FIXED-SATELLITE (Earth-to-space) METEOROLOGICAL-SAT- ELLITE (Earth-to-space) Mobile-satellite (Earth-to- space) (no airborne transmissions)	
5.462A	US258 G104 G117	US258

International Table			United States Table		FCC Rule Part(s)
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8215-8400 EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) MOBILE 5.463			8215-8400 EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) Mobile-satellite (Earth-to-space) (no airborne transmissions)	8215-8400	
5.462A			US258 G117	US258	
8400-8500 FIXED MOBILE except aeronautical mobile SPACE RESEARCH (space-to-Earth) 5.465 5.466			8400-8450 FIXED SPACE RESEARCH (space-to-Earth) (deep space only)	8400-8450 Space research (space-to-Earth) (deep space only)	
			8450-8500 FIXED SPACE RESEARCH (space-to-Earth)	8450-8500 SPACE RESEARCH (space-to-Earth)	
5.467					
8500-8550 RADIOLOCATION			8500-8550 RADIOLOCATION G59	8500-8550 Radiolocation	
5.468 5.469					
8550-8650 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active)			8550-8650 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH (active)	8550-8650 Earth exploration-satellite (active) Radiolocation Space research (active)	
5.468 5.469 5.469A					
8650-8750 RADIOLOCATION			8650-9000 RADIOLOCATION G59	8650-9000 Radiolocation	
5.468 5.469					
8750-8850 RADIOLOCATION AERONAUTICAL RADIONAVIGATION 5.470					
5.471					

8850-9000 RADIOLOCATION MARITIME RADIONAVIGATION 5.472			
5.473	US53	US53	
9000-9200 AERONAUTICAL RADIONAVIGATION 5.337 Radiolocation	9000-9200 AERONAUTICAL RADIO- NAVIGATION 5.337 Radiolocation G2	9000-9200 AERONAUTICAL RADIO- NAVIGATION 5.337 Radiolocation	Aviation (87)
5.471	US48 G19	US48	
9200-9300 RADIOLOCATION MARITIME RADIONAVIGATION 5.472	9200-9300 MARITIME RADIO- NAVIGATION 5.472 Radiolocation US110 G59	9200-9300 MARITIME RADIO- NAVIGATION 5.472 Radiolocation US110	
5.473 5.474	5.474	5.474	
9300-9500 RADIONAVIGATION 5.476 Radiolocation	9300-9500 RADIONAVIGATION 5.476 US66 Radiolocation US51 G56 Meteorological aids	9300-9500 RADIONAVIGATION 5.476 US66 Radiolocation US51 Meteorological aids	
5.427 5.474 5.475	5.427 5.474 US67 US71	5.427 5.474 US67 US71	
9500-9800 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION SPACE RESEARCH (active)	9500-9800 EARTH EXPLORATION- SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active)	9500-9800 Earth exploration- satellite (active) Radiolocation Space research (active)	
5.476A			
9800-10000 RADIOLOCATION Fixed	9800-10000 RADIOLOCATION	9800-10000 Radiolocation	
5.477 5.478 5.479	5.479	5.479	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
10-10.45 FIXED MOBILE RADIOLOCATION Amateur 5.479	10-10.45 RADIOLOCATION Amateur 5.479 5.480	10-10.45 FIXED MOBILE RADIOLOCATION Amateur 5.479	10-10.45 RADIOLOCATION 5.479 US58 US108 G32	10-10.45 Radiolocation Amateur 5.479 US58 US108 NG42	Private Land Mobile (90) Amateur (97)
10.45-10.5 RADIOLOCATION Amateur Amateur-satellite 5.481			10.45-10.5 RADIOLOCATION US58 US108 G32	10.45-10.5 Radiolocation Amateur Amateur-satellite US58 US108 NG42 NG134	
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			10.6-10.68 EARTH EXPLORATION-SATELLITE (passive) SPACE RESEARCH (passive) US265 US277	10.6-10.68 EARTH EXPLORATION-SATELLITE (passive) FIXED SPACE RESEARCH (passive) US265 US277	
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) US246 US355		

