

11.7-12.2 GHz (space-to-Earth)

14.0-14.5 GHz (Earth-to-space)

VMESs shall be authorized as set forth in § 25.226 of this chapter.

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10. Section 25.203 is amended by revising paragraphs (d) and (k) and the introductory language in paragraph (c) to read as follows:

§ 25.203 Choice of sites and frequencies.

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(c) Prior to the filing of its application, an applicant for operation of an earth station, other than an ESV or a VMES, shall coordinate the proposed frequency usage with existing terrestrial users and with applicants for terrestrial station authorizations with previously filed applications in accordance with the following procedure:

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(d) An applicant for operation of an earth station, other than an ESV or a VMES, shall also ascertain whether the great circle coordination distance contours and rain scatter coordination distance contours, computed for those values of parameters indicated in § 25.251 (Appendix 7 of the ITU RR) for international coordination, cross the boundaries of another Administration. In this case, the applicant shall furnish the Commission copies of these contours on maps drawn to appropriate scale for use by the Commission in effecting coordination of the proposed earth station with the Administration(s) affected.

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(k) An applicant for operation of an earth station, other than an ESV or a VMES, that will operate with a geostationary satellite or non-geostationary satellite in a shared frequency band in which the non-geostationary system is (or is proposed to be) licensed for feeder links, shall demonstrate in its applications that its proposed earth station will not cause unacceptable interference to any other satellite network that is authorized to operate in the same frequency band, or certify that the operations of its earth station shall conform to established coordination agreements between the operator(s) of the space station(s) with which the earth station is to communicate and the operator(s) of any other space station licensed to use the band.

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11. Section 25.204 is amended by adding paragraph (j) to read as follows:

§ 25.204 Power limits.

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(j) Within 125 km of the Tracking and Data Relay System Satellite (TDRSS) sites identified in § 25.226(c) of this chapter, VMES transmissions in the 14.0-14.2 GHz (Earth-to-space) band shall not

exceed an EIRP spectral density towards the horizon of 12.5 dBW/MHz, and shall not exceed an EIRP towards the horizon of 16.3 dBW.

12. Section 25.205 is amended by adding paragraph (c) to read as follows:

§ 25.205 Minimum angle of antenna elevation.

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(c) VMESs making a special showing requesting angles of elevation less than 5° measured from the horizontal plane to the direction of maximum radiation pursuant to (a) of this section must still meet the EIRP and EIRP density towards the horizon limits contained in § 25.204(j) of this chapter.

13. Section 25.209(f) is amended to read as follows:

§ 25.209 Antenna performance standards.

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(f) An earth station with an antenna not conforming to the standards of paragraphs (a) and (b) of this section will be authorized only if the applicant meets its burden of demonstrating that its antenna will not cause unacceptable interference. For ESVs in the C-band, this demonstration must comply with the procedures set forth in § 25.221. For ESVs in the Ku-band, this demonstration must comply with the procedures set forth in § 25.222. For VMES, this demonstration shall comply with the procedures set forth in § 25.226. For feeder-link earth stations in the 17/24 GHz BSS, this demonstration must comply with the procedures set forth in § 25.223. For other FSS earth stations, this demonstration must comply with the procedures set forth in §§ 25.218 or 25.220. In any case, the Commission will impose appropriate terms and conditions in its authorization of such facilities and operations.

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14. Section 25.218 is amended by modifying paragraph (a)(1) to read as follows:

§ 25.218 Off-Axis EIRP envelope for FSS earth station operators.

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(a)(1) ESV and VMES applications

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15. Section 25.220 is amended by amending the introductory language to paragraph (a)(1) to read as follows:

§ 25.220 Non-conforming transmit/receive earth station operations.

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(a)(1) This section applies to earth station applications other than ESV, VMES and 17/24 GHz BSS feeder link applications in which the proposed earth station operations do not fall within the applicable off-axis EIRP envelope specified in Section 25.218 of this Chapter.

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16. Part 25 is amended by adding new Section 25.226 to read as follows:

§ 25.226 Blanket Licensing provisions for domestic, U.S. Vehicle-Mounted Earth Stations (VMESs) receiving in the 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), and 11.7-12.2 GHz (space-to-Earth) frequency bands and transmitting in the 14.0-14.5 GHz (Earth-to-space) frequency band, operating with Geostationary Satellites in the Fixed-Satellite Service.

(a) The following ongoing requirements govern all VMES licensees and operations in the 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) and 14.0-14.5 GHz (Earth-to-space) frequency bands receiving from and transmitting to geostationary orbit satellites in the fixed-satellite service. VMES licensees shall comply with the requirements in either paragraph (a)(1), (a)(2) or (a)(3) of this section and all of the requirements set forth in paragraphs (a)(4)-(a)(9) and paragraphs (c), (d), and (e) of this section. Paragraph (b) of this section identifies items that shall be included in the application for VMES operations to demonstrate that these ongoing requirements will be met.

