



**6712-01**

**FEDERAL COMMUNICATIONS COMMISSION**

**47 CFR Parts 1, 2, 15, 90, 95, and 97**

**[ET Docket No. 15-26; FCC 17-94]**

**Permitting Radar Services in the 76-81 GHz Band**

**AGENCY:** Federal Communications Commission.

**ACTION:** Final rule.

**SUMMARY:** In this document, the Federal Communications Commission (Commission) amends its rules to permit vehicular radars and certain non-vehicular fixed and mobile radars used at airports to operate in the entire 76-81 GHz band on an interference-protected basis. Access to the entire 76-81 GHz band is intended to provide sufficient spectrum bandwidth to enable the deployment of wideband high-precision short-range vehicular radar (SRR) applications, such as blind spot detectors, that can enhance the safety of drivers and other road users, while continuing to allow the deployment of proven long-range vehicular radar (LRR) applications, such as adaptive cruise control. The amended rules also permit the deployment in airport air operations areas of fixed and mobile radars that detect foreign object debris (FOD) on runways, which could harm aircraft on take-off and landing, and aircraft-mounted radars that can help aircraft avoid colliding with equipment, buildings, and other aircraft while moving on airport grounds. In addition, the amended rules allow for the continued shared use of the 76-81 GHz band by other incumbent users, including amateur radio operators and the scientific research community.

**DATES:** *Effective date:* Effective [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER], except for § 15.37(l), which is effective

**[INSERT DATE ONE YEAR AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].**

*Applicability date:* Section 15.37(o) was applicable beginning July 13, 2017.

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**SUPPLEMENTARY INFORMATION:** This is a summary of the Commission's Report and Order, ET Docket No. 15-26, FCC 17-94, adopted July 13, 2017 and released July 14, 2017. The full text of this document is available for public inspection and copying during normal business hours in the FCC Reference Center (Room CY-A257), 445 12<sup>th</sup> Street, SW, Washington, DC 20554, or by downloading the text from the Commission's web site at

[http://transition.fcc.gov/Daily\\_Releases/Daily\\_Business/2017/db0714/FCC-17-94A1.pdf](http://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db0714/FCC-17-94A1.pdf).

Alternative formats are available for people with disabilities (Braille, large print, electronic files, audio format) by sending an email to [fcc504@fcc.gov](mailto:fcc504@fcc.gov) or calling the Commission's Consumer and Governmental Affairs Bureau at (202) 418-0530 (voice), (202) 418-0432 (TTY).

## **Synopsis**

### **I. INTRODUCTION**

1. On February 3, 2015, the Commission adopted a Notice of Proposed Rulemaking (NPRM) in this proceeding. 80 FR 12120, March 6, 2015. In the Report and Order, the Commission amended the United States Table of Frequency Allocations (U.S. Table) in § 2.106 and several related service rules to establish a comprehensive and consistent set of rules and policies for radar operations in the 76-81 GHz band. The following are the major actions that the Commission took to support the deployment in the 76-81 GHz band of advanced vehicular radar applications and certain non-vehicular fixed and mobile radar applications for use at airports:

- Allocated the 77.5-78 GHz band to the Radiolocation Service on a primary basis in the U.S. Table to provide a contiguous five gigahertz band at 76-81 GHz for radar operations.
- Allowed vehicular radars and certain non-vehicular fixed and mobile radars used at airports to operate in the entire 76-81 GHz band.
- Consolidated radar operations in the 76-81 GHz band under part 95 of the Commission's rules to be licensed-by-rule and protected from interference with the same technical parameters as currently specified for 76-77 GHz radars in part 15 of the rules.
- Restricted fixed radar operations to airport air operations areas to prevent such radars signals from illuminating public roadways and causing harmful interference to vehicular radar operations.
- Reduced the maximum equivalent isotropically radiated power (EIRP) of amateur and amateur satellite operations in the 76-81 GHz band to match that of radar operations in the 76-81 GHz band to reduce the potential for these amateur operations to cause harmful interference to radar operations in the band.

## II. DISCUSSION

2. In the Report and Order, the Commission amended parts 1, 2, 15, 90, 95, and 97 of its rules to facilitate the deployment in the 76-81 GHz band of advanced vehicular radar applications and certain fixed and mobile radars in airport air operations areas. These actions are described in greater detail below.

### A. Allocation Changes to the 77.5-78 GHz Band

3. As proposed in the NPRM, the Commission allocated the 77.5-78 GHz band to the Radiolocation Service (RLS) on a primary basis in the U.S. Table. This action made the entire 76-81 GHz band available for licensed radar applications on a primary basis nationwide

and brought the U.S. Table into agreement with the International Table of Frequency Allocations. In response to commenters' concerns about the potential for interference from amateur operations to vehicular radar operations in the 76-81 GHz band, the Commission changed the Amateur Service and Amateur Satellite Service allocations in the 77.5-78 GHz band of the U.S. Table from primary to secondary status to match the secondary Amateur Service and Amateur Satellite Service allocations in the remainder of the 76-81 GHz band. As secondary users in the 76-81 GHz band, amateurs will have an obligation to operate in a manner that minimizes the potential for harmful interference to licensed radar applications that will operate under the primary RLS allocation throughout the entire 76-81 GHz band and Radio Astronomy Service (RAS) stations in the 76-81 GHz band, and cannot claim protection from harmful interference from any primary service. If amateur radio operators cause any harmful interference, they will be required to provide an immediate remedy, up to and including terminating their operations. As an added protection against potential interference from amateur operations to vehicular radar operations in the 76-81 GHz band, the Commission amended the part 97 Amateur Radio Service rules to specify a maximum EIRP of 55 dBm (316 Watts) that Amateur Service and Amateur Satellite Service stations in the 76-81 GHz band may transmit, the same as the allowable vehicular radar peak EIRP limit.