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 US211	10.7-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 US211 NG104 US355	Satellite Communications (25) Fixed Microwave (101)
11.7-12.5 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE	11.7-12.1 FIXED 5.486 FIXED-SATELLITE (space-to-Earth) 5.484A Mobile except aeronautical mobile 5.485 5.488	11.7-12.2 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE	11.7-12.1 5.486 12.1-12.2	11.7-12.2 FIXED-SATELLITE (space-to-Earth) NG143 NG145 Mobile except aeronautical mobile 5.486 5.488	
5.487 5.487A 5.492	12.1-12.2 FIXED-SATELLITE (space-to-Earth) 5.484A 5.485 5.488 5.489	5.487 5.487A 5.492	12.2-12.7	12.2-12.7 FIXED BROADCASTING-SATELLITE	Satellite Communications (25) Fixed Microwave (101)
12.5-12.75 FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space)	12.2-12.7 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE	12.2-12.5 FIXED MOBILE except aeronautical mobile BROADCASTING	5.490	5.487A 5.488 5.490	
5.494 5.495 5.496	See next page for 12.7-12.75 GHz	12.5-12.75 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A MOBILE except aeronautical mobile BROADCASTING-SATELLITE 5.493	See next page for 12.7-12.75 GHz	See next page for 12.7-12.75 GHz	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
See previous page for 12.5-12.75 GHz	12.7-12.75 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE except aeronautical mobile	See previous page for 12.5-12.75 GHz	12.7-12.75	12.7-12.75 FIXED NG118 FIXED-SATELLITE (Earth-to-space) MOBILE NG53	Satellite Communications (25) Auxiliary Broadcasting (74) Cable TV Relay (78) Fixed Microwave (101)
12.75-13.25 FIXED FIXED-SATELLITE (Earth-to-space) 5.441 MOBILE Space research (deep space) (space-to-Earth)			12.75-13.25 US251	12.75-13.25 FIXED NG118 FIXED-SATELLITE (Earth- to-space) 5.441 NG104 MOBILE US251 NG53	
13.25-13.4 EARTH EXPLORATION-SATELLITE (active) AERONAUTICAL RADIONAVIGATION 5.497 SPACE RESEARCH (active)			13.25-13.4 EARTH EXPLORATION- SATELLITE (active) AERONAUTICAL RADIO- NAVIGATION 5.497 SPACE RESEARCH (active)	13.25-13.4 AERONAUTICAL RADIO- NAVIGATION 5.497 Earth exploration-satellite (active) Space research (active)	Aviation (87)
5.498A 5.499			5.498A		
13.4-13.75 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH 5.501A Standard frequency and time signal-satellite (Earth-to-space)			13.4-13.75 EARTH EXPLORATION- SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH 5.501A Standard frequency and time signal-satellite (Earth-to-space)	13.4-13.75 Earth exploration-satellite (active) Radiolocation Space research Standard frequency and time signal-satellite (Earth-to-space)	Private Land Mobile (90)
5.499 5.500 5.501 5.501B			5.501B		
13.75-14 FIXED-SATELLITE (Earth-to-space) 5.484A RADIOLOCATION Standard frequency and time signal-satellite (Earth-to-space) Space research			13.75-14 RADIOLOCATION G59 Standard frequency and time signal-satellite (Earth-to-space) Space research US337 5.503A US356 US357	13.75-14 FIXED-SATELLITE (Earth-to-space) US337 Radiolocation Standard frequency and time signal-satellite (Earth-to-space) Space research	Satellite Communications (25) Private Land Mobile (90)
5.499 5.500 5.501 5.502 5.503 5.503A				5.503A US356 US357	

14-14.25 FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 RADIONAVIGATION 5.504 Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Space research			14-14.2 RADIONAVIGATION US292 Space research	14-14.2 FIXED-SATELLITE (Earth-to-space) RADIONAVIGATION US292 Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Space research	Satellite Communications (25) Maritime (80) Aviation (87)
5.505 14.25-14.3 FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 RADIONAVIGATION 5.504 Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Space research 5.505 5.508 5.509			14.2-14.4	14.2-14.4 FIXED-SATELLITE (Earth-to-space) Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Mobile except aeronautical mobile	Satellite Communications (25) Fixed Microwave (101)
14.3-14.4 FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Radionavigation-satellite	14.3-14.4 FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Radionavigation-satellite	14.3-14.4 FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Radionavigation-satellite			
14.4-14.47 FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Space research (space-to-Earth)			14.4-14.47 Fixed Mobile	14.4-14.47 FIXED-SATELLITE (Earth-to-space) Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite	Satellite Communications (25)
14.47-14.5 FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.506 MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite Radio astronomy			14.47-14.5 Fixed Mobile	14.47-14.5 FIXED-SATELLITE (Earth-to-space) Mobile-satellite (Earth-to-space) except aeronautical mobile-satellite	
5.149			US203 US342	US203 US342	

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14.5-14.8 FIXED FIXED-SATELLITE (Earth-to-space) 5.510 MOBILE Space research			14.5-14.7145 FIXED Mobile Space research	14.5-14.7145	
14.8-15.35 FIXED MOBILE Space research			14.7145-15.1365 MOBILE Fixed Space research US310	14.7145-15.1365 US310	
			15.1365-15.35 FIXED Mobile Space research	15.1365-15.35	
5.339			5.339 US211	5.339 US211	
15.35-15.4 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive)			15.35-15.4 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) US246		
5.340 5.511					
15.4-15.43 AERONAUTICAL RADIONAVIGATION 5.511D			15.4-15.43 AERONAUTICAL RADIONAVIGATION US260 US211		Aviation (87)
15.43-15.63 FIXED SATELLITE (Earth-to-space) 5.511A AERONAUTICAL RADIONAVIGATION			15.43-15.63 AERONAUTICAL RADIO- NAVIGATION US260	15.43-15.63 FIXED SATELLITE (Earth-to-space) AERONAUTICAL RADIO- NAVIGATION US260	Satellite Communications (25) Aviation (87)
5.511C			5.511C US211 US359	5.511C US211 US359	
15.63-15.7 AERONAUTICAL RADIONAVIGATION 5.511D			15.63-15.7 AERONAUTICAL RADIONAVIGATION US260 US211		Aviation (87)
15.7-16.6 RADIOLOCATION 5.512 5.513			15.7-16.6 RADIOLOCATION G59	15.7-17.2 Radiolocation	Private Land Mobile (90)