(1) The following requirements shall apply to a VMES that uses transmitters with off-axis EIRP spectral-densities lower than or equal to the levels in paragraph (a)(1)(i) of this subsection. A VMES, or VMES system, operating under this subsection shall provide a detailed demonstration as described in paragraph (b)(1) of this section. The VMES transmitter also shall comply with the antenna pointing and cessation of emission requirements in paragraphs (a)(1)(ii) and (a)(1)(iii) of this subsection.

(i) A VMES system shall not exceed the off-axis EIRP spectral-density limits and conditions defined in paragraphs (a)(1)(A)-(D) of this subsection.

(A) The off-axis EIRP spectral-density emitted from the VMES, in the plane of the geostationary satellite orbit (GSO) as it appears at the particular earth station location, shall not exceed the following values:

15 - 10log(N) - 25logθ	dBW/4 kHz	for	1.5° ≤ θ ≤ 7°
-6 - 10log(N)	dBW/4 kHz	for	7° < θ ≤ 9.2°
18 - 10log(N) - 25logθ	dBW/4 kHz	for	9.2° < θ ≤ 48°
-24 - 10log(N)	dBW/4 kHz	for	48° < θ ≤ 85°
-14 - 10log(N)	dBW/4 kHz	for	85° < θ ≤ 180°

where theta (θ) is the angle in degrees from the line connecting the focal point of the antenna to the orbital location of the target satellite, the plane of the GSO is determined by the focal point of the antenna and the line tangent to the arc of the GSO at the orbital location of the target satellite. For VMES networks using frequency division multiple access (FDMA) or time division multiple access (TDMA) techniques, N is equal to one. For VMES networks using multiple co-frequency transmitters that have the same EIRP, N is the maximum expected

number of co-frequency simultaneously transmitting VMES earth stations in the same satellite receiving beam. For the purpose of this subsection, the peak EIRP of an individual sidelobe shall not exceed the envelope defined above for θ between 1.5° and 7.0° . For θ greater than 7.0° , the envelope shall be exceeded by no more than 10% of the sidelobes, provided no individual sidelobe exceeds the envelope given above by more than 3 dB.

(B) In all directions other than along the GSO, the off-axis EIRP spectral-density for co-polarized signals emitted from the VMES shall not exceed the following values:

$18 - 10\log(N) - 25\log\theta$	dBW/4 kHz	for	$3.0^\circ \leq \theta \leq 48^\circ$
$-24 - 10\log(N)$	dBW/4 kHz	for	$48^\circ < \theta \leq 85^\circ$
$-14 - 10\log(N)$	dBW/4kHz	for	$85^\circ < \theta \leq 180^\circ$

where θ and N are defined in (a)(1)(i)(A). This off-axis EIRP spectral-density applies in any plane that includes the line connecting the focal point of the antenna to the orbital location of the target satellite with the exception of the plane of the GSO as defined in paragraph (a)(1)(i)(A) of this section. For the purpose of this subsection, the envelope shall be exceeded by no more than 10% of the sidelobes provided no individual sidelobe exceeds the gain envelope given above by more than 6 dB. The region of the main reflector spillover energy is to be interpreted as a single lobe and shall not exceed the envelope by more than 6 dB.

(C) In all directions, the off-axis EIRP spectral-density for cross-polarized signals emitted from the VMES shall not exceed the following values:

$5 - 10\log(N) - 25\log\theta$	dBW/4 kHz	for	$1.8^\circ \leq \theta \leq 7.0^\circ$
$-16 - 10\log(N)$	dBW/4 kHz	for	$7.0^\circ < \theta \leq 9.2^\circ$

where θ and N are defined as set forth in paragraph (a)(1)(i)(A) of this section. This EIRP spectral-density applies in any plane that includes the line connecting the focal point of the antenna to the target satellite.

(D) For non-circular VMES antennas, the major axis of the antenna shall be aligned with the tangent to the arc of the GSO at the orbital location of the target satellite, to the extent required to meet the specified off-axis EIRP spectral-density criteria.

(ii) Each VMES transmitter shall meet one of the following antenna pointing requirements:

(A) Each VMES transmitter shall maintain a pointing error of less than or equal to 0.2° between the orbital location of the target satellite and the axis of the main lobe of the VMES antenna, or

(B) Each VMES transmitter shall declare a maximum antenna pointing error that may be greater than 0.2° provided that the VMES does not exceed the off-axis EIRP spectral-density limits in paragraph (a)(1)(i) of this section, taking into account the antenna pointing error.