4. Although the Commission determined that the addition of the primary RLS allocation in the 77.5-78 GHz band did not raise any new interference considerations for RAS operations in the 76-81 GHz band, because there is no distinction between RAS use of the 77.5-78 GHz band and the remainder of the 76-81 GHz band it upgraded the secondary RAS allocation in the 77.5-78 GHz band to primary status to match the RAS allocations in the 76-77.5 GHz/78-81 GHz bands. By making the RLS and RAS co-primary throughout the 76-81 GHz band, the Commission provided regulatory consistency between the two services and eliminated

the potential problem, in the event of harmful interference to the RAS due to vehicular radar operations, of determining protection rights in favor of addressing and mitigating the interference concern. However, since the Commission determined that addition of the primary RLS allocation in the 77.5-78 GHz band did not raise any new interference considerations that would justify upgrading the secondary Space Research Service (space-to-Earth) (SRS (space-to-Earth)) allocation in the 77.5-78 GHz band to primary status, the Commission maintained this service's current secondary status, consistent with the SRS (space-to-Earth) allocations in the remainder of the 76-81 GHz band. Given the size and scope of the automotive fleet in the United States as compared to the two RAS facilities that operate in the 76-81 GHz band, the Commission declined to adopt commenters proposals for an automatic or manual on/off switch and coordination zones in the vicinity of RAS observatories for vehicular radars that operate in the 76-81 GHz band.

**B. Consolidating Vehicular Radar Operations into the 76-81 GHz Band**

5. As part of the Commission's efforts to consolidate future vehicular radar operations into the 76-81 GHz band, the NPRM noted that there is little or no use of vehicular radars in the 16.2-17.7 GHz and 46.7-46.9 GHz bands, and sought comment on modifying the Commission's part 15 rules to no longer approve vehicular radar devices for operation in these bands. Since no commenters opposed this suggestion, the Commission deleted the references to vehicular radar operations in the 16.2-17.7 GHz and 46.7-46.9 GHz bands from the Commission's part 15 rules and ceased accepting applications for equipment certification of such devices effective upon the adoption of the Report and Order. It prohibited the continued manufacture, importation, marketing, sale, and installation for use in the United States of such equipment in the 16.2-17.7 GHz band under the sole existing equipment authorization, FCC ID No. L2C0004TR. However, it grandfathered, for the life of the equipment, any vehicular radars

that are already installed or in use under this authorization, thus allowing such systems to continue operating for the life of the vehicle or until the supply of existing equipment necessary for maintenance is exhausted.

6. As proposed in the NPRM, the Commission also phased out unlicensed wideband radars authorized under § 15.252 to operate in the 23.12-29 GHz and ultra-wideband (UWB) radars authorized under § 15.515 to operate in the 22-29 GHz band (collectively, “unlicensed 24 GHz wideband and UWB vehicular radars”). In response to commenters’ concerns that ceasing certification of new unlicensed 24 GHz wideband and UWB vehicular radars beginning 30 days after publication of the final rules in the Federal Register, as proposed in the NPRM, would be insufficiently short, the Commission decided it will not certify new unlicensed 24 GHz wideband and UWB vehicular radar equipment on or after one year from the date of publication of the Report and Order in the Federal Register. In response to commenters’ suggestions to, at a minimum, harmonize the phase-out of unlicensed 24 GHz wideband and UWB vehicular radars with the phase-out adopted for 24 GHz vehicular radars in the European Union (EU), the Commission decided to allow the manufacture, importation, marketing, sale, and installation of, as well as Class II permissive changes for, previously certified unlicensed 24 GHz wideband and UWB vehicular radar devices until January 1, 2022, consistent with the EU transition plan for 24 GHz vehicular radars. After January 1, 2022, the manufacture, importation, marketing, sale, and installation of, and Class II permissive changes for, these devices for use in the United States, with one limited exception regarding sale and installation for the repair/replacement of defective, damaged, or malfunctioning equipment, will not be permitted.

7. However, as proposed in the NPRM, the Commission decided to permit unlicensed 24 GHz wideband and UWB vehicular radars that are already installed or in use by January 1, 2022 to continue to operate in the vehicle. In that regard, the Commission provided a

narrow exception to the phase-out requirements to permit, for the life of the vehicle, the continued sale and installation of unlicensed 24 GHz wideband and UWB radar devices for the exclusive purpose of repairing or replacing defective, damaged, or potentially malfunctioning equipment installed on or before January 1, 2022. This exception is available only when it is not possible to repair or replace the radar equipment designed to operate in the 24 GHz band with radar equipment designed to operate in the 76-81 GHz band, and is limited to the repair and replacement of unlicensed 24 GHz wideband and UWB vehicular radar equipment that has been certified for operation in the 24 GHz band. The Commission expects manufacturers to draw on existing stock of equipment that has been approved before January 1, 2022, but it will address requests for additional relief (e.g., manufacture, importation, or product redesign) on a case-by-case basis.

