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

In the Matter of	)	
	)	
Amendment of Parts 2, 15, 80, 90, 97, and 101 of the Commission's Rules Regarding Implementation of the Final Acts of the World Radiocommunication Conference (Geneva, 2012)(WRC-12), Other Allocation Issues, and Related Rule Updates	)	ET Docket No. 15-99

REPORT AND ORDER

Adopted: March 27, 2017 **Released: March 29, 2017**

By the Commission:

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I. INTRODUCTION

1. This Order adopts rules to implement certain radio frequency allocation decisions from the World Radiocommunication Conference (Geneva, 2012) (WRC-12) and conforms our rules to the WRC-12 Final Acts. These decisions will collectively promote the advancement of new and expanded services and provide significant benefits to the American public. The following are the major actions we take to support non-Federal spectrum requirements:

- Allocate the 472-479 kHz band to the amateur service on a secondary basis and amend Part 97 to provide for amateur service use of this band and of the 135.7-137.8 kHz band.
- Amend Part 80 to authorize radio buoy operations in the 1900-2000 kHz band under a ship station license.
- Allocate eight frequency bands in the 4 to 44 MHz range to the radiolocation service for

Federal and non-Federal use, limited to oceanographic radars. We also amend Part 90 to provide for licensing of oceanographic radars, and require those radars currently operating under an experimental license to conform their operations to the adopted rules within five years of the effective date of this Order.

- Reallocate the 156.7625-156.7875 MHz and 156.8125-156.8375 MHz bands to the mobile-satellite service (MSS) (Earth-to-space) on a primary basis for Federal and non-Federal use, limited to the reception of Automatic Identification Systems (AIS) broadcast messages from ships. We also amend Part 80 to permit ships to transmit AIS broadcast messages in these bands, and amend Part 25 to permit MSS satellites to receive in these bands and in the existing AIS bands.
- Allocate the 5000-5091 MHz band to the aeronautical mobile (route) service (AM(R)S) on a primary basis for Federal and non-Federal use. AM(R)S use of the 5000-5030 MHz band extends the tuning range for the recently-established Aeronautical Mobile Airport Communications System (AeroMACS) that will support surface applications at airports. AM(R)S use of the 5030-5091 MHz band will support unmanned aircraft systems (UAS).

II. BACKGROUND

2. The Commission's Allocation Table, contained in Section 2.106 of the rules, sets forth the allocation of radio frequencies both domestically and internationally.[1] Except as otherwise provided for in Section 2.102 of the rules, the assignment, licensing and use of frequencies between 9 kHz and 275 GHz must be in accordance with the Allocation Table in Section 2.106.

3. The International Telecommunication Union (ITU) allocates frequency bands to various radio services on either a worldwide or Regional basis and enters these radio services in its Table of Frequency Allocations as part of the *Radio Regulations*.[2] The ITU revises its Table of Frequency Allocations (shown in Section 2.106 of our rules as the "International Table") and other provisions in its *Radio Regulations* at periodic World Radiocommunication Conferences (WRCs). In preparation for the WRC-12 the Commission and National Telecommunications and Information Administration (NTIA) jointly transmitted their allocation proposals to the U.S. Department of State (*U.S. Proposals for WRC-12*).[3] The ITU convened the World Radiocommunication Conference 2012 (WRC-12) from January 23 - February 17, 2012, in Geneva, Switzerland, and adopted allocation changes that affect both Federal and non-Federal entities. These international allocation decisions are known as the *WRC-12 Final Acts*. Following WRC-12, the ITU revised its *Radio Regulations* to incorporate the *WRC-12 Final Acts*.[4]

[1] An "allocation" is an entry in the Allocation Table of a given frequency band that designates its use by one or more terrestrial or space radiocommunication services or the radio astronomy service (together, "radio services") under specified conditions. When a frequency band is allocated to one or more radio services on a primary basis, the Commission protects the authorized stations from interference based on the order in which the station license was issued unless it specifies a different protection arrangement. Stations of a secondary service may not cause harmful interference to, nor claim protection from, stations of a primary service to which frequencies are already assigned or may be assigned at a later date. 47 CFR §§ 2.1(c), 2.104(d), 2.104(e)(2), 2.105(c).

[2] The ITU may also include conditions for the use of an allocation, which are listed in international footnotes.

[3] The *U.S. Proposals for the WRC-12* consisted of three letters from the Commission and NTIA to the U.S. Department of State: First Tranche (February 17, 2011); Second Tranche (RCS-2394/1, June 21, 2011); and Third Tranche (September 19, 2011) (together, *U.S. Proposals for WRC-12*, available at http://transition.fcc.gov/ib/wrc-12/us/).

[4] The ITU *Radio Regulations*, Edition of 2012, include the *WRC-12 Final Acts* (ITU *Radio Regulations*). The ITU *Radio Regulations* are available at http://www.itu.int/pub/R-REG-RR-2012. We note that the World Radiocommunication Conference (Geneva, 2015) (WRC-15) concluded on November 27, 2015, and that the ITU has recently released updated its Radio Regulations.

4. On April 23, 2015, the Commission adopted the *Notice of Proposed Rulemaking* in this proceeding (*WRC-12 NPRM*), which made several proposals to implement international allocation decisions from the *WRC-12 Final Acts* by amending the U.S. Table and the corresponding service rules.[5] In response to the *WRC-12 NPRM*, 33 parties filed comments and 17 parties filed reply comments.[6]

III. DISCUSSION

5. In this Report and Order, we amend Parts 2, 15, 25, 80, 90, and 97 of the Commission's rules to implement specific allocations from the *WRC-12 Final Acts* that affect a number of frequency bands between 8.3 kHz and 3000 GHz and to adopt related service rules. This Report and Order also addresses the allocation and service rules pertaining to radio buoy use of the 1900-2000 kHz band. This Report and Order does not address the allocation of additional spectrum for aeronautical mobile telemetry (AMT) operations.[7]

A. Amateur Radio Use of the 135.7-137.8 kHz and 472-479 kHz Bands

6. In this section, we address the allocation of the 472-479 kHz band (630 meter band) to the amateur service on a secondary basis, the deletion of certain allocations from the 135.7-137.8 kHz and 472-479 kHz bands, and the adoption of corresponding service rules for amateur radio in these bands that allow for co-existence with Power Line Carrier (PLC) systems that use these bands.[8]

1. Secondary Amateur Service Allocation in the 472-479 kHz Band

7. As proposed in the *WRC-12 NPRM*, we allocate the 472-479 kHz band to the amateur service on a secondary basis and limit the maximum equivalent isotropically radiated power (EIRP)[9] of amateur stations using this band to five watts in the United States, except for that portion of Alaska that is within 800 kilometers of the Russian Federation's borders, where the maximum EIRP is limited to one watt.[10]

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[5] *Amendment of Parts 1, 2, 15, 25, 27, 74, 78, 80, 87, 90, 97, and 101 of the Commission's Rules Regarding Implementation of the Final Acts of the World Radiocommunication Conference (Geneva, 2007) (WRC-07), Other Allocation Issues, and Related Rule Updates*, ET Docket No. 12-338, ET Docket No. 15-99, and IB Docket 06-123, Report and Order, Order, and Notice of Proposed Rulemaking, 30 FCC Rcd 4183 (2015) (*WRC-07 R&O* or *WRC-12 NPRM*, as appropriate).

[6] *See* Appx. A for the list of commenters.

[7] *See WRC-12 NPRM*, 30 FCC Rcd at 4255-62, paras. 206-221 (seeking comment on the ability of Federal/non-Federal AMT stations to share spectrum with incumbent services in the 4400-4940 MHz and 5925-6700 MHz bands). We defer consideration of this issue to a future order.

[8] *WRC-12 NPRM*, 30 FCC Rcd at 4240-48, paras. 159-182. PLC systems are defined as an unintentional radiator employed as a carrier current system used by an electric power utility entity on transmission lines for protective relaying, telemetry, etc. for general supervision of the power system. The system operates by the transmission of radio frequency energy by conduction over the electric power transmission lines of the system. The system does not include those electric lines which connect the distribution substation to the customer or house wiring. 47 CFR § 15.3(t).

[9] EIRP is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain). 47 CFR § 2.1(c). EIRP is equal to ERP multiplied by 1.64. *See* "Guidelines for Determining the Effective Radiated Power (ERP) and Equivalent Isotropically Radiated Power (EIRP) of a RF Transmitting System," Office of Engineering and Technology, FCC, Nov. 30, 2010 (https://apps.fcc.gov/oetcf/kdb/forms/FTSSearchResultPage.cfm?switch=P&id=47469).

[10] *WRC-12 NPRM*, 30 FCC Rcd at 4242, para. 165-166. Specifically, we amend the non-Federal Table within Section 2.106 of the rules by dividing the 435-495 kHz band into three bands (435-472 kHz, 472-479 kHz, 479-495 kHz) so that the secondary amateur service allocation can be directly listed in the 472-479 kHz band. We also add a reference to international footnote 5.80A to the 472-479 kHz band, thereby limiting amateur stations using frequencies in this band to a maximum EIRP of five watts.

8. The amateur service will share this band with PLC systems, which electric utility companies use and operate in the 9-490 kHz range under Part 15 of our rules on an unprotected and non-interference basis with respect to authorized radio users.[11] The Utilities Telecom Council (UTC) objects to our allocation proposal, arguing that there is insufficient understanding about the interference potential between amateur operations and PLC systems, that opening up the band to amateur operations will increase the probability of interference to and from PLC systems, and that the allocation would unnecessarily constrain utility access to the band, thus depriving utilities of the flexibility needed to deploy PLC systems.[12]

9. On the other hand, the amateur radio community supports this allocation. The Amateur Radio Research and Development Corporation (AMRAD) claims that this allocation "will improve technical knowledge on radio propagation, short antenna design techniques, digital transmission and reception technologies, and communication with high environmental noise."[13] ARRL, the national association for Amateur Radio (ARRL), notes that this allocation, along with that of 135.7-137.8 kHz, will allow for amateur operations in representative bands of the radio spectrum in the United States.[14] Most importantly, the amateur radio community claims that co-existence with PLC systems is possible, citing amateur service operations on frequencies near 500 kHz under experimental licenses, which have not resulted in any interference complaints.[15]

10. We agree that adding a secondary amateur service allocation to the 472-479 kHz band will provide new opportunities for amateur operators to experiment with equipment, techniques, antennas,

[11] *See* United States Footnotes, 47 CFR § 2.106, footnote US2; *see also* 47 CFR §§ 15.5(b), 15.113(b), 90.35(g) (operating under Part 15 of our rules, PLC systems are not permitted to cause interference and must accept interference from licensed services).

[12] *See* Utilities Telecom Council Comments at 5-6 (Aug. 31, 2015) (UTC Comments); *see also* Utilities Telecom Council Reply at 2 (Sep. 1, 2015) (UTC Reply) ("PLC systems that use the 472-479 kHz band are more likely to be used for distribution lines, where they are likely to be in proximity to residential areas"). *But see supra* note 8 (citing the definition of PLC systems which indicates that our rules do not apply to distribution lines, only to transmission lines).

[13] *See* George E. Lemaster Reply at 1 (Sep. 29, 2015) (Lemaster Reply).

[14] *See* ARRL Comments at 3 (Aug. 31, 2015) (ARRL Comments). *See* ARRL Comments, ET Docket 12-338, at 2 (Feb. 25, 2013) (ARRL WRC-07 Comments); *see also* 47 CFR § 97.301(b).

[15] *See* ARRL Comments at 13, John H. Davis Comments at 2, 23 (Aug. 31, 2015) (Davis Comments), Neil O. Klagge Comments at 1 (Jun. 8, 2015) (Klagge Comments), Lemaster Reply at 1, J.S. McDonald Comments at 2 (Jun. 11, 2015) (McDonald Comments), Michael Ports Comments at 1 (Jun. 15, 2015) (Ports Comments). *See, e.g.*, Amateur Radio Research and Development Corporation Reply at 3 (Sep. 30, 2015), John K. Andrews Comments at 2 (Aug. 13, 2015) (Andrews Comments), ARRL Comments at 27, Donald B. Chester Reply at 2 (Sep. 30, 2015), John H. Davis Reply to UTC Comments at 2 (Sep. 30, 2015), Ronald R. Douglass Sr Comments at 2 (Jul. 14, 2015), Klagge Comments at 1, Patrick E. Hamel Comments at1 (Jun. 16, 2015) (Hamel Comments), James F. Hollander Reply at 8 (Sep. 18, 2015) (Hollander Reply), Laurence J. Howell Comments at 2 (Jun. 15, 2015) (Howell Comments), Steven B. Johnston Comments at 1 (Jul. 2, 2015) (Johnston Comments), Lemaster Reply at 1, McDonald Comments at 1, Jory McIntosh Comments at 5 (Apr. 30, 2015) (McIntosh Comments), Michael Mussler Reply at 1 (Sep. 29, 2015) (Mussler Reply), Ports Comments at 3, Frederick H. Raab Reply at 1 (Sep. 29, 2015). The Commission has issued experimental licenses to amateur operators for spectrum near 500 kHz, and many of these experimental stations are authorized to operate with radiated power levels that greatly exceed the limit of five watts EIRP that we are considering in this proceeding. No interference reports have been filed with the Commission or NTIA concerning these experimental operations. *See, e.g.*, the following experimental stations, which are authorized to operate in segments of the 460-490 kHz band with a maximum ERP of between five and 500 watts (*i.e.*, between 8.2 and 820 watts EIRP): call signs WA2XRM, WD2XSH, WE2XPQ, WF2XXQ, WG2XCT, WG2XFQ, WG2XIQ, WG2XNI, WG2XSV, WH2XGP, WH2XHY, WH2XPK, and WH2XQC.

and propagation phenomena.[16] The 472-479 kHz band offers amateur service operators different propagation characteristics from the 135.7-137.8 kHz band, which was allocated on a secondary basis to amateur service in the *WRC-07 Report and Order (R&O)*.[17] At the same time, we recognize the importance of PLC systems and their impact on utility safety, security and reliability of utility operations.[18] Our allocation decision will not compromise the use or deployment of PLC systems. As discussed in more detail below, co-existence between PLC systems and amateur radio operations in these bands is possible, and the service rules we adopt in this Order will foster this co-existence.[19] Further, our secondary allocation to the amateur service will harmonize the United States and international allocations for this band and provide new opportunities for amateur service experimentation, while still allowing for operation of PLC systems.

2. Deletion of Allocations from the New Amateur Bands

11. As proposed in the *WRC-12 NPRM*, we remove several allocations from the 135.7-137.8 kHz and 472-479 kHz bands.[20] Specifically, we delete the non-Federal fixed service (FS) and maritime mobile service (MMS) allocations from the 135.7-137.8 kHz band.[21] We take this action because there are no non-Federal stations in the FS and MMS that are licensed to operate in this band, and because we find that any future requirements for non-Federal stations in the FS or MMS can be accommodated in other frequency bands. However, because there is some limited Federal use of this band, we will maintain the existing primary FS and MMS allocations in the Federal Table.[22]

12. In addition, as proposed in the *WRC-12 NPRM*, we delete the Federal MMS and aeronautical radionavigation service (ARNS) allocations and the non-Federal MMS allocation from the 472-479 kHz band.[23] NTIA has not authorized any Federal stations in the ARNS or MMS to operate in

[16] *See* Hollander Reply at 5, Howell Comments at 1-17, Nickolaus E. Leggett Comments at 4 (May 4, 2015) (Leggett Comments), Mussler Reply at 1, Ports Comments at 2-4.

[17] *See* Davis Comments at 14-18 (discussing the operational and technical differences between the two bands); *see also* ARRL Reply at 5 (Sep. 30, 2015) (asserting that the 135.7-137.8 kHz and 472-479 kHz bands "exhibit radically different propagation characteristics relative to long distance communications, and experimentation in both bands is necessary"). *See also* note 5, supra, for the *WRC-07 R&O* citation.

[18] *See* UTC Comments at 7 (requesting the Commission elevate the status of PLC systems that currently operate on an unlicensed basis to "be able to object to interference cause by Amateur operations"). *But see infra* paras. 13-29 (finding that the rules we adopt in this Order provide sufficient protection to PLC systems in both the 135.7-137.8 kHz and 472-479 kHz bands).

[19] *See infra* paras. 13-29.

[20] *WRC-12 NPRM*, 30 FCC Rcd at 4247-48, paras. 181-182.

[21] *See WRC-12 NPRM*, 30 FCC Rcd at 4248, para. 181 (removing from this band the reference to international footnote 5.64, which contains a use restriction that applies to the deleted allocations, and the cross reference to the maritime services in Part 80).

[22] *See WRC-12 NPRM*, 30 FCC Rcd at 4248, para. 181. In the *WRC-12 NPRM* the Commission sought comment on whether to adopt exclusion areas or use other methods to protect these Federal operations in the 135.7-137.8 kHz band. We find it unnecessary to take any specific action to protect these Federal operations because stations in the amateur service will operate on a secondary basis and must not cause harmful interference to primary services in the band. 47 CFR § 2.105(c)(2).

[23] Specifically, we divide the 435-495 kHz band within the Federal Table into three bands (435-472 kHz, 472-479 kHz, 479-495 kHz) to allow for the primary MMS allocation and the secondary ARNS allocation to be removed from the 472-479 kHz band. Because we remove the ARNS allocation from the 472-479 kHz band, we also remove that band from footnote US231. Similarly, because we remove the primary MMS allocation from the Federal and non-Federal Tables, we also remove the references to international footnotes 5.79 and 5.79A, which contain use restrictions on the deleted MMS allocations. We also remove the cross reference to the maritime services in Part 80 that applies to this band.

the 472-479 kHz band, and there is only limited use of the non-Federal MMS allocation. Any future requirements for non-Federal MMS stations can be accommodated in other frequency bands. However, there are two non-Federal licensees that operate three public coast stations under their current licenses on a primary basis. We will grandfather operation of these stations by amending Section 80.357(b)(1) to limit the use of the 472-479 kHz band to public coast stations that were licensed as of the effective date of this Report and Order. Accordingly, we will add a footnote to the Table of Allocations that grandfathers the following licensees to operate public coast stations on a primary basis in the 472-479 kHz band pursuant to their current radio station authorization, subject to periodic renewals: Global HF Net LLC (call signs KFS and WNU) and New England Historical Radio Society, Inc. (call sign WNE).[24]

3. Service Rules for the Amateur Service in the 135.7-137.8 kHz and 472-479 kHz Bands

13. We adopt service rules for the amateur radio service in the 135.7-137.8 kHz (2200 meter band) and 472-479 kHz (630 meter band) bands that will ensure the compatibility of amateur radio operations and PLC systems that operate in these bands, and promote the shared use of these bands. Under these rules, electric utilities will not be required to modify existing PLC systems to accommodate amateur operations, and previously notified amateur stations will not be required to alter their operations to accommodate new or modified PLC operations.