(iii) Each VMES transmitter shall meet one of the following cessation of emission requirements:

(A) For VMESs operating under paragraph (a)(1)(ii)(A) of this section, all emissions from the VMES shall automatically cease within 100 milliseconds if the angle between the orbital location of the target satellite and the axis of the main lobe of the VMES antenna exceeds 0.5° , and transmission shall not resume until such angle is less than or equal to 0.2° , or

(B) For VMES transmitters operating under paragraph (a)(1)(ii)(B) of this section, all emissions from the VMES shall automatically cease within 100 milliseconds if the angle between the orbital location of the target satellite and the axis of the main lobe of the VMES antenna exceeds the declared maximum antenna pointing error and shall not resume transmissions until such angle is less than or equal to the declared maximum antenna pointing error.

(2) The following requirements shall apply to a VMES that uses off-axis EIRP spectral-densities in excess of the levels in paragraph (a)(1)(i) of this section. A VMES, or VMES system, operating under this subsection shall file certifications and provide a detailed demonstration as described in paragraph (b)(2) of this section.

(i) The VMES shall transmit only to the target satellite system(s) referred to in the certifications required by paragraph (b)(2) of this section.

(ii) If a good faith agreement cannot be reached between the target satellite operator and the operator of a future satellite that is located within 6 degrees longitude of the target satellite, the VMES operator shall accept the power-density levels that would accommodate that adjacent satellite.

(iii) The VMES shall operate in accordance with the off-axis EIRP spectral-densities that the VMES supplied to the target satellite operator in order to obtain the certifications listed in paragraph (b)(2) of this section. The VMES shall automatically cease emissions within 100 milliseconds if the VMES transmitter exceeds the off-axis EIRP spectral-densities supplied to the target satellite operator.

(3) The following requirements shall apply to a VMES system that uses variable power-density control of individual simultaneously transmitting co-frequency VMES earth stations in the same satellite receiving beam. A VMES system operating under this subsection shall file certifications and provide a detailed demonstration as described in paragraph (b)(3) of this section.

(i) Except as defined under subsection (a)(3)(ii) below, the effective aggregate EIRP-density from all terminals shall be at least 1 dB below the off-axis EIRP-density limits defined in (a)(1)(i)(A)-(C). In this context the term "effective" means that the resultant co-polarized and cross-polarized EIRP-density experienced by any GSO or non-GSO

satellite shall not exceed that produced by a single VMES transmitter operating 1 dB below the limits defined in (a)(1)(i)(A)-(C). A VMES system operating under this subsection shall file certifications and provide a detailed demonstration as described in paragraphs (b)(3)(i) and (b)(3)(iii) of this section.

(ii) The following requirements shall apply to a VMES that uses off-axis EIRP spectral-densities in excess of the levels in paragraph (a)(3)(i) of this section. A VMES system operating under this subsection shall file certifications and provide a detailed demonstration as described in paragraphs (b)(3)(ii) and (b)(3)(iii) of this section.

(A) If a good faith agreement cannot be reached between the target satellite operator and the operator of a future satellite that is located within 6 degrees longitude of the target satellite, the VMES shall operate at an EIRP-density defined in (a)(3)(i) of this section.

(B) The VMES shall operate in accordance with the off-axis EIRP spectral-densities that the VMES supplied to the target satellite operator in order to obtain the certifications listed in paragraph (b)(3)(ii) of this section. The individual VMES terminals shall automatically cease emissions within 100 milliseconds if the VMES transmitter exceeds the off-axis EIRP spectral-densities supplied to the target satellite operator. The overall system shall be capable of shutting off an individual transmitter or the entire system if the aggregate off-axis EIRP spectral-densities exceed those supplied to the target satellite operator.

(C) The VMES shall transmit only to the target satellite system(s) referred to in the certifications required by paragraph (b)(3) of this section.

(iii) The VMES shall file a report one year following license issuance detailing the effective aggregate EIRP-density levels resulting from its operation, in compliance with paragraph (b)(3)(iii) of this section.

(4) An applicant filing to operate a VMES terminal or system and planning to use a contention protocol shall certify that its contention protocol use will be reasonable.

(5) There shall be a point of contact in the United States, with phone number and address, available 24 hours a day, seven days a week, with authority and ability to cease all emissions from the VMESs.

(6) For each VMES transmitter, a record of the vehicle location (*i.e.*, latitude/longitude), transmit frequency, channel bandwidth and satellite used shall be time annotated and maintained for a period of not less than one (1) year. Records shall be recorded at time intervals no greater than every five (5) minutes while the VMES is transmitting. The VMES operator shall make this data available upon request to a coordinator, fixed system operator, fixed-satellite system operator, NTIA, or the Commission within 24 hours of the request.

(7) In the 10.95-11.2 GHz (space-to-Earth) and 11.45-11.7 GHz (space-to-Earth) frequency bands VMESs shall not claim protection from interference from any authorized terrestrial stations to which frequencies are either already assigned, or may be assigned in the future.