8. The Commission clarified that the proposal with regard to phasing out use of the 22-29 GHz band for wideband and UWB vehicular radar operations that operate under §§ 15.252 and 15.515 of the rules was not intended to apply to unlicensed radars that operate at 24.075-24.175 GHz and 24.0-24.25 GHz under §§ 15.245 and 15.249 of the rules, respectively. These rules, which are not being modified, authorize a wide variety of devices that include, but are not limited to, vehicular-specific radars. As such, the Commission will continue to certify radars that operate under these rules and they can continue to be used in vehicular applications.

### **C. Fixed and Other Mobile Radar Operations in the 76-81 GHz Band**

9. Fixed Radars Operations. The NPRM proposed to adopt rules that would permit fixed infrastructure radar applications in all or part of the 76-81 GHz band if there was sufficient demand for such uses and studies could support sharing between vehicular and non-vehicular radar applications in the band. Although several commenters expressed interest in deploying fixed radar applications in the 76-81 GHz band at any location, there was substantial

disagreement as to whether such applications could successfully coexist with vehicular radars. Many commenters opposed allowing fixed radar operations in the 76-81 GHz band, citing potential interference that could compromise the safe operation of vehicular radar systems. Although commenters asserted that they expected fixed radar manufacturers to design equipment that is technically identical to vehicular radars, the Commission stated that it could not guarantee that this would happen in practice since it neither proposed nor developed a record for the Commission to mandate device specifications and guidelines. Therefore, to prevent non-vehicular fixed radar applications outside of airport locations from causing harmful interference to vehicular radars and provide a more certain environment for the successful migration of vehicular radars to the 76-81 GHz band, the Commission decided to maintain the existing prohibition on non-vehicular fixed radar operations outside of airport air operations areas.

10. However, the Commission recognized the possibility that there may be situations in which fixed radars might be compatible with vehicular radars in the 76-81 GHz band, and did not foreclose exploration of such scenarios. The Commission acknowledged that, under careful coordination, it might be possible for fixed radars to operate in the band at carefully selected locations without causing harmful interference to vehicular radars, but noted that there was insufficient information in the record to develop the specific criteria for a successful coordination process. The Commission stated that it is open to the possibility that specific, limited fixed uses of 76-81 GHz radars outside of airport locations may be possible so long as it can be convinced that such use would not cause harmful interference to vehicular radar operations in the band.

11. Airport Radar Operations. Prior to adoption of the Report and Order, unlicensed FOD detection radar operations were operating as fixed devices in the 76-77 GHz band under part 15 of the rules, and could be authorized as either fixed or mobile devices on a licensed basis under the Commission's part 90 rules in the 78-81 GHz band, in airport air operations areas only.



As proposed in the NPRM and supported by the record, the Commission decided to permit fixed and mobile FOD detection radar operations throughout the entire 76-81 GHz band on airport grounds only, under the same technical requirements as those provided for such operations in the 76-77 GHz band in part 15 of the Commission's rules. To minimize the potential for harmful interference to vehicular radar operations from expanded FOD detection radar operations, the Commission maintained the limitation that FOD detection radar operations occur only in airport locations that avoid illumination of public roadways (i.e., in airport air operations areas). This restriction will provide geographic separation between airport-based radar operations and vehicular radar operations on public roads, avoiding any possibility of harmful interference to vehicular radar operations in the 76-81 GHz band. As proposed in the NPRM and supported by the record, the Commission grandfathered for the life of the equipment, or until the supply of existing equipment necessary for maintenance is exhausted, any FOD detection radars that are already installed or in use. If entities want to operate existing FOD detection radars in the 77-78 GHz band, which has not previously been available for FOD detection radar use, such equipment would first have to be certified under the Commission's equipment authorization procedures to operate in the 77-78 GHz band under the part 95 rules.

12. The Commission also permitted the use of aircraft-mounted radar applications, referred to as "wingtip radars," in the entire 76-81 GHz band with the same technical rules as FOD detection radars, as long as they are used in airport air operations areas while aircraft (including helicopters) are on the ground. These radars will be used to prevent and mitigate the severity of aircraft wingtip collisions while planes move between airport gates and runways. The Commission agreed with commenters that aircraft-mounted radar applications can help protect aircraft during taxiing and ground maneuvering, improve airport operations, and provide

significant benefits to the airline industry and traveling public, while still protecting vehicular radars from harmful interference.

13. Based on the potential for airborne radar operations to interfere with RAS operations, the Commission decided not to permit the use of aircraft-mounted radars when the aircraft (or helicopter) is airborne. To provide greater assurance that parties will comply with the ground-based restriction for aircraft-mounted radars, the Commission also decided to require that aircraft-mounted radars include an automatic mechanism that discontinues all 76-81 GHz radar functions while the aircraft is airborne, which no commenters objected to, and one commenter indicated is technically feasible.