16.6-17.1 RADIOLOCATION Space research (deep space) (Earth-to-space) 5.512 5.513			16.6-17.1 RADIOLOCATION G59 Space research (deep space) (Earth-to-space)		
17.1-17.2 RADIOLOCATION 5.512 5.513			17.1-17.2 RADIOLOCATION G59		
17.2-17.3 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) 5.512 5.513 5.513A			17.2-17.3 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH (active)	17.2-17.3 Radiolocation Earth exploration-satellite (active) Space research (active)	
17.3-17.7 FIXED-SATELLITE (Earth-to-space) 5.516 Radiolocation 5.514	17.3-17.7 FIXED-SATELLITE (Earth-to-space) 5.516 BROADCASTING-SATELLITE Radiolocation 5.514 5.515 5.517	17.3-17.7 FIXED-SATELLITE (Earth-to-space) 5.516 Radiolocation 5.514	17.3-17.7 Radiolocation US259 G59	17.3-17.7 FIXED-SATELLITE (Earth-to-space) US271 BROADCASTING-SATELLITE NG163 NG167 US259	Satellite Communications (25)
17.7-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.516 MOBILE	17.7-17.8 FIXED FIXED-SATELLITE (space-to-Earth) (Earth-to-space) 5.516 BROADCASTING-SATELLITE Mobile 5.518 5.515 5.517	17.7-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.516 MOBILE	17.7-17.8	17.7-17.8 FIXED FIXED-SATELLITE (Earth-to-space) US271 NG144	Satellite Communications (25) Auxiliary Broadcasting (74) Cable TV Relay (78) Fixed Microwave (101)
	17.8-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.516 MOBILE		17.8-18.3 FIXED-SATELLITE (space-to-Earth) G117	17.8-18.3 FIXED	Auxiliary Broadcasting (74) Cable TV Relay (78) Fixed Microwave (101)
18.1-18.4 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.520 MOBILE 5.519 5.521			5.519 US334 See next page for 18.3-18.6 GHz	5.519 US334 NG144 See next page for 18.3-18.58 GHz	See next page for 18.3-18.58 GHz

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Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
See previous page for 18.1-18.4 GHz			18.3-18.6 FIXED-SATELLITE (space-to-Earth) G117	18.3-18.58 FIXED FIXED-SATELLITE (space-to-Earth) NG164	Satellite Communications (25) Auxiliary Broadcast. (74) Cable TV Relay (78) Fixed Microwave (101)
18.4-18.6 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 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)			18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED-SATELLITE (space-to-Earth) US255 G117 SPACE RESEARCH (passive)	18.58-18.6 FIXED-SATELLITE (space-to-Earth) NG164	Satellite Communications (25)
5.522A 5.522C	18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.522B MOBILE except aeronautical mobile SPACE RESEARCH (passive)	18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.522B MOBILE except aeronautical mobile Space research (passive)		US334 NG144	
5.522A 5.522C	18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.522B MOBILE except aeronautical mobile SPACE RESEARCH (passive)	18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.522B MOBILE except aeronautical mobile Space research (passive)	US254 US334	18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED-SATELLITE (space-to-Earth) US255 NG164 SPACE RESEARCH (passive)	US254 US334 NG144
18.8-19.3 FIXED FIXED-SATELLITE (space-to-Earth) 5.523A MOBILE			18.8-20.2 FIXED-SATELLITE (space-to-Earth) G117	18.8-19.3 FIXED-SATELLITE (space-to-Earth) NG165	US334 NG144
19.3-19.7 FIXED FIXED-SATELLITE (space-to-Earth) (Earth-space) 5.523B 5.523C 5.523D 5.523E MOBILE				19.3-19.7 FIXED FIXED-SATELLITE (space-to-Earth) NG166	
5.524	19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A Mobile-satellite (space-to-Earth)	19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A MOBILE-SATELLITE (space-to-Earth)	19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A Mobile-satellite (space-to-Earth)	19.7-20.1 FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth)	Satellite Communications (25)
5.524	5.524 5.525 5.526 5.527 5.528 5.529	5.524	5.525 5.526 5.527 5.528 5.529 US334		