(8) A VMES terminal receiving in the 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth) and 11.7-12.2 GHz (space-to-Earth) bands shall receive protection from interference caused by space stations other than the target space station only to the degree to which harmful interference would not be expected to be caused to an earth station employing an antenna conforming to the referenced patterns defined in paragraphs (a) and (b) of section 25.209 and stationary at the location at which any interference occurred.

(9) Each VMES terminal shall automatically cease transmitting within 100 milliseconds upon loss of reception of the satellite downlink signal.

(b) Applications for VMES operation in the 14.0-14.5 GHz (Earth-to-space) band to GSO satellites in the fixed-satellite service shall include, in addition to the particulars of operation identified on Form 312, and associated Schedule B, the applicable technical demonstrations in paragraphs (b)(1), (b)(2) or (b)(3) and the documentation identified in paragraphs (b)(4) through (b)(8) of this section.

(1) A VMES applicant proposing to implement a transmitter under paragraph (a)(1) of this section shall demonstrate that the transmitter meets the off-axis EIRP spectral-density limits contained in paragraph (a)(1)(i) of this section. To provide this demonstration, the application shall include the tables described in paragraph (b)(1)(i) of this section or the certification described in paragraph (b)(1)(ii) of this section. The VMES applicant also shall provide the value N described in paragraph (a)(1)(i)(A) of this section. A VMES applicant proposing to implement a transmitter under paragraph (a)(1)(ii)(A) of this section shall provide the certifications identified in paragraph (b)(1)(iii) of this section. A VMES applicant proposing to implement a transmitter under paragraph (a)(1)(ii)(B) of this section shall provide the demonstrations identified in paragraph (b)(1)(iv) of this section.

(i) Any VMES applicant filing an application pursuant to paragraph (a)(1) of this section shall file three tables showing the off-axis EIRP level of the proposed earth station antenna in the direction of the plane of the GSO; the co-polarized EIRP in the elevation plane, that is, the plane perpendicular to the plane of the GSO; and cross-polarized EIRP. Each table shall provide the EIRP level at increments of 0.1° for angles between 0° and 10° off-axis, and at increments of 5° for angles between 10° and 180° off-axis.

(A) For purposes of the off-axis EIRP table in the plane of the GSO, the off-axis angle is the angle in degrees from the line connecting the focal point of the antenna to the orbital location of the target satellite, and the plane of the GSO is determined by the focal point of the antenna and the line tangent to the arc of the GSO at the orbital position of the target satellite.

(B) For purposes of the off-axis co-polarized EIRP table in the elevation plane, the off-axis angle is the angle in degrees from the line connecting the focal point of the antenna to the orbital location of the target satellite, and the elevation plane is defined as the plane perpendicular to the plane of the GSO defined in paragraph (b)(1)(i)(A) of this section.

(C) For purposes of the cross-polarized EIRP table, the off-axis angle is the angle in degrees from the line connecting the focal point of the antenna to the orbital location of the target satellite and the plane of the GSO as defined in paragraph (b)(1)(i)(A) of this section will be used.

(ii) A VMES applicant shall include a certification, in Schedule B, that the VMES antenna conforms to the gain pattern criteria of § 25.209(a) and (b), that, combined with the maximum input power density calculated from the EIRP density less the antenna gain, which is entered in Schedule B, demonstrates that the off-axis EIRP spectral density envelope set forth in paragraphs (a)(1)(i)(A) through (a)(1)(i)(C) of this section will be met under the assumption that the antenna is pointed at the target satellite.

(iii) A VMES applicant proposing to implement a transmitter under paragraph (a)(1)(ii)(A) of this section shall provide a certification from the equipment manufacturer stating that the antenna tracking system will maintain a pointing error of less than or equal to 0.2° between the orbital location of the target satellite and the axis of the main lobe of the VMES antenna and that the antenna tracking system is capable of ceasing emissions within 100 milliseconds if the angle between the orbital location of the target satellite and the axis of the main lobe of the VMES antenna exceeds 0.5°.

(iv) A VMES applicant proposing to implement a transmitter under paragraph (a)(1)(ii)(B) of this section shall:

(A) declare, in its application, a maximum antenna pointing error and demonstrate that the maximum antenna pointing error can be achieved without exceeding the off-axis EIRP spectral-density limits in paragraph (a)(1)(i) of this section; and

(B) demonstrate that the VMES transmitter can detect if the transmitter exceeds the declared maximum antenna pointing error and can cease transmission within 100 milliseconds if the angle between the orbital location of the target satellite and the axis of the main lobe of the VMES antenna exceeds the declared maximum antenna pointing error, and will not resume transmissions until the angle between the orbital location of the target satellite and the axis of the main lobe of the VMES antenna is less than or equal to the declared maximum antenna pointing error.