**D. Radar Operations in the 76-81 GHz Band Under Part 95 of the Commission's Rules**

14. As proposed in the NPRM and supported by the majority of commenters, the Commission consolidated 76-81 GHz radar operations, except for Level Probing Radars (LPRs), under part 95 of the Commission's rules to be licensed-by-rule and protected from interference. Radar applications operating in the 76-81 GHz range will now be governed by Subpart M, The 76-81 GHz Radar Service, in part 95 of the rules. LPRs, which are authorized by § 15.256 to operate in a variety of frequency ranges, including the 75-85 GHz band, and can coexist with vehicular radar operations, will remain authorized to operate on an unlicensed basis.

15. A licensed-by-rule approach under part 95 will provide a level of interference protection to 76-81 GHz radar operations that the Commission's part 15 rules cannot provide since unlicensed users must accept interference from licensed and unlicensed users, whereas under part 95, primary licensed users are protected from interference from secondary and unlicensed users. A licensed-by-rule approach will also reduce the application and licensing burdens associated with authorizing radar operations under an individual license basis, and create

time and cost efficiencies for deployment of these important services. Given that FOD detection radar operations are restricted to airport air operations areas that do not have public vehicle access, and considering the narrow beamwidths, highly directional antennas, and large signal propagation losses at relatively short distances of radar operations in the 76-81 GHz band, the Commission saw no need to require licensed FOD detection radars to coordinate with other licensed services or exclude FOD detection radars from part 95 regulation.

16. Technical Rules. As proposed in the NPRM, the Commission adopted technical rules for the newly expanded radar band that mirrored those currently provided for unlicensed vehicular radars and FOD detection radars in the 76-77 GHz band under the part 15 rules. Specifically, the Commission adopted the same average (50 dBm) and peak (55 dBm) EIRP emissions limits for radar applications in the entire 76-81 GHz band as is currently specified in the part 15 rules for unlicensed vehicular radars in the 76-77 GHz band. The Commission also adopted other technical rules for the newly expanded radar band that mirrored those currently provided under part 15, including unwanted emissions limits, equipment certification, and radiofrequency exposure evaluation. Consistent with the NPRM, the new part 95 rules do not specify distinct spectrum blocks in the 76-81 GHz band for particular radar operations such as LRR and SRR, or FOD detection and aircraft-mounted radars. Instead, the Commission chose to rely on market forces and standardization processes to drive radars use of the band in accordance with application needs and the state of the technology, and decided that interested parties can determine whether particular segments of the 76-81 GHz band should be designated exclusively for LRR or SRR applications, or for FOD detection or aircraft-mounted radars. Neither LRR applications nor aircraft-mounted radars are restricted to operating within a one-gigahertz block of spectrum within the 76-81 GHz band, as suggested by some commenters.

17. Vehicular and FOD detection radars currently certified under part 15 to operate in the 76-77 GHz band need not be recertified under part 95 to continue to operate in the band. These devices may continue their operations, but will now do so on a licensed-by-rule basis and be entitled to interference protection from amateur operations in the 76-81 GHz band. Any changes for such previously certified devices will need to comply with the applicable part 95 rules.

### **III. PROCEDURAL MATTERS**

#### **A. Paperwork Reduction Act Analysis**

18. This document does not contain any new or modified information collections subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13.

#### **B. Congressional Review Act**

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

#### **C. Final Regulatory Flexibility Act**

20. The Regulatory Flexibility Act of 1980 (RFA) requires that an agency prepare a regulatory flexibility analysis for notice and comment rulemakings, unless the agency certifies that “the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities.” Accordingly, the Commission has prepared a Final Regulatory Flexibility Analysis (FRFA), set forth in Appendix B of the Report and Order concerning the possible impact of the rule changes.

### **IV. ORDERING CLAUSES**

21. Accordingly, IT IS ORDERED that pursuant to sections 1, 2, 4(i), 301, 302(a), and 303(f) of the Communications Act of 1934, 47 U.S.C. 151, 152, 154(i), 301, 302(a), and

303(f), the Report and Order in ET Docket No. 15-26 is hereby adopted.

22. IT IS FURTHER ORDERED that parts 1, 2, 15, 90, 95, and 97 of the Commission's rules, 47 CFR parts 1, 2, 15, 90, 95, and 97 ARE AMENDED, effective **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**, except as otherwise specified.

**List of Subjects**

47 CFR Parts 1 and 2

Radio, Telecommunications.

47 CFR Parts 15, 90, 95, and 97

Communications equipment, Radar, Radio.

FEDERAL COMMUNICATIONS COMMISSION.

Katura Jackson,  
Federal Register Liaison Officer,  
Office of the Secretary.

**Final Rules**

For the reasons discussed in the preamble, the Federal Communications Commission amends 47 CFR parts 1, 2, 15, 90, 95, and 97 as follows:

**PART 1 – PRACTICE AND PROCEDURE**

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

AUTHORITY: 47 U.S.C. 151, 154(i), 154(j), 155, 157, 160, 201, 225, 227, 303(r), 309, 332, 1403, 1404, 1451, 1452, and 1455.