14. Separation Distance. As proposed, we will permit amateur stations to operate in the 135.7-137.8 kHz and 472-479 kHz bands when separated by a specified distance from electric power transmission lines with PLC systems that use the same bands.[25] To support the operations of both the amateur service and PLC systems in these bands, we adopt a minimum horizontal separation distance of one kilometer between the transmission line and the amateur station when operating in these bands.[26]

15. Regarding operations in the 135.7-137.8 kHz band, ARRL had provided a technical analysis in ET Docket No. 12-338,[27] which concluded that PLC systems "will be sufficiently protected from amateur stations transmitting at an EIRP of 1 W with a separation distance of 1 km from the transmission lines carrying the PLC signals, beyond which there is no interference potential."[28] UTC agrees with this conclusion and supports a separation distance of at least one kilometer for amateur operation in this band.[29]

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[24] *See* Appx. B, for the text of footnote NG8.

[25] *WRC-12 NPRM*, 30 FCC Rcd at 4243, para. 168. The *WRC-12 NPRM* also sought comment on the applicability of the IEEE 1613-2009 standard to PLC systems, which might obviate the need for a specified separation distance. *WRC-12 NPRM*, 30 FCC Rcd at 4245, para. 174. ARRL argues that if utilities met this standard "there would be no interaction between amateur stations and PLC systems even if the latter were operated on a co-channel basis." ARRL Comments at 22. The IEEE 1613-2009 standard is not applicable to PLC systems operating in the subject bands because the interference susceptibility testing and performance requirements in the standard are for frequencies ranging from 80 MHz to 1000 MHz. The techniques used to mitigate the interference susceptibility of PLC systems from radio signals at 80 MHz to 1000 MHz would not be applicable in the case of amateur stations' transmissions co-channel to PLC systems.

[26] *See WRC-12 NPRM*, 30 FCC Rcd at 4246, para. 177. This "horizontal distance" is the lateral distance between the center of the amateur station antenna and a vertical projection of the overhead transmission line down to the height of the center of the amateur station antenna. This distance will be calculated from the coordinates (*i.e.* latitude and longitude) of the amateur station antenna and the coordinates of the nearest point on the transmission line without having to know the heights of the antenna or the transmission line. *Id.* None of the parties supported the alternative slant-distance method for specifying separation distance.

[27] *See* ARRL WRC-07 Comments at Annex A.

[28] *See* ARRL Comments at 14.

[29] UTC Comments at 6.

16. ARRL prefers that amateur stations have the option to be located closer to the transmission lines with PLC systems and recommends a notification procedure to address any potential interference to PLC systems.[30] Several members of the amateur community would like a shorter than one kilometer separation distance, while others agree that one kilometer is a reasonable separation distance.[31] Further, ARRL acknowledges that the likelihood of an amateur station seeking to conduct experiments within one kilometer of PLC systems is very low.[32] We find that a one kilometer separation distance reasonably ensures that PLC systems and amateur radio stations are unlikely to experience interference. In addition, establishing a zone where amateur use is not authorized will simplify and streamline the process for determining whether an amateur station can transmit in these bands when in proximity to transmission lines upon which PLC systems operate.

17. We adopt the same separation distance for amateur operations in the 472-479 kHz band, as we do for the 135.7-137.8 kHz band, since these bands share the same considerations for co-existence of the two uses. ARRL noted that at "distances of one kilometer or more, there is no chance of interference to a PLC line whatsoever."[33] While UTC does not agree with ARRL's assertion for the proposed EIRP limit of five watts for the 472-479 kHz band[34] it fails to provide any technical analysis of its own to demonstrate that these constraints will prove problematic for PLC systems. We believe the one kilometer separation distance is adequate to ensure the co-existence of amateur and PLC operations and, therefore, we will apply the one kilometer separation distance to the 472-479 kHz band.

18. Fixed Location Restriction. We restrict amateur service operations to fixed locations and prohibit mobile operations in these bands.[35] This restriction will ensure that amateur stations remain at the locations specified in their notification and comply with our separation distance requirements discussed below. UTC and some amateur service commenters support this restriction.[36] However, several amateur commenters request that fixed locations include temporary fixed locations or that

[30] *See* ARRL Comments at 15. ARRL notes that harmful interference from PLC systems to amateur radio reception is unlikely when the separation distance is over 300 meters from a transmission line carrying PLCs. *See* ARRL Comments at 25-26, Exhibit A.

[31] *See*, *e.g.*, Andrews Comments at 2, Davis Comments at 2-3 (stating that many amateur operators concur that a 1 km separation distance is reasonable, but that if the Commission finds a closer separation distance is appropriate, suggests that a minimum separation of 350 meters for the 2200 m band and 100 meters for the 630 m band appears to be desirable), Howell Comments at 2, 13 (stating that he could accept a 1 km separation distance, but that a much smaller separation appears reasonable). *But see* James F. Hollander Comments at 2 (Jun. 10, 2015) (Hollander Comments) (suggesting at least 100 meters), Johnston Comments at 2 (suggesting 250 meters, based on radiated noise from power lines), Klagge Comments at 1 (suggesting less than 500 meters), John W. Molnar Comments at 2 (Jun. 12, 2015) (stating that a separation distance greater than 500 meters "seems excessive"), Raab Comments on Recommendations for Co-existence of Amateur and PLC Operations at 1 (Aug. 31, 2015) (proposing 300 meters), Eric M. Tichansky Comments at 3 (Aug. 10, 2016) (suggesting that for the 630 m band, a separation distance of 500 meters for five watts EIRP and 100-500 meters for one watt EIRP).

[32] *See* ARRL Comments at 15-16. ARRL claims that "transmission lines can also be noisy, making it unlikely that any PLC emissions will be greater than the ambient noise levels commonly found on these frequencies near transmission lines. It is therefore not likely that Amateurs will choose to operate on these bands if their antennas must be located very close to transmission lines." *See* ARRL Comments at 25-26.

[33] *See* ARRL Comments at 35-36.

[34] *See* UTC Reply at 2.

[35] *See* Appx. B, Section 97.303(g)(1).

[36] *See* UTC Reply at 9. *See also* James E. Whedbee Comments at 3 (Jun. 29, 2015) (recommending the adoption of fixed station operation only, and therefore, that portable and mobile operations be prohibited, except for emergency transmissions) (Whedbee Comments).

fixed-portable operations be allowed.[37] We will allow temporary fixed use at sites that meet our technical rules and follow our notification requirements.[38] In other words, the location of the amateur station must not be located within one kilometer of PLC systems and its operations must be in accordance with Part 97 rules.

19. Prior Notification Requirement for Amateur Service Operations. We will require amateur operators to notify UTC of the location of their proposed station prior to commencing operations, to confirm that the station is not located within the one kilometer separation distance. As noted in the *WRC-12 NPRM*, we are concerned whether transmission lines are easily identifiable and whether PLC systems operate on a particular transmission line in the relevant bands.[39] UTC and several of the amateur service commenters agree that a process to coordinate or notify operations in the 135.7-137.8 kHz and 472-279 kHz bands is advisable.[40] Even though several amateur service commenters claim that they can readily identify transmission lines and compute the separation distance,[41] we find that transmission lines are not always readily identifiable.[42] Further, amateur operators may not be able to determine whether PLC systems operate in the relevant bands on the subject transmission lines. For these reasons, we adopt a notification process to ensure that amateur stations seeking to operate in these bands are located outside the separation distance.

20. The notification requirement will entail notifying UTC of the operator's call sign and coordinates of the proposed station's location for confirmation that the location is outside the one kilometer separation distance, or the relevant PLC system is not transmitting on the requested bands. UTC, which maintains a database of PLC systems[43] must respond to the notification within 30 days if it objects. If UTC raises no objection, amateur radio operators may commence operations on the band identified in their notification. The Wireless Telecommunications Bureau will issue a public notice providing the details for filing notifications with UTC.

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[37] *See* Klagge Comments at 1, Hollander Reply at 8 (using a fixed portable station temporarily set up at a location such as for a simulated emergency test or the annual radio Field Day exercise). *But see* George Magiros Comments at 4-5 (Aug. 31, 2015) (Magiros Comments) (arguing for no fixed location restriction because "amateur licensees can be trusted to check whether they are suitably distant from PLC operations"), Steven Mierisch Comments at 2 (Sep. 1, 2015) (suggesting that amateur stations on these bands should be prohibited from transmitting in motion, and that exceptions "could be made for amateur stations aboard US registered vessels, which are operating in international waters. Maritime stations could also be allowed some specified distance from power lines or from the shore").

[38] *See infra* paras. 19-20.

[39] *WRC-12 NPRM*, 30 FCC Rcd at 4245, para. 176.

[40] *See* ARRL Comments at 15-16 ("to preclude any adverse interaction in those rare instances in which an Amateur LF station would be located closer to a transmission line carrying PLC signals than one kilometer, the rules could reasonably require advance notification to the utility involved"), Andrews Comments at 3, John H. Davis Reply to Comments by Whedbee, ARRL, Raab, Magiros and others at 2 (Sep. 30, 2015) (Davis Reply to Amateurs) ("it would be helpful to have industry-amateur cooperation as a double-check in doubtful cases over difficult terrain"); *see also* UTC Comments at 8-9 ("utilities need to have prior notice before an Amateur commences operation so that they can work together to ensure co-existence from the start").

[41] *See* Davis Comments at 5, Hollander Comments at 4.

[42] *See* ARRL Comments at 30-31 ("ARRL agrees that it is not always easy to differentiate transmission lines from electric distribution lines"); *but see* Ex Parte Statement of ARRL, ET Docket No. 15-99, at 7 (Mar. 10, 2016) (ARRL *ex parte* statement) (arguing that amateur radio operators are sophisticated users of the radio spectrum and are fully capable of making determination like which lines are transmission lines carrying PLC signals and which ones are distribution lines).

[43] *See* 47 CFR § 15.113.

21. ARRL, in a late-filed *ex parte* statement, argues that notification procedures that would require amateur operators to notify UTC of their planned operations in the subject bands is "overboard", "completely unnecessary", "unhelpful" and create "an unreasonable regulatory burden."[44] We disagree with ARRL. The notification procedures we adopt seek to strike a balance between amateur operations used for experimental purposes and PLC operation used by electric utilities for the reliability and security of electric service to the public. Our procedures are the least burdensome considering we seek to ensure that no potential interference occurs from these two uses. A simple notification to UTC with a 30-day waiting period does not appear to be burdensome. Amateur operations can commence as soon as that period expires. ARRL claims that UTC should provide access to the PLC database to them or directly to amateurs to assist them in determining whether their notified operations are within the one-kilometer separation distance from transmission lines with PLC systems operating on these bands. ARRL fails to make a persuasive case why it would be a better organization to make those determinations rather than UTC. Further, since UTC has control of the PLC database which can be updated, we find no reason to mandate its release to another party especially considering the sensitive nature of information it contains.[45]

22. New Buildout of Transmission Lines with PLC Systems. If an electric utility seeks to deploy a new or modified PLC system on a transmission line that is within one kilometer of a previously coordinated amateur station,[46] the electric utility must employ a frequency in the 9-490 kHz range that has not been included in the amateur station's notification, as ARRL suggests.[47] If the previously coordinated amateur station no longer operates in the band, the electric utility may deploy a PLC system in that band.

23. Radiated and Transmitter Power. As discussed in the *WRC-12 NPRM*, we adopt maximum EIRP limits and transmitter power limits for the new amateur service bands.[48] Amateur stations may operate in the 135.7-137.8 kHz band with a maximum radiated power of one watt EIRP.[49] Several amateur service commenters recommend that we specify a maximum transmitter power developed specifically for these bands,[50] while others recommend that a maximum transmitter power not be specified,[51] or that we apply only the general Part 97 transmitter power limit to both bands.[52] We find

[44] *See* ARRL *ex parte* statement at 3, 5.

[45] *See* UTC Reply at 4-5 (claiming that "disclosure of the PLC database would reveal information that could be used maliciously to disrupt electric service and in any event run counter to Section 1016 of the U.S. Patriot Act" and urging the Commission to decline to allow amateur access to the database or, in the alternative, allow UTC to maintain control over the database while assisting the coordination of PLC systems with amateur operations).

[46] *See infra* Appx. B.

[47] *See* ARRL Comments at 28-29.

[48] *WRC-12 NPRM*, 30 FCC Rcd at 4245, para. 175.

[49] International footnote 5.67A, adopted in the *WRC-07 R&O*, provided for one watt EIRP in this band. *See WRC-07 R&O*, 30 FCC Rcd at 4197, para. 29.

[50] *See* Dale Bower Comments at 1 (Jul. 2, 2015) (requesting "at least 100 watts into any antenna at 100 feet"), Hollander Comments at 5-6, Leggett Comments at 5 (stating that it "would be preferable if a simple output power limit was specified in the rules"), McDonald Comments at 2-3, Christopher Rose Comments at 1 (Jul. 6, 2015) (Rose Comments) (suggesting a transmitter power limit of 50 W PEP).

[51] *See* Davis Comments at 11-13 (suggesting alternative power determination methods, including a combination of antenna height and transmitter power limits), Hamel Comments at 3 (suggesting an optional method based on antenna height and transmitter power), Howell Comments at 7, Lemaster Reply at 1.

[52] *See* ARRL Comments at 32-33 (recommend that we apply the general Part 97 transmitter output power limit to both bands), Andrews Comments at 3-4 (suggesting that no transmitter power limit be specified, but also stating that perhaps an overall transmitter power of 1.5 kW PEP would be appropriate), Illman Comments at 1 (Jul. 6, 2016), Hollander Comments at 4.

that amateur stations operating in the 135.7-137.8 kHz band should be subject only to the general Part 97 limit of 1.5 kW peak envelope power (PEP).[53] We find it unnecessary to limit the transmitter power beyond what it is already provided for in our rules, because antennas used in this frequency band are highly inefficient in converting the RF power delivered to the antenna terminals.

24. We also adopt the power limits proposed in the *WRC-12 NPRM* for amateur stations operating in the 472-479 kHz band.[54] For such stations, the maximum radiated power will be five watts EIRP, except for stations located in the portion of Alaska that is within 800 kilometers of the Russian Federation, where the EIRP will be limited to one watt. We also limit the transmitter power for amateur radio operations in the 472-479 kHz band to 500 watts PEP; provided, however, that the resulting radiated power does not exceed five watts EIRP.[55] In other words, it may be necessary to reduce transmitter power below 500 watts PEP to avoid exceeding the five watts EIRP limit.

25. Antenna Height Restriction. As discussed in the *WRC-12 NPRM*, we will require that the antennas used to transmit in these bands not exceed 60 meters in height above ground level (AGL), as ARRL proposed.[56] Several amateur commenters and UTC support this height restriction, which will assist in a more efficient sharing between the amateur service and PLC systems.[57] The adoption of this height restriction will aid in the sharing of these amateur service bands with PLC systems by limiting the potential for amateurs' signals to exceed the adopted EIRP limits with longer, higher gain antennas,[58] and

[53] 47 CFR § 97.313(b). PEP is the average power supplied to the antenna transmission line by a transmitter during one RF cycle at the crest of the modulation envelope taken under normal operating conditions. 47 CFR §97.3(b)(6). To ensure that amateur operators do not exceed the maximum permitted EIRP, we note for example, that for monopole antennas higher than 24.5 meters the transmitter output power should be reduced below 1.5 kW PEP. *See Request Amendment of Commission's Rules to Create a Low Frequency Allocation for the Amateur Radio Service*, The American Radio Relay League Incorporated Petition for Rule Making, RM-9404, at 13 (Oct. 22, 1998) (ARRL Petition for Rule Making), and Erratum, RM-9404, at replacement page 13 (Nov. 18, 1998) (calculations made using technical materials in submittal).

[54] *WRC-12 NPRM*, 30 FCC Rcd at 4245, para. 175.

[55] The transmitter power limit is based on an antenna efficiency of one percent. Report ITU-R M.2200 concludes that transmitting antenna systems of the type which might be employed in the amateur service in the 472-479 kHz band "would be relatively inefficient (in the range of 1 to 20%)." A short vertical antenna with antenna height of 15.24 meters (50 feet) has an efficiency of 4.20%, and thus, a significantly shorter antenna can achieve a 1% efficiency. *See* Report ITU-R M.2200, Section 6.3; *see also* Section 6.2 at Table 1 and Annex 1 at A2.1.

[56] *WRC-12 NPRM*, 30 FCC Rcd at 4246, para. 178 (seeking comments on ARRL's proposal to establish an antenna height limit of 200 feet in these bands due to obstruction marking considerations); *see* ARRL Comments at 32. ARRL has stated that the "tallest vertical monopole that should be reasonably considered for an amateur station is 61 meters because above that level, the amateur station would be required to obtain prior FAA authorization; and it would be have to comply with FAA painting and lighting requirements. Very few amateur stations incorporate antennas of that height." *See* ARRL Petition for Rule Making, *supra* note 53, at 13.

[57] *See* UTC Comments at 6, UTC Reply at 4 (stating that there is general support in the record for this height restriction), Andrews Comments at 3, Hollander Comments at 3, Ports Comments at 4. *But see* Brian R. Chapman Comments at 1 (Aug. 31, 2016) (Chapman Comments), Davis Comments at 18-19 (stating that "a line-of-sight path makes little difference to signal propagation at these frequencies"), Howell Comments at 7 (stating that he has no issue with limiting antenna height to 200 feet, but also stating he would like temporary access to larger antennas), McDonald Comments at 2.