(2) A VMES applicant proposing to implement a transmitter under paragraph (a)(2) of this section and using off-axis EIRP spectral-densities in excess of the levels in paragraph (a)(1)(i) of this section shall provide the following certifications and demonstration as exhibits to its earth station application:

(i) A statement from the target satellite operator certifying that the proposed operation of the VMES has the potential to create harmful interference to satellite networks adjacent to the target satellite(s) that may be unacceptable.

(ii) A statement from the target satellite operator certifying that the power density levels that the VMES applicant provided to the target satellite operator are consistent with the existing coordination agreements between its satellite(s) and the adjacent satellite systems within 6° of orbital separation from its satellite(s).

(iii) A statement from the target satellite operator certifying that it will include the power-density levels of the VMES applicant in all future coordination agreements.

(iv) A demonstration from the VMES operator that the VMES system is capable of detecting and automatically ceasing emissions within 100 milliseconds when the transmitter exceeds the off-axis EIRP spectral-densities supplied to the target satellite operator.

(3) A VMES applicant proposing to implement a VMES system under paragraph (a)(3) of this section and using variable power-density control of individual simultaneously transmitting co-frequency VMES earth stations in the same satellite receiving beam shall provide the following certifications and demonstration as exhibits to its earth station application:

(i) The applicant shall make a detailed showing of the measures it intends to employ to maintain the effective aggregate EIRP-density from all simultaneously transmitting co-frequency terminals operating with the same satellite transponder at least 1 dB below the EIRP-density limits defined in paragraphs (a)(1)(i)(A)-(C) of this section. In this context the term "effective" means that the resultant co-polarized and cross-polarized EIRP-density experienced by any GSO or non-GSO satellite shall not exceed that produced by a single VMES transmitter operating at 1 dB below the limits defined in paragraphs (a)(1)(i)(A)-(C) of this section. The International Bureau will place this showing on Public Notice along with the application.

(ii) An applicant proposing to implement a VMES under (a)(3)(ii) of this section that uses off-axis EIRP spectral-densities in excess of the levels in paragraph (a)(3)(i) of this section shall provide the following certifications, demonstration and list of satellites as exhibits to its earth station application:

(A) A detailed showing of the measures the applicant intends to employ to maintain the effective aggregate EIRP-density from all simultaneously transmitting co-frequency terminals operating with the same satellite transponder at the EIRP-density limits supplied to the target satellite operator. The International Bureau will place this showing on Public Notice along with the application.

(B) A statement from the target satellite operator certifying that the proposed operation of the VMES has the potential to create harmful interference to satellite networks adjacent to the target satellite(s) that may be unacceptable.

(C) A statement from the target satellite operator certifying that the aggregate power density levels that the VMES applicant provided to the target satellite operator are consistent with the existing coordination agreements between its satellite(s) and the adjacent satellite systems within 6° of orbital separation from its satellite(s).

(D) A statement from the target satellite operator certifying that it will include the aggregate power-density levels of the VMES applicant in all future coordination agreements.

(E) A demonstration from the VMES operator that the VMES system is capable of detecting and automatically ceasing emissions within 100 milliseconds when an individual transmitter exceeds the off-axis EIRP spectral-densities supplied to the target satellite operator and that the overall system is capable of shutting off

an individual transmitter or the entire system if the aggregate off-axis EIRP spectral-densities exceed those supplied to the target satellite operator.

(F) An identification of the specific satellite or satellites with which the VMES system will operate.

(iii) The applicant shall acknowledge that it will maintain sufficient statistical and technical information on the individual terminals and overall system operation to file a detailed report, one year after license issuance, describing the effective aggregate EIRP-density levels resulting from the operation of the VMES system.

(4) There shall be an exhibit included with the application describing the geographic area(s) in which the VMESs will operate.

(5) Any VMES applicant filing for a VMES terminal or system and planning to use a contention protocol shall include in its application a certification that will comply with the requirements of paragraph (a)(4) of this section.

(6) The point of contact referred to in paragraph (a)(5) of this section shall be included in the application.

(7) Any VMES applicant filing for a VMES terminal or system shall include in its application a certification that will comply with the requirements of paragraph (a)(6) of this section.

(8) All VMES applicants shall submit a radio frequency hazard analysis determining via calculation, simulation, or field measurement whether VMES terminals, or classes of terminals, will produce power densities that will exceed the Commission's radio frequency exposure criteria. VMES applicants with VMES terminals that will exceed the guidelines in Section 1.1310 for radio frequency radiation exposure shall provide, with their environmental assessment, a plan for mitigation of radiation exposure to the extent required to meet those guidelines. All VMES licensees shall ensure installation of VMES terminals on vehicles by qualified installers who have an understanding of the antenna's radiation environment and the measures best suited to maximize protection of the general public and persons operating the vehicle and equipment. A VMES terminal exhibiting radiation exposure levels exceeding 1.0 mW/cm² in accessible areas, such as at the exterior surface of the radome, shall have a label attached to the surface of the terminal warning about the radiation hazard and shall include thereon a diagram showing the regions around the terminal where the radiation levels could exceed 1.0 mW/cm². All VMES licensees shall ensure that a VMES terminal ceases transmission upon encountering an obstruction that degrades the VMES downlink signal.