2. Amend § 1.1307 by adding an entry for “76-81 GHz Radar Service (part 95)” above the entry for “Amateur Radio Service (part 97)” in Table 1 in paragraph (b)(1) and revising paragraphs (b)(2)(i) and (ii) to read as follows:

**§ 1.1307 Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.**

\* \* \* \* \*

(b) \* \* \*

(1) \* \* \*

Table 1 – Transmitters, Facilities and Operations Subject to Routine Environmental Evaluation

Service (title 47 CFR rule part)	Evaluation required if:
* * * * *	
76-81 GHz Radar Service (part 95)	All included.
* * * * *	

(2)(i) Mobile and portable transmitting devices that operate in the Commercial Mobile Radio Services pursuant to part 20 of this chapter; the Cellular Radiotelephone Service pursuant to part 22 of this chapter; the Personal Communications Services (PCS) pursuant to part 24 of this chapter; the Satellite Communications Services pursuant to part 25 of this chapter; the

Miscellaneous Wireless Communications Services pursuant to part 27 of this chapter; the Upper Microwave Flexible User Service pursuant to part 30 of this chapter; the Maritime Services (ship earth stations only) pursuant to part 80 of this chapter; the Specialized Mobile Radio Service, the 4.9 GHz Band Service, and the 3650 MHz Wireless Broadband Service pursuant to part 90 of this chapter; the Wireless Medical Telemetry Service (WMTS), the Medical Device Radiocommunication Service (MedRadio), and the 76-81 GHz Band Radar Service pursuant to part 95 of this chapter; and the Citizens Broadband Radio Service pursuant to part 96 of this chapter are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use, as specified in §§ 2.1091 and 2.1093 of this chapter.

(ii) Unlicensed PCS, unlicensed NII, and millimeter-wave devices are also subject to routine environmental evaluation for RF exposure prior to equipment authorization or use, as specified in §§ 15.255(g), 15.257(g), 15.319(i), and 15.407(f) of this chapter.

\* \* \* \* \*

## **PART 2 – FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS;**

### **GENERAL RULES AND REGULATIONS**

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

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

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

- a. Revise page 62.
- b. Under “International Footnotes,” add, in numerical order, footnote 5.559B.

The revision and addition read as follows:

#### **§ 2.106 Table of Frequency Allocations.**

\* \* \* \* \*

<p>76-77.5  RADIO ASTRONOMY  RADIOLOCATION  Amateur  Amateur-satellite  Space research (space-to-Earth)</p>	<p>76-81  RADIO ASTRONOMY  RADIOLOCATION  Space research (space-to-Earth)</p>	<p>76-77  RADIO ASTRONOMY  RADIOLOCATION  Amateur  Space research (space-to-Earth)  US342</p> <p>77-81  RADIO ASTRONOMY  RADIOLOCATION  Amateur  Amateur-satellite  Space research (space-to-Earth)</p>	<p>RF Devices (15)  Personal Radio (95)  Amateur Radio (97)</p>
<p>5.149  77.5-78  AMATEUR  AMATEUR-SATELLITE  RADIOLOCATON 5.559B  Radio astronomy  Space research (space-to-Earth)</p>			
<p>5.149  78-79  RADIOLOCATION  Amateur  Amateur-satellite  Radio astronomy  Space research (space-to-Earth)</p>			
<p>5.149 5.560  79-81  RADIO ASTRONOMY  RADIOLOCATION  Amateur  Amateur-satellite  Space research (space-to-Earth)</p>	<p>5.560 US342</p>	<p>5.560 US342</p>	
<p>5.149  81-84  FIXED 5.338A  FIXED-SATELLITE (Earth-to-space)  MOBILE  MOBILE-SATELLITE (Earth-to-space)  RADIO ASTRONOMY  Space research (space-to-Earth)</p>	<p>81-84  FIXED  FIXED-SATELLITE (Earth-to-space) US297  MOBILE  MOBILE-SATELLITE (Earth-to-space)  RADIO ASTRONOMY  Space research (space-to-Earth)</p>		<p>RF Devices (15)  Fixed Microwave (101)</p>
<p>5.149 5.561A  84-86  FIXED 5.338A  FIXED-SATELLITE (Earth-to-space) 5.561B  MOBILE  RADIO ASTRONOMY</p>	<p>US161 US342 US389  84-86  FIXED  FIXED-SATELLITE (Earth-to-space)  MOBILE  RADIO ASTRONOMY</p>		
<p>5.149</p>	<p>US161 US342 US389</p>		



\* \* \* \* \*

## INTERNATIONAL FOOTNOTES

\* \* \* \* \*

5.559B The use of the frequency band 77.5-78 GHz by the radiolocation service shall be limited to short-range radar for ground-based applications, including automotive radars. The technical characteristics of these radars are provided in the most recent version of Recommendation ITU-R M.2057. The provisions of No. 4.10 do not apply. (WRC-15)

\* \* \* \* \*

5. Amend § 2.1091 by revising paragraphs (c)(1) introductory text and (c)(2) to read as follows:

**§ 2.1091 Radiofrequency radiation exposure evaluation: mobile devices.**

\* \* \* \* \*

(c)(1) Mobile devices that operate in the Commercial Mobile Radio Services pursuant to part 20 of this chapter; the Cellular Radiotelephone Service pursuant to part 22 of this chapter; the Personal Communications Services pursuant to part 24 of this chapter; the Satellite Communications Services pursuant to part 25 of this chapter; the Miscellaneous Wireless Communications Services pursuant to part 27 of this chapter; the Upper Microwave Flexible Use Service pursuant to part 30 of this chapter; the Maritime Services (ship earth station devices only) pursuant to part 80 of this chapter; the Specialized Mobile Radio Service, and the 3650 MHz Wireless Broadband Service pursuant to part 90 of this chapter; the 76-81 GHz Band Radar Service pursuant to part 95 of this chapter; and the Citizens Broadband Radio Service pursuant to part 96 of this chapter are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if:

\* \* \* \* \*

(2) Unlicensed personal communications service devices, unlicensed millimeter-wave devices, and unlicensed NII devices authorized under §§ 15.255(g), 15.257(g), 15.319(i), and 15.407(f) of this chapter are also subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if their ERP is 3 watts or more or if they meet the definition of a portable device as specified in § 2.1093(b) requiring evaluation under the provisions of that section.