[58] For example, this height limitation removes the possibility that amateur operators could use kite or balloon wire radiators having lengths much greater than 60 meters. This issue was raised in an earlier proceeding. *See* Mark Simon Comments, RM-9404, at 1 (Jan. 29, 1999) (stating that a Dutch amateur experiment used "a kite-borne 900-foot antenna").

could reduce the number of antenna structures that must comply with the Federal Aviation Administration (FAA) notification and obstruction marking and lighting requirements in Part 17 of our rules.[59]

26. Operating Privileges. As discussed in the *WRC-12 NPRM*, we make these bands available for Amateur Extra, Advanced and General Class licensees.[60] As ARRL notes and in line with Commission policy, licensees in these three operator classes are afforded operating privileges in all frequency bands that are allocated to the amateur service.[61] Licensees with Technician and Novice Class licenses have not demonstrated the same operational and technical qualifications and hence have more limited frequency privileges.[62] It is unlikely that a significant number of these licensees would choose to experiment in this band.[63]

27. Authorized Emission Types. Consistent with our proposal in the *WRC-12 NPRM*,[64] and with the existing rules in Section 97.305 for the frequency bands below 30 MHz, we authorize amateur stations to transmit the following emission types throughout the new amateur bands: CW (international Morse code telegraphy), RTTY (narrow-band direct-printing telegraphy), data, phone, and image emissions.[65] These emission types provide amateur operators with maximum flexibility,[66] and we find that additional restrictions would needlessly hinder experimentation.[67]

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[59] *See generally* 47 CFR Part 17, Subparts B-C.

[60] *See WRC-12 NPRM*, 30 FCC Rcd at 4247, para 180 (seeking comment on limiting operating privileges in these bands). Specifically, we add the 135.7-137.8 kHz and 472-479 kHz bands to the list of authorized frequency bands in the tables in Section 97.301(b)-(d). *See infra* Appx. B.

[61] *See* ARRL Comments at 33-34.

[62] *See Amendment of Part 97 of the Commission's Rules to Implement WRC-03 Regulations Applicable to Operator Licenses in the Amateur Radio Service*, Report and Order and Order on Reconsideration, 21 FCC Rcd 14797, 14802-803, para. 11 (2006) (noting that the current structure of amateur radio operator license classes, and the requirements for obtaining these licenses, were developed to simplify the license structure of the Amateur Radio Service while maintaining additional frequency privileges as an incentive for amateur radio operators to advance their communications and technical skills).

[63] *See* Chapman Comments at 1 (suggesting "that the minimum class license necessary to access these bands should be Amateur Extra"), Rose Comments at 1 (suggesting that use should be limited to Extra Class amateur radio operators, because few have equipment at this time to operate in these bands). *But see* Whedbee Comments at 8-9 (advising that that General, Advanced, and Amateur Extra Class operators have operating privileges in the new amateur bands on a phased-in approach), UTC Reply at 3 (supporting Whedbee's phased-in approach); *see also* Davis Comments at 21-23, Davis Reply to Amateurs at 4 (stating his belief that it would be consistent with Commission policy to make the 2200 meter band available to Technician Class licensees), Magiros Comments at 6 (stating that use of the lower frequency bands should be granted to all amateur license classes).

[64] *WRC-12 NPRM*, 30 FCC Rcd at 4247, para. 180.

[65] *See infra* Appx. B for the specific amendments to the table within Section 97.305(c).

[66] *See* ARRL Comments at 34 (stating that "maximum flexibility with emission types should be permitted in both bands," and that, in addition to CW, RTTY, and data emissions, "[p]hone and image [emissions] should be permitted as well, especially at 630 meters. The 2200-meter band is narrow, but analog SSB is certainly not impractical in the 630-meter band, and in any case digital voice is an important experimental emission at that order of frequency.").

[67] *See* Andrews Comments at 4 (stating that these bands should not be subdivided either by license class or operating mode), Hamel Comments at 4 (stating that the only emission type prohibited should be those with bandwidths beyond the band edges, such as full-carrier AM and high-power pulses), Hollander Comments at 8 (stating that the full 2200/630 m bands should be available to software-driven modes), Leggett Comments at 4-5, McDonald Comments at 3, Davis Reply to Amateurs at 4. *Cf.* Rose Comments at 1 (stating that 2200 meters should be restricted to Morse code and narrowband digital modes, and that 630 meters should also include SSB voice and perhaps repeater operations).

28. Frequency Sharing Requirements. We amend Section 97.303 to list the radiocommunication services that must be protected from harmful interference.[68] Specifically, amateur stations transmitting in the 135.7-137.8 kHz band must not cause harmful interference to, and must accept interference from, stations authorized by the United States Government in the fixed and maritime mobile services and stations authorized by other nations in the fixed, maritime mobile, and radionavigation services. Amateur stations transmitting in the 472-479 kHz band must not cause harmful interference to, and must accept interference from, stations authorized by the Commission in the maritime mobile service and stations authorized by other nations in the maritime mobile and aeronautical radionavigation services.

29. Other Issues. We decline to prohibit automatically controlled stations from operating in these bands, even though several amateur commenters support the prohibition of automatic control in the new amateur bands.[69] We find that the technical rules and notification requirements that we are adopting obviate the need to prohibit automatically controlled stations from operating in the new amateur bands because they address any concerns over co-existence of these two uses. Further, as proposed in the *WRC-12 NPRM,* we are adding definitions for the terms effective radiated power, isotropically radiated power and LF (low frequency) in Section 97.3 of our rules. Finally, we decline to permit previously licensed experimental stations – some of which have been authorized with significantly more radiated power than the adopted EIRP limits for these new amateur service bands – to communicate with amateur stations operating in these bands. Amateur operations in these bands currently authorized under experimental licenses should transition their operations in accordance with the adopted rules and not circumvent such rules by use of experimental licenses.[70]

B. Radio Buoys Operating in the 1900-2000 kHz Band

30. Allocation. We allocate the 1900-2000 kHz band to the maritime mobile service (MMS) on a primary basis for non-Federal use in ITU Regions 2 and 3, and limit the use of this allocation to radio buoys on the open sea and the Great Lakes.[71] This allocation addresses the limited situations where radio buoys cannot be authorized under the radiolocation service allocation because of newer technology that uses features like GPS rather than radiodetermination.[72]

31. Use of Allocation by U.S. Commercial Fishing Fleet. In the *WRC-07 R&O*, the Commission recognized the public benefit associated with the use of radio buoys by the U.S. commercial fishing fleet, and in the *WRC-12 NPRM* the Commission proposed revisions to its rules that would provide radio buoy operators with a legitimate path to operate.[73] In doing so, the Commission proposed

[68] ARRL supports our proposed amendment of Section 97.303. *See* ARRL Comments at 34-35.

[69] *See* ARRL Comments at 33, Hollander Comments at 8 (stating that "[t]hese days, physical station presence of the human operator is irrelevant, such as at a repeater--given the station operator has remote control capability sufficient to supervise and turn the system off if necessary"), Davis Reply to Amateurs at 5. *Cf.* McIntosh Comments at 7 (requesting that we not allow automatic operations within the 2200 meter and 630 meter band allocations to provide the most efficient use of the spectrum by the amateur community).

[70] *See* Hamel Comments at 4 (requesting a limited-duration permission for experimental stations to communicate with amateur stations). *See also* 47 CFR § 5.125 ("Generally, stations in the Experimental Radio Service may communicate only with other stations licensed in the Experimental Radio Service").

[71] We codify this decision in the Allocation Table by amending footnote NG92 to include a primary maritime mobile service allocation in Regions 2 and 3 for radio buoy use. We also make these same geographic areas available to radio buoys operating under the existing radiolocation service allocation.

[72] Radio buoys traditionally have been operating under a radiolocation service allocation because their location is determined by the transmission of an omnidirectional signal that is used for radio direction finding. *See* 47 CFR § 2.1(c). Radio buoys using GPS technology do not fall under this definition because their position is not determined by means of the propagation properties of radio waves.

[73] *WRC-12 NPRM*, 30 FCC Rcd at 4238-40, paras. 153-158.

to geographically limit the use of the MMS allocation, and the existing radiolocation service allocation, to radio buoys used by the U.S. commercial fishing fleet[74] on the open sea, but sought comment on whether the geographic area should be extended to include the Chesapeake Bay, Great Lakes, or other inland waters.[75] ARRL claims that the geographic restriction to the open sea is not helpful because there is no "practical ability to police this requirement" and neither radio buoy manufacturers nor the commercial fishing fleet can be relied upon for compliance.[76]

32. We recognize ARRL's concerns that radio buoy manufacturers will not be able to ensure where fishing vessels will be using radio buoys. However, we believe that amateur radio and radio buoys can continue to share this frequency band as they have done for many years. Specifically, because radio buoys are low-power and narrow-bandwidth[77] devices, while amateur stations tend to use much higher power, we believe that they can continue to be accommodated with minimal impact on amateur radio operations. Any intermittent interference amateur operators may receive in the 1900-2000 kHz band from lower-powered radio buoys is not expected to significantly hamper amateur operations in the band because amateur operators can readily tune around these narrow radio buoy signals and because the adjacent 1800-1900 kHz band is allocated exclusively for amateur radio use.[78] Although we had requested comment on rules that would have effectively permitted radio buoys to operate on any waters where the United States exercises sovereignty, we are persuaded by ARRL's comments to adopt final rules that are better tailored to the places where the commercial fishing fleet can make reasonable and productive use of radio buoys. We thus find it in the public interest to permit commercial fishing vessels to use these buoys on the open sea and the Great Lakes.[79]

33. Also, we amend, as proposed, footnote NG92 to provide that the co-primary services in the 1900-2000 kHz band are protected from harmful interference only to the extent that the offending station is not operating in accordance with the technical rules.[80] ARRL argues that this is not a practical metric for determining when harmful interference is actionable, and that it is largely unenforceable.[81] ARRL fails to understand that the statement inserted in NG92 only clarifies that co-primary allocations in the 1900-2000 kHz band (*i.e.*, the amateur, radiolocation, and maritime mobile services) share the same type of interference protection – one that protects only from a violation of the technical rules. In sum,

[74] Radio buoys assist fishermen in locating their gear and provide an important safety factor if the gear needs to be retrieved quickly to escape bad weather.

[75] *WRC-12 NPRM*, 30 FCC Rcd at 4238-39, paras. 153-155.

[76] *See* ARRL Comments at 8*, see also* Donald B. Chester Reply at 1 (Sep. 28, 2015) (Chester Reply), Brian S. McDaniel Comments at 2 (May 5, 2015) (McDaniel Comments), and Michael L. Peak Reply at 1 (Sep. 30, 2015) (Peak Reply). In addition, we note that these and other parties from the amateur radio community commented on the radio buoy allocation issues, and none support the continued operation of radio buoys in the 1900-2000 kHz band. *See* ARRL Comments at 4-11, Robert Bethman Reply at 1 (Sep. 11, 2015) (Bethman Reply), Chester Reply at 1, McDaniel Comments at 6, and Peak Reply at 1.

[77] *See* FCC Identifier XLTKTUS-1L, authorizing ITM Marine to market radio buoy equipment operating in the 1.9-1.999 MHz band with an emission designator of 60HA1A. That is, the necessary bandwidth of this radio buoy is only 60 hertz. 47 C.F.R. § 2.202(b).

[78] *See infra* para. 34. Radio buoys are limited to 8 watts of output power, while amateur stations may transmit with a transmitter power of up to 1500 watts of peak envelope power. 47 CFR § 97.313(b). Based on these characteristics, we decline to further modify radio buoy operations, *e.g.*, we will not require that radio buoys operate on a secondary basis or that they transmit their GPS coordinates. *See* ARRL Comments at 9-10.

[79] "Open sea" is defined as the water area of the open coast seaward of the ordinary low-water mark, or seaward of inland waters. 47 CFR § 80.5.

[80] *See infra* Appx. B, footnote NG92.

[81] *See* ARRL Comments at 8.

radio buoys and amateur stations have co-equal status and therefore have the same level of interference protection from each other.

34. We decline to make additional spectrum available for radio buoy use. In the *WRC-12 NPRM* the Commission sought comment on alternative approaches that would allow continued radio buoy use by the U.S. commercial fishing fleet, including allocating additional spectrum.[82] Several amateur radio commenters request that new radio buoys be transitioned to another nearby frequency band.[83] However, we do not agree that additional spectrum is necessary for radio buoy operations because the 1900-2000 kHz band can be successfully shared with amateurs and the number of radio buoys does not appear to be significant enough to require a different allocation.[84] In addition, as stated above, the 1800-1900 kHz band is already allocated for exclusive amateur use, and the record does not indicate that this exclusive allocation is insufficient and that the public interest would be served by creating an additional exclusive allocation for amateur use at 1900-2000 kHz. Therefore, it appears unnecessary for us to make additional spectrum available for exclusive amateur use at this time by relocating low-power radio buoys out of the 1900-2000 kHz band.

35. Amendment to Part 80 Rules. We amend Part 80 of our rules to authorize the use of frequencies in the 1900-2000 kHz band for radio buoy operations under a ship station license provided that the use of these frequencies is related to commercial fishing operations, the transmitter output power does not exceed 8 watts, and the station antenna height does not exceed 4.6 meters above sea level in a buoy station or 6 meters above the mast of the ship on which it is installed.[85]

36. In the *WRC-12 NPRM*, the Commission proposed technical requirements for these radio buoys based in the existing Part 80 rules and the characteristics of radio buoys that were imported and/or marketed pursuant to Part 90 rules at the time of the NPRM. Specifically, the Commission proposed to authorize buoy stations in the 1900-2000 kHz band, provided that the output power does not exceed 10 watts and the station antenna height does not exceed 4.6 meters above sea level in a buoy station or 6 meters above the mast of the ship on which it is installed.[86] ARRL claims that the proposed technical characteristics are "quite liberal," that there is no record evidence to support such a substantial EIRP as necessary for the U.S. fishing fleet, and estimates that "the EIRP from these buoys over a salt water ground is between 1-5 watts each."[87] While Part 90 did not establish power limits in this band, no

[82] *WRC-12 NPRM*, 30 FCC Rcd at 4239-40, paras. 156-157.

[83] ARRL argues that new radio buoys should be operated in the 1750-1800 kHz band, and a sunset date for 1900-2000 kHz buoys be established. ARRL Comments at 11. Other commenters recommend the relocation of radio buoys to 1715-1800 kHz. *See* Chester Reply at 2-4, McDaniel Comments at 4-5, Peak Reply at 1 (noting that radio buoys would suffer far less interference operating in the 1715-1800 kHz band). Robert Bethman states that there is no reason that these buoys cannot be programmed out of the 1900-2000 kHz band, arguing that it would be a very simple frequency synthesizer adjustment to alter the operating frequency outside of this band entirely. *See* Bethman Reply at 1.

[84] Further, any additional spectrum requirements for radio buoys can be addressed in other bands. For example, the Commission recently granted two waiver requests addressing radio buoy use in in the 26 MHz and 29 MHz bands. *See Datawell B.V. and Marine Instruments S.A. Requests for Waivers to Permit Certification and Use of High Frequency Radio Buoys*, WT Docket No. 15-197, Order, DA 15-928 (Feb. 26, 2016).

[85] *See infra* Appx. B (new Section 80.376). In the *WRC-12 NPRM*, the Commission proposed to implement this decision in Section 80.375, which pertains only to radiolocation frequencies. *WRC-12 NPRM*, 30 FCC Rcd at 4238, para. 154. Because we are also permitting radio buoy operations under the maritime mobile service (see paragraph 29, *supra*), we implement our decision in new Section 80.376.

[86] *WRC-12 NPRM*, 30 FCC Rcd at 4238-39, para. 155.

[87] ARRL Comments at 9. *See* McDaniel Comments at 6 (suggesting a lower transmitter output of 1 watt ERP in sea areas nearer to the coastline).

equipment authorization has been sought with an output power over 8 watts.[88] Therefore, to address some of the amateur community's concerns over potential interference from these radio buoys we will limit radio buoys transmitter output power to 8 watts.

37. With regard to equipment authorization of radio buoys, we find it unnecessary to provide the proposed six-month phase-out period for Part 90 equipment authorizations considering that no applications for radio buoy equipment operating in the 1900-2000 kHz band have been submitted since the adoption of the *WRC-12 NPRM*. Hence, applications for equipment authorization of radio buoys must meet the new Part 80 rules, as of the effective date of this Order.[89] Also as proposed, we grandfather radio buoys authorized under Section 90.103(b) prior to the cutoff date so they may continue to be manufactured, imported, and marketed under the previously approved equipment authorization.[90]

C. Aviation Services Uses in the 5000-5150 MHz Band

38. In this section, we take actions in support of aeronautical mobile (route) service (AM(R)S) surface applications at airports in the 5000-5030 MHz band and unmanned aircraft systems (UAS) in the 5030-5091 MHz band.[91]

39. 5000-5030 MHz Band. As proposed, we allocate the 5000-5030 MHz bands to the AM(R)S on a primary basis for Federal and non-Federal use, for systems operating in accordance with international aeronautical standards, limited to surface applications at airports (*i.e.*, AeroMACS).[92] AeroMACS refers to a collection of high data rate wireless networks that are used for airport surface operations (i.e. ground-to-ground communications) to provide broadband communications between aircraft and other ground vehicles, as well as between critical fixed assets. AeroMACS is designed to support a wide variety of services and applications, including Air Traffic Control/Air Traffic Management and infrastructure functions, as well as airline and airport operations.[93] For example, AeroMACS frequencies might be used by pilots to receive weather and airfield information; by fire rescue, snow

[88] *See* FCC Identifier XLTKTUS-1L, authorizing ITM Marine to market radio buoy equipment operating in the 1.9-1.999 MHz band with a maximum conducted power of 8.0 watts. However, due to the structure of radio buoys, the conducted power and output power are typically the same because the line loss between the transmitter output and the antenna base is negligible.

[89] *WRC-12 NPRM*, 30 FCC Rcd at 4240, para. 158.

[90] *Id.*; *see* 47 CFR §§ 2.803, 2.901, 90.203.

[91] *WRC-12 NPRM*, 30 FCC Rcd 4264-65, paras. 229-232. The aeronautical mobile (route) service is an aeronautical mobile service (i.e. a mobile service that supports communications between aeronautical stations and aircraft stations, or between aircraft stations) and is reserved for communications relating to the safety and regularity of flight. *See* 47 CFR § 2.1.

[92] *See WRC-12 NPRM*, 30 FCC Rcd 4264, para. 230. To implement this allocation decision, we add an entry in the U.S. Table for a primary AM(R)S allocation in the 5000-5010 MHz band and adopt footnote US115. This new U.S. footnote contains the primary AM(R)S allocation for the 5010-5030 MHz band, limits the use of the AM(R)S allocation in the 5000-5030 MHz band to surface applications at airports that operate in accordance with international standards (*i.e.*, AeroMACS), limits AeroMACS operations in the 5010-5030 MHz band to those requirements that cannot be satisfied in 5000-5010 MHz and 5091-5150 MHz bands, requires that AeroMACS systems in the 5010-5030 MHz band be capable of operational modification if receiving harmful interference from, or causing interference to, the radionavigation-satellite service, and authorizes aeronautical fixed communications that are an integral part of the AeroMACS system on a primary basis. *See infra* Appx. B, Section 2.106 for the text of footnote US115.