(c) (1) Operations of VMESs in the 14.0-14.2 GHz (Earth-to-space) frequency band within 125 kms of the NASA TDRSS facilities on Guam (latitude 13° 36' 55" N, longitude 144° 51' 22" E) or White Sands, New Mexico (latitude 32° 20' 59" N, longitude 106° 36' 31" W and latitude 32° 32' 40" N, longitude 106° 36' 48" W) are subject to coordination with the National Aeronautics and Space Administration (NASA) through the National Telecommunications and Information Administration (NTIA) Interdepartment Radio Advisory Committee (IRAC). Licensees shall notify the International Bureau once they have completed coordination. Upon receipt of such notification from a licensee, the International Bureau will issue a public notice stating that the licensee may commence operations within the coordination zone in 30 days if no party has opposed the operations.

(2) When NTIA seeks to provide similar protection to future TDRSS sites that have been coordinated through the IRAC Frequency Assignment Subcommittee process, NTIA will notify the Commission's International Bureau that the site is nearing operational status. Upon public notice from the International Bureau, all Ku-band VMES licensees shall cease operations in the 14.0-14.2 GHz band within 125 kms of the new TDRSS site until the licensees complete coordination with NTIA/IRAC for the new TDRSS facility. Licensees shall notify the International Bureau once they have completed coordination for the new TDRSS site. Upon receipt of such notification from a licensee, the International Bureau will issue a public notice stating that the licensee may commence operations within the coordination zone in 30 days if no party has opposed the operations. The VMES licensee then will be permitted to commence operations in the 14.0-14.2 GHz band within 125 kms of the new TDRSS site, subject to any operational constraints developed in the coordination process.

(d) (1) Operations of VMESs in the 14.47-14.5 GHz (Earth-to-space) frequency band in the vicinity of radio astronomy service (RAS) observatories observing in the 14.47-14.5 GHz band are subject to coordination with the National Science Foundation (NSF). The appropriate NSF contact point to initiate coordination is Electromagnetic Spectrum Manager, NSF, 4201 Wilson Blvd., Suite 1045, Arlington VA 22203, fax 703-292-9034, email esm@nsf.gov. Licensees shall notify the International Bureau once they have completed coordination. Upon receipt of the coordination agreement from a licensee, the International Bureau will issue a public notice stating that the licensee may commence operations within the coordination zone in 30 days if no party has opposed the operations.

(2) Table 1 provides a list of each applicable RAS site, its location, and the applicable coordination zone.

Table 1 Applicable Radio Astronomy Service (RAS) Facilities and Associated Coordination Distances.

Observatory	Latitude (North)	Longitude (West)	Radius (km) of Coordination Zone
Arecibo Observatory, Arecibo PR	18° 20' 37"	66° 45' 11"	Island of Puerto Rico
Green Bank WV	38° 25' 59"	79° 50' 23"	160
Very Large Array, near Socorro NM	34° 04' 44"	107° 37' 06"	160
Pisgah Astronomical Research Institute, Rosman NC	35° 11' 59"	82° 52' 19"	160
U of Michigan Radio Astronomy Observatory, Stinchfield Woods MI	42° 23' 56"	83° 56' 11"	160
Very Long Baseline Array (VLBA) stations:			
Owens Valley CA	37° 13' 54"	118° 16' 37"	160*
Mauna Kea HI	19° 48' 05"	155° 27' 20"	50
Brewster WA	48° 07' 52"	119° 41' 00"	
Kitt Peak AZ	31° 57' 23"	111° 36' 45"	
Pie Town NM	34° 18' 04"	108° 07' 09"	
Los Alamos NM	35° 46' 30"	106° 14' 44"	
Fort Davis TX	30° 38' 06"	103° 56' 41"	
North Liberty IA	41° 46' 17"	91° 34' 27"	

Hancock NH	42° 56' 01"	71° 59' 12"	
St. Croix VI	17° 45' 24"	64° 35' 01"	

* Owens Valley CA operates both a VLBA station and single-dish telescopes.