\* \* \* \* \*

6. Amend § 2.1093 by revising paragraph (c)(1) to read as follows:

**§ 2.1093 Radiofrequency radiation exposure evaluation: portable devices.**

\* \* \* \* \*

(c)(1) Portable devices that operate in the Cellular Radiotelephone Service pursuant to part 22 of this chapter; the Personal Communications Service (PCS) pursuant to part 24 of this chapter; the Satellite Communications Services pursuant to part 25 of this chapter; the Miscellaneous Wireless Communications Services pursuant to part 27 of this chapter; the Upper Microwave Flexible Use Service pursuant to part 30 of this chapter; the Maritime Services (ship earth station devices only) pursuant to part 80 of this chapter; the Specialized Mobile Radio Service, the 4.9 GHz Band Service, and the 3650 MHz Wireless Broadband Service pursuant to part 90 of this chapter; the Wireless Medical Telemetry Service (WMTS), the Medical Device Radiocommunication Service (MedRadio), and the 76-81 GHz Band Radar Service pursuant to subparts H, I, and M of part 95 of this chapter, respectively; unlicensed personal communication service, unlicensed NII devices and millimeter-wave devices authorized under §§ 15.255(g), 15.257(g), 15.319(i), and 15.407(f) of this chapter; and the Citizens Broadband Radio Service

pursuant to part 96 of this chapter are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use.

\* \* \* \* \*

## **PART 15 – RADIO FREQUENCY DEVICES**

7. The authority citation for part 15 continues to read as follows:

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

8. Amend § 15.37 by adding paragraphs (l) through (p) to read as follows:

### **§ 15.37 Transition provisions for compliance with the rules.**

\* \* \* \* \*

(l) The certification of wideband vehicular radars designed to operate in the 23.12-29 GHz band under § 15.252 and ultra-wideband vehicular radars designed to operate in the 22-29 GHz band under § 15.515 shall not be permitted on or after **[INSERT DATE ONE YEAR AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

(m) The manufacture, importation, marketing, sale, and installation of wideband or ultra-wideband vehicular radars that are designed to operate in the 23.12-29 GHz band under § 15.252 and/or in the 22-29 GHz band under § 15.515 shall not be permitted after January 1, 2022.

Notwithstanding the foregoing, sale and installation of such radars is permitted, for the life of the vehicle, when the following conditions have been met:

(1) The sale and installation is for the exclusive purpose of repairing or replacing defective, damaged, or potentially malfunctioning radars that are designed to operate in the 23.12-29 GHz band under § 15.252 and/or in the 22-29 GHz band under § 15.515;

(2) The equipment being repaired or replaced has been installed in the vehicle on or before January 1, 2022; and

(3) It is not possible to replace the vehicular radar equipment designed to operate in the 23.12-29 GHz and/or 22-29 GHz bands with vehicular radar equipment designed to operate in the 76-81 GHz band.

(n) Wideband or ultra-wideband vehicular radars operating in the 23.12-29 GHz band under § 15.252 and/or in the 22-29 GHz band under § 15.515 that are already installed or in use may continue to operate in accordance with their previously obtained certification. Class II permissive changes for such equipment shall not be permitted after January 1, 2022.

(o) Applicable July 13, 2017, the certification, manufacture, importation, marketing, sale, and installation of field disturbance sensors that are designed to operate in the 16.2-17.7 GHz and 46.7-46.9 GHz bands shall not be permitted. Field disturbance sensors already installed or in use in the 16.2-17.7 GHz band may continue to operate in accordance with their previously obtained certification. Class II permissive changes shall not be permitted for such equipment.

(p) Effective **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**, the certification under this part of vehicular radars and fixed radar systems used in airport air operations areas that are designed to operate in the 76-77 GHz band shall not be permitted. Vehicular radars and fixed radar systems used in airport air operations areas operating in the 76-77 GHz band that are already installed or in use may continue to operate in accordance with their previously obtained certification. Any future certification, or any change of already issued certification and operations of such equipment, shall be under part 95, subpart M, of this chapter.

9. Amend § 15.252 by revising the section heading and paragraphs (a) introductory text and (a)(1), removing paragraph (b)(1), redesignating paragraphs (b)(2) through (6) as paragraphs (b)(1) through (5), revising newly redesignated paragraphs (b)(2) and (3), and adding paragraph

(d) to read as follows:

**§ 15.252 Operation of wideband vehicular radar systems within the band 23.12-29.0 GHz.**

(a) Operation under this section is limited to field disturbance sensors that are mounted in terrestrial transportation vehicles. Terrestrial use is limited to earth surface-based, non-aviation applications.