[93] *See WRC-12 NPRM*, 30 FCC Rcd at 4205, para. 51, n. 138 (*citing* Future Aeronautical Communications, Chapter 12, titled "Aeronautical Mobile Airport Communications System (AeroMACS)," by James M. Budinger and Edward Hall (2011), Section 3.2, p. 241. *See also* "Aeronautical Mobile Airport Communications System (AeroMACS) for Access to SWIM," by NASA/GRC/James Budinger, Nov. 3, 2010 (NASA presentation)).

removal, and ground personnel to coordinate operations; and by airport security personnel to monitor live video feeds.

40. The WiMAX Forum supports our allocation proposal, asserting it will support numerous AeroMACS applications for a broad range of users and will ensure additional flexibility in the assignment of channels to the various Federal and non-Federal stakeholders.[94] In the *WRC-07 R&O*, the Commission made the globally harmonized 5091-5150 MHz band available for AeroMACS, expecting that it will be the main frequency band for deployment of AeroMACS. We find that there is a need for additional spectrum, especially at the nation's busiest airports.[95] Today's action extends the tuning range for AeroMACS to include the 5000-5030 MHz band in the United States.[96]

41. 5030-5091 MHz Band. We allocate the 5030-5091 MHz band to the AM(R)S on a primary basis for Federal and non-Federal use. We also add international footnote 5.443C to this band limiting the use to internationally standardized aeronautical systems and setting limits for unwanted emissions from AM(R)S stations to adjacent band radionavigation-satellite service (RNSS) downlinks to an EIRP density of -75 dBW/MHz. Our *WRC-12 NPRM* proposal, which was based on the *U.S. Proposals for WRC-12*, noted that the 5030-5091 MHz band would be appropriate to satisfy the terrestrial, line-of-sight, spectrum requirements for command and control of UAS in non-segregated airspace.[97]

42. Boeing supports the AM(R)S allocation, noting the expected substantial growth of UAS in the coming years, including flight operations outside of segregated airspace.[98] The Small UAV Coalition generally supports this allocation, noting that the allocation of this band should be flexible to accommodate future uses of the band by low-altitude small UAS and uses beyond line-of-sight.[99] We adopt the AM(R)S allocation to support the anticipated growth of UAS and promote their safe operation. Technical and operational rules relating to altitude, weight, or other requirements will be addressed in the service rules for this band, which will be promulgated in a separate proceeding.[100]

43. 5000-5150 MHz Band. As proposed, we add an entry in the U.S. Table that reflects the primary aeronautical mobile-satellite (R) service (AMS(R)S) allocation in the 5000-5150 MHz band, previously reflected in a footnote.[101] Further, we adopt two international footnotes that limit the AMS(R)S allocation to internationally standardized aeronautical systems.[102]

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[94] *See* The WiMAX Forum Reply at 2-3 (Sep. 28, 2015) (WiMAX Forum Reply) (contending that the additional spectrum will be especially important in the country's busiest airports, many of which are capacity-constrained and stand to benefit the most with the implementation of AeroMACS).

[95] *WRC-12 NPRM*, 30 FCC Rcd at 4264, para. 230; WiMAX Forum Reply at 2-3.

[96] The WiMAX Forum further requests the Commission consider the need for a frequency coordinator for the AeroMACS bands and the need for AeroMACS service rules. *See* WiMAX Forum Reply at 5. We will not address those requests in this proceeding. Issues relating to service rules and frequency coordination will be addressed in due course in a separate proceeding.

[97] *WRC-12 NPRM*, 30 FCC Rcd at 4262, para. 225. *See also U.S. Proposals for WRC-12*, First Tranche, Agenda Item 1.3 ("given that there is minimum use in this band worldwide and because the lack of an existing or planned microwave landing system deployment in the United States at 5030-5091 MHz ensures availability of appropriate aeronautical spectrum for terrestrial line-of-sight UAS in the band").

[98] The Boeing Company Comments at 6-7 (Aug. 31, 2015) (Boeing Comments).

[99] *See* The Small UAV Coalition Comments at 3-4 (Aug. 31, 2015).

[100] *See WRC-12 NPRM*, 30 FCC Rcd at 4264, para. 229. *See also* Boeing Comments at 6 (noting that the 5030-5091 MHz band is well suited for line-of-sight control links because it remains relatively unused).

[101] United States Footnotes, 47 CFR § 2.106, footnote US367. No commenter discussed the AMS(R)S proposals.

[102] International Footnotes, 47 CFR § 2.106, footnotes 5.443AA and 5.443D.

D. Protecting Passive Sensors in the 86-92 GHz Band

44. For the reasons provided below, we will not adopt, at this time, proposed footnote US162, which would have encouraged fixed service operators transmitting in the adjacent bands (81-86 GHz and 92-94 GHz) to take all reasonable steps to ensure that their unwanted emissions power in the 86-92 GHz passive band does not exceed WRC-12's non-mandatory unwanted emissions levels.[103]

45. The 86-92 GHz band is allocated to the Earth exploration-satellite service (EESS) (passive), radio astronomy service, and space research service (passive). WRC-12 sought to protect the EESS passive sensors that receive in this band,[104] proposed non-mandatory protection requirements from out-of-band emissions from active services in adjacent bands and "urge[d] administrations to take all reasonable steps to ensure" that such emissions do not exceed the recommended maximum levels.[105] The *WRC-12 NPRM* proposed the adoption of a footnote that would "*encourage* operators of fixed stations […] to take all reasonable steps to ensure that their unwanted emissions in the 86-92 GHz does not exceed WRC-12's non-mandatory unwanted emission levels" (*emphasis added*).[106] The National Academy of Sciences Committee on Radio Frequencies (CORF) supports the unwanted emission standards in the proposed footnote as consistent with Resolution 750, arguing that the "standards" are necessary to properly protect EESS observations in the band.[107]

46. The 81-86 GHz and 92-94 GHz bands are allocated, *inter alia*, to the fixed service on a primary basis for Federal and non-Federal use. In 2003, the Commission added these bands to Part 101 of the rules and adopted various service rules, including emissions limits.[108] Fixed service operators licensed to transmit in these bands have tailored their operations and equipment to the current rules.[109] The proposed footnote US162 provides emission limits that are significantly more stringent than those in Part 101.[110] Adopting the footnote, albeit it only provides for non-mandatory limits, will be confusing for incumbent users of the adjacent bands and will not provide any meaningful protection for the EESS passive sensors in the 86-92 GHz band beyond that already required under Part 101 of the rules. Further, the adoption of the underlying emission limits for the protection of the EESS passive sensors in the 86-92 GHz band, an action supported by CORF, would require a proceeding in order to develop a record that could support changes to the existing rules. The current proceeding does not provide the appropriate proper framework to address such changes. In addition, there are other proceedings underway addressing

[103] *WRC-12 NPRM,* 30 FCC Rcd at 4269, para. 249.

[104] A passive sensor is a measuring instrument in the EESS or in the space research service by means of which information is obtained by reception of radio waves of natural origin. 47 CFR § 2.1(c).

[105] *See* ITU Radio Regulations, Resolution 750 (Rev.WRC-12).

[106] *WRC-12 NPRM*, 30 FCC Rcd at 4269, para. 249.

[107] *See* National Academy of Sciences' Committee on Radio Frequencies Reply at 6-7 (Sep. 29, 2015) (CORF Reply).

[108] *See Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands*, WT Docket No. 02-146, Report and Order, 18 FCC Rcd 23318, 23353, para 92 (2003) (*70/80/90 GHz R&O*); *see also* 47 CFR § 101.111(a)(2)(v).

[109] *See, e.g.,* Aoptix Certification Test Report for Optical Network Terminal at 15, available at https://apps.fcc.gov/oetcf/eas/reports/ViewExhibitReport.cfm?mode=Exhibits&RequestTimeout=500&calledFromFrame=N&application_id=vPwQI8sEmMaojH6a3zDfSw%3D%3D&fcc_id=RY7HYBRID4GIGE80G.

[110] The *WRC-12 NPRM* proposal for the 81-86 GHz and 92-94 GHz bands specified a maximum level of unwanted emission power limit of -55 dBW/100 MHz for frequencies ranging from 87 to 91.95 GHz and 86.05-91.95 GHz, respectively. This limit is equivalent to -45dBm/1MHz, which is 32 dB lower than our current emission mask rule of -13 dBm/1 MHz in the same frequency range. *See* 47 CFR § 101.111(a)(2)(v).

Part 101 emission mask rules governing fixed operations in these bands that may be better suited in examining these considerations.[111]

E. Passive Use of Bands Above 275 GHz

47. As proposed, we extend the U.S. Table of Allocations past the 275-1000 GHz band to 3000 GHz.[112] These bands are "not allocated" to specific services, though passive services such as the Earth exploration-satellite service (EESS), space research service (SRS), and radio astronomy service (RAS) already utilize portions of the 275-3000 GHz range for scientific observation.[113] We adopt a revised footnote US565 which incorporates language of the new international footnote 5.565 and of the proposed footnote US565.[114]

48. WRC-12 revised international footnote 5.565 to identify an additional 226 gigahertz of spectrum for passive spaceborne sensor use in the 275-990 GHz range.[115] The footnote further urges administrations, when making those frequencies available for active service applications to take all practicable steps to protect these passive services from harmful interference, until the date when the Table of Frequency Allocations is established in the 275-1000 GHz frequency range. CORF, in its comments, generally supports the sharing of frequency allocations where practical, stating that technical factors associated with radio transmission in these high frequencies may well support shared use in many cases. However, CORF objects to the proposed U.S. footnote because it appears to be at odds with international footnote 5.565's "explicit goal of protecting passive uses."[116]

49. We do not agree with CORF's interpretation and we are concerned that the text of international footnote 5.565 could be construed as placing a reservation for future passive service allocations in the U.S. Table, which would inhibit development of other radiocommunication services in this spectrum. As the Commission tentatively concluded in the *WRC-12 NPRM*, we find that it is premature to establish a specific allocation in the U.S. Table in this frequency range and we find it unnecessary to place spectrum use restrictions in these frequencies.[117] Instead, maintaining spectrum flexibility in these bands will encourage the development of new uses in the future.

50. We recognize that the 275-3000 GHz frequency range is used and may be used more extensively in the future for experimentation with, and development of, an array of active service applications.[118] Because international footnote 5.565 can be interpreted as establishing an "allocation" for

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[111] *See, e.g., Amendment of Part 101 of the Commission's Rules to Facilitate the Use of Microwave for Wireless Backhaul and Other Uses and to Provide Additional Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave Licensees,* WT Docket No. 10-153 (also referred to as the Wireless Backhaul Proceeding).

[112] *WRC-12 NPRM*, 30 FCC Rcd at 4270, para. 253.

[113] *See* 47 CFR § 2.106. Prior to WRC-12, the last entry in the International Table read as follows: "275-1000 [GHz] (Not allocated) 5.565.

[114] In the *WRC-12 NPRM*, the Commission proposed to replace existing footnote US565 (which contained the pre-WRC-12 text of international footnote 5.565) with the current version of international footnote 5.565. The Commission also proposed to adopt a new U.S. footnote (tentatively numbered as US565) that would clarify that international footnote 5.565 does not establish priority of use in the U.S. Table, and does not preclude or constrain the allocation of frequency bands in the 275-3000 GHz range to active services at a future date. *WRC-12 NPRM*, 30 FCC Rcd at 4270, para. 253.

[115] As a result of WRC-12's action, 565 gigahertz – or 78 percent – of the 725 gigahertz of spectrum in the 275-1000 GHz range has been identified for passive service applications in the International Table. *WRC-12 NPRM*, 30 FCC Rcd at 4269-70, paras. 252, 254.

[116] CORF Reply at 8.

[117] *WRC-12 NPRM*, 30 FCC Rcd at 4270, para. 254.

[118] *Id.*

passive uses only, we find that the text of this international footnote must be clarified. In particular, we are not prepared to determine whether the frequency bands identified for use by passive service applications in international footnote 5.565 are entitled to interference protection from a yet to be proposed active service. For these reasons, we revise existing footnote US565 to identify expected passive uses of the 275-1000 GHz range and to clarify that this footnote does not establish any priority of use in the U.S. Table, and does not preclude or constrain any active service use or future allocation of frequency bands in the 275-3000 GHz range.[119] This clarifying text is sufficient, given that passive and active services can share frequencies above 275 GHz without constraints, especially considering the atmospheric absorption at these frequencies and the narrowness of the antenna beamwidths, which make sharing among different services possible.

F. Rulemaking Proposals That Did Not Receive Any Specific Comments

51. In this section, we consider those proposals in the *WRC-12 NPRM,* which were not addressed by any of the commenters. In the *WRC-12 NPRM*, the Commission set forth in detail the rationales for adopting the proposals discussed below. For those reasons, we find these proposals implement important U.S. policy goals and serve the public interest. Therefore, we amend Sections 2.100, 2.102, 2.106, 80.215, 80.373, 80.871, 90.7, 90.103, and 90.425 of the Commission's rules as described below. These rule changes will be codified in the Commission's rules as shown in Appendix B.

52. Passive Systems for Lightning Detection (8.3-11.3 kHz). We allocate the 8.3-9 kHz and 9-11.3 kHz bands to the meteorological aids service on a primary basis for Federal and non-Federal use.[120] We also adopt international footnote 5.54A, limiting use of these frequency bands to passive use only. Consequently, we revise Section 2.102(a) to require that the assignment of frequencies between 8.3 kHz and 275 GHz be in accordance with the Allocation Table.

53. Maritime Mobile Service Use of the Frequency 500 kHz. We allocate the 495-505 kHz band to the maritime mobile service, remove the aeronautical mobile and land mobile service portions of the existing allocation, and remove the existing distress and calling restriction.[121]

54. Oceanographic Radar Applications in the 4-44 MHz Range. We allocate seven frequency bands (4.438-4.488 MHz, 5.25-5.275 MHz, 16.1-16.2 MHz, 24.45-24.65 MHz, 26.2-26.42 MHz, 41.015-41.665 MHz, and 43.35-44 MHz) to the radiolocation service (RLS) on a primary basis for Federal and non-Federal use, and allocate the 13.45-13.55 MHz band to the RLS on a secondary basis for Federal and non-Federal use.[122] We add footnotes to the U.S. Table that prohibit oceanographic radars transmitting in these bands from causing harmful interference to, or claiming protection from, existing and future stations in the incumbent fixed and mobile services.[123] We also raise to primary status the secondary mobile except aeronautical mobile service allocation in the 5.25-5.275 MHz band, so that existing and future stations in this service can also be protected from

[119] Specifically, we revise existing footnote US565 by replacing the pre-WRC-12 text of international footnote 5.565 with the current text of that footnote (except that we delete the sentence urging administrations to take all practicable steps to protect passive services and we simplify the remaining text), and we add the following sentence to the end of this footnote: "This provision does not establish priority of use in the United States Table of Frequency Allocations, and does not preclude or constrain any active service use or future allocation of frequency bands in the 275-3000 GHz range."

[120] *WRC-12 NPRM*, 30 FCC Rcd at 4236-38, paras. 149-152.

[121] *WRC-12 NPRM*, 30 FCC Rcd at 4248-49, paras. 183-185.

[122] *WRC-12 NPRM*, 30 FCC Rcd at 4249-52, paras. 186-197.

[123] This requirement will be implemented in the U.S. Table by adding international footnote 5.132A to the 4.438-4.488 MHz, 5.25-5.275 MHz, 13.45-13.55 MHz, and 24.45-24.65 MHz bands, international footnote 5.145A to the 16.1-16.2 MHz band, and new footnote US132A to the 26.2-26.42 MHz, 41.015-41.665 MHz, and 43.35-44 MHz bands.

interference from oceanographic radars. Next, we amend Part 90 of the rules by adding the oceanographic radar bands to the Radiolocation Service Frequency Table and take other associated actions that incorporate WRC-12's operational requirements for oceanographic radars and will allow licensees of existing experimental stations to apply for Part 90 licenses.[124] Finally, we require that all oceanographic radar licensees currently operating under Part 5 of the rules transition their operations to frequencies within an allocated band within five years of the effective date of this Report and Order.

55. Improved Satellite-AIS Capability. To improve satellite detection of messages from maritime Automatic Identification Systems (AIS), we reallocate two bands – 156.7625-156.7875 MHz (AIS 3) and 156.8125-156.8375 MHz (AIS 4) – to the mobile-satellite service (MSS), restricted to Earth-to-space (uplink) operations, on a primary basis for Federal and non-Federal use.[125] We revise footnote US52 to restrict the use of these MSS uplink allocations to the reception of long-range AIS broadcast messages from ships. We remove the primary maritime mobile service (MMS) allocation from these bands and amend the relevant Commission's rules to remove references to these MMS frequencies.[126] We further revise footnote US52 to grandfather the single MMS licensee (BKEP Materials, LLC) until the expiration date of its licenses (August 26, 2019). We amend Section 80.203 to clarify that we will no longer accept applications for certification of non-AIS VHF radios that include channels 75 (156.775 MHz) and 76 (156.825 MHz) as of the effective date of this Report and Order. Finally, we add to Section 80.393 the simplex channels at 156.775 MHz (AIS 3) and 156.825 MHz (AIS 4) and we add to Section 25.202 these bands and the existing AIS bands (161.9625-161.9875 MHz and 162.0125-162.0375 MHz).

56. Allocating the 22.55-23.15 GHz and 25.5-27 GHz Bands to the Space Research Service. We amend the U.S. Table to allocate the 22.55-23.15 GHz band to the space research service (SRS) (Earth-to-space) on a primary basis for both Federal and non-Federal use and to add a reference to international footnote 5.532A.[127] In addition, we add a primary non-Federal SRS (space-to-Earth) allocation to the companion 25.5-27 GHz band, which currently is allocated to the SRS (space-to-Earth) only for Federal use.

57. Deletion of Aeronautical Mobile Service from the 37-38 GHz Band. We amend the U.S. Table to limit the existing primary mobile service allocation in the 37-38 GHz band only to the land mobile and maritime mobile services.[128] In other words, this primary allocation entry will read "MOBILE except aeronautical mobile service."