20.1-20.2 FIXED-SATELLITE (space-to-Earth) 5.484A MOBILE-SATELLITE (space-to-Earth)				20.1-20.2 FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) 5.525 5.526 5.527 5.528 US334	
5.524 5.525 5.526 5.527 5.528			US334	US334	
20.2-21.2 FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Standard frequency and time signal-satellite (space-to-Earth)			20.2-21.2 FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Standard frequency and time signal-satellite (space-to-Earth)	20.2-21.2 Standard frequency and time signal-satellite (space-to-Earth)	
5.524			G117		
21.2-21.4 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive)			21.2-21.4 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive) US263		Fixed Microwave (101)
21.4-22 FIXED MOBILE BROADCASTING- SATELLITE 5.530	21.4-22 FIXED MOBILE	21.4-22 FIXED MOBILE BROADCASTING- SATELLITE 5.530 5.531	21.4-22 FIXED MOBILE		
22-22.21 FIXED MOBILE except aeronautical mobile 5.149			22-22.21 FIXED MOBILE except aeronautical mobile US342		
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) US342 US263		

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
22.5-22.55 FIXED MOBILE			22.5-22.55 FIXED MOBILE US211		Fixed Microwave (101)
22.55-23.55 FIXED INTER-SATELLITE MOBILE			22.55-23.55 FIXED INTER-SATELLITE US278 MOBILE		Satellite Communications (25) Fixed Microwave (101)
5.149			US342		
23.55-23.6 FIXED MOBILE			23.55-23.6 FIXED MOBILE		Fixed Microwave (101)
23.6-24 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive)			23.6-24 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive)		
5.340			US246		
24-24.05 AMATEUR AMATEUR-SATELLITE			24-24.05	24-24.05 AMATEUR AMATEUR-SATELLITE	ISM Equipment (18) Amateur (97)
5.150			5.150 US211	5.150 US211	
24.05-24.25 RADIOLOCATION Amateur Earth exploration-satellite (active)			24.05-24.25 RADIOLOCATION G59 Earth exploration-satellite (active)	24.05-24.25 Radiolocation Amateur Earth exploration-satellite (active)	ISM Equipment (18) Private Land Mobile (90) Amateur (97)
5.150			5.150	5.150	
24.25-24.45 FIXED	24.25-24.45 RADIONAVIGATION	24.25-24.45 RADIONAVIGATION FIXED MOBILE	24.25-24.45	24.25-24.45 FIXED	Fixed Microwave (101)

24.45-24.75 FIXED INTER-SATELLITE	24.45-24.65 INTER-SATELLITE RADIONAVIGATION 5.533	24.45-24.65 FIXED INTER-SATELLITE MOBILE RADIONAVIGATION 5.533	24.45-24.65 INTER-SATELLITE RADIONAVIGATION 5.533		Satellite Communications (25)
	24.65-24.75 INTER-SATELLITE RADIOLOCATION-SAT- ELLITE (Earth-to-space)	24.65-24.75 FIXED INTER-SATELLITE MOBILE 5.533 5.534	24.65-24.75 INTER-SATELLITE RADIOLOCATION-SATELLITE (Earth-to-space)		
24.75-25.25 FIXED	24.75-25.25 FIXED-SATELLITE (Earth-to-space) 5.535	24.75-25.25 FIXED FIXED-SATELLITE (Earth-to-space) 5.535 MOBILE 5.534	24.75-25.05 RADIONAVIGATION	24.75-25.05 FIXED-SATELLITE (Earth-to-space) NG167 RADIONAVIGATION	Satellite Communications (25) Aviation (87)
			25.05-25.25	25.05-25.25 FIXED-SATELLITE (Earth-to-space) NG167 FIXED	Satellite Communications (25) Fixed Microwave (101)
25.25-25.5 FIXED INTER-SATELLITE 5.536 MOBILE Standard frequency and time signal-satellite (Earth-to-space)			25.25-25.5 FIXED INTER-SATELLITE 5.536 MOBILE Standard frequency and time signal-satellite (Earth-to-space)	25.25-25.5 Standard frequency and time signal-satellite (Earth-to-space)	
25.5-27 EARTH EXPLORATION-SATELLITE (space-to-Earth) 5.536A 5.536B FIXED INTER-SATELLITE 5.536 MOBILE Standard frequency and time signal-satellite (Earth-to-space)			25.5-27 EARTH EXPLORATION- SATELLITE (space-to- Earth) 5.536A FIXED INTER-SATELLITE 5.536 MOBILE Standard frequency and time signal-satellite (Earth-to-space)	25.5-27 Earth exploration-satellite (space-to-Earth) 5.536A Standard frequency and time signal-satellite (Earth-to-space)	
27-27.5 FIXED INTER-SATELLITE 5.536 MOBILE	27-27.5 FIXED FIXED-SATELLITE (Earth-to-space) INTER-SATELLITE 5.536 5.537 MOBILE		27-27.5 FIXED INTER-SATELLITE 5.536 MOBILE	27-27.5	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
27.5-28.5 FIXED 5.537A FIXED-SATELLITE (Earth-to-space) 5.484A 5.539 MOBILE 5.538 5.540			27.5-30	27.5-29.5 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE	Satellite Communications (25) Fixed Microwave (101)
28.5-29.1 FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 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) 5.523C 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 5.539 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space)	29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 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 5.539 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space)	29.5-29.9 FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) 5.525 5.526 5.527 5.529	Satellite Communications (25)	
5.540 5.542	5.540 5.542	5.540 5.542			
29.9-30 FIXED-SATELLITE (Earth-to-space) 5.484A 5.539 MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.543 5.525 5.526 5.527 5.538 5.540 5.542			29.9-30 FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) 5.525 5.526 5.527 5.543		