(1) The -10 dB bandwidth of the fundamental emissions shall be located within the 23.12-29.0 GHz band, exclusive of the 23.6-24.0 GHz restricted band, as appropriate, under all conditions of operation including the effects from stepped frequency, frequency hopping or other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage.

\* \* \* \* \*

(b) \* \* \*

(2) In addition to the radiated emissions limits specified in the table in paragraph (b)(1) of this section, transmitters operating under the provisions of this section shall not exceed the following RMS average EIRP limits when measured using a resolution bandwidth of no less than 1 kHz:

<b>Frequency in MHz</b>	<b>EIRP in dBm</b>
1164-1240	-85.3
1559-1610	-85.3

(3) There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs and this 50 MHz bandwidth must be contained within the 24.05-29.0 GHz band. The peak EIRP limit is  $20 \log(\text{RBW}/50)$  dBm where RBW is the resolution bandwidth in MHz employed by the measurement instrument. RBW shall not be lower than 1 MHz or greater than 50 MHz. Further, RBW shall

not be greater than the -10 dB bandwidth of the device under test. For transmitters that employ frequency hopping, stepped frequency or similar modulation types, measurement of the -10 dB minimum bandwidth specified in this paragraph shall be made with the frequency hop or step function disabled and with the transmitter operating continuously at a fundamental frequency. The video bandwidth of the measurement instrument shall not be less than RBW. The limit on peak emissions applies to the 50 MHz bandwidth centered on the frequency at which the highest level radiated emission occurs. If RBW is greater than 3 MHz, the application for certification shall contain a detailed description of the test procedure, the instrumentation employed in the testing, and the calibration of the test setup.

\* \* \* \* \*

(d) Wideband vehicular radar systems operating in the 23.12-29.0 GHz band are subject to the transition provisions of § 15.37(l) through (n).

**§ 15.253 [Removed and Reserved]**

10. Remove and reserve § 15.253.

11. Amend § 15.515 by adding paragraph (h) to read as follows:

**§ 15.515 Technical requirements for vehicular radar systems.**

\* \* \* \* \*

(h) UWB vehicular systems operating in the 22-29 GHz band are subject to the transition provisions of § 15.37(l) through (n).

**PART 90 – PRIVATE LAND MOBILE RADIO SERVICES**

12. 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.

**§ 90.103 [Amended]**

13. Amend § 90.103 by removing the entry “78,000-81,000” in the table in paragraph (b).

**PART 95 – PERSONAL RADIO SERVICES**

14. The authority citation for part 95 continues to read as follows:

AUTHORITY: 47 U.S.C. 154, 301, 302(a), 303, and 307(e).

15. Revise § 95.347 to read as follows:

**§ 95.347 Automatic control.**

Operation of Personal Radio Services stations under automatic control is prohibited, unless otherwise allowed for a particular Personal Radio Service by rules in the subpart governing that specific service. See, e.g., §§ 95.1747, 95.2347, 95.2547, 95.3347.

16. Add subpart M, consisting of §§ 95.3301 through 95.3385, to read as follows:

**Subpart M – The 76-81 GHz Band Radar Service**

ADMINISTRATIVE RULES

Sec.

95.3301 Scope.

95.3303 Definitions, the 76-81 GHz Band Radar Service.

95.3305 Radar operator eligibility in the 76-81 GHz Band.

OPERATING RULES

95.3331 Permissible 76-81 GHz Band Radar Service uses.

95.3333 Airborne use of 76-81 GHz Band Radar Service is prohibited.

95.3347 76-81 GHz Band Radar Service automatic control.

TECHNICAL RULES

95.3361 Certification.

95.3367 76-81 GHz Band Radar Service radiated power limits.

95.3379 76-81 GHz Band Radar Service unwanted emissions limits.

95.3385 76-81 GHz Band Radar Service RF exposure evaluation.

## **Subpart M – The 76-81 GHz Band Radar Service**

### **ADMINISTRATIVE RULES**

#### **§ 95.3301 Scope.**

This subpart sets out the regulations that apply to radar systems operating in the 76-81 GHz band. This subpart does not apply to Level Probing Radars that operate under part 15 of this title.

#### **§ 95.3303 Definitions, the 76-81 GHz Band Radar Service.**

- (a) Air operations area. See § 87.5 of this chapter.
- (b) Field disturbance sensor. See § 15.5(l) of this chapter.
- (c) Foreign object debris (FOD) detection radar. A radar device designed to detect foreign object debris in airport air operations areas and to monitor aircraft as well as service vehicles on taxiways, and other airport vehicle service areas that have no public vehicle access.
- (d) Radar. See § 2.1(c) of this chapter.

#### **§ 95.3305 Radar operator eligibility in the 76-81 GHz Band.**

Subject to the requirements of §§ 95.305 and 95.307, any person is eligible to operate a radar in the 76-81 GHz band without an individual license; such operation must comply with all applicable rules in this subpart.

### **OPERATING RULES**

#### **§ 95.3331 Permissible 76-81 GHz Band Radar Service uses.**

Radar systems operating in the 76-81 GHz band may operate as vehicular radars, or as fixed or mobile radars in airport air operations areas, including but not limited to FOD detection radars and aircraft-mounted radars for ground use only.