[124] Specifically, we amend Section 90.103 by listing the eight oceanographic radar bands in the table within paragraph (b), limit the station class of these radars to radiolocation land stations, and restrict the use of these bands by adding new Limitation 3, which is codified in new paragraph (c)(3). Section 90.103(c)(3) limits the peak EIRP of oceanographic radars to 25 dBW, requires that oceanographic radars not cause harmful interference to, nor claim protection from interference caused by, stations in the currently allocated fixed or mobile services, and provides a cross reference to Resolution 612 of the ITU Radio Regulations for international coordination requirements and for recommended spectrum sharing techniques (*i.e.*, oceanographic radars should, where applicable, use techniques that allow multiples of such radars to operate on the same frequency, and should use directional antennas, where applicable and as required, to facilitate sharing). Next, we amend Section 90.425 to incorporate WRC-12's operational requirements for oceanographic radars. *See infra* Appx. B. Finally, we reflect the Part 2 definition of the term EIRP in Section 90.7 of the rules.

[125] *WRC-12 NPRM*, 30 FCC Rcd at 4252-55, paras. 198-205.

[126] *See infra* Appx. B (Sections 80.215, 80.373, and 80.871).

[127] International footnote 5.532A states, *inter alia*, that the location of SRS earth stations must maintain a separation distance of at least 54 km from the border of neighboring countries to protect existing and future stations in the fixed and mobile services unless a shorter distance is agreed to. *WRC-12 NPRM*, 30 FCC Rcd at 4266-67, paras. 233-238.

[128] *WRC-12 NPRM*, 30 FCC Rcd at 4267-68, paras. 239-244.

58. Allocating the 7850-7900 MHz Band to the Federal Meteorological-Satellite Service. We allocate the 7850-7900 MHz band to the meteorological satellite-service (MetSat) (space-to-Earth) on a primary basis for Federal use and adopt international footnote 5.461B restricting use of the allocation to non-geostationary systems.[129] As consequence of this action, the larger 7750-7900 MHz band is now allocated to the fixed service and the meteorological satellite-service (space-to-Earth) on a primary basis for Federal use, and per international footnote 5.461B, MetSat use of this band is limited to non-geostationary satellite systems.

59. Allocating the 15.4-15.7 GHz Band to the Federal Radiolocation Service. We allocate the 15.4-15.7 GHz band to the radiolocation service (RLS) on a primary basis for Federal use.[130] We also add international footnotes 5.511E and 5.511F to the Federal Table, which require that RLS stations operating in the 15.4-15.7 GHz band not cause harmful interference to, or claim protection from, stations operating in the aeronautical radionavigation service,[131] and not exceed the power flux-density level of −156 dB(W/m^2) in a 50 MHz bandwidth in the 15.35-15.4 GHz band, at any radio astronomy observatory site for more than 2 percent of the time.[132] Also, we adopt footnote US511E, which limits RLS use of the 15.4-15.7 GHz band to Federal systems requiring a necessary bandwidth greater than 1600 MHz that cannot be accommodated within the band 15.7-17.3 GHz, except that radar systems requiring use of the band 15.4-15.7 GHz for testing, training, and exercises may be accommodated on a case-by-case basis.[133]

60. Other Administrative Matters. We adopt our proposal to update footnote NG49 and renumber it as NG16.[134] Specifically, we no longer list the individual frequencies within the footnote, and we remove the geographic restriction from this footnote. These updates will bring the U.S. Table in line with existing service rules. We also amend Section 2.100 of the rules to state that the ITU *Radio Regulations*, Edition of 2012, have been incorporated to the extent practicable in Part 2.[135]

IV. PROCEDURAL MATTERS

61. **Final Regulatory Flexibility Certification**. The Regulatory Flexibility Act of 1980, as amended (RFA)[136] requires that a regulatory flexibility analysis be prepared for rulemaking proceedings, unless the agency certifies that "the rule will not have a significant economic impact on a substantial number of small entities."[137] The Final Regulatory Flexibility Certification for this proceeding is set forth in Appendix C.

62. **Paperwork Reduction Analysis**. This Report and Order contains new information collections subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13. It will be submitted to the Office of Management and Budget (OMB) for review under Section 3507(d) of the PRA.

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[129] *WRC-12 NPRM*, 30 FCC Rcd at 4270-71, paras. 255-259.

[130] *WRC-12 NPRM*, 30 FCC Rcd at 4271-72, paras. 260-264.

[131] International Footnotes, 47 CFR § 2.106, footnote 5.511E.

[132] International Footnotes, 47 CFR § 2.106, footnote 5.511F.

[133] Footnote US511E also requires that RLS stations operating in the 15.4-15.7 GHz band must not cause harmful interference to, nor claim protection from, radars operating in the aeronautical radionavigation service, and that radar systems operating in the radiolocation service may not be developed solely for operation in the 15.4-15.7 GHz band.

[134] *WRC-12 NPRM*, 30 FCC Rcd at 4272-73, para. 265.

[135] *WRC-12 NPRM*, 30 FCC Rcd at 4273, para. 266.

[136] The RFA, *see* 5 U.S.C. § 601 *et. seq.*, has been amended by the Contract With America Advancement Act of 1996, Pub. L. No. 104-121, 110 Stat. 847 (1996) (CWAAA). Title II of the CWAAA is the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA).

[137] 5 U.S.C. § 605(b).

The Commission will publish a separate notice in the Federal Register inviting comment on the new information collection requirements adopted herein. The requirements will not go into effect until OMB has approved it and the Commission has published a notice announcing the effective date of the information collection requirements. In this document, we have assessed the potential effects of the prior notification requirement for amateur service operations in the 135.7-137.8 kHz and 472-479 kHz bands, and find that there will in the great majority of instances be a *de minimis* paperwork burden for amateur service licensees resulting from the collection of information by the Utilities Telecom Council. Finally, we note that, because "small entities," as defined in the Regulatory Flexibility Act of 1980, as amended, are not persons eligible for licensing in the amateur service, this rule does not apply to "small entities." Therefore, the requirement in the Small Business Paperwork Relief Act of 2002, Public Law 107-198, 44 U.S.C. 3506(c)(4), that the Commission seek to further reduce this information requirement burden for small business concerns with fewer than 25 employees does not apply.

63. **Congressional Review Act.** The Commission will send a copy of this Report and Order to Congress and the Government Accountability Office pursuant to the Congressional Review Act, *see* 5 U.S.C. 801(a)(1)(A).

V. ORDERING CLAUSES

64. Accordingly, IT IS ORDERED that pursuant to Sections 1, 4, 301, 302, and 303 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 154, 301, 302a, and 303, this REPORT AND ORDER is hereby ADOPTED and the Commission's rules ARE AMENDED as set forth in Appendix B. IT IS FURTHER ORDERED that the rules adopted herein WILL BECOME EFFECTIVE 30 days after the date of publication in the Federal Register, except for Sections 97.3, 97.15(c), 97.301(b)-(d), 97.303(g), 97.305(c), and 97.313(k)-(l), because Section 97.303(g)(2) contains a new information collection requirement that requires approval by OMB under the PRA. These rules sections WILL BE EFFECTIVE after the Commission publishes a notice in the Federal Register announcing such approval and the relevant effective date.

65. IT IS ALSO ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this REPORT AND ORDER, including the Final Regulatory Flexibility Certification, to the Chief Counsel for Advocacy of the Small Business Administration.

66. IT IS FURTHER ORDERED that the Commission SHALL SEND a copy of this *Report and Order* in a report to be sent to Congress and the General Accounting Office pursuant to the Congressional Review Act, see 5 U.S.C. § 801(a)(1)(A).

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A

Commenters

Comments

Aerospace and Flight Test Radio Coordinating Council
Andrews, John K. (Andrews)
ARRL, the national association for Amateur Radio (ARRL)
Boeing Company, The (Boeing)
Bower, Dale (Bower)
Chapman, Brian R. (Chapman)
Davis, John H. (Davis)
Douglass, Ronald R. Sr (Douglass)
Fixed Wireless Communications Coalition
Hamel, Patrick E. (Hamel)
Hollander, James F. (Hollander)
Howell, Laurence J. (Howell)
Illman, Richard (Illman)
Johnston, Steven B. (Johnston)
Klagge, Neil O. (Klagge)
Langridge, John
Leggett, Nickolaus E. (Leggett)
Magiros, George (Magiros)
McDaniel, Brian S. (McDaniel)
McDonald, J. S. (McDonald)
McIntosh, Jory (McIntosh)
Mierisch, Steven (Mierisch)
Molnar, John W.
National Spectrum Management Association
Poll, James V.
Ports, Michael (Ports)
Raab, Frederick H. (Raab)
Rose, Christopher (Rose)
Small UAV Coalition, The
Society of Broadcast Engineers, Inc.
Tichansky, Eric M.
Utilities Telecom Council (UTC)
Whedbee, James E. (Whedbee)

Reply Comments

ARRL
Amateur Radio Research and Development Corporation (AMRAD)
Bethman, Robert (Bethman)
Boeing
Chester, Donald B. (Chester)
Davis
FWCC
Hollander
Klagge
Leggett
Lemaster, George E. (Lemaster)
Mussler, Michael (Mussler)
National Academy of Sciences, through the National Research Council's Committee on Radio

Frequencies (CORF)
Peak, Michael L. (Peak)
UTC
Whedbee
WiMAX Forum, The

APPENDIX B

Final Rules

For the reasons discussed in the preamble, the Federal Communications Commission amends 47 CFR Parts 2, 15, 25, 80, 90, and 97 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 2.100 is amended to read as follows:

§ 2.100 International regulations in force.

The ITU Radio Regulations, Edition of 2012, have been incorporated to the extent practicable in this part.

3. Section 2.102 is amended by revising paragraph (a) to read as follows:

§ 2.102 Assignment of frequencies.

(a) Except as otherwise provided in this section, the assignment of frequencies and bands of frequencies to all stations and classes of stations and the licensing and authorizing of the use of all such frequencies between 8.3 kHz and 275 GHz, and the actual use of such frequencies for radiocommunication or for any other purpose, including the transfer of energy by radio, shall be in accordance with the Table of Frequency Allocations in §2.106.

* * * * *

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

a. Pages 1-2, 4-5, 7-8, 11-13, 15-17, 18-20, 23-24, 41-42, 45, 51, 53-54, 57, and 67-68 are revised.

b. In the list of United States (US) Footnotes, footnotes US52, US231, US246, and US565 are revised; footnotes US115, US132A, and US511E are added; and footnote US367 is removed.

c. In the list of non-Federal Government (NG) Footnotes, footnotes NG8 and NG16 are added, footnote NG49 is removed, and footnote NG92 is revised.

§ 2.106 Table of Frequency Allocations.

The revisions and additions read as follows:

* * * * *

International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
Below 8.3 (Not Allocated) 5.53 5.54			Below 8.3 (Not Allocated) 5.53 5.54		
8.3-9 METEOROLOGICAL AIDS 5.54A 5.54B 5.54C			8.3-9 METEOROLOGICAL AIDS 5.54A		
9-11.3 METEOROLOGICAL AIDS 5.54A RADIONAVIGATION			9-11.3 METEOROLOGICAL AIDS 5.54A RADIONAVIGATION US18 US2		
11.3-14 RADIONAVIGATION			11.3-14 RADIONAVIGATION US18 US2		
14-19.95 FIXED MARITIME MOBILE 5.57 5.55 5.56			14-19.95 FIXED MARITIME MOBILE 5.57 US2	14-19.95 Fixed US2	
19.95-20.05 STANDARD FREQUENCY AND TIME SIGNAL (20 kHz)			19.95-20.05 STANDARD FREQUENCY AND TIME SIGNAL (20 kHz) US2		
20.05-70 FIXED MARITIME MOBILE 5.57			20.05-59 FIXED MARITIME MOBILE 5.57 US2	20.05-59 FIXED US2	
			59-61 STANDARD FREQUENCY AND TIME SIGNAL (60 kHz) US2		
5.56 5.58			61-70 FIXED MARITIME MOBILE 5.57 US2	61-70 FIXED US2	
70-72 RADIONAVIGATION 5.60	70-90 FIXED MARITIME MOBILE 5.57 MARITIME RADIONAVIGATION 5.60 Radiolocation	70-72 RADIONAVIGATION 5.60 Fixed Maritime mobile 5.57 5.59	70-90 FIXED MARITIME MOBILE 5.57 Radiolocation	70-90 FIXED Radiolocation	Private Land Mobile (90)
72-84 FIXED MARITIME MOBILE 5.57 RADIONAVIGATION 5.60 5.56		72-84 FIXED MARITIME MOBILE 5.57 RADIONAVIGATION 5.60			
84-86 RADIONAVIGATION 5.60		84-86 RADIONAVIGATION 5.60 Fixed Maritime mobile 5.57 5.59			

86-90 FIXED MARITIME MOBILE 5.57 RADIONAVIGATION 5.56	5.61	86-90 FIXED MARITIME MOBILE 5.57 RADIONAVIGATION 5.60	US2	US2	
90-110 RADIONAVIGATION 5.62 Fixed 5.64			90-110 RADIONAVIGATION 5.62 US18 US2 US104		Aviation (87) Private Land Mobile (90)
110-112 FIXED MARITIME MOBILE RADIONAVIGATION 5.64	110-130 FIXED MARITIME MOBILE MARITIME RADIONAVIGATION 5.60 Radiolocation	110-112 FIXED MARITIME MOBILE RADIONAVIGATION 5.60 5.64	110-130 FIXED MARITIME MOBILE Radiolocation		Private Land Mobile (90)
112-115 RADIONAVIGATION 5.60		112-117.6 RADIONAVIGATION 5.60 Fixed Maritime mobile			
115-117.6 RADIONAVIGATION 5.60 Fixed Maritime mobile 5.64 5.66		 5.64 5.65			
117.6-126 FIXED MARITIME MOBILE RADIONAVIGATION 5.60 5.64		117.6-126 FIXED MARITIME MOBILE RADIONAVIGATION 5.60 5.64			
126-129 RADIONAVIGATION 5.60		126-129 RADIONAVIGATION 5.60 Fixed Maritime mobile 5.64 5.65			
129-130 FIXED MARITIME MOBILE RADIONAVIGATION 5.60 5.64	5.61 5.64	129-130 FIXED MARITIME MOBILE RADIONAVIGATION 5.60 5.64	5.64 US2		
130-135.7 FIXED MARITIME MOBILE 5.64 5.67	130-135.7 FIXED MARITIME MOBILE 5.64	130-135.7 FIXED MARITIME MOBILE RADIONAVIGATION 5.64	130-135.7 FIXED MARITIME MOBILE 5.64 US2		Maritime (80)
135.7-137.8 FIXED MARITIME MOBILE Amateur 5.67A 5.64 5.67 5.67B	135.7-137.8 FIXED MARITIME MOBILE Amateur 5.67A 5.64	135.7-137.8 FIXED MARITIME MOBILE RADIONAVIGATION Amateur 5.67A 5.64 5.67B	135.7-137.8 FIXED MARITIME MOBILE 5.64 US2	135.7-137.8 Amateur 5.67A US2	Amateur Radio (97) Page 2

435-472 MARITIME MOBILE 5.79 Aeronautical radionavigation 5.77 5.82	5.78 5.82		435-472 MARITIME MOBILE 5.79 5.79A Aeronautical radionavigation 5.82 US2 US231	435-472 MARITIME MOBILE 5.79 5.79A 5.82 US2 US231	
472-479 MARITIME MOBILE 5.79 Amateur 5.80A Aeronautical radionavigation 5.77 5.80 5.80B 5.82			472-479 US2	472-479 Amateur 5.80A 5.82 US2 NG8	Amateur Radio (97)
479-495 MARITIME MOBILE 5.79 5.79A Aeronautical radionavigation 5.77 5.82	479-495 MARITIME MOBILE 5.79 5.79A Aeronautical radionavigation 5.77 5.80 5.82		479-495 MARITIME MOBILE 5.79 5.79A Aeronautical radionavigation 5.82 US2 US231	479-495 MARITIME MOBILE 5.79 5.79A 5.82 US2 US231	Maritime (80)
495-505 MARITIME MOBILE			495-505 MARITIME MOBILE		Maritime (80) Aviation (87)
505-526.5 MARITIME MOBILE 5.79 5.79A 5.84 AERONAUTICAL RADIONAVIGATION	505-510 MARITIME MOBILE 5.79	505-526.5 MARITIME MOBILE 5.79 5.79A 5.84 AERONAUTICAL RADIONAVIGATION Aeronautical mobile Land mobile	505-510 MARITIME MOBILE 5.79		Maritime (80)
	510-525 MARITIME MOBILE 5.79A 5.84 AERONAUTICAL RADIONAVIGATION		510-525 MARITIME MOBILE (ships only) 5.79A 5.84 AERONAUTICAL RADIONAVIGATION (radiobeacons) US18 US14 US225		Maritime (80) Aviation (87)
526.5-1606.5 BROADCASTING	525-535 BROADCASTING 5.86 AERONAUTICAL RADIONAVIGATION	526.5-535 BROADCASTING Mobile 5.88	525-535 MOBILE US221 AERONAUTICAL RADIONAVIGATION (radiobeacons) US18 US239		Aviation (87) Private Land Mobile (90)
	535-1605 BROADCASTING	535-1606.5 BROADCASTING	535-1605	535-1605 BROADCASTING NG1 NG5	Radio Broadcast (AM)(73) Private Land Mobile (90)
5.87 5.87A	1605-1625 BROADCASTING 5.89	1606.5-1800 FIXED MOBILE RADIOLOCATION RADIONAVIGATION	1605-1615 MOBILE US221 G127 1615-1705	1605-1705 BROADCASTING 5.89	Radio Broadcast (AM)(73) Alaska Fixed (80) Private Land Mobile (90)
1606.5-1625 FIXED MARITIME MOBILE 5.90 LAND MOBILE 5.92	5.90				
1625-1635 RADIOLOCATION 5.93	1625-1705 FIXED MOBILE BROADCASTING 5.89 Radiolocation				
1635-1800 FIXED MARITIME MOBILE 5.90 LAND MOBILE	5.90		US299	US299 NG1 NG5	
	1705-1800 FIXED MOBILE RADIOLOCATION AERONAUTICAL RADIONAVIGATION		1705-1800 FIXED MOBILE RADIOLOCATION US240		Alaska Fixed (80) Private Land Mobile (90)
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1850-2000 FIXED MOBILE except aeronautical mobile 5.92 5.96 5.103	1850-2000 AMATEUR FIXED MOBILE except aeronautical mobile RADIOLOCATION RADIONAVIGATION 5.102	5.97		NG92	
2000-2025 FIXED MOBILE except aeronautical mobile (R) 5.92 5.103	2000-2065 FIXED MOBILE		2000-2065 FIXED MOBILE	2000-2065 MARITIME MOBILE	Private Land Mobile (90)
2025-2045 FIXED MOBILE except aeronautical mobile (R) Meteorological aids 5.104 5.92 5.103					
2045-2160 FIXED MARITIME MOBILE LAND MOBILE 5.92			US340	US340 NG7	
	2065-2107 MARITIME MOBILE 5.105 5.106		2065-2107 MARITIME MOBILE 5.105 US296 US340		Maritime (80)
2160-2170 RADIOLOCATION 5.93 5.107	2107-2170 FIXED MOBILE		2107-2170 FIXED MOBILE US340	2107-2170 FIXED MOBILE except aeronautical mobile US340 NG7	Maritime (80) Private Land Mobile (90)
2170-2173.5 MARITIME MOBILE			2170-2173.5 MARITIME MOBILE (telephony) US340	2170-2173.5 MARITIME MOBILE US340	Maritime (80)
2173.5-2190.5 MOBILE (distress and calling) 5.108 5.109 5.110 5.111			2173.5-2190.5 MOBILE (distress and calling) 5.108 5.109 5.110 5.111 US279 US340		Maritime (80) Aviation (87)
2190.5-2194 MARITIME MOBILE			2190.5-2194 MARITIME MOBILE (telephony) US340	2190.5-2194 MARITIME MOBILE US340	Maritime (80)