30-31 FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) Standard frequency and time signal-satellite (space-to-Earth)			30-31 FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) Standard frequency and time signal-satellite (space-to-Earth)	30-31 Standard frequency and time signal-satellite (space-to-Earth)	
5.542			G117		
31-31.3 FIXED 5.543A MOBILE Standard frequency and time signal-satellite (space-to-Earth) Space research 5.544 5.545			31-31.3 Standard frequency and time signal-satellite (space-to-Earth)	31-31.3 FIXED MOBILE Standard frequency and time signal-satellite (space-to-Earth)	Fixed Microwave (101)
5.149			US211 US342	US211 US342	
31.3-31.5 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive)			31.3-31.8 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive)		
5.340					
31.5-31.8 EARTH EXPLORATION- SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) Fixed Mobile except aeronautical mobile	31.5-31.8 EARTH EXPLORATION- SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive)	31.5-31.8 EARTH EXPLORATION- SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) Fixed Mobile except aeronautical mobile			
5.149 5.546	5.340	5.149	US246		
31.8-32 FIXED 5.547A RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth)			31.8-32 RADIONAVIGATION US69 SPACE RESEARCH (deep space) (space-to- Earth) US262	31.8-32 SPACE RESEARCH (deep space) (space-to- Earth) US262	
5.547 5.547B 5.548			5.548 US211 USzzz	5.548 US211 USzzz	

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
32-32.3 FIXED 5.547A INTER-SATELLITE RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth) 5.547 5.547C 5.548			32-32.3 RADIONAVIGATION US69 SPACE RESEARCH (deep space) (space-to- Earth) US262 USzzz	32-32.3 SPACE RESEARCH (deep space) (space-to- Earth) US262 USzzz	
32.3-33 FIXED 5.547A INTER-SATELLITE RADIONAVIGATION 5.547 5.547D 5.548			32.3-33 INTER-SATELLITE US278 RADIONAVIGATION US69 USzzz		Aviation (87)
33-33.4 FIXED 5.547A RADIONAVIGATION 5.547 5.547E			33-33.4 RADIONAVIGATION US69 US360 G117		
33.4-34.2 RADIOLOCATION 5.549			33.4-34.2 RADIOLOCATION US360 G117	33.4-35.5 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	
34.7-35.2 RADIOLOCATION Space research 5.550 5.549			34.7-35.5 RADIOLOCATION US360 G117	34.7-35.5 Radiolocation US360	
35.2-35.5 METEOROLOGICAL AIDS RADIOLOCATION 5.549			35.5-36 EARTH EXPLORATION- SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) US360 G117	35.5-36 Earth exploration-satellite (active) Radiolocation Space research (active) US360	
35.5-36 METEOROLOGICAL AIDS EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) 5.549 5.551A					

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UNITED STATES (US) FOOTNOTES

* * * * *

US7 In the band 420-450 MHz and within the following areas, the peak envelope power output of a transmitter employed in the amateur service shall not exceed 50 watts, unless expressly authorized by the Commission after mutual agreement, on a case-by-case basis, between the Federal Communications Commission Engineer in Charge at the applicable district office and the military area frequency coordinator at the applicable military base. For areas (e) through (j), the appropriate military coordinator is located at Peterson AFB, CO.

(a) The entire State of New Mexico and Texas west of longitude 104° 00' West;

(b) The entire State of Florida including the Key West area and the areas enclosed within a 322-kilometer (200-mile) radius of Patrick Air Force Base, Florida (latitude 28° 21' North, longitude 80° 43' West), and within a 322-kilometer (200-mile) radius of Eglin Air Force Base, Florida (latitude 30° 30' North, longitude 86° 30' West);

(c) The entire State of Arizona;

(d) Those portions of California and Nevada south of latitude 37° 10' North, and the areas enclosed within a 322-kilometer (200-mile) radius of the Pacific Missile Test Center, Point Mugu, California (latitude 34° 09' North, longitude 119° 11' West).