(3) When NTIA seeks to provide similar protection to future RAS sites that have been coordinated through the IRAC Frequency Assignment Subcommittee process, NTIA will notify the Commission's International Bureau that the site is nearing operational status. Upon public notice from the International Bureau, all Ku-band VMES licensees shall cease operations in the 14.47-14.5 GHz band within the relevant geographic zone (160 kms for single-dish radio observatories and Very Large Array antenna systems and 50 kms for Very Long Baseline Array antenna systems) of the new RAS site until the licensees complete coordination for the new RAS facility. Licensees shall notify the International Bureau once they have completed coordination for the new RAS site and shall submit the coordination agreement to the Commission. Upon receipt of such notification from a licensee, the International Bureau will issue a public notice stating that the licensee may commence operations within the coordination zone in 30 days if no party has opposed the operations. The VMES licensee then will be permitted to commence operations in the 14.47-14.5 GHz band within the relevant coordination distance around the new RAS site, subject to any operational constraints developed in the coordination process.

(e) VMES licensees shall use Global Positioning Satellite-related or other similar position location technology to ensure compliance with paragraphs (c) and (d) of this section.

APPENDIX C

Final Regulatory Flexibility Analysis

As required by the Regulatory Flexibility Act of 1980, as amended (RFA),¹ the Notice of Proposed Rulemaking (*NPRM*) in this proceeding, *Amendment of Parts 2 and 25 of the Commission's Rules to Allocate Spectrum and Adopt Service Rules and Procedures to Govern the Use of Vehicle-Mounted Earth Stations in Certain Frequency Bands Allocated to the Fixed-Satellite Service*, IB Docket No. 07-101, adopted on May 9, 2007 and released on May 15, 2007, incorporated an Initial Regulatory Flexibility Analysis (IRFA).² The Commission sought written public comment on the proposals in the *NPRM*, including comment on the IRFA. This present Final Regulatory Flexibility Analysis (FRFA) conforms to the RFA.³

A. Need for, and Objectives of, the Report and Order

The *NPRM* sought to promote innovative and flexible use of satellite technology to provide advanced communications capabilities from Vehicle-Mounted Earth Stations (VMES) that would operate as a licensed application of the Fixed-Satellite Service (FSS) in certain Ku-band frequencies within the United States. It sought comment and developed a record on the capability of VMES to meet the interference avoidance requirements of the Ku-band FSS.

The objective of the Report and Order is to adopt domestic U.S. allocation, service and licensing rules to permit the licensing of VMES in the conventional and extended Ku-band frequencies where such systems will meet the Commission's two-degree satellite spacing interference avoidance requirements of the Ku-band FSS. In this regard, the "conventional" Ku-band refers to frequencies in the 11.7-12.2 GHz (downlink) and 14.0-14.5 GHz (uplink) bands and the covered "extended Ku-band" includes the 10.95-11.2 GHz and 11.45-11.7 GHz (downlink) bands. The rules will permit VMES to operate as a primary application of the FSS in the conventional bands. In the extended band frequencies, VMES may be authorized to communicate with geostationary satellite orbit FSS space stations but must accept interference from stations of the Fixed Service (FS) operating in accordance with the Commission's rules. The rules promote spectrum sharing with certain secondary operations in the uplink bands, including government space research service and radio astronomy service stations.

B. Summary of Significant Issues Raised by Public Comments in Response to the IRFA

No parties filed comments that separately or specifically addressed the IRFA.

C. Description and Estimate of the Number of Small Entities to Which Rules Will Apply

¹ See 5 U.S.C. § 603. The Small Business Regulatory Enforcement Fairness Act of 1996, Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996) amended the RFA (see 5 U.S.C. § 601-612).

² See *NPRM*, 22 FCC Rcd 9649, 9701-9704 (2007).

³ See 5 U.S.C. § 604.

The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that may be affected by the rules adopted herein.⁴ The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."⁵ In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.⁶ A small business concern is one that: (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).⁷ Below, we further describe and estimate the number of small entity licensees that may be affected by the adopted rules.

Satellite Telecommunications and All Other Telecommunications. These two economic census categories address the satellite industry. The first category has a small business size standard of \$15 million or less in average annual receipts, under SBA rules.⁸ The second has a size standard of \$25 million or less in annual receipts.⁹ The most current Census Bureau data in this context, however, are from the (last) economic census of 2002, and we will use those figures to gauge the prevalence of small businesses in these categories.¹⁰

The category of Satellite Telecommunications "comprises establishments primarily engaged in providing telecommunications services to other establishments in the telecommunications and broadcasting industries by forwarding and receiving communications signals via a system of satellites or reselling satellite telecommunications."¹¹ For this category, Census Bureau data for 2002 show that there were a total of 371 firms that operated for the entire year.¹² Of this total, 307 firms had annual receipts of under \$10 million, and 26 firms had receipts of \$10 million to \$24,999,999.¹³ Consequently, we estimate that the majority of Satellite Telecommunications firms are small entities that might be affected by our action.