International Table			United States Table		FCC Rule Part(s)
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3.4-3.5 AERONAUTICAL MOBILE (R)			3.4-3.5 AERONAUTICAL MOBILE (R) US283 US340		Aviation (87)
3.5-3.8 AMATEUR FIXED MOBILE except aeronautical mobile 5.92	3.5-3.75 AMATEUR 5.119	3.5-3.9 AMATEUR FIXED MOBILE	3.5-4	3.5-4 AMATEUR	Amateur Radio (97)
3.8-3.9 FIXED AERONAUTICAL MOBILE (OR) LAND MOBILE	3.75-4 AMATEUR FIXED MOBILE except aeronautical mobile (R)				
3.9-3.95 AERONAUTICAL MOBILE (OR) 5.123		3.9-3.95 AERONAUTICAL MOBILE BROADCASTING			
3.95-4 FIXED BROADCASTING		3.95-4 FIXED BROADCASTING			
	5.122 5.125	5.126	US340	US340	
4-4.063 FIXED MARITIME MOBILE 5.127 5.126			4-4.063 FIXED MARITIME MOBILE US340		Maritime (80)
4.063-4.438 MARITIME MOBILE 5.79A 5.109 5.110 5.130 5.131 5.132 5.128			4.063-4.438 MARITIME MOBILE 5.79A 5.109 5.110 5.130 5.131 5.132 US82 US296 US340		Maritime (80) Aviation (87)
4.438-4.488 FIXED MOBILE except aeronautical mobile (R) Radiolocation 5.132A 5.132B	4.438-4.488 FIXED MOBILE except aeronautical mobile (R) RADIOLOCATION 5.132A	4.438-4.488 FIXED MOBILE except aeronautical mobile Radiolocation 5.132A	4.438-4.488 FIXED MOBILE except aeronautical mobile (R) RADIOLOCATION 5.132A US340		Maritime (80) Private Land Mobile (90)
4.488-4.65 FIXED MOBILE except aeronautical mobile (R)		4.488-4.65 FIXED MOBILE except aeronautical mobile	4.488-4.65 FIXED MOBILE except aeronautical mobile (R) US22 US340		Maritime (80) Aviation (87) Private Land Mobile (90)
4.65-4.7 AERONAUTICAL MOBILE (R)			4.65-4.7 AERONAUTICAL MOBILE (R) US282 US283 US340		Aviation (87)

4.7-4.75 AERONAUTICAL MOBILE (OR)			4.7-4.75 AERONAUTICAL MOBILE (OR) US340		
4.75-4.85 FIXED AERONAUTICAL MOBILE (OR) LAND MOBILE BROADCASTING 5.113	4.75-4.85 FIXED MOBILE except aeronautical mobile (R) BROADCASTING 5.113	4.75-4.85 FIXED BROADCASTING 5.113 Land mobile	4.75-4.85 FIXED MOBILE except aeronautical mobile (R) US340		Maritime (80) Private Land Mobile (90)
4.85-4.995 FIXED LAND MOBILE BROADCASTING 5.113			4.85-4.995 FIXED MOBILE US340	4.85-4.995 FIXED US340	Aviation (87) Private Land Mobile (90)
4.995-5.003 STANDARD FREQUENCY AND TIME SIGNAL (5 MHz)			4.995-5.005 STANDARD FREQUENCY AND TIME SIGNAL (5 MHz)		
5.003-5.005 STANDARD FREQUENCY AND TIME SIGNAL Space research			US1 US340		
5.005-5.06 FIXED BROADCASTING 5.113			5.005-5.06 FIXED US22 US340		Aviation (87) Private Land Mobile (90)
5.06-5.25 FIXED Mobile except aeronautical mobile 5.133			5.06-5.25 FIXED US22 Mobile except aeronautical mobile US212 US340		Maritime (80) Aviation (87) Private Land Mobile (90)
5.25-5.275 FIXED MOBILE except aeronautical mobile Radiolocation 5.132A 5.133A	5.25-5.275 FIXED MOBILE except aeronautical mobile RADIOLOCATION 5.132A	5.25-5.275 FIXED MOBILE except aeronautical mobile Radiolocation 5.132A	5.25-5.275 FIXED MOBILE except aeronautical mobile RADIOLOCATION 5.132A US340		Maritime (80) Private Land Mobile (90)
5.275-5.45 FIXED MOBILE except aeronautical mobile			5.275-5.45 FIXED US22 Mobile except aeronautical mobile US23 US340		Maritime (80) Aviation (87) Private Land Mobile (90) Amateur Radio (97)
5.45-5.48 FIXED AERONAUTICAL MOBILE (OR) LAND MOBILE	5.45-5.48 AERONAUTICAL MOBILE (R)	5.45-5.48 FIXED AERONAUTICAL MOBILE (OR) LAND MOBILE	5.45-5.68 AERONAUTICAL MOBILE (R)		Aviation (87)
5.48-5.68 AERONAUTICAL MOBILE (R) 5.111 5.115			5.111 5.115 US283 US340		
5.68-5.73 AERONAUTICAL MOBILE (OR) 5.111 5.115			5.68-5.73 AERONAUTICAL MOBILE (OR) 5.111 5.115 US340		
5.73-5.9 FIXED LAND MOBILE	5.73-5.9 FIXED MOBILE except aeronautical mobile (R)	5.73-5.9 FIXED Mobile except aeronautical mobile (R)	5.73-5.9 FIXED MOBILE except aeronautical mobile (R) US340		Maritime (80) Aviation (87) Private Land Mobile (90)

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11.175-11.275 AERONAUTICAL MOBILE (OR)			11.175-11.275 AERONAUTICAL MOBILE (OR) US340		
11.275-11.4 AERONAUTICAL MOBILE (R)			11.275-11.4 AERONAUTICAL MOBILE (R) US283 US340		Aviation (87)
11.4-11.6 FIXED			11.4-11.6 FIXED US340		Private Land Mobile (90)
11.6-11.65 BROADCASTING 5.134 5.146			11.6-12.1 BROADCASTING 5.134		International Broadcast Stations (73F)
11.65-12.05 BROADCASTING 5.147					
12.05-12.1 BROADCASTING 5.134 5.146			US136 US340		
12.1-12.23 FIXED			12.1-12.23 FIXED US340		Private Land Mobile (90)
12.23-13.2 MARITIME MOBILE 5.109 5.110 5.132 5.145			12.23-13.2 MARITIME MOBILE 5.109 5.110 5.132 5.145 US82 US296 US340		Maritime (80)
13.2-13.26 AERONAUTICAL MOBILE (OR)			13.2-13.26 AERONAUTICAL MOBILE (OR) US340		
13.26-13.36 AERONAUTICAL MOBILE (R)			13.26-13.36 AERONAUTICAL MOBILE (R) US283 US340		Aviation (87)
13.36-13.41 FIXED RADIO ASTRONOMY 5.149			13.36-13.41 RADIO ASTRONOMY US342 G115	13.36-13.41 RADIO ASTRONOMY US342	
13.41-13.45 FIXED Mobile except aeronautical mobile (R)			13.41-13.45 FIXED Mobile except aeronautical mobile (R) US340	13.41-13.45 FIXED US340	Private Land Mobile (90)

13.45-13.55 FIXED Mobile except aeronautical mobile (R) Radiolocation 5.132A 5.149A	13.45-13.55 FIXED Mobile except aeronautical mobile (R) Radiolocation 5.132A	13.45-13.55 FIXED Mobile except aeronautical mobile (R) Radiolocation 5.132A US340	13.45-13.55 FIXED Radiolocation 5.132A US340	
13.55-13.57 FIXED Mobile except aeronautical mobile (R) 5.150		13.55-13.57 FIXED Mobile except aeronautical mobile (R) 5.150 US340	13.55-13.57 FIXED 5.150 US340	ISM Equipment (18) Private Land Mobile (90)
13.57-13.6 BROADCASTING 5.134 5.151		13.57-13.87 BROADCASTING 5.134		International Broadcast Stations (73F)
13.6-13.8 BROADCASTING				
13.8-13.87 BROADCASTING 5.134 5.151		US136 US340		
13.87-14 FIXED Mobile except aeronautical mobile (R)		13.87-14 FIXED Mobile except aeronautical mobile (R) US340	13.87-14 FIXED US340	Private Land Mobile (90)
14-14.25 AMATEUR AMATEUR-SATELLITE		14-14.35	14-14.25 AMATEUR AMATEUR-SATELLITE US340	Amateur Radio (97)
14.25-14.35 AMATEUR 5.152		US340	14.25-14.35 AMATEUR US340	
14.35-14.99 FIXED Mobile except aeronautical mobile (R)		14.35-14.99 FIXED Mobile except aeronautical mobile (R) US340	14.35-14.99 FIXED US340	Private Land Mobile (90)
14.99-15.005 STANDARD FREQUENCY AND TIME SIGNAL (15 MHz) 5.111		14.99-15.01 STANDARD FREQUENCY AND TIME SIGNAL (15 MHz)		
15.005-15.01 STANDARD FREQUENCY AND TIME SIGNAL Space research		5.111 US1 US340		
15.01-15.1 AERONAUTICAL MOBILE (OR)		15.01-15.1 AERONAUTICAL MOBILE (OR) US340		Page 12

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15.6-15.8 BROADCASTING 5.134 5.146			US136 US340		
15.8-16.1 FIXED 5.153			15.8-16.1 FIXED US340		Private Land Mobile (90)
16.1-16.2 FIXED Radiolocation 5.145A 5.145B	16.1-16.2 FIXED RADIOLOCATION 5.145A	16.1-16.2 FIXED Radiolocation 5.145A	16.1-16.2 FIXED RADIOLOCATION 5.145A US340		
16.2-16.36 FIXED			16.2-16.36 FIXED US340		
16.36-17.41 MARITIME MOBILE 5.109 5.110 5.132 5.145			16.36-17.41 MARITIME MOBILE 5.109 5.110 5.132 5.145 US82 US296 US340		Maritime (80)
17.41-17.48 FIXED			17.41-17.48 FIXED US340		Private Land Mobile (90)
17.48-17.55 BROADCASTING 5.134 5.146			17.48-17.9 BROADCASTING 5.134		International Broadcast Stations (73F)
17.55-17.9 BROADCASTING			US136 US340		
17.9-17.97 AERONAUTICAL MOBILE (R)			17.9-17.97 AERONAUTICAL MOBILE (R) US283 US340		Aviation (87)
17.97-18.03 AERONAUTICAL MOBILE (OR)			17.97-18.03 AERONAUTICAL MOBILE (OR) US340		
18.030-18.052 FIXED			18.03-18.068 FIXED		Maritime (80) Private Land Mobile (90)
18.052-18.068 FIXED Space research			US340		
18.068-18.168 AMATEUR AMATEUR-SATELLITE 5.154			18.068-18.168 US340	18.068-18.168 AMATEUR AMATEUR-SATELLITE US340	Amateur Radio (97)
18.168-18.78 FIXED Mobile except aeronautical mobile			18.168-18.78 FIXED Mobile US340		Maritime (80) Private Land Mobile (90)

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22.855-23 FIXED 5.156			22.855-23 FIXED US340		Private Land Mobile (90)
23-23.2 FIXED Mobile except aeronautical mobile (R) 5.156			23-23.2 FIXED Mobile except aeronautical mobile (R) US340	23-23.2 FIXED US340	
23.2-23.35 FIXED 5.156A AERONAUTICAL MOBILE (OR)			23.2-23.35 AERONAUTICAL MOBILE (OR) US340		
23.35-24 FIXED MOBILE except aeronautical mobile 5.157			23.35-24.45 FIXED MOBILE except aeronautical mobile	23.35-24.45 FIXED US340	Private Land Mobile (90)
24-24.45 FIXED LAND MOBILE					
24.45-24.6 FIXED LAND MOBILE Radiolocation 5.132A 5.158	24.45-24.65 FIXED LAND MOBILE RADIOLOCATION 5.132A	24.45-24.6 FIXED LAND MOBILE Radiolocation 5.132A	24.45-24.65 FIXED MOBILE except aeronautical mobile RADIOLOCATION 5.132A US340	24.45-24.65 FIXED RADIOLOCATION 5.132A US340	
24.6-24.89 FIXED LAND MOBILE	24.65-24.89 FIXED LAND MOBILE	24.6-24.89 FIXED LAND MOBILE	24.65-24.89 FIXED MOBILE except aeronautical mobile US340	24.65-24.89 FIXED US340	
24.89-24.99 AMATEUR AMATEUR-SATELLITE			24.89-24.99 US340	24.89-24.99 AMATEUR AMATEUR-SATELLITE US340	Amateur Radio (97)
24.99-25.005 STANDARD FREQUENCY AND TIME SIGNAL (25 MHz)			24.99-25.01 STANDARD FREQUENCY AND TIME SIGNAL (25 MHz)		
25.005-25.01 STANDARD FREQUENCY AND TIME SIGNAL Space research			 US1 US340		
25.01-25.07 FIXED MOBILE except aeronautical mobile			25.01-25.07 US340	25.01-25.07 LAND MOBILE US340 NG112	Private Land Mobile (90)
25.07-25.21 MARITIME MOBILE			25.07-25.21 MARITIME MOBILE US82 US281 US296 US340	25.07-25.21 MARITIME MOBILE US82 US281 US296 US340 NG112	Maritime (80) Private Land Mobile (90)

25.21-25.55 FIXED MOBILE except aeronautical mobile			25.21-25.33 US340	25.21-25.33 LAND MOBILE US340	Private Land Mobile (90)
			25.33-25.55 FIXED MOBILE except aeronautical mobile US340	25.33-25.55 US340	
25.55-25.67 RADIO ASTRONOMY 5.149			25.55-25.67 RADIO ASTRONOMY US74 US342		
25.67-26.1 BROADCASTING			25.67-26.1 BROADCASTING US25 US340		International Broadcast Stations (73F) Remote Pickup (74D)
26.1-26.175 MARITIME MOBILE 5.132			26.1-26.175 MARITIME MOBILE 5.132 US25 US340		Remote Pickup (74D) Low Power Auxiliary (74H) Maritime (80)
26.175-26.2 FIXED MOBILE except aeronautical mobile			26.175-26.2 US340	26.175-26.2 LAND MOBILE US340	Remote Pickup (74D) Low Power Auxiliary (74H)
26.2-26.35 FIXED MOBILE except aeronautical mobile Radiolocation 5.132A 5.133A	26.2-26.42 FIXED MOBILE except aeronautical mobile RADIOLOCATION 5.132A	26.2-26.35 FIXED MOBILE except aeronautical mobile Radiolocation 5.132A	26.2-26.42 RADIOLOCATION US132A US340	26.2-26.42 LAND MOBILE RADIOLOCATION US132A US340	Remote Pickup (74D) Low Power Auxiliary (74H) Private Land Mobile (90)
26.35-27.5 FIXED MOBILE except aeronautical Mobile	26.42-27.5 FIXED MOBILE except aeronautical mobile	26.35-27.5 FIXED MOBILE except aeronautical mobile	26.42-26.48 US340	26.42-26.48 LAND MOBILE US340	Remote Pickup (74D) Low Power Auxiliary (74H)
			26.48-26.95 FIXED MOBILE except aeronautical mobile US340	26.48-26.95 US340	
			26.95-27.41	26.95-26.96 FIXED 5.150 US340	ISM Equipment (18)
				26.96-27.23 MOBILE except aeronautical mobile 5.150 US340	ISM Equipment (18) Personal Radio (95)
				27.23-27.41 FIXED MOBILE except aeronautical mobile	ISM Equipment (18) Private Land Mobile (90) Personal Radio (95)
5.150	5.150	5.150	5.150 US340	5.150 US340	

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27.5-28 METEOROLOGICAL AIDS FIXED MOBILE			US340	US340	
			27.54-28 FIXED MOBILE	27.54-28	
			US298 US340	US298 US340	
28-29.7 AMATEUR AMATEUR-SATELLITE			28-29.7	28-29.7 AMATEUR AMATEUR-SATELLITE	Amateur Radio (97)
			US340	US340	
29.7-30.005 FIXED MOBILE			29.7-29.89	29.7-29.8 LAND MOBILE	Private Land Mobile (90)
				US340	
				29.8-29.89 FIXED	
			US340	US340	
			29.89-29.91 FIXED MOBILE	29.89-29.91	
			US340	US340	
			29.91-30	29.91-30 FIXED	
			US340	US340	
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			30.56-32	30.56-32 FIXED LAND MOBILE	Private Land Mobile (90)
				NG124	
			32-33 FIXED MOBILE	32-33	
			33-34	33-34 FIXED LAND MOBILE	Private Land Mobile (90)
				NG124	