(e) In the State of Massachusetts within a 160-kilometer (100-mile) radius around locations at Otis Air Force Base, Massachusetts (latitude 41° 45' North, longitude 70° 32' West).

(f) In the State of California within a 240-kilometer (150-mile) radius around locations at Beale Air Force Base, California (latitude 39° 08' North, longitude 121° 26' West).

(g) In the State of Alaska within a 160-kilometer (100-mile) radius of Clear, Alaska (latitude 64° 17' North, longitude 149° 10' West).

(h) In the State of North Dakota within a 160-kilometer (100-mile) radius of Concrete, North Dakota (latitude 48° 43' North, longitude 97° 54' West).

(i) In the States of Alabama, Georgia and South Carolina within a 200-kilometer (124-mile) radius of Warner Robins Air Force Base, Georgia (latitude 32° 38' North, longitude 83° 35' West).

(j) In the State of Texas within a 200-kilometer (124-mile) radius of Goodfellow Air Force Base, Texas (latitude 31° 25' North, longitude 100° 24' West).

* * * * *

US48 In the band 9000-9200 MHz, the use of the radiolocation service by non-Federal Government licensees may be authorized on the condition that harmful interference is not caused to the aeronautical radionavigation service or to the Federal Government radiolocation service.

* * * * *

US110 In the band 9200-9300 MHz, the use of the radiolocation service by non-Federal Government licensees may be authorized on the condition that harmful interference is not caused to the maritime radionavigation service or to the Federal Government radiolocation service.

* * * * *

US217 In the band 420-450 MHz, pulse-ranging radiolocation systems may be authorized for Federal and non-Federal Government use along the shorelines of the contiguous 48 States and Alaska. In the sub-band 420-435 MHz, spread spectrum radiolocation systems may be authorized for Federal and non-Federal Government use within the contiguous 48 States and Alaska. All stations operating in accordance with this provision shall be secondary to stations operating in accordance with the Table of

Frequency Allocations. Authorizations shall be granted on a case-by-case basis; however, operations proposed to be located within the following geographic areas should not expect to be accommodated:

- (a) The entire State of New Mexico and Texas west of longitude 104° 00' West;
- (b) The entire State of Florida including the Key West area and the areas enclosed within a 322-kilometer (200-mile) radius of Patrick Air Force Base, Florida (latitude 28° 21' North, longitude 80° 43' West), and within a 322-kilometer (200-mile) radius of Eglin Air Force Base, Florida (latitude 30° 30' North, longitude 86° 30' West);
- (c) The entire State of Arizona;
- (d) Those portions of California and Nevada south of latitude 37° 10' North, and the areas enclosed within a 322-kilometer (200-mile) radius of the Pacific Missile Test Center, Point Mugu, California (latitude 34° 09' North, longitude 119° 11' West).
- (e) In the State of Massachusetts within a 160-kilometer (100-mile) radius around locations at Otis Air Force Base, Massachusetts (latitude 41° 45' North, longitude 70° 32' West).
- (f) In the State of California within a 240-kilometer (150-mile) radius around locations at Beale Air Force Base, California (latitude 39° 08' North, longitude 121° 26' West).
- (g) In the State of Alaska within a 160-kilometer (100-mile) radius of Clear, Alaska (latitude 64° 17' North, longitude 149° 10' West).
- (h) In the State of North Dakota within a 160-kilometer (100-mile) radius of Concrete, North Dakota (latitude 48° 43' North, longitude 97° 54' West).
- (i) In the States of Alabama, Georgia and South Carolina within a 200-kilometer (124-mile) radius of Warner Robins Air Force Base, Georgia (latitude 32° 38' North, longitude 83° 35' West).
- (j) In the State of Texas within a 200-kilometer (124-mile) radius of Goodfellow Air Force Base, Texas (latitude 31° 25' North, longitude 100° 24' West).

All stations operating in accordance with this provision will be secondary to stations operating in accordance with the Table of Frequency Allocations.

* * * * *

US244 The band 136-137 MHz is allocated to the non-Federal Government aeronautical mobile (R) service on a primary basis, and is subject to pertinent international treaties and agreements. The frequencies 136, 136.025, 136.05, 136.075, 136.1, 136.125, 136.15, 136.175, 136.2, 136.225, 136.25, 136.275, 136.3, 136.325, 136.35, 136.375, 136.4, 136.425, 136.45, and 136.475 MHz are available on a shared basis to the Federal Aviation Administration for air traffic control purposes, such as automatic weather observation stations (AWOS), automatic terminal information services (ATIS), flight information services-broadcast (FIS-B), and airport control tower communications.

* * * * *

US246 No station shall be authorized to transmit in the following bands:

- 73-74.6 MHz,
- 608-614 MHz, except for medical telemetry equipment¹,
- 1400-1427 MHz,
- 1660.5-1668.4 MHz,
- 2690-2700 MHz,
- 4990-5000 MHz,
- 10.68-10.7 GHz,

¹ Medical telemetry equipment shall not cause harmful interference to radio astronomy operations in the band 608-614 MHz and shall be coordinated under the requirements found in 47 C.F.R. § 95.1119.