**§ 95.3333 Airborne use of 76-81 GHz Band Radar Service is prohibited.**

Notwithstanding the provisions of § 95.3331, 76-81 GHz Band Radar Service is prohibited aboard aircraft in flight. Aircraft-mounted radars shall be equipped with a mechanism that will prevent operations once the aircraft becomes airborne.

**§ 95.3347 76-81 GHz Band Radar Service automatic control.**

Notwithstanding the provisions of § 95.347, 76-81 GHz Band Radar Service operations may be conducted under manual or automatic control.

**TECHNICAL RULES**

**§ 95.3361 Certification.**

Radar equipment operating in the 76-81 GHz band shall be certificated in accordance with this subpart and subpart J of part 2 of this chapter.

**§ 95.3367 76-81 GHz Band Radar Service radiated power limits.**

The fundamental radiated emission limits within the 76-81 GHz band are expressed in terms of Equivalent Isotropically Radiated Power (EIRP) and are as follows:

(a) The maximum power (EIRP) within the 76-81 GHz band shall not exceed 50 dBm based on measurements employing a power averaging detector with a 1 MHz Resolution Bandwidth (RBW).

(b) The maximum peak power (EIRP) within the 76-81 GHz band shall not exceed 55 dBm based on measurements employing a peak detector with a 1 MHz RBW.

**§ 95.3379 76-81 GHz Band Radar Service unwanted emissions limits.**

(a) The power density of any emissions outside the 76-81 GHz band shall consist solely of spurious emissions and shall not exceed the following:

(1) Radiated emissions below 40 GHz shall not exceed the field strength as shown in the

following emissions table.

<b>Frequency (MHz)</b>	<b>Field strength (microvolts/meter)</b>	<b>Measurement distance (meters)</b>
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

(i) In the emissions table in paragraph (a)(1) of this section, the tighter limit applies at the band edges.

(ii) The limits in the table in paragraph (a)(1) of this section are based on the frequency of the unwanted emissions and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

(iii) The emissions limits shown in the table in paragraph (a)(1) of this section are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9.0-90.0 kHz, 110.0-490.0 kHz, and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector with a 1 MHz RBW.

(2) The power density of radiated emissions outside the 76-81 GHz band above 40.0 GHz shall not exceed the following, based on measurements employing an average detector with a 1 MHz RBW:

(i) For radiated emissions outside the 76-81 GHz band between 40 GHz and 200 GHz from field disturbance sensors and radar systems operating in the 76-81 GHz band: 600 pW/cm<sup>2</sup> at a

distance of 3 meters from the exterior surface of the radiating structure.

(ii) For radiated emissions above 200 GHz from field disturbance sensors and radar systems operating in the 76-81 GHz band: 1000 pW/cm<sup>2</sup> at a distance of 3 meters from the exterior surface of the radiating structure.

(3) For field disturbance sensors and radar systems operating in the 76-81 GHz band, the spectrum shall be investigated up to 231.0 GHz.

(b) Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation. Equipment is presumed to operate over the temperature range -20 to +50 degrees Celsius with an input voltage variation of 85% to 115% of rated input voltage, unless justification is presented to demonstrate otherwise.

**§ 95.3385 76-81 GHz Band Radar Service RF exposure evaluation.**

Regardless of the power density levels permitted under this subpart, devices operating under the provisions of this subpart are subject to the radiofrequency radiation exposure requirements specified in §§ 1.1307(b), 2.1091, and 2.1093 of this chapter, as appropriate. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

**PART 97 – AMATEUR RADIO SERVICE**

17. 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.

18. Amend § 97.303 by revising paragraphs (c) and (f) and removing and reserving paragraph (s) to read as follows:

**§ 97.303 Frequency sharing requirements.**

\* \* \* \* \*

(c) Amateur stations transmitting in the 76-81 GHz segment, the 136-141 GHz segment, or the 241-248 GHz segment must not cause harmful interference to, and must accept interference from, stations authorized by the United States Government, the FCC, or other nations in the radiolocation service.

\* \* \* \* \*

(f) Amateur stations transmitting in the following segments must not cause harmful interference to radio astronomy stations: 3.332-3.339 GHz, 3.3458-3.3525 GHz, 76-81 GHz, 136-141 GHz, 241-248 GHz, 275-323 GHz, 327-371 GHz, 388-424 GHz, 426-442 GHz, 453-510 GHz, 623-711 GHz, 795-909 GHz, or 926-945 GHz. In addition, amateur stations transmitting in the following segments must not cause harmful interference to stations in the Earth exploration-satellite service (passive) or the space research service (passive): 275-277 GHz, 294-306 GHz, 316-334 GHz, 342-349 GHz, 363-365 GHz, 371-389 GHz, 416-434 GHz, 442-444 GHz, 496-506 GHz, 546-568 GHz, 624-629 GHz, 634-654 GHz, 659-661 GHz, 684-692 GHz, 730-732 GHz, 851-853 GHz, or 951-956 GHz.

\* \* \* \* \*

(s) [Reserved]

\* \* \* \* \*

19. Amend § 97.313 by adding paragraph (m) to read as follows:

**§ 97.313 Transmitter power standards.**

\* \* \* \* \*

(m) No station may transmit with a peak equivalent isotropically radiated power (EIRP) exceeding 316 W in the 76-81 GHz (4 mm) band.

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