			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 5.149			37.5-38 Radio astronomy US342	37.5-38 LAND MOBILE Radio astronomy US342 NG59 NG124	
			38-38.25 FIXED MOBILE RADIO ASTRONOMY US81 US342	38-38.25 RADIO ASTRONOMY US81 US342	
38.25-39 FIXED MOBILE	38.25-39.986 FIXED MOBILE	38.25-39.5 FIXED MOBILE	38.25-39 FIXED MOBILE	38.25-39	
39-39.5 FIXED MOBILE Radiolocation 5.132A 5.159			39-40	39-40 LAND MOBILE NG124	Private Land Mobile (90)
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39.986-40.02 FIXED MOBILE Space research		39.986-40 FIXED MOBILE RADIOLOCATION 5.132A Space research			
		40-40.02 FIXED MOBILE Space research	40-41.015 FIXED MOBILE 5.150 US210 US220	40-41.015 5.150 US210 US220	ISM Equipment (18) Private Land Mobile (90) Page 18
40.02-40.98 FIXED MOBILE 5.150					

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40.98-41.015 FIXED MOBILE Space research 5.160 5.161			(See previous page)		
41.015-42 FIXED MOBILE			41.015-41.665 FIXED MOBILE RADIOLOCATION US132A US220	41.015-41.665 RADIOLOCATION US132A US220	Private Land Mobile (90)
			41.665-42 FIXED MOBILE US220	41.665-42 US220	
5.160 5.161 5.161A					
42-42.5 FIXED MOBILE Radiolocation 5.132A 5.160 5.161B	42-42.5 FIXED MOBILE 5.161		42-43.35	42-43.35 FIXED LAND MOBILE NG124 NG141	Public Mobile (22) Private Land Mobile (90)
42.5-44 FIXED MOBILE			43.35-44 RADIOLOCATION US132A	43.35-43.69 FIXED LAND MOBILE RADIOLOCATION US132A NG124	
				43.69-44 LAND MOBILE RADIOLOCATION US132A NG124	Private Land Mobile (90)
5.160 5.161 5.161A					
44-47 FIXED MOBILE			44-46.6	44-46.6 LAND MOBILE NG124 NG141	
			46.6-47 FIXED MOBILE	46.6-47	
5.162 5.162A					
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	50-54 AMATEUR 5.162A 5.166 5.167 5.167A 5.168 5.170		50-73	50-54 AMATEUR	Amateur Radio (97)

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68-74.8 FIXED MOBILE except aeronautical mobile	68-72 BROADCASTING Fixed Mobile 5.173	68-74.8 FIXED MOBILE			
	72-73 FIXED MOBILE			72-73 FIXED MOBILE NG3 NG16 NG56	Public Mobile (22) Maritime (80) Aviation (87) Private Land Mobile (90) Personal Radio (95)
	73-74.6 RADIO ASTRONOMY 5.178		73-74.6 RADIO ASTRONOMY US74 US246		
	74.6-74.8 FIXED MOBILE		74.6-74.8 FIXED MOBILE US273		Private Land Mobile (90)
5.149 5.175 5.177 5.179		5.149 5.176 5.179			
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	76-88 BROADCASTING Fixed Mobile 5.185	5.182 5.183 5.188 87-100 FIXED MOBILE BROADCASTING		76-88 BROADCASTING NG5 NG14 NG115 NG149	Broadcast Radio (TV)(73) LPTV, TV Translator/ Booster (74G) Low Power Auxiliary (74H)
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			US73	US73 NG124	
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154-156.4875 FIXED MOBILE except aeronautical mobile (R)	154-156.4875 FIXED MOBILE	154-156.4875 FIXED MOBILE		154-156.2475 FIXED LAND MOBILE NG112	Maritime (80) Private Land Mobile (90) Personal Radio (95)
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			156.2475-156.5125	156.2475-156.5125 MARITIME MOBILE NG22	Maritime (80) Aviation (87)
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5.111 5.226 5.227			156.5125-156.5375 MARITIME MOBILE (distress, urgency, safety and calling via DSC) 5.111 5.226 US266		
			156.5375-156.7625	156.5375-156.7625 MARITIME MOBILE	
156.5625-156.7625 FIXED MOBILE except aeronautical mobile (R)	156.5625-156.7625 FIXED MOBILE				
5.226	5.226		5.226 US52 US227 US266	5.226 US52 US227 US266	
156.7625-156.7875 MARITIME MOBILE Mobile-satellite (Earth-to-space)	156.7625-156.7875 MARITIME MOBILE MOBILE-SATELLITE (Earth-to-space)	156.7625-156.7875 MARITIME MOBILE Mobile-satellite (Earth-to-space)	156.7625-156.7875 MOBILE-SATELLITE (Earth-to-space) (AIS 3)		Satellite Communications (25) Maritime (80)
5.111 5.226 5.228	5.111 5.226 5.228	5.111 5.226 5.228	5.226 US52 US266		
156.7875-156.8125 MARITIME MOBILE (distress and calling) 5.111 5.226			156.7875-156.8125 MARITIME MOBILE (distress, urgency, safety and calling) 5.111 5.226 US266		Maritime (80) Aviation (87)
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			157.0375-157.1875 MARITIME MOBILE US214	157.0375-157.1875	Maritime (80)
			5.226 US266 G109	5.226 US214 US266	

			157.1875-161.575	157.1875-157.45 MOBILE except aeronautical mobile US266 5.226 NG111	Maritime (80) Aviation (87) Private Land Mobile (90)
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35.5-36 METEOROLOGICAL AIDS EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) 5.549 5.549A			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	
36-37 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive) 5.149 5.550A			36-37 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive) US342 US550A		
37-37.5 FIXED MOBILE except aeronautical mobile SPACE RESEARCH (space-to-Earth) 5.547			37-38 FIXED MOBILE except aeronautical mobile SPACE RESEARCH (space-to-Earth)	37-37.5 FIXED MOBILE except aeronautical mobile US151	Upper Microwave Flexible Use (30)
37.5-38 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile SPACE RESEARCH (space-to-Earth) Earth exploration-satellite (space-to-Earth) 5.547			US151	37.5-38 FIXED FIXED-SATELLITE (space-to-Earth) NG63 MOBILE except aeronautical mobile US151	Satellite Communications (25) Upper Microwave Flexible Use (30)
38-39.5 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Earth exploration-satellite (space-to-Earth) 5.547			38-38.6 FIXED MOBILE 38.6-39.5	38-39.5 FIXED FIXED-SATELLITE (space-to-Earth) NG63 MOBILE NG175	
39.5-40 FIXED FIXED-SATELLITE (space-to-Earth) 5.516B MOBILE MOBILE-SATELLITE (space-to-Earth) Earth exploration-satellite (space-to-Earth) 5.547			39.5-40 FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) US382 G117	39.5-40 FIXED FIXED-SATELLITE (space-to-Earth) NG63 MOBILE NG175 US382	

International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
200-209 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) 5.340 5.341 5.563A			200-209 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) 5.341 5.563A US246		
209-217 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY 5.149 5.341			209-217 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY 5.341 US342		
217-226 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) 5.562B 5.149 5.341			217-226 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) 5.562B 5.341 US342		
226-231.5 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) 5.340			226-231.5 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) US246		
231.5-232 FIXED MOBILE Radiolocation			231.5-232 FIXED MOBILE Radiolocation		
232-235 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Radiolocation			232-235 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Radiolocation		
235-238 EARTH EXPLORATION-SATELLITE (passive) FIXED-SATELLITE (space-to-Earth) SPACE RESEARCH (passive) 5.563A 5.563B			235-238 EARTH EXPLORATION-SATELLITE (passive) FIXED-SATELLITE (space-to-Earth) SPACE RESEARCH (passive) 5.563A 5.563B		
238-240 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE			238-240 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE		

240-241 FIXED MOBILE RADIOLOCATION	240-241 FIXED MOBILE RADIOLOCATION		
241-248 RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite 5.138 5.149	241-248 RADIO ASTRONOMY RADIOLOCATION 5.138 US342	241-248 RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite 5.138 US342	ISM Equipment (18) Amateur Radio (97)
248-250 AMATEUR AMATEUR-SATELLITE Radio astronomy 5.149	248-250 Radio astronomy US342	248-250 AMATEUR AMATEUR-SATELLITE Radio astronomy US342	Amateur Radio (97)
250-252 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) 5.340 5.563A	250-252 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) 5.563A US246		
252-265 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) RADIO ASTRONOMY RADIONAVIGATION RADIONAVIGATION-SATELLITE 5.149 5.554	252-265 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) RADIO ASTRONOMY RADIONAVIGATION RADIONAVIGATION-SATELLITE 5.554 US211 US342		
265-275 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY 5.149 5.563A	265-275 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY 5.563A US342		
275-3000 (Not allocated) 5.565	275-3000 (Not allocated) US565		Amateur Radio (97)

UNITED STATES (US) FOOTNOTES

* * * * *

US52 In the VHF maritime mobile band (156-162 MHz), the following provisions shall apply:

(a) Except as provided for below, the use of the bands 161.9625-161.9875 MHz (AIS 1 with center frequency 161.975 MHz) and 162.0125-162.0375 MHz (AIS 2 with center frequency 162.025 MHz) by the maritime mobile and mobile-satellite (Earth-to-space) services is restricted to Automatic Identification Systems (AIS). The use of these bands by the aeronautical mobile (OR) service is restricted to AIS emissions from search and rescue aircraft operations. Frequencies in the AIS 1 band may continue to be used by non-Federal base, fixed, and land mobile stations until March 2, 2024.

(b) Except as provided for below, the use of the bands 156.7625-156.7875 MHz (AIS 3 with center frequency 156.775 MHz) and 156.8125-156.8375 MHz (AIS 4 with center frequency 156.825 MHz) by the mobile-satellite service (Earth-to-space) is restricted to the reception of long-range AIS broadcast messages from ships (Message 27; see most recent version of Recommendation ITU-R M.1371). The frequencies 156.775 MHz and 156.825 MHz may continue to be used by non-Federal ship and coast stations for navigation-related port operations or ship movement until August 26, 2019.

(c) The frequency 156.3 MHz may also be used by aircraft stations for the purpose of search and rescue operations and other safety-related communication.

(d) Federal stations in the maritime mobile service may also be authorized as follows: (1) Vessel traffic services under the control of the U.S. Coast Guard on a simplex basis by coast and ship stations on the frequencies 156.25, 156.55, 156.6 and 156.7 MHz; (2) Inter-ship use of the frequency 156.3 MHz on a simplex basis; (3) Navigational bridge-to-bridge and navigational communications on a simplex basis by coast and ship stations on the frequencies 156.375 and 156.65 MHz; (4) Port operations use on a simplex basis by coast and ship stations on the frequencies 156.6 and 156.7 MHz; (5) Environmental communications on the frequency 156.75 MHz in accordance with the national plan; and (6) Duplex port operations use of the frequencies 157 MHz for ship stations and 161.6 MHz for coast stations.

* * * * *

US115 In the bands 5000-5010 MHz and 5010-5030 MHz, the following provisions shall apply:

(a) In the band 5000-5010 MHz, systems in the aeronautical mobile (R) service (AM(R)S) are limited to surface applications at airports that operate in accordance with international aeronautical standards (i.e., AeroMACS).

(b) The band 5010-5030 MHz is also allocated on a primary basis to the AM(R)S, limited to surface applications at airports that operate in accordance with international aeronautical standards. In making assignments for this band, attempts shall first be made to satisfy the AM(R)S requirements in the bands 5000-5010 MHz and 5091-5150 MHz. AM(R)S systems used in the band 5010-5030 MHz shall be designed and implemented to be capable of operational modification if receiving harmful interference from the radionavigation-satellite service. Finally, notwithstanding Radio Regulation No. 4.10, stations in the AM(R)S operating in this band shall be designed and implemented to be capable of operational modification to reduce throughput and/or preclude the use of specific frequencies in order to ensure protection of radionavigation-satellite service systems operating in this band.

(c) Aeronautical fixed communications that are an integral part of the AeroMACS system in the bands 5000-5010 MHz and 5010-5030 MHz are also authorized on a primary basis.

* * * * *

US132A In the bands 26.2-26.42 MHz, 41.015-41.665 MHz, and 43.35-44 MHz, applications of radiolocation service are limited to oceanographic radars operating in accordance with ITU Resolution 612 (Rev. WRC-12). Oceanographic radars shall not cause harmful interference to, or claim protection from, non-Federal stations in the land mobile service in the bands 26.2-26.42 MHz and 43.69-44 MHz,

Federal stations in the fixed or mobile services in the band 41.015-41.665 MHz, and non-Federal stations in the fixed or land mobile services in the band 43.35-43.69 MHz.

* * * * *

US231 When an assignment cannot be obtained in the bands between 200 kHz and 525 kHz, which are allocated to aeronautical radionavigation, assignments may be made to aeronautical radiobeacons in the maritime mobile bands at 435-472 kHz and 479-490 kHz, on a secondary basis, subject to the coordination and agreement of those agencies having assignments within the maritime mobile bands which may be affected. Assignments to Federal aeronautical radionavigation radiobeacons in the bands 435-472 kHz and 479-490 kHz shall not be a bar to any required changes to the maritime mobile service and shall be limited to non-voice emissions.

* * * * *

US246 No station shall be authorized to transmit in the following bands: 73-74.6 MHz, 608-614 MHz, except for medical telemetry equipment[1] and white space devices,[2] 1400-1427 MHz, 1660.5-1668.4 MHz, 2690-2700 MHz, 4990-5000 MHz, 10.68-10.7 GHz, 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, 109.5-111.8 GHz, 114.25-116 GHz, 148.5-151.5 GHz, 164-167 GHz, 182-185 GHz, 190-191.8 GHz, 200-209 GHz, 226-231.5 GHz, 250-252 GHz.

* * * * *

US511E The use of the band 15.4-15.7 GHz by the radiolocation service is limited to Federal systems requiring a necessary bandwidth greater than 1600 MHz that cannot be accommodated within the band 15.7-17.3 GHz except as described below. In the band 15.4-15.7 GHz, stations operating in the radiolocation service shall not cause harmful interference to, nor claim protection from, radars operating in the aeronautical radionavigation service. Radar systems operating in the radiolocation service shall not be developed solely for operation in the band 15.4-15.7 GHz. Radar systems requiring use of the band 15.4-15.7 GHz for testing, training, and exercises may be accommodated on a case-by-case basis.

US565 The following frequency bands in the range 275-1000 GHz are identified for passive service applications:

– radio astronomy service: 275-323 GHz, 327-371 GHz, 388-424 GHz, 426-442 GHz, 453-510 GHz, 623-711 GHz, 795-909 GHz and 926-945 GHz;

– Earth exploration-satellite service (passive) and space research service (passive): 275-286 GHz, 296-306 GHz, 313-356 GHz, 361-365 GHz, 369-392 GHz, 397-399 GHz, 409-411 GHz, 416-434 GHz, 439-467 GHz, 477-502 GHz, 523-527 GHz, 538-581 GHz, 611-630 GHz, 634-654 GHz, 657-692 GHz, 713-718 GHz, 729-733 GHz, 750-754 GHz, 771-776 GHz, 823-846 GHz, 850-854 GHz, 857-862 GHz, 866-882 GHz, 905-928 GHz, 951-956 GHz, 968-973 GHz and 985-990 GHz.

The use of the range 275-1000 GHz by the passive services does not preclude use of this range by active services. This provision does not establish priority of use in the United States Table of Frequency Allocations, and does not preclude or constrain any active service use or future allocation of frequency bands in the 275-3000 GHz range.

[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 CFR 95.1119.

[2] White space devices shall not cause harmful interference to radio astronomy operations in the band 608-614 MHz and shall not operate within the areas described in 47 CFR 15.712(h).

NON-FEDERAL GOVERNMENT (NG) FOOTNOTES

* * * * *

NG8 In the band 472-479 kHz, non-Federal stations in the maritime mobile service that were licensed or applied for prior to [insert effective date of the WRC-12 R&O] may continue to operate on a primary basis, subject to periodic license renewals.

* * * * *

NG16 In the bands 72-73 MHz and 75.4-76 MHz, frequencies may be authorized for mobile operations in the Industrial/Business Radio Pool, subject to not causing interference to the reception of broadcast television signals on channels 4 and 5.

* * * * *

NG92 The band 1900-2000 kHz is also allocated on a primary basis to the maritime mobile service in Regions 2 and 3 and to the radiolocation service in Region 2, and on a secondary basis to the radiolocation service in Region 3. The use of these allocations is restricted to radio buoy operations on the open sea and the Great Lakes. Stations in the amateur, maritime mobile, and radiolocation services in Region 2 shall be protected from harmful interference only to the extent that the offending station does not operate in compliance with the technical rules applicable to the service in which it operates.

* * * * *

PART 15 – RADIO FREQUENCY DEVICES

5. The authority citation for Part 15 is amended to read as follows:

AUTHORITY: 47 U.S.C. 154, 302a, 303, 304, 307, 336, 544a, and 549.

6. Section 15.113 is amended by adding paragraph (g) to read as follows:

§ 15.113 Power Line Carrier Systems.

* * * * *

(g) Special provisions. An electric power utility entity shall not operate a new or modified power line carrier (PLC) system in the 135.7-137.8 kHz and/or 472-479 kHz bands if a previously coordinated amateur station pursuant to Section 97.301(g)(2) of this Chapter is located within one kilometer of the transmission lines conducting the PLC signal.

* * * * *

PART 25 – SATELLITE COMMUNICATIONS

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

AUTHORITY: Interprets or applies sections 4, 301, 302, 303, 307, 309, 319, 332, 705, and 721 of the Communications Act, as amended, 47 U.S.C. 154, 301, 302, 303, 307, 309, 319, 332, 605, and 721, unless otherwise noted.

8. Section 25.202 is amended by adding paragraph (a)(12) to read as follows:

§ 25.202 Frequencies, frequency tolerance, and emission limits.

(a) * * *

* * * * *

(12) The following frequencies are available for use by the mobile-satellite service (Earth-to-space) for the reception of Automatic Identification Systems (AIS) broadcast messages from ships:

156.7625-156.7875 MHz
156.8125-156.8375 MHz
161.9625-161.9875 MHz
162.0125-162.0375 MHz

* * * * *

PART 80 – STATIONS IN THE MARITIME SERVICES

9. The authority citation for Part 80 continues to read as follows:

AUTHORITY: Secs. 4, 303, 307(e), 309, and 332, 48 Stat. 1066, 1082, as amended; 47 U.S.C. 154, 303, 307(e), 309, and 332, unless otherwise noted. Interpret or apply 48 Stat. 1064-1068, 1081-1105, as amended; 47 U.S.C. 151-155, 301-609; 3 UST 3450, 3 UST 4726, 12 UST 2377.