15.35-15.4 GHz,
 23.6-24 GHz,
 31.3-31.8 GHz,
 50.2-50.4 GHz,
 52.6-54.25 GHz,
 86-92 GHz,
 100-102 GHz,
 105-116 GHz,
 164-168 GHz,
 182-185 GHz,
 217-231 GHz.

* * * * *

US262 The use of the band 31.8-32.3 GHz by the space research service (deep space) (space-to-Earth) and of the band 34.2-34.7 GHz by the space research service (deep space) (Earth-to-space) are limited to Goldstone, California.

* * * * *

US276 Except as otherwise provided for herein, use of the band 2360-2385 MHz by the mobile service is limited to aeronautical telemetering and associated telecommand operations for flight testing of manned or unmanned aircraft, missiles or major components thereof. The following three frequencies are shared on a co-equal basis by Government and non-Government stations for telemetering and associated telecommand operations of expendable and reusable launch vehicles whether or not such operations involve flight testing: 2364.5 MHz, 2370.5 MHz, and 2382.5 MHz. All other mobile telemetering uses shall be secondary to the above uses.

US277 The band 10.6-10.68 GHz is also allocated on a primary basis to the radio astronomy service. However, the radio astronomy service shall not receive protection from stations in the fixed service which are licensed to operate in the one hundred most populous urbanized areas as defined by the 1990 U.S. Census.

US278 In the bands 22.55-23.55 GHz and 32.3-33 GHz, non-geostationary inter-satellite links may operate on a secondary basis to geostationary inter-satellite links.

* * * * *

US310 In the band 14.896-15.121 GHz, non-Federal Government space stations in the space research service may be authorized on a secondary basis to transmit to Tracking and Data Relay Satellites subject to such conditions as may be applied on a case-by-case basis. Such transmissions shall not cause harmful interference to authorized Federal Government stations. The power flux-density produced by such non-Federal Government stations at the Earth's surface in any 4 kHz band for all conditions and methods of modulation shall not exceed:

-148 dB(W/m²) for $0^\circ < * \leq 5^\circ$
 -148 + (*-5)/2 dB(W/m²) for $5^\circ < * \leq 25^\circ$
 -138 dB(W/m²) for $25^\circ < * \leq 90^\circ$

where * is the angle of arrival of the radio-frequency wave (degrees above the horizontal). These limits relate to the power flux-density and angles of arrival which would be obtained under free-space propagation conditions.

* * * * *

US316 The band 2900-3000 MHz is also allocated on a primary basis to the meteorological aids service. Operations in this service are limited to Federal Government Next Generation Weather Radar (NEXRAD) systems where accommodation in the 2700-2900 MHz band is not technically practical and are subject to coordination with existing authorized stations.

* * * * *

US320 The use of the bands 137-138 MHz, 148-150.05 MHz, and 400.15-401 MHz by the mobile-satellite service is limited to non-voice, non-geostationary satellite systems and may include satellite links between land earth stations at fixed locations.

* * * * *

US328 The band 2320-2345 MHz is also available for aeronautical telemetering and associated telecommand operations for flight testing of manned or unmanned aircraft, missiles or major components thereof on a secondary basis to the Satellite Digital Audio Radio Service.

* * * * *

US342 In making assignments to stations of other services to which the bands:

13360-13410 kHz,	14.47-14.5 GHz,	145.45-145.75 GHz,
37.5-38.25 MHz,	22.01-22.21 GHz,	146.82-147.12 GHz,
322-328.6 MHz,	22.21-22.5 GHz,	150-151 GHz,
1330-1400 MHz,	22.81-22.86 GHz,	174.42-175.02 GHz,
1610.6-1613.8 MHz,	23.07-23.12 GHz,	177-177.4 GHz,
1660-1660.5 MHz,	31.2-31.3 GHz,	178.2-178.6 GHz,
1668.4-1670 MHz,	36.43-36.5 GHz,	181-181.46 GHz,
3260-3267 MHz,	42.5-43.5 GHz,	186.2-186.6 GHz,
3332-3339 MHz,	48.94-49.04 GHz,	250-251 GHz,
3345.8-3352.5 MHz,	93.07-93.27 GHz,	257.5-258 GHz,
4825-4835 MHz,	97.88-98.08 GHz,	261-265 GHz,
4950-4990 MHz,	140.69-140.98 GHz,	262.24-262.76 GHz,
6650-6675.2 MHz,	144.68-144.98 GHz,	265-275 GHz

are allocated, all practicable steps shall be taken to protect the radio astronomy service from harmful interference. Emissions from spaceborne or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. 4.5 and 4.6 and Article 29 of the ITU Radio Regulations).