The second category of All Other Telecommunications comprises, *inter alia*, "establishments primarily engaged in providing specialized telecommunications services, such as satellite tracking, communications telemetry, and radar station operation. This industry also includes establishments primarily engaged in providing satellite terminal stations and associated facilities connected with one or

⁴ 5 U.S.C. § 604(a)(3).

⁵ 5 U.S.C. § 601(6).

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

⁷ Small Business Act, 15 U.S.C. § 632 (1996).

⁸ 13 C.F.R. § 121.201, NAICS code 517410.

⁹ 13 C.F.R. § 121.201, NAICS code 517919.

¹⁰ 13 C.F.R. § 121.201, NAICS codes 517410 and 517910 (2002).

¹¹ U.S. Census Bureau, 2007 NAICS Definitions, "517410 Satellite Telecommunications"; <http://www.census.gov/naics/2007/def/ND517410.HTM>.

¹² U.S. Census Bureau, 2002 Economic Census, Subject Series: Information, "Establishment and Firm Size (Including Legal Form of Organization)," Table 4, NAICS code 517410 (issued Nov. 2005).

¹³ *Id.* An additional 38 firms had annual receipts of \$25 million or more.

more terrestrial systems and capable of transmitting telecommunications to, and receiving telecommunications from, satellite systems.”¹⁴ For this category, Census Bureau data for 2002 show that there were a total of 332 firms that operated for the entire year.¹⁵ Of this total, 303 firms had annual receipts of under \$10 million and 15 firms had annual receipts of \$10 million to \$24,999,999.¹⁶ Consequently, we estimate that the majority of All Other Telecommunications firms are small entities that might be affected by our action.

Space Station Licensees (Geostationary). Commission records reveal that there are 20 space station licensees and operators in the Ku-band. We do not request or collect annual revenue information concerning such licensees and operators, and thus are unable to estimate the number of geostationary space station licensees and operators that would constitute a small business under the SBA definition cited above, or apply any rules providing special consideration for geostationary space station licensees and operators that are small businesses.

Fixed-Satellite Service Transmit/Receive Earth Stations. Currently there are approximately 2,879 operational fixed-satellite service transmit/receive earth stations authorized for use in the Ku-band. The Commission does not request or collect annual revenue information, and thus is unable to estimate the number of earth stations that would constitute a small business under the SBA definition.

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

The *NPRM* sought comment on whether to extend the current rules for Earth Stations on Vessels (ESVs) – an existing mobile application of the FSS – to VMES, a new mobile application of the FSS. The ESV rules, and the VMES rules adopted in the Report and Order, require satellite telecommunications operators to establish a database for tracking the location of VMES remote earth stations. This database will assist investigations of radio frequency interference claims. Application of the ESV rules to VMES requires VMES operators to name a point of contact to maintain information about location and frequencies used by VMES terminals. Such information will assist in investigating radio frequency interference claims. The Commission does not expect significant costs associated with these proposals. Therefore, we do not anticipate that the burden of compliance will be greater for smaller entities.

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

The RFA requires that, to the extent consistent with the objectives of applicable statutes, the analysis shall discuss significant alternatives such as: (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for

¹⁴ U.S. Census Bureau, 2007 NAICS Definitions, “517919 All Other Telecommunications”; <http://www.census.gov/naics/2007/def/ND517919.HTM#N517919>.

¹⁵ U.S. Census Bureau, 2002 Economic Census, Subject Series: Information, “Establishment and Firm Size (Including Legal Form of Organization),” Table 4, NAICS code 517910 (issued Nov. 2005).

¹⁶ *Id.* An additional 14 firms had annual receipts of \$25 million or more.

small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.¹⁷

This *NPRM* solicited comment on alternatives for more efficient processing of VMES applications and simplification of VMES procedures, for example, by migrating from non-conforming use licensing to a licensing method that would provide for licenses with terms of fifteen years. The *NPRM* also sought comment on streamlining the application process for VMES operations by permitting blanket licensing of multiple VMES terminals in a single application, as an alternative to requiring all VMES terminals to be licensed individually. In adopting blanket licensing with fifteen-year terms for conforming VMES terminals, the Report and Order simplifies the application process for VMES and establishes licensing terms consistent with other satellite-based services, such as ESV. Thus, adoption of the rules should reduce the costs associated with obtaining and maintaining authority to operate a VMES network.

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

None.

Report to Congress: The Commission will send a copy of the Report and Order, including this FRFA, in a report to be sent to Congress pursuant to the Congressional Review Act. In addition, the Commission will send a copy of the Report and Order, including this FRFA, to the Chief Counsel for Advocacy of the SBA. A copy of the Report and Order and FRFA (or summaries thereof) also will be published in the Federal Register.¹⁸

¹⁷ 5 U.S.C. § 603(c)(1), (c)(4).

¹⁸ See 5 U.S.C. § 604(b).