10. Section 80.203 is amended by adding paragraph (p) to read as follows:

§80.203 Authorization of transmitters for licensing.

(p) As of [insert effective date of this Report and Order], the Commission will no longer accept applications for certification of non-AIS VHF radios that include channels 75 and 76.

11. Section 80.215 is amended by removing note 13 from paragraph (e)(1) and by removing and reserving paragraph (g)(3).

§ 80.215 Transmitter power.

* * * * *

(e) * * *

(1) Ship stations 156-162 MHz—25 W[6]

* * * * *

(g) * * *

* * * * *

(3) [Reserved]

* * * * *

12. Section 80.357 is amended by revising note 1 to the table within paragraph (b)(1) to read as follows:

[1] All frequencies in this table are shown in kilohertz. The use of frequencies in the 472-479 kHz band is restricted to public coast stations that were licensed on or before [insert effective date of this R&O].

13. Section 80.373 is amended by revising the table in paragraph (f) to: (1) remove the entries for channel designator 75 (156.775 MHz) and channel designator 76 (156.825 MHz) below the heading “Port Operations;” (2) revise the note reference associated with channel designator 71 (156.575 MHz) from “19” to “18” below the heading “Noncommercial;” (3) remove note 18; and (4) renumber the text of note 19 as 18.

§ 80.373 Private communications frequencies.

* * * * *

(f) * * *

FREQUENCIES IN THE 156-162 MHZ BAND

Channel designator	Carrier frequency (MHz) ship transmit	Carrier frequency (MHz) coast transmit	Points of communication (intership and between coast and ship unless otherwise indicated)
Port Operations			
01A[1]	156.050	156.050	
63A[1]	156.175	156.175	
05A[2]	156.250	156.250	
65A	156.275	156.275	
66A	156.325	156.325	
12[3]	156.600	156.600	
73	156.675	156.675	
14[3]	156.700	156.700	
74	156.725	156.725	
77[4]	156.875	……..	Intership only.
20A[12]	157.000	……..	Intership only.
Navigational (Bridge-to-Bridge)[5]			
* *	* *	* *	*
Noncommercial			
67[14]	156.375	……..	Intership only.
68[17]	156.425	156.425	
09[16]	156.450	156.450	
69	156.475	156.475	
71[18]	156.575	156.575	
72	156.625	……..	Intership only.
78A	156.925	156.925	
79A	156.975	156.975	Great Lakes only.
80A	157.025	157.025	Do.
Distress, Safety and Calling			
* *	* *	* *	*

* * * * *

[18] 156.575 MHz is available for port operations communications use only within the U.S. Coast Guard designated VTS radio protection area of Seattle (Puget Sound) described in §80.383. Normal output power must not exceed 1 watt. Maximum output power must not exceed 10 watts.

14. Section 80.376 is added to read as follows:

§ 80.376 Radio buoy operations.

Frequencies in the 1900-2000 kHz band are authorized for radio buoy operations under a ship radio station license provided:

(a) The use of these frequencies is related to commercial fishing operations on the open sea and the Great Lakes; and

(b) The output power does not exceed 8 watts and the station antenna height does not exceed 4.6 meters above sea level in a buoy station or 6 meters above the mast of the ship on which it is installed.

15. Section 80.393 is amended to read as follows:

§ 80.393 Frequencies for AIS stations.

Automatic Identification Systems (AIS) are a maritime broadcast service. The simplex channels at 156.775 MHz (AIS 3), 156.825 MHz (AIS 4), 161.975 MHz (AIS 1), and 162.025 MHz (AIS 2), each with a 25 kHz bandwidth, may be authorized only for AIS. In accordance with the Maritime Transportation Security Act, the United States Coast Guard regulates AIS carriage requirements for non-Federal Government ships. These requirements are codified at 33 CFR 164.46, 401.20.

16. Section 80.871 is amended by revising the table in paragraph (d) to remove the entries for channel designator 75 (156.775 MHz) and channel designator 76 (156.825 MHz).

§ 80.871 VHF radiotelephone station.

* * * * *

(d) * * *

Channel designators	Transmitting frequencies (MHz)	
	Ship station	Coast station
* * *	* *	* *
15	156.750	156.750
16	156.800	156.800
17	156.850	156.850
* * *	* *	* *

PART 90 – PRIVATE LAND MOBILE RADIO SERVICES

17. The authority citation for Part 90 continues to read as follows:

AUTHORITY: Sections 4(i), 11, 303(g), 303(r), and 332(c)(7) of the Communications Act of 1934, as amended, 47 U.S.C. 154(i), 161, 303(g), 303(r), and 332(c)(7), and Title VI of the Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. 112-96, 126 Stat. 156.

18. Section 90.7 is amended by adding the following term and definition in alphabetical order to read as follows:

§ 90.7 Definitions.

* * * * *

Equivalent Isotropically Radiated Power (EIRP). The product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain).

* * * * *

19. Section 90.103 is amended by adding or revising the following entries to the table in paragraph (b) and by adding paragraph (c)(3) to read as follows:

§ 90.103 Radiolocation Service.

* * * * *

(b) * * *

RADIOLOCATION SERVICE FREQUENCY TABLE

Frequency or band	Class of station(s)	Limitation
	Kilohertz	
* * *	* *	* *
4438 to 4488 ……..……...….	Radiolocation land	3
5250 to 5275 ……...….	.....do	3
	Megahertz	
13.45 to 13.55 ……	.....do	3
16.10 to 16.20 ……	.....do	3
24.45 to 24.65 ……	.....do	3
26.20 to 26.42 ……	.....do	3
41.015 to 41.665 ……	.....do	3
43.35 to 44.00 ……	.....do	3
420 to 450 ……..	Radiolocation land or mobile	21
2450 to 2500 ……..	.....do	9, 22, 23
* * *	* *	* *

(c) * * *

* * * * *

(3) Operations in this band are limited to oceanographic radars using transmitters with a peak equivalent isotropically radiated power (EIRP) not to exceed 25 dBW. Oceanographic radars shall not cause harmful interference to, nor claim protection from interference caused by, stations in the fixed or mobile services as specified in § 2.106, footnotes 5.132A, 5.145A, and US132A. See Resolution 612 of the ITU Radio Regulations for international coordination requirements and for recommended spectrum sharing techniques.

* * * * *

20. Section 90.425 is amended by revising paragraph (c)(1) and by adding paragraph (c)(3) to read as follows:

§ 90.425 Station identification.

* * * * *

(c) Special provisions for identification in the Radiolocation Service. (1) Stations in the Radiolocation Service are not required to identify except upon special instructions from the Commission or as required by paragraphs (c)(2) and (c)(3) of this section.

* * * * *

(3) Oceanographic radars operating in the bands shown in section 90.103(b) shall transmit a station identification (call sign) on the assigned frequency, in international Morse code at a transmission rate in accordance with paragraph (b)(2) at the end of each data acquisition cycle, but at an interval of no more than 20 minutes.

* * * * *

PART 97 – AMATEUR RADIO SERVICE

21. The authority citation for part 97 continues to read as follows:

AUTHORITY: 48 Stat. 1066, 1082, as amended; 47 U.S.C. 154, 303. Interpret or apply 48 Stat. 1064-1068, 1081-1105, as amended; 47 U.S.C. 151-155, 301-609, unless otherwise noted.

22. Section 97.3(b) is amended by revising the definitions to read as follows:

§ 97.3 Definitions.

* * * * *

(b) * * *

(1) EHF (extremely high frequency). The frequency range 30-300 GHz.

(2) EIRP (equivalent isotropically radiated power). The product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain).

NOTE: Divide EIRP by 1.64 to convert to effective radiated power.

(3) ERP (effective radiated power) (in a given direction). The product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction.

NOTE: Multiply ERP by 1.64 to convert to equivalent isotropically radiated power.

(4) HF (high frequency). The frequency range 3-30 MHz.

(5) Hz. Hertz.

(6) LF (low frequency). The frequency range 30-300 kHz.

(7) m. Meters.

(8) MF (medium frequency). The frequency range 300-3000 kHz.

(9) PEP (peak envelope power). The average power supplied to the antenna transmission line by a transmitter during one RF cycle at the crest of the modulation envelope taken under normal operating conditions.

(10) RF. Radio frequency.

(11) SHF (super high frequency). The frequency range 3-30 GHz.

(12) UHF (ultra high frequency). The frequency range 300-3000 MHz.

(13) VHF (very high frequency). The frequency range 30-300 MHz.

(14) W. Watts.

* * * * *

23. Section 97.15 is amended by adding paragraph (c) to read as follows:

§ 97.15 Station antenna structures.

* * * * *

(c) Antennas used to transmit in the 2200 m and 630 m bands must not exceed 60 meters in height above ground level.

24. Section 97.301 is amended by revising the tables in paragraphs (b), (c), and (d) to read as follows:

§ 97.301 Authorized frequency bands.

* * * * *

(b) * * *

Wavelength band	ITU Region 1	ITU Region 2	ITU Region 3	Sharing requirements see § 97.303 (Paragraph)
LF	kHz	kHz	kHz	
2200 m…….	135.7-137.8…….	135.7-137.8…….	135.7-137.8…...	(a), (g)
MF	kHz	kHz	kHz	
630 m……...	472-479……...	472-479……...	472-479…….	(g)
160 m……..	1810-1850…...…	1800-2000……..	1800-2000….....	(a)
* *	* *	*	*	*

(c) * * *

Wavelength band	ITU Region 1	ITU Region 2	ITU Region 3	Sharing requirements see § 97.303 (Paragraph)
LF	kHz	kHz	kHz	
2200 m…….	135.7-137.8…….	135.7-137.8…….	135.7-137.8…...	(a), (g)
MF	kHz	kHz	kHz	
630 m……...	472-479……...	472-479……...	472-479…….	(g)
160 m……..	1810-1850…...…	1800-2000……..	1800-2000….....	(a)
* *	* *	*	*	*

(d) * * *

Wavelength band	ITU Region 1	ITU Region 2	ITU Region 3	Sharing requirements see § 97.303 (Paragraph)
LF	kHz	kHz	kHz	
2200 m…….	135.7-137.8…….	135.7-137.8…….	135.7-137.8…...	(a), (g)
MF	kHz	kHz	kHz	
630 m……...	472-479……...	472-479……...	472-479…….	(g)
160 m……..	1810-1850…...…	1800-2000……..	1800-2000….....	(a)
* *	* *	*	*	*

* * * * *

25. Section 97.303 is amended by adding paragraph (g) to read as follows:

§ 97.303 Frequency sharing requirements.

* * * * *

(g) In the 2200 m and 630 m bands:

(1) Amateur stations in the 135.7-137.8 kHz (2200 m) and 472-479 kHz (630 m) bands shall only operate at fixed locations. Amateur stations shall not operate within a horizontal distance of one kilometer from a transmission line that conducts a power line carrier (PLC) signal in the 135.7-137.8 kHz or 472-479 kHz bands. Horizontal distance is measured from the station's antenna to the closest point on the transmission line.

(2) Prior to commencement of operations in the 135.7-137.8 kHz (2200 m) and/or 472-479 kHz (630 m) bands, amateur operators shall notify the Utilities Telecom Council (UTC) of their intent to operate by submitting their call signs, intended band or bands of operation, and the coordinates of their antenna's fixed location. Amateur stations will be permitted to commence operations after the 30-day period unless UTC notifies the station that its fixed location is located within one kilometer of PLC systems operating in the same or overlapping frequencies.

(3) Amateur stations in the 135.7-137.8 kHz (2200 m) band shall not cause harmful interference to, and shall accept interference from: (i) stations authorized by the United States Government in the fixed and maritime mobile services; (ii) stations authorized by other nations in the fixed, maritime mobile, and radionavigation service.

(4) Amateur stations in the 472-479 kHz (630 m) band shall not cause harmful interference to, and shall accept interference from: (i) stations authorized by the FCC in the maritime mobile service; (ii) stations authorized by other nations in the maritime mobile and aeronautical radionavigation services.

(5) Amateur stations causing harmful interference shall take all necessary measures to eliminate such interference – including temporary or permanent termination of transmissions.

* * * * *

26. Section 97.305 is amended by revising the table within paragraph (c) to read as follows:

§ 97.305 Authorized emission types.

* * * * *

(c) * * *

Wavelength band	Frequencies	Emission types authorized	Standards see § 97.307(f), paragraph:
LF:			
2200 m	Entire band	RTTY, data	(3).
2200 m	Entire band	Phone, image	(1), (2).
MF:			
630 m	Entire band	RTTY, data	(3).
630 m	Entire band	Phone, image	(1), (2).
* *	*	*	*

27. Section 97.313 is amended by adding paragraphs (k) and (l) to read as follows.

§ 97.313 Transmitter power standards.

* * * * *

(k) No station may transmit in the 135.7-137.8 kHz (2200 m) band with a transmitter power exceeding 1.5 kW PEP or a radiated power exceeding 1 W EIRP.

(l) No station may transmit in the 472-479 kHz (630 m) band with a transmitter power exceeding 500 W PEP or a radiated power exceeding 5 W EIRP, except that in Alaska, stations located within 800 kilometers of the Russian Federation may not transmit with a radiated power exceeding 1 W EIRP.

* * * * *

APPENDIX C

Final Regulatory Flexibility Certification

1. Final Regulatory Flexibility Certification. The Regulatory Flexibility Act of 1980, as amended (RFA)[1] requires that a regulatory flexibility analysis be prepared for rulemaking proceedings, unless the agency certifies that "the rule will not have a significant economic impact on a substantial number of small entities."[2] The RFA generally defines "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[3] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[4] 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).[5]

2. In this Report and Order, the Commission takes three actions that will cause a direct cost to regulated entities. First, the Commission requires that all commercial fishing vessels that operate radio buoys in the 1900-2000 kHz band be authorized under a ship radio station license. Based on the comments of ITM Marine in ET Docket No. 12-338, there are between 750 and 1000 active commercial fishing vessels that operate such radio buoys.[6] We expect that some of these fishing vessels are owned by small businesses that do not already have a ship radio station license. Because the total cost for a ship radio station license is $215, we find that the direct cost of this requirement will be far less than one percent of revenue for any future small business licensee.

3. Second, the Commission requires that oceanographic radars, which currently operate under experimental license authority, operate in accordance with the adopted Part 90 rules within five years of the effective date of this Report and Order. Based on our review of licenses in the Commission's Experimental Licensing System, the adopted rules will affect nine universities and one manufacturer. Based on information provided by the National Oceanic and Atmospheric Administration (NOAA), we believe that, in most cases, existing oceanographic radars can transition to the nearest allocated band without major hardware modification.[7] We note that only two of these universities are private institutions (Cornell University and San Francisco University) that meet the definition of small organization, *see*

[1] The RFA, *see* § 5 U.S.C. S 601 *et. seq.*, has been amended by the Contract With America Advancement Act of 1996, Pub. L. No. 104-121, 110 Stat. 847 (1996) (CWAAA). Title II of the CWAAA is the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA).

[2] 5 U.S.C. § 605(b).

[3] 5 U.S.C. § 601(6).

[4] 5 U.S.C. § 601(3) (incorporating by reference the definition of "small business concern" in Small Business Act, 15 U.S.C. S § 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."

[5] Small Business Act, § 15 U.S.C. S 632.

[6] *See Amendment of Parts 1, 2, 15, 74, 78, 87, 90, and 97 of the Commission's Rules Regarding Implementation of the Final Acts of the World Radiocommunication Conference (Geneva, 2007) (WRC-07), Other Allocation Issues, and Related Rule Updates,* ET Docket 12-338, Comments of Steve Beaver (March 4, 2013) at 1 ("We estimate that there are at least 500 active [high seas migratory species fishing] vessels, and possible 250-500 [] more in the USA, which are using radio buoys.").

[7] *See* National Oceanic and Atmospheric Administration, Summary of WRC-12 HF Radar Frequency Outcomes (Jan. 26, 2012) ("In most cases, transitioning to the nearest allocated band should not require major hardware modification"), http://www.ioos.noaa.gov/hfradar/summary_wrc_12outcomes.pdf.

U.S.C. § 601(4). We further note that there "are 1,600 private, nonprofit institutions nationwide,"[8] and the great majority of these are clearly small organizations. Therefore, we find that requiring oceanographic radars to operate under the adopted Part 90 rules will impact far less than one percent of private, nonprofit academic institutions that are small organizations. We also believe that the single licensee that is a manufacturer (CODAR Ocean Sensor, Ltd.) will be positively impacted because it has committed to "produce, sell, and support [oceanographic radars] that operate in all of the ITU allocated bands and conform to any local regulations."[9]

4. Third, the Commission reallocates the 156.7625-156.7875 MHz and 156.8125-156.8375 MHz bands from the maritime mobile service (MMS) to the mobile-satellite service, and requires that MMS operations in these bands cease as of August 26, 2019. There is a single licensee (BKEP Materials, LLC) authorized to operate three private coast stations in these bands. Based on our review of licenses in the Commission's Universal Licensing System, the Commission has issued 2770 licenses for private coast stations to operate in the 156-157.1 MHz band. We estimate that at least 1000 of these licensees are small entities. Therefore, we find that these reallocations will impact far less than one percent of the total number of small entities operating in the 156-157.1 MHz band.

5. Therefore, we certify that the requirements of this Report and Order will not have a significant economic impact on a substantial number of small entities. The Commission will send a copy of this Report and Order including this final certification, in a report to Congress pursuant to the Small Business Regulatory Enforcement Fairness Act of 1996, *see* 5 U.S.C. § 801(a)(1)(A). In addition, the Report and Order and this certification will be sent to the Chief Counsel for Advocacy of the Small Business Administration, and will be published in the Federal Register. *See* 5 U.S.C. § 605(b).

[8] *See* "Quick Facts About Private Colleges" by the National Association of Independent Colleges and Universities (http://www.naicu.edu/about/page/quick-facts-about-private-colleges#Institution).

[9] *See* "Outcome of the 2012 World Radiocommunication Conference: Oceanographic HF Radars Officially Recognized by ITU," March 2012, by CODAR Ocean Sensors (http://www.codar.com/news_03_2012_2.shtml).