* * * * *

USxxx In the band 401-403 MHz, the non-Federal Government Earth exploration-satellite (Earth-to-space) and meteorological-satellite (Earth-to-space) services are limited to earth stations transmitting to Federal Government space stations.

USyyy The band 1164-1189 MHz is also allocated to the radionavigation-satellite service (space-to-Earth, space-to-space) on a primary basis. In this band, stations in the radionavigation-satellite service shall not cause harmful interference to, nor claim protection from, stations of the aeronautical radionavigation service.

USzzz In designing systems for the inter-satellite service in the band 32.3-33 GHz, for the radionavigation service in the band 32-33 GHz, and for the space research service (deep space) (space-to-Earth) in the band 31.8-32.3 GHz, all necessary measures shall be taken to prevent harmful interference between these services, bearing in mind the safety aspects of the radionavigation service.

* * * * *

NON-FEDERAL GOVERNMENT (NG) FOOTNOTES

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NG41 Frequencies in the bands 3700-4200 MHz and 5925-6425 MHz, may also be assigned to stations in the international fixed public and international control services located in Puerto Rico, the U.S. Virgin Islands, and Navassa Island.

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FEDERAL GOVERNMENT (G) FOOTNOTES

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G2 In the bands 216-225, 420-450 (except as provided by US217 and G129) 890-902, 928-942, 1300-1400, 2310-2385, 2417-2450, 2700-2900, 5650-5925 and 9000-9200 MHz, the Government radiolocation service is limited to the military services.

* * * * *

G129 Government wind profilers are authorized to operate on a primary basis in the radiolocation service in the frequency band 448-450 MHz with an authorized bandwidth of no more than 2 MHz centered on 449 MHz, subject to the following conditions: 1) wind profiler locations must be pre-coordinated with the military services to protect fixed military radars; and 2) wind profiler operations shall not cause harmful interference to, nor claim protection from, military mobile radiolocation stations that are engaged in critical national defense operations.

PART 25--SATELLITE COMMUNICATIONS

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

AUTHORITY: 47 U.S.C. 701-744. Interprets or applies Sections 4, 301, 302, 303, 307, 309 and 332 of the Communications Act, as amended, 47 U.S.C. Sections 154, 301, 302, 303, 307, 309 and 332, unless otherwise noted.

5. Section 25.202(a)(3) is revised and new sections 25.202(a)(4)(iii) and 25.202(a)(7) are added to read as follows:

§ 25.202 Frequencies, frequency tolerance and emission limitations.

(a)(1) * * *

* * * * *

(3) The following frequencies are available for use by the non-voice, non-geostationary mobile-satellite service:

137-138 MHz: space-to-Earth
148-150.05 MHz: Earth-to-space

399.9-400.05 MHz: Earth-to-space
400.15-401 MHz: space-to-Earth

(4) * * *

(iii) The following frequencies are available for use by the L-band Mobile-Satellite Service:

1525-1559 MHz: space-to-Earth
1626.5-1660.5 MHz: Earth-to-space

The use of the frequencies 1544-1545 MHz and 1645.5-1646.5 MHz is limited to distress and safety communications.

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Part 87—AVIATION SERVICES

6. The authority citation for Part 87 continues to read as follows:

AUTHORITY: 48 Stat. 1066, 1082, as amended; 47 U.S.C. 154, 303, 307(e) unless otherwise noted. Interpret or apply 48 Stat. 1064-1068, 1081-1105, as amended; 47 U.S.C. 151-156, 301-609.

7. Section 87.303 is amended by revising paragraph (d)(1) to read as follows:

§ 87.303 Frequencies.

* * * * *

(d)(1) Frequencies in the bands 1435-1525 MHz and 2360-2385 MHz are assigned primarily for telemetry and telecommand operations associated with the flight testing of manned or unmanned aircraft and missiles, or their major components. The bands 1525-1535 MHz and 2310-2360 MHz are also available for these purposes on a secondary basis. Until January 1, 2007, flight test operations in the band 2385-2390 MHz may continue on a primary basis within 160 km of the nine sites listed in 47 C.F.R. § 2.106, footnote US363. Permissible uses of these bands include telemetry and telecommand transmissions associated with the launching and reentry into the Earth's atmosphere, as well as any incidental orbiting prior to reentry, of manned or unmanned objects undergoing flight tests. In the band 1435-1530 MHz, the following frequencies are shared with flight telemetry mobile stations: 1444.5, 1453.5, 1501.5, 1515.5, 1524.5, and 1525.5 MHz. In the band 2360-2390 MHz, the following frequencies may be assigned on a co-equal basis for telemetry and associated telecommand operations in fully operational or expendable and re-usable launch vehicles, whether or not such operations involve flight testing: 2364.5, 2370.5 and 2382.5 MHz. In the band 2360-2390 MHz, all other mobile telemetry uses are secondary to the above stated launch vehicle uses